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FY2020 ENCINA COMPREHENSIVE ASSET MANAGEMENT PLAN (E-CAMP)

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Prepared for
Encina Wastewater Authority
6200 Avenida Encinas
Carlsbad, California 92011-1095

K/J Project No. 1844103*00

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Abbreviations and Acronyms List

AACE	Association for the Advancement of Cost Engineering
AB	Aeration Basin
AFRF	Alternative Fuels Receiving Facility
APCD	Air Pollution Control District
BMS	Building Management System
BOE	Basis of Estimate
CCBE	Chlorine Contact Basin Effluent
CCI	Construction Cost Index
CCT	Chlorine Contact Tanks
CCTV	Closed Caption Television
CEPT	Chemically Enhanced Primary Treatment
CGCM	Combined Generator Control Modules
CIP	Capital Improvement Projects
CMMS	Computerized Maintenance Management System
CMU	Concrete Masonry Unit
CO	Carbon Monoxide
CPS	Combined Pump Station
CWRF	Carlsbad Water Recycling Facility
DAFT	Dissolved Air Flotation Thickeners
DB	Design-Build
DBB	Design-Bid-Build
DBO	Design-Build-Operate
DBOO	Design-Build-Own-Operate
DPR	Direct Potable Reuse
E-CAMP	Encina Comprehensive Asset Management Plan
EI&C	Electrical, Instrumentation and Control
EMH	Electrical Manholes
ENR	Engineering News Record
EPS	Effluent Pump Station
EWA	Encina Wastewater Authority
EWPCF	Encina Water Pollution Control Facility
FCC	Flood Control Channel
FOG	Fats, Oils and Grease
FRP	Fiberglass Reinforced Plastic

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FY	Fiscal Year
H ₂ S	Hydrogen Sulfide
HH	Handholes
HVAC	Heating, Ventilation and Air-Conditioning
IP	Internet Protocol
IT	Information Technology
IPR	Indirect Potable Reuse
LFRS	Lateral Force-Resisting System
MAD	Mesophilic Anaerobic Digestion
MCC	Motor Control Center
MCP	Master Control Panel
MGD/mgd	Million Gallons per Day
NO _x	Nitrogen Oxides
O&M	Operations & Maintenance
OM	Operations Manual
ORF	Odor Reduction Facility
OSA	Outside Air Systems
OT	Operational Technology
PE	Primary Effluent
PLC	Programmable Logic Controller
PSB	Primary Sedimentation Basins
PVC	Polyvinyl Chloride
RAS	Return Activated Sludge
R-CAMP	Remote Comprehensive Asset Management Plan
RCP	Reinforced Concrete Pipe
R&D	Research and Development
RDT	Rotary Drum Thickeners
ROV	Remotely Operated Vehicle
R&R	Rehabilitation and Replacement
RSC	Reduced Sulfur Compound
SAN	Storage Area Network
SCADA	Supervisory Control and Data Acquisition
SDCWA	San Diego County Water Authority
SE	Secondary Effluent
SEEPS	Secondary Effluent Equalization Pump Station
SDPS	Storm Drainage Pump Station

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SLC	State Lands Commission
SRT	Solids Retention Time
TWAS	Thickened Waste Activated Sludge
UV	Ultraviolet
VAV	Variable Air Volume
VFD	Variable Frequency Drive
VOC	Volatile Organic Compounds
VRF	Variable Refrigerant Flow
WAS	Waste Activated Sludge

Executive Summary

ES.1 Introduction

Encina Wastewater Authority (EWA) is a public joint powers authority located in Carlsbad that provides wastewater treatment services to over 400,000 North San Diego County residents and industrial customers. EWA is owned by six member agencies which are: City of Carlsbad, City of Vista, City of Encinitas, Buena Sanitation District, Leucadia Wastewater District, and Vallecitos Water District.

The Encina Water Pollution Control Facility (EWPCF) was initially constructed in 1963 to treat wastewater from the cities of Carlsbad and Vista. Since its original design and construction, the EWPCF has undergone five major expansion phases with the latest (Phase V) completed in 2009. Current average dry weather flow capacity of the EWPCF is 40.5 million gallons per day (mgd) of liquid treatment and 43.3 mgd of solids treatment. Several rehabilitation projects have been completed since the Phase V expansion, but no increase in the capacities noted above was provided.

EWA strives to conduct sound planning to maintain reliable and cost-effective service, as well as to invest appropriately to fully fund the cost of service, including capital improvements. The Encina Comprehensive Asset Management Plan (E-CAMP) was established in 1993 as a planning tool to cost effectively manage assets over their full life cycle by planning and prioritizing condition assessments and asset rehabilitation and replacement (R&R) for the EWPCF. The focus of most projects identified for the EWPCF in the E-CAMP are safety, regulatory compliance, reliability, public and EWA impacts, energy or organizational related.

The E-CAMP identifies future expenditures for capital improvement projects (CIP) and then communicates the proposed improvements to the member agencies, their representatives, and EWA staff. This E-CAMP update includes recommendations for fiscal year (FY) 2020 through FY2025. Capital asset related to projects for EWA's remote facilities are identified in the Remote Comprehensive Asset Management Plan (R-CAMP) and are not evaluated in this E-CAMP.

The E-CAMP for the EWPCF is updated periodically prior to establishing the budget. While the E-CAMP is independent of the budgeting process, the information is leveraged in the budgeting process and providing direction for EWA staff.

ES.2 E-CAMP Process

The E-CAMP process includes five task elements: project identification and grouping; project evaluation; project cost estimating; project prioritization; and implementation schedule. A flow diagram of the EWA CIP development, including the E-CAMP process, is provided as Figure ES-1 with the E-CAMP task elements shown in blue.

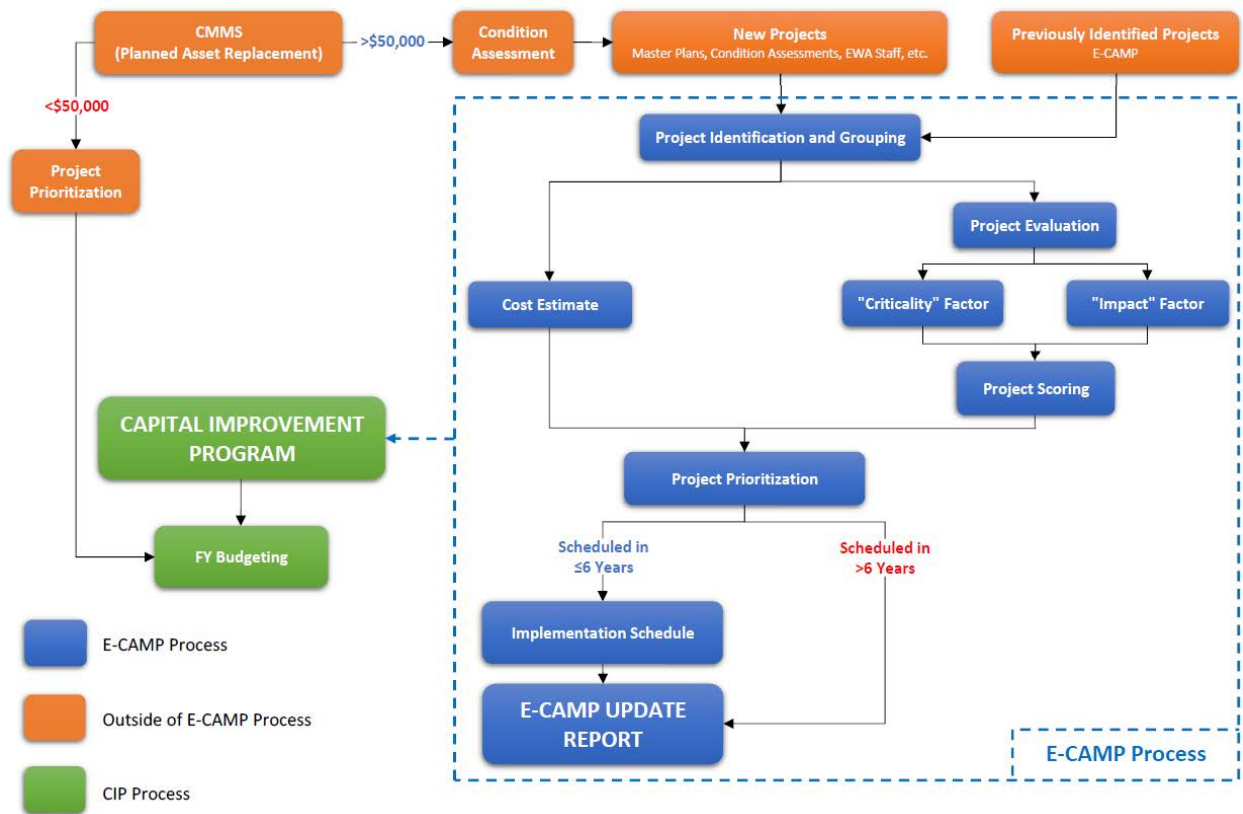


Figure ES-1: EWA CIP Development

Projects that are included in the E-CAMP are identified through a number of means including EWA's Computerized Maintenance Management System (CMMS), condition assessments, the previous E-CAMP update, EWA staff, studies and reports, and other engineering services performed for EWA. Projects may be grouped based on proximity, type of work, or priority to increase economic efficiency and reduce costs.

After the final list of E-CAMP projects is established, each project is evaluated using a set of six evaluation criteria: safety; regulatory compliance; reliability; impacts to the public and EWA; energy efficiency; and organizational efficiency. These evaluation criteria are assigned a criticality factor that represent the level of importance of each across all the projects. Each project is scored across each of the evaluation criteria and the sum of the six criteria scores is the evaluation score for each project.

Project cost estimates are developed for the full list of projects included in the E-CAMP. The project cost estimates include construction, condition assessment, study, design, engineering during construction, and construction management costs. Additionally, allowances for electrical, instrumentation and control (EI&C) during design and construction are included in the cost estimates.

All projects identified in the E-CAMP are prioritized by considering the evaluation scoring results and estimated costs. The project prioritization process provides EWA with informed condition

and cost data to select which projects to schedule for implementation over the next six fiscal years (through FY2025). A recommended implementation schedule is prepared and provides direction for upcoming capital improvements to be included in the budgeting process. Projects that are not selected for implementation over the next six fiscal years are not scheduled in the E-CAMP but are included for future reference.

ES.3 Condition Assessment Summary

Condition assessments are a key component of a strong asset management program. Regular condition assessments are conducted by EWA to reduce risks of disrupted service and provide sound budget allocations based on up-to-date facilities evaluations. Condition assessments are also triggered when an asset is within five years of its nominal service life or by staff observations of condition. When a condition assessment is completed, either the assessed service life is extended or a project is identified to replace or rehabilitate the asset. If identified for replacement or rehabilitation, the proposed work is incorporated into a project.

ES.4 Studies and Professional Services

Studies are completed to provide planning information for maintaining EWA facilities. Additional professional services include engineering services, research and development (R&D) services, air permitting, and other services. A more detailed description of the identified studies and professional services can be found in Section 4 of this report.

ES.5 Identification of E-CAMP Projects

As described in the E-CAMP process, the first step is to identify projects for consideration of implementation. Over 75 projects, and related studies, were identified through this process and more detailed information regarding these projects, including background, description, justification/consequences, and project delivery method can be found in Section 5 of this report. Projects are categorized into the following seven different categories related to the EWPCF:

1. Liquid Process
2. Outfall
3. Solids Process
4. Energy Management
5. General
6. Technology
7. *Reserved
8. Professional Services

ES.6 Project Evaluation

Projects in the E-CAMP are evaluated using a set of six evaluation criteria. These evaluation criteria are assigned a criticality factor from 1 to 6, with 1 representing the lowest level of importance and 6 representing the highest. Table ES-1 provides the six evaluation criteria and their assigned criticality factors.

Table ES-1: Evaluation Criteria

Evaluation Criteria	Criticality Factor
Safety	6
Regulatory Compliance	5
Reliability	4
Public and EWA Impacts	3
Energy Efficiency	2
Organizational Efficiency	1

Each project is assigned an impact factor across each of the six defined evaluation criteria from 0 to 5, with 0 representing the lowest impact and 5 representing the highest impact. The impact factors assigned to a project for each evaluation criteria are then multiplied by the criticality factor of the evaluation criteria to calculate criteria scores. The six criteria scores are then summed to determine the evaluation score for each project.

ES.7 Project Prioritization

Projects identified in the E-CAMP include those recommended for implementation in the next six fiscal years and potential future projects. Projects, studies, and professional services recommended for implementation over the next six fiscal years are identified in Table ES-2 along with a brief project description for each. A consequence of deferment for each project and study is also provided in the table. The consequence of deferment represents the area of impact, across the evaluation criteria, where not implementing the project, study, or professional service would have a negative effect.

Table ES-2: Overview of Projects Recommended for Implementation for FY2020 - FY2025 (continued)																		
Project Numbers and Titles		Project Description	Consequence of Deferment					Score	Cost									
			Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency		Organizational Efficiency	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total (FY20 - FY25)	≥FY2026	Total (All Years)
Liquid Process (1.X)																		\$ 33,200,000
P - 1.1.005	Primary Area Improvements	This project will rehabilitate the primary sedimentation basins, replace the existing bar screens, replace the existing belt conveyor, provide a new grit and screenings building extension and new washer compactors, replace the existing grit washing and dewatering system, and modify the existing odor control facilities.			X		X	NS	\$ 9,960,000	\$ 7,520,000	\$ -	\$ -	\$ -	\$ -	\$ 17,480,000	\$ -	\$ 17,480,000	
P - 1.2.009	PSB Mechanical Rehab - Short Term	This project will include mechanical rehabilitation and replacement of sludge collectors, scum skimmers, weirs, launders, and rotating mechanisms on the helical skimmers for Primary Sedimentation Basins 1 through 6.			X		X	25	\$ -	\$ -	\$ -	\$ -	\$ 1,960,000	\$ 1,960,000	\$ 3,910,000	\$ -	\$ 3,910,000	
P - 1.3.007	Secondary Clarifiers and Strainers Improvements	This project will include mechanical rehabilitation of secondary clarifiers 5, 6, and 8 as well as rehab the gates, spray and wash systems, and launder trough and support systems and weirs of secondary clarifiers 1 through 8. The auto strainers on the 3W, 3WL, and 3WHP plant water systems will be replaced.			X		X	NS	\$ 3,410,000	\$ 2,090,000	\$ -	\$ -	\$ -	\$ -	\$ 5,500,000	\$ -	\$ 5,500,000	
P - 1.3.018	AB Anaerobic Selector Zones	This project will provide baffles, anaerobic mixers, and other modifications needed to implement a true anaerobic selector. Two anaerobic selector zones will be installed in each of the three active aeration basins.						X	22	\$ -	\$ -	\$ 720,000	\$ 520,000	\$ -	\$ -	\$ 1,240,000	\$ -	\$ 1,240,000
P - 1.3.022	Outfall Flow Equalization Basin Settlement	This project will address settlement issues around the Secondaries Equalization Basin facilities. Existing backfill will be removed and replaced with suitable backfill material on the east, south, and west sides of the basin, and in situ compaction grouting of the existing backfill will be completed on the north side of the basin.	X	X	X			41	\$ 1,010,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,010,000	\$ -	\$ 1,010,000	
P - 1.4.002	Chlorine Building and EPS Improvements	This project will replace the Effluent Pump Station (EPS)/Chlorine Contact Tank (CCT) Motor Control Center (MCC) and conductors as well as the wiring and exposed conduit of the abandoned equipment. The chlorination building will be rehabbed to provide adequate secondary containment.	X		X			40	\$ -	\$ -	\$ 410,000	\$ 3,670,000	\$ -	\$ -	\$ 4,080,000	\$ -	\$ 4,080,000	
Outfall (2.X)																		\$ 1,600,000
P - 2.1.002	Ocean Outfall Maintenance and Inspection - External	This routine project will provide general overview inspection of the pipe exterior including ballast condition and assess the cathodic protection system. This project will also complete the recommendations provided in the inspection report which may include minor repair or debris removal.		X	X			NS	\$ 100,000	\$ -	\$ 100,000	\$ -	\$ 100,000	\$ -	\$ 310,000	\$ -	\$ 310,000	
P - 2.1.005	Ocean Outfall Bathymetric Survey - External	This routine project would complete a bathymetric survey of the exterior of the Ocean Outfall, which would provide an exact location of the outfall, and documentation of the pipeline and ballast material, and a bathymetric chart of the surrounding area.		X	X			NS	\$ -	\$ 110,000	\$ -	\$ -	\$ -	\$ -	\$ 110,000	\$ -	\$ 110,000	
P - 2.1.006	Ocean Outfall - Integrity Assessment	This routine project includes performing core sampling of the land outfall and sample analysis for an assessment of the structural integrity.		X	X			NS	\$ -	\$ 230,000	\$ -	\$ -	\$ -	\$ -	\$ 230,000	\$ -	\$ 230,000	
P - 2.1.007	84-inch Outfall Inspection - Internal	This routine project will inspect/assess the concrete of the 84-inch reinforced concrete pipe (RCP) outfall.		X	X			NS	\$ -	\$ 170,000	\$ -	\$ -	\$ 170,000	\$ -	\$ 340,000	\$ -	\$ 340,000	
P - 2.1.008	Secondary Effluent Land Outfall Improvements	This project will resurface the surge tower concrete and recoat the primary effluent (PE) and secondary effluent (SE) pipelines. This project will also resurface the 84-inch outfall concrete, seal joints, and remove corrosion.		X	X		X	44	\$ 570,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 570,000	\$ -	\$ 570,000	
Solids Process (3.X)																		\$ 68,300,000
P - 3.1.002	Solids Thickening Improvements	This project will replace the Dissolved Air Flotation Thickeners (DAFT) with Rotary Drum Thickeners, replace half the MCCs and conductors in the Dewatering Building, replace a section of thickened waste activated sludge (TWAS) piping, and construct an enclosure for the Dryer Building satellite laboratory.			X		X	NS	\$ 1,050,000	\$ 4,480,000	\$ 7,170,000	\$ 2,240,000	\$ -	\$ -	\$ 14,940,000	\$ -	\$ 14,940,000	
P - 3.2.013	Digester Rehabilitation and Improvements	This project will perform structural repairs/reinforcement, coating, and mixing system improvements to Digesters 4, 5, and 6. The heat exchangers for each digester will be replaced or rehabbed. This project will also add a second waste gas flare.	X	X	X		X	NS	\$ 7,080,000	\$ 7,670,000	\$ -	\$ -	\$ -	\$ -	\$ 14,750,000	\$ -	\$ 14,750,000	
P - 3.3.006	Second Dryer and Centrifuge Replacement	This project will install a second dryer and replace centrifuges with higher capacity units.		X	X		X	29	\$ -	\$ -	\$ -	\$ 5,020,000	\$ 13,140,000	\$ 13,140,000	\$ 31,300,000	\$ 7,340,000	\$ 38,640,000	

Table ES-2: Overview of Projects Recommended for Implementation for FY2020 - FY2025 (continued)																		
Project Numbers and Titles		Project Description	Consequence of Deferment					Score	Cost									
			Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency		Organizational Efficiency	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total (FY20 - FY25)	≥FY2026	Total (All Years)
Energy Management (4.X)																		\$ 12,700,000
P - 4.1.005	Cogen Engine Top-End Overhaul	This routine project will provide top-end overhaul services of the Cogen engines.		X	X		X		NS	\$ -	\$ 170,000	\$ 510,000	\$ 340,000	\$ 340,000	\$ -	\$ 1,350,000	\$ -	\$ 1,350,000
P - 4.1.006	Cogen Engine In-Frame Overhaul	This routine project will provide in-frame overhaul services of the Cogen engines.		X	X		X		NS	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 860,000	\$ 860,000	\$ -	\$ 860,000
P - 4.1.007	Cogen Engine Full Overhaul	This routine project will provide full overhaul services of the Cogen engines.		X	X		X		NS	\$ 1,010,000	\$ 1,010,000	\$ -	\$ -	\$ -	\$ -	\$ 2,020,000	\$ -	\$ 2,020,000
P - 4.1.015	Cogen Engine Catalyst System and Gas Conditioning Facilities	This project includes installation of the Cogen engine catalyst system for four engines and construction of an integrated gas conditioning system.					X	X	21	\$ -	\$ -	\$ -	\$ -	\$ 2,310,000	\$ 2,310,000	\$ 4,620,000	\$ -	\$ 4,620,000
P - 4.1.022	Turbo Blower Upgrade	This project will replace the existing three large blowers and one small blower with two new Turbo Blowers.					X	X	23	\$ -	\$ -	\$ -	\$ -	\$ 230,000	\$ 990,000	\$ 1,220,000	\$ 2,600,000	\$ 3,820,000
General (5.X)																		\$ 22,500,000
P - 5.1.001	ORF I System Rehabilitation	This project will rehabilitate the coating on Levels 1 and 2 of the odor reduction facility (ORF) 1 unit and perform maintenance coating on roof-top ductwork.			X	X			37	\$ 110,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 110,000	\$ -	\$ 110,000
P - 5.1.002	ORF Carbon Media Replacement	This routine project will replace the activated carbon in ORF I, II or III as part of on-going maintenance.			X	X			NS	\$ 200,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 710,000	\$ -	\$ 710,000
P - 5.1.014	New Treatment System at ORF II	The existing biotower, carbon adsorber, and fan located at ORF II will be demolished and replaced with a new carbon adsorber system.			X	X			27	\$ 130,000	\$ 500,000	\$ 2,840,000	\$ 2,840,000	\$ -	\$ -	\$ 6,310,000	\$ -	\$ 6,310,000
P - 5.2.006	Plant Water Functional Improvements	This project will provide a new 1W System distribution network and skid mounted centrifugal booster pumps.			X			X	18	\$ -	\$ -	\$ -	\$ 300,000	\$ 910,000	\$ -	\$ 1,220,000	\$ -	\$ 1,220,000
P - 5.2.012	Site Security Facilities	This project will develop a set of applicable security policies, procedures, and protocols; replace perimeter fencing; and repair and improve lighting systems.	X					X	26	\$ -	\$ -	\$ 220,000	\$ 220,000	\$ -	\$ -	\$ 440,000	\$ -	\$ 440,000
P - 5.2.019	Plant Landscaping	This project will assess the entire EWPCF and create sustainable landscaping and irrigation design guidelines for EWA's facilities transition to a sustainable, low-maintenance landscaped environment that is regionally appropriate, utilizes sustainable materials and construction practices, and conserves water resources.						X	17	\$ -	\$ -	\$ 190,000	\$ -	\$ -	\$ -	\$ 190,000	\$ -	\$ 190,000
P - 5.2.021	Climate Control at MCCs and Cogen Building	This project will improve MCC climate control through weather sealing to prevent coastal air infiltration, installation of corrosion protection coating, and insulation to minimize heat gains from outdoors.			X			X	40	\$ 400,000	\$ 400,000	\$ -	\$ -	\$ -	\$ -	\$ 800,000	\$ -	\$ 800,000
P - 5.2.032	Plant-Wide Asset Painting and Protective Coating	This routine project will provide painting and protective coating to all outside piping and equipment for asset corrosion control.			X			X	NS	\$ 160,000	\$ 160,000	\$ 160,000	\$ 160,000	\$ 160,000	\$ 160,000	\$ 930,000	\$ -	\$ 930,000
P - 5.2.035	Storm Drainage Pump Station Improvements	This project will make repairs to the wet well and bypass channel, discharge pipe thrust blocks and walkway slabs, discharge pipes, pumps, and gates.		X	X				41	\$ 160,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 160,000	\$ -	\$ 160,000
P - 5.2.037	2W System and Sand Filter Replacement	This project will resize the 2W system to accommodate a demand reduction, and will replace the filter media and recoat the piping, valves, and appurtenances of the 2W sand filter.			X			X	19	\$ -	\$ -	\$ -	\$ 280,000	\$ 840,000	\$ -	\$ 1,130,000	\$ -	\$ 1,130,000
P - 5.3.004	Admin Building Chiller Replacement	This project will supplement the Administration Building chiller with a new absorption chiller and hot water loop utilizing heat waste from the internal combustion (IC) engines hot water recovery system.			X			X	19	\$ 610,000	\$ 610,000	\$ -	\$ -	\$ -	\$ -	\$ 1,230,000	\$ -	\$ 1,230,000
P - 5.3.016	Cogen Wall Repair	This project will implement structural and mechanical repairs to the Cogen wall that has been damaged due to corrosion and water intrusion.	X		X				NS	\$ 1,480,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,480,000	\$ -	\$ 1,480,000
P - 5.4.005	Implement Minor Condition Assessment Recommendations	This routine project implements minor recommendations made during condition assessments on an ongoing basis.	X	X	X			X	NS	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 900,000	\$ -	\$ 900,000
P - 5.4.006	As-Needed Contractor Services	This routine project provides contractor services for needs that develop on an ongoing basis.	X	X	X	X	X	X	NS	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 6,000,000	\$ -	\$ 6,000,000
P - 5.4.007	Miscellaneous Building Rehabilitation	This routine project provides miscellaneous building rehabilitation and temporary facility services for needs that develop on an ongoing basis.	X		X			X	NS	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 900,000	\$ -	\$ 900,000

Table ES-2: Overview of Projects Recommended for Implementation for FY2020 - FY2025 (continued)																			
Project Numbers and Titles		Project Description	Consequence of Deferment						Score	Cost									
			Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency		FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total (FY20 - FY25)	≥FY2026	Total (All Years)	
Technology (6.X)																			\$ 13,600,000
P - 6.1.205	Network Improvements	This project will implement supervisory control and data acquisition (SCADA) system modifications and additions to the control room, primary server room, and secondary server room. Also included in this project is installation of a fiber-optic backbone loop.			X	X		X	NS	\$ 3,060,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,060,000	\$ -	\$ 3,060,000	
P - 6.1.206	Secondaries Electrical and Controls Improvements	This project will replace MCCs in the secondaries building and implement SCADA system modifications and additions.			X	X		X	20	\$ -	\$ -	\$ -	\$ -	\$ 1,410,000	\$ 940,000	\$ 2,340,000	\$ -	\$ 2,340,000	
P - 6.1.207	Cogen Electrical and Controls Improvements	This project will replace the electrical and automation systems that manage engine, distribution, grid sync, and ancillary equipment that serves Cogen.			X	X		X	16	\$ -	\$ -	\$ -	\$ -	\$ 2,000,000	\$ 2,000,000	\$ 4,000,000	\$ -	\$ 4,000,000	
P - 6.1.208	CPS/SEEPS Electrical and Controls Improvements	This project will replace MCCs in the secondaries building and implement SCADA system modifications and additions.			X	X		X	11	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,000,000	\$ 1,000,000	\$ 2,030,000	\$ 3,030,000	
P - 6.1.514	As-Needed Integration Services	This routine project provides integrator services for needs that develop on an ongoing basis.			X	X		X	NS	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 1,200,000	\$ -	\$ 1,200,000	
Professional Services (8.X)																			\$ 6,100,000
CA - 8.1.012-017	Asset Condition Assessments - EWPCF	This project provides condition assessment services on an ongoing basis.	X	X	X			X	NS	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 600,000	\$ -	\$ 600,000	
ES - 8.3.001	E-CAMP and R-CAMP Update	The E-CAMP provides a recommended project implementation schedule for the EWPCF for EWA to use in planning capital project improvements.	X	X	X	X		X	NS	\$ -	\$ 150,000	\$ -	\$ 150,000	\$ -	\$ 150,000	\$ 450,000	\$ -	\$ 450,000	
ES - 8.4.001	Extension of Staff Engineering Services	This routine project provides engineering services for needs that develop on an ongoing basis.						X	NS	\$ 650,000	\$ 650,000	\$ 650,000	\$ 650,000	\$ 650,000	\$ 650,000	\$ 3,900,000	\$ -	\$ 3,900,000	
ES - 8.4.002	Research and Development Projects Services	This routine project provides research and development (R&D) services associated with potential energy or resource recovery related facilities.		X		X	X		NS	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 600,000	\$ -	\$ 600,000	
ES - 8.4.010	Electronic Operations Manual and Document Management Updates	This routine project provides updates to the Operations Manual with the upgrades made to the EWPCF and to format the material into an electronic format.				X		X	NS	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 300,000	\$ -	\$ 300,000	
ES - 8.4.012	Air Permitting Assistance	This routine project provides air permitting services for needs that develop on an ongoing basis.		X		X			NS	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 150,000	\$ -	\$ 150,000	
S - 3.3.025	Existing Dryer Components Rehab and Interim Dryer Improvements	This study will study the heat dryer process to establish the assessed useful life of major process components. This study will also determine the feasibility and process modifications required to produce Class A and Class B biosolids and how to optimize the phasing of the existing and second heat dryer.			X	X		X	40	\$ 50,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 50,000	\$ -	\$ 50,000	
S-8.2.015	Potable Reuse Study	This study is to evaluate the most practical approach for implementation of a potable reuse program as regulations have developed and opportunities for collaboration with regional stakeholders are better understood.				X			NS	\$ 80,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 80,000	\$ -	\$ 80,000	
Totals										\$ 33,100,000	\$ 27,900,000	\$ 14,800,000	\$ 18,300,000	\$ 26,100,000	\$ 26,100,000	\$ 146,300,000	\$ 11,900,000	\$ 158,200,000	

1. Total project costs are rounded to the nearest ten thousand dollars.

2. Summaries of total project costs are rounded to the nearest hundred thousand dollars.

3. Costs shown in December 2018 dollars.

4. The E-CAMP is a living, dynamic document that is updated every two years and this table is updated as part of that process.

NS = Not Scored

ES.8 Recommended Project Implementation Schedule and Cost Summary

The recommended project implementation schedule is based upon the project evaluation process and prioritized projects presented in this E-CAMP. The capital improvement budgets for projects planned for execution over the next six years, FY2020 through FY2025, are summarized in Table ES-3 by category related to the EWPCF. A detailed project implementation schedule and cost summary of the capital improvement budgets planned over the next six years, on which Table ES-3 is based, are presented in Section 7 of this report. This information is leveraged in the budgeting process by EWA staff.

In addition, subsequent E-CAMPs will monitor and re-evaluate projects in and beyond the six year implementation schedule provided in this E-CAMP. Common themes of these projects that should continue to be evaluated and considered include:

- Rehabilitation and replacement
- Solids process improvements
- Improvements to impacts to the public and EWA (such as odor, sound, appearance, and traffic)
- Efficiency optimization
- Future regulatory and industry trends (such as water reuse)

Table ES-3: Overview of Recommended Implementation Schedule for Prioritized Projects (FY2020 - FY2025)

Project Category	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total FY2020-FY2025	≥FY2026	Total All Years
Liquid Process	\$ 14,400,000	\$ 9,600,000	\$ 1,100,000	\$ 4,200,000	\$ 2,000,000	\$ 2,000,000	\$ 33,200,000	\$ -	\$ 33,200,000
Outfall	\$ 700,000	\$ 500,000	\$ 100,000	\$ -	\$ 300,000	\$ -	\$ 1,600,000	\$ -	\$ 1,600,000
Solids Process	\$ 8,100,000	\$ 12,200,000	\$ 7,200,000	\$ 7,300,000	\$ 13,100,000	\$ 13,100,000	\$ 61,000,000	\$ 7,300,000	\$ 68,300,000
Energy Management	\$ 1,000,000	\$ 1,200,000	\$ 500,000	\$ 300,000	\$ 2,900,000	\$ 4,200,000	\$ 10,100,000	\$ 2,600,000	\$ 12,700,000
General	\$ 4,500,000	\$ 3,100,000	\$ 4,800,000	\$ 5,200,000	\$ 3,300,000	\$ 1,600,000	\$ 22,500,000	\$ -	\$ 22,500,000
Technology	\$ 3,300,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 3,600,000	\$ 4,100,000	\$ 11,600,000	\$ 2,000,000	\$ 13,600,000
Professional Services	\$ 1,100,000	\$ 1,100,000	\$ 900,000	\$ 1,100,000	\$ 900,000	\$ 1,100,000	\$ 6,100,000	\$ -	\$ 6,100,000
Total	\$ 33,100,000	\$ 27,900,000	\$ 14,800,000	\$ 18,300,000	\$ 26,100,000	\$ 26,100,000	\$ 146,300,000	\$ 11,900,000	\$ 158,200,000

Notes:

1. Costs in ≥FY2026 are projected future expenditures for prioritized projects identified in FY2020 through FY2025.
2. Costs are rounded to the nearest hundred thousand dollars.
3. Costs shown in December 2018 dollars.
4. Projected capital expenditures do not account for carry forward funds.

Section 1: Introduction

Encina Wastewater Authority (EWA) is a public joint powers authority located in the City of Carlsbad that provides wastewater treatment services to over 400,000 North San Diego County residents and industrial customers. EWA is owned by six member agencies which are: City of Carlsbad, City of Vista, City of Encinitas, Buena Sanitation District, Leucadia Wastewater District, and Vallecitos Water District.

1.1 Background

EWA was formed to operate and administer the Encina Water Pollution Control Facility (EWPCF) which is an award-winning secondary activated sludge type treatment facility. The EWPCF was initially constructed in 1963 to treat wastewater from the cities of Carlsbad and Vista. Since its original design and construction, the EWPCF has undergone five major expansion phases with the latest (Phase V) construction completed in 2009. Current average dry weather flow capacity of the EWPCF is 40.5 million gallons per day (mgd) of liquid treatment and 43.3 mgd of solids treatment. Several rehabilitation projects have been completed since the Phase V expansion, but no increase in the capacities noted above was provided.

1.2 Purpose

EWA strives to conduct sound planning to maintain reliable and cost-effective service, as well as to invest appropriately to fully fund the cost of service provided, including capital improvements. The Encina Comprehensive Asset Management Plan (E-CAMP) was established in 1993 as a planning tool to cost effectively manage assets over their full life cycle by planning and prioritizing condition assessments and asset rehabilitation and replacement (R&R) for the EWPCF. Member agencies have invested significant resources in the EWPCF, and EWA places a high importance on preserving asset reliability of the EWPCF while protecting the health and safety of workers and the public. The focus of most projects identified for the EWPCF in the E-CAMP are safety, regulatory compliance, reliability, public and EWA impacts, energy or organizational related.

The purpose of the E-CAMP is to develop a comprehensive and reliable planning tool to successfully address the EWPCF infrastructure needs and challenges. The E-CAMP and related documentation is updated to estimate asset service life remaining for major equipment and facilities at the EWPCF. This allows EWA to plan ongoing assessment and replacement of assets to realize full use of service life and to replace assets prior to the end of their assessed service life.

The E-CAMP provides a project implementation schedule and cost summary for the next six fiscal years (FY) (FY2020 through FY2025). The E-CAMP for the EWPCF is updated periodically prior to establishing the budget, and while the E-CAMP is independent of the budgeting process, the information is leveraged in the budgeting process and provides direction for EWA staff. The E-CAMP identifies future expenditures for capital improvement projects (CIP) and then communicates the proposed improvements to EWA staff, the member agencies, and their representatives. EWA staff then projects short and long-term future expenditures for CIP and communicates proposed improvements to the EWA Board of Directors.

In addition to the E-CAMP which is maintained for capital asset related projects for facilities at the EWPCF and the outfall, EWA maintains the Remote Comprehensive Asset Management Plan (R-CAMP) for capital asset projects related to remote facilities that are operated by EWA staff but not located at the EWPCF. Capital assets related to EWA's remote facilities are not evaluated in this E-CAMP.

Section 2: Encina Comprehensive Asset Management Plan Process

This section outlines EWA's approach and basic framework behind the E-CAMP process. The E-CAMP process incorporates project identification based on asset inventory and ongoing condition assessments and is updated prior to establishing the budget. While the E-CAMP is independent of the budgeting process, the information is leveraged in the budgeting process. The E-CAMP also helps establish capital rehabilitation project planning with consideration given to anticipated changes in regulatory compliance, cost-saving opportunities, available funding, and ongoing operations and maintenance (O&M) requirements of the EWPCF.

2.1 Process

The E-CAMP process includes five task elements which are as follows:

- Task Element 1 – Project Identification and Grouping
- Task Element 2 – Project Evaluation
- Task Element 3 – Project Cost Estimating
- Task Element 4 – Project Prioritization
- Task Element 5 – Implementation Schedule

A flow diagram of the EWA CIP development, including the E-CAMP process, is provided as Figure 2-1 with the E-CAMP task elements shown in blue. The following subsections provide detail on the five E-CAMP process task elements listed above.

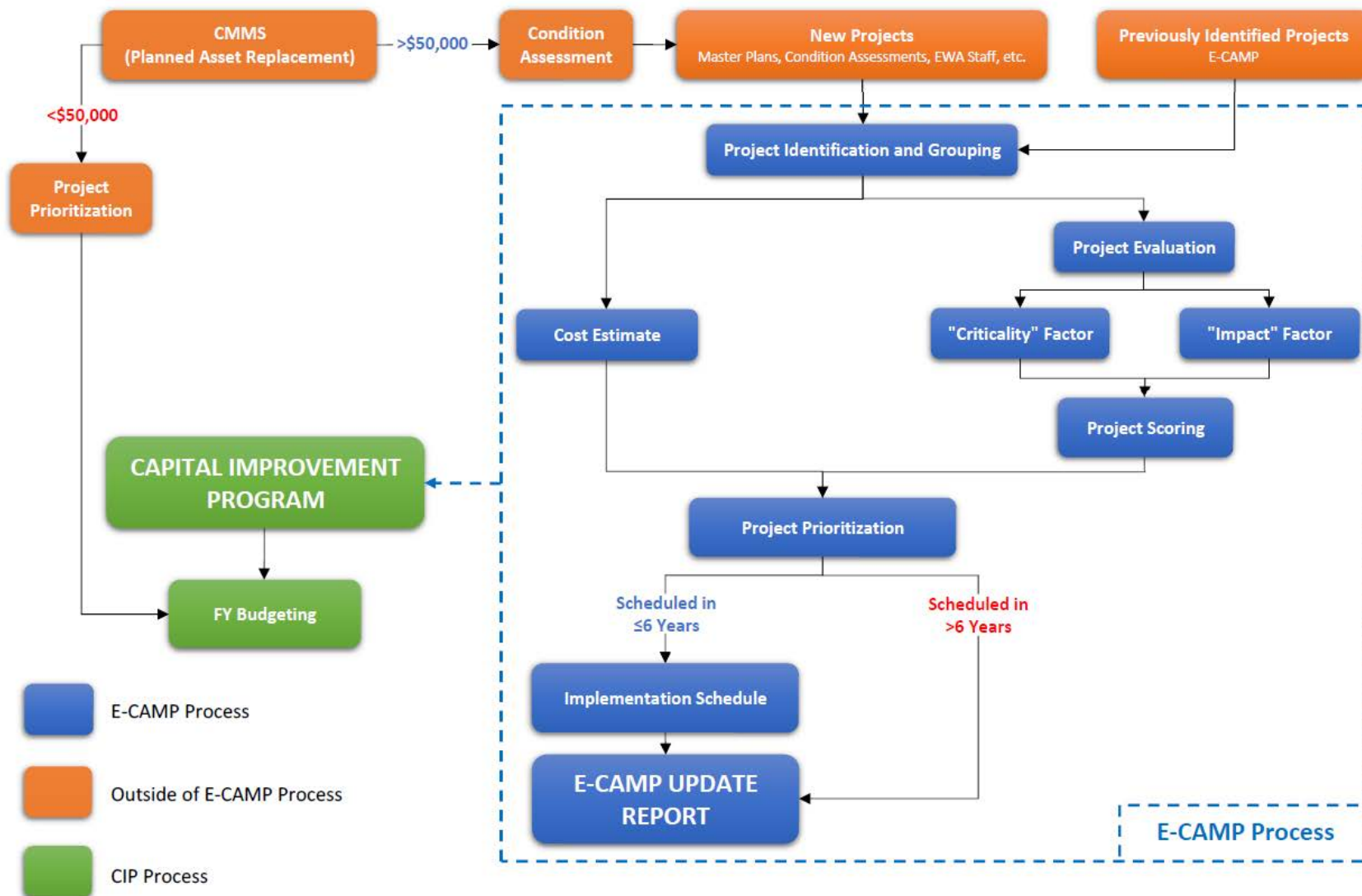


Figure 2-1: EWA CIP Development

2.1.1.1 Project Identification and Grouping

The first step of the E-CAMP process is identification and grouping of projects. Projects that are included in the E-CAMP are identified through a number of means including EWA's Computerized Maintenance Management System (CMMS), condition assessments, the previous E-CAMP, EWA staff, studies and reports, other engineering services performed for EWA, regulatory environment, and industry trends. This section will discuss the methods that are used to identify projects.

2.1.1.1 Computerized Maintenance Management System

EWA manages its assets through the CMMS eMaint by Fluke, which it recently transitioned to from Munis by Tyler Technologies. The General Services department tracks and establishes budgets for preventative maintenance activities which generally replace or upgrade minor assets through projects that have a value of less than \$50,000. Major assets that are replaced or upgraded through projects that have a value of \$50,000 or more are included in the E-CAMP. However, EWA staff may include select projects in the E-CAMP that would have otherwise been in the General Services department if those assets being replaced or upgraded are considered to be a high priority.

When the CMMS identifies an asset that is within approximately five years of the end of its nominal service life, a condition assessment will be triggered.

2.1.1.2 Condition Assessments

Condition assessments are a key component of a strong asset management program and provide a solid foundation for future decision making by providing up-to-date information that is used to confirm assumptions and identify new concerns and risks. Decisions leading to the R&R of assets rely on a clear understanding of the condition of its infrastructure and how it is performing. Poor or missing asset condition information could result in the inability to identify a potential failure of an asset which can have consequences that constitute a business risk or potential loss. This would leave EWA with limited options which could require the asset to be replaced reactively instead of proactively, usually the most expensive option.

By conducting regular condition assessments and monitoring asset performance, rehabilitation strategies can be defined and replacement schedules determined that can result in the lowest net-life capital and O&M costs. This allows EWA to better understand the remaining useful life of its assets, plan ongoing assessment efforts, and effectively manage assets and prioritize the replacement of assets to prioritize capital expenditures to maintain and replace assets to maximize the service life at the lowest overall cost. A condition assessment documents the current condition of the asset(s) being assessed and recommends one of the following when it is completed:

1. For assets with remaining useful life, the assessed service life can be extended assuming a cost-effective level of maintenance. The CMMS will be updated to reflect the new assessed service life.

2. For assets with a near-term end of useful life, a project is identified to replace or rehabilitate the asset. After the asset is replaced or rehabilitated, the CMMS will be updated to reflect the new asset information.

2.1.1.3 Previous Encina Comprehensive Asset Management Plan

The previous E-CAMP is used as another source to identify projects to include in the E-CAMP currently being prepared. The previous E-CAMP includes a recent, comprehensive list of projects that were formerly identified for the EWPCF. This list along with the recommendations of the previous E-CAMP, the outcome of the budgeting process since preparation of the previous E-CAMP, and EWA input is used to identify what previous E-CAMP projects should and shouldn't be included in the E-CAMP currently being prepared. The following summarizes which projects from the previous E-CAMP are either included or not included in the current E-CAMP:

Included

1. Projects that were not selected for implementation in either the previous E-CAMP or through EWA's budgeting process.
2. Projects that were selected for implementation in the previous E-CAMP but were only partially funded or were not completed or funded as recommended based on EWA's budgeting process.

Not Included

1. Projects that were selected for implementation in the previous E-CAMP and were completed or funded as recommended based on EWA's budgeting process.
2. Projects that were previously identified or recommended but not selected through EWA's budgeting process that EWA has since classified as projects that should not be included in the E-CAMP. EWA may choose to not include a project for reasons such as the project may not meet cost/benefit requirements, it has been determined it does not need to be completed, or it should be tracked and budgeted for by the General Services department.

2.1.1.4 Other Project Sources

In addition to the previous E-CAMP, CMMS, and recent condition assessments, other sources of information are sought, reviewed and evaluated for inclusion in the E-CAMP. Projects to be included in the E-CAMP may be identified from the following:

1. EWA Staff – Staff observations of the condition of an asset may trigger a condition assessment to be completed in advance of the CMMS triggering a condition assessment, which could result in the identification of a project. Additionally, EWA Staff are encouraged to provide input on potential process improvements that might require new assets.

2. Studies and Reports – EWA routinely has studies and reports completed including conceptual studies, special studies, and master plans. These studies and reports may recommend projects to be completed which could be incorporated into the E-CAMP.
3. Engineering Services – Professional engineering services are provided to EWA on an ongoing basis. Through these services, projects may be identified which could be incorporated into the E-CAMP.
4. Regulatory Environment – Changes to regulations or legislation may impact operations at the EWPCF. Based on these changes, projects may be identified which could be incorporated into the E-CAMP.
5. Industry Trends – Trends within the wastewater and water industry such as climate change, water reuse, and technology, may impact operations at the EWPCF. Projects may be identified based on these trends which could be incorporated into the E-CAMP.

2.1.1.5 Project Grouping

Grouping of E-CAMP projects occurs after all projects to be included in the E-CAMP have been identified. Where practical, projects may be grouped into a single project to increase economic efficiency and reduce costs. Projects can be grouped together based on several considerations including proximity of project locations, type of work, or priority of the projects to increase economic efficiency and reduce costs. After project grouping is completed, a final list of projects to be included in the E-CAMP is established.

2.1.1.6 Project Numbering System

Projects are given unique numbers that relate to the most appropriate plant category. Condition assessments, studies, updates, engineering services and other services are also numbered in accordance with the project numbering system. The numbering system consists of four segments as described below and depicted in Figure 2-2 using P-1.3.004 as an example. A summary of the project numbering system breakdown structure is presented in Table 2-1.

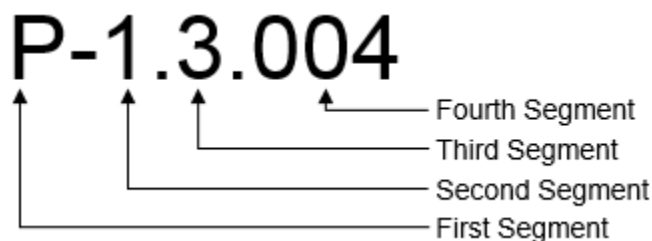


Figure 2-2: Project Numbering System Example

- The first segment is an alpha reference representing the phase of the improvement. In the example, the letter “P” designates that it is a capital construction or planned maintenance project. Other alpha abbreviations include: CA – Condition Assessment, S – Study, ES – Engineering Services, and OS – Other Services.

- The second segment is a one-digit number associated with the general category of the EWPCF. In the example, the number 1 represents that the project is in the “Liquid Process” category.
- The third segment is a one-digit number associated with a specific category or area of the EWPCF. In the example, the number 3 represents that the project is associated with “Secondary Treatment”.
- The fourth segment is a three-digit number that identifies the project within a specific category or area of the EWPCF. This number increases sequentially as projects are identified for each specific category.

Table 2-1: Project Numbering System

P-1: Liquid Process
P-1.1: Headworks
P-1.2: Primary Treatment
P-1.3: Secondary Treatment
P-1.4: Effluent
P-2: Outfall
P-2.1: Outfall
P-3: Solids Process
P-3.1: Biosolids Thickening
P-3.2: Biosolids Digestion
P-3.3: Biosolids Dewatering and Drying
P-4: Energy Management
P-4.1: Energy Management
P-5: General
P-5.1: Odor Control
P-5.2: Plant-Wide Systems
P-5.3: Buildings
P-5.4: Miscellaneous
P-6: Technology
P-6.1: Operations Technology
P-6.1.1 Special Studies
P-6.1.2 Enterprise SCADA
P-6.1.3 Information Driven
P-6.1.4 Operations Improvement
P-6.1.5 SCADA Asset Management
P-6.2: Business Technology
P-6.2.1 Technology and Data Governance
P-6.2.2 Business Management Enhancements
P-6.2.3 Regulatory Compliance
P-6.2.4 Asset Management
P-6.2.5 Capital Program Management
P-6.2.6 Document/Records Management
P-6.2.7 Information Technology Infrastructure
P-7: Reserved
P-8: Professional Services (not associated with specific projects)
CA-8.1: Condition Assessments
S-8.2: Studies and Updates
S-8.3: E-CAMP Updates
ES-8.4: Engineering Services
OS-8.5: Other Services
P-9: Remote Facility Improvements (refer to the R-CAMP)

2.1.2 Project Evaluation

After the final list of projects to be included in the E-CAMP is established, each project is individually evaluated using a set of six evaluation criteria: safety, regulatory compliance, reliability, impacts to the public and EWA, energy efficiency, and organizational efficiency. These evaluation criteria are assigned a criticality factor that represent the level of importance of

each across all the projects. The criticality factors stay with their corresponding evaluation criteria throughout the project evaluation process.

Each project is assigned an impact factor across each of the evaluation criteria which provides a relative comparison of each project's ability to satisfy each of the criteria. The impact factors assigned to a project for each evaluation criteria are multiplied by the criticality factor of each evaluation criteria to develop criteria scores. The sum of these six criteria scores is the evaluation score for each project. The criteria score calculation is illustrated below and the project evaluation process is discussed in further detail in Section 6 of this E-CAMP.

$$\text{Criteria Score} = \text{Criticality Factor} * \text{Impact Factor}$$

2.1.3 Project Cost Estimating

Project cost estimates are developed for the final list of projects included in the E-CAMP. The project cost estimates included in the E-CAMP include construction, condition assessment, study, design, engineering during construction, and construction management costs. These costs allow EWA to perform current and future budgetary planning as part of its CIP.

E-CAMP projects have varying levels of detail and some are more defined than others. Generally, the cost estimates are Class 4 planning level costs with a level of accuracy commensurate with levels developed by the AACE International which is provided in Table 2-2. As individual projects move forward with scope definition and design, the costs should be revisited and defined.

Table 2-2: Cost Estimate Classification Matrix for Process Industries

Estimate Class	<i>Primary Characteristic</i>	<i>Secondary Characteristic</i>		
	Maturity Level of Project Definition Deliverables Expressed as % of complete definition	End Usage Typical purpose of estimate	Methodology Typical estimating method	Expected Accuracy Range Typical variation in low and high ranges
Class 5	0% to 2%	Concept Screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study of feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

Source: AACE International Recommended Practices 18R-97.

Project costs estimates are developed through the following means:

1. Cost estimates for projects that were previously prepared outside of the E-CAMP, such as in studies, reports, or condition assessments, are incorporated into the E-CAMP.
2. Cost estimates for projects that were previously prepared as part of EWA's previous budgeting process are incorporated into the E-CAMP.
3. Cost estimates for projects that were previously prepared as part of earlier E-CAMPs are incorporated into the E-CAMP.
4. Cost estimates not previously developed are prepared and incorporated into the E-CAMP.

For cost estimates that were previously prepared, construction costs are adjusted based on Engineering News Record's (ENR) Construction Cost Index (CCI) for Los Angeles, California from the time the initial estimate was completed to when the cost estimates are updated as part of the E-CAMP. Cost estimates for this E-CAMP were updated to December 2018 (CCI 12011.85).

The baseline percentages for estimating construction costs are provided in Table 2-3. These percentages may be adjusted, at the discretion of the engineer/cost estimator, for each project if there is a greater amount of information known and detail available to better define the project. These percentages may also be adjusted if a previous cost estimate for the project was developed.

Table 2-3: Construction Cost Baseline Percentages

Description	Percentage
Contractor Overhead and Profit	27%
Shipping Rate	40% of the total is shipped at 15%
Sales Tax	50% of the total is taxed at 7.75%
Project Contingency	40%

Allowance amounts for additional project phase costs for condition assessments, studies, design, engineering during construction, construction management, and electrical, instrumentation and control (EI&C) are included in the cost estimates based upon percentages of construction costs. The baseline rates for estimating these project phase costs are provided in Table 2-4. These rates may be adjusted, or minimum costs may be used, at the discretion of the engineer/cost estimator, for each project. These rates may also be adjusted if a previous cost estimate for the project was developed. As detailed scoping of projects is defined and design level phases progress, these percentages should be revisited to review applicability of each cost and percentage.

Table 2-4: Project Phase Costs Baseline Rates

Project Phase	Rate	Contingency
Condition Assessment	1.5%	20%
Conceptual Study	2.5%	20%
Design	8.0%	15%
Engineering During Construction	4.5%	15%
Construction Management	5.5%	20%
El&C – Design	0 – 5%	--
El&C – Construction	0 – 5%	--

A Basis of Estimate (BOE) which provides additional costing assumptions and stipulations not summarized in this project cost estimating section is included as Appendix C. Cost estimates for the projects included in this E-CAMP are provided in Appendix D. Notes for each cost estimate provide additional information such as the source of the cost estimate and adjustments made in the percentages or rates.

EWA should implement sound project bidding practices to control project costs including pre-purchasing major assets to eliminate contractor mark-up, bid projects at a time of the year when the bidding climate is favorable, and design and bid similar projects together.

2.1.4 Project Prioritization

All projects identified in the E-CAMP are then prioritized by considering the evaluation scoring results and estimated costs. The scoring results directly relate to the impact that a project would have to EWA (a project with a higher score would have a higher impact). Through this comparison projects may be assigned to one of four categories; (1) low cost and high impact, (2) high cost and high impact, (3) low cost and low impact, and (4) high cost and low impact. The benefit of this approach is that it allows EWA to better identify both cost and impact when prioritizing projects. The project prioritization process is discussed in further detail in Section 6 of this E-CAMP.

2.1.5 Implementation Schedule

The project prioritization process described above provides EWA with informed condition and cost data to select which projects to schedule for implementation over the next six fiscal years (through FY2025). A recommended implementation schedule is provided in Section 7. Projects that are not selected for implementation over the next six fiscal years are not scheduled or cash flowed in the E-CAMP. The implementation schedule is discussed in further detail in Section 7 of this E-CAMP.

Section 3: Condition Assessment Summary

Regular condition assessments, like those undertaken by EWA, reduce risks of disrupted service and provide defensible budget allocation based on up-to-date facilities evaluations. Condition assessments are also triggered when the CMMS identifies an asset that is within approximately five years of the end of its nominal service life or by staff observations of condition. For major assets, professional assistance is normally utilized to conduct a formal condition assessment. When a condition assessment is completed, either the assessed service life is extended based on observation of estimated remaining service life assuming a cost-effective level of maintenance or a project is identified to replace or upgrade the asset. EWA manages its assets through its CMMS, eMaint, to which it recently transitioned from Munis. This E-CAMP details condition assessments scheduled to be completed for FY2020 and FY2021. The next update to the E-CAMP will provide regular condition assessments beyond FY2020 and FY2021.

3.1 Condition Assessments – FY2020

CA-8.1.012 FY2020 Assessments Triggered by Asset Age

This project will provide condition assessment of EWA assets with a nominal replacement date of FY2024. The following assets nearing the end of assessed service life will be replaced as part of projects or assessed as part of specific studies:

AHU-6691-000	AHU-Second Floor Supply Fan (Dewat)
F-8832-000	Fan-Foul Air Booster (ML Channel)
CHF-6921-000	CEPT Polymer Blending Unit, Dynablend (East)
CHF-6922-000	CEPT Polymer Blending Unit, Dynablend (West)
AHU-1610-000	Fan-Room, ORF, & Primary Gallery
FLT-0030-000	Filter-3WHP/2W Sandfilter
DU-2511-A00	Primary Sludge and Scum Collector 1
DU-2511-B00	Primary Sludge and Scum Collector 2
DU-2512-A00	Primary Sludge and Scum Collector 3
DU-2512-B00	Primary Sludge and Scum Collector 4
DU-2513-A00	Primary Sludge and Scum Collector 5
DU-2513-B00	Primary Sludge and Scum Collector 6
DU-2514-A00	Primary Sludge and Scum Collector 7
DU-2514-B00	Primary Sludge and Scum Collector 8
DU-2515-A00	Primary Sludge and Scum Collector 9
DU-2515-B00	Primary Sludge and Scum Collector 10
MME-2501-A00	Helical Scum Skimmer 1
MME-2501-B00	Helical Scum Skimmer 2
MME-2502-A00	Helical Scum Skimmer 3
MME-2502-B00	Helical Scum Skimmer 4
MME-2503-A00	Helical Scum Skimmer 5
MME-2503-B00	Helical Scum Skimmer 6
MME-2504-A00	Helical Scum Skimmer 7
MME-2504-B00	Helical Scum Skimmer 8
MME-2505-A00	Helical Scum Skimmer 9

MME-2505-B00	Helical Scum Skimmer 10
T-2401-000	Primary Sedimentation Tank 1
T-2402-000	Primary Sedimentation Tank 2
T-2403-000	Primary Sedimentation Tank 3
T-2404-000	Primary Sedimentation Tank 4
T-2405-000	Primary Sedimentation Tank 5
T-2406-000	Primary Sedimentation Tank 6
T-2407-000	Primary Sedimentation Tank 7
T-2408-000	Primary Sedimentation Tank 8
T-2409-000	Primary Sedimentation Tank 9
T-2410-000	Primary Sedimentation Tank 10
T-6910-000	Ferric Chloride Storage Tank
T-6920-000	CEPT Polymer Storage Tank

3.2 Condition Assessments – FY2021

CA-8.1.013 FY2021 Assessments Triggered by Asset Age

This project will provide condition assessment of EWA assets with a nominal replacement date of FY2025. The following assets nearing the end of assessed service life will be replaced as part of projects or assessed as part of specific studies:

E-8900-000	Emergency Standby Generator, Flow EQ
G-8900-000	Emergency Standby Generator, Flow EQ / 1000KW
CON-6203-000	Conveyor Screw #1 (North)
CON-6204-000	Conveyor Screw #2 (South)
Unknown	Foul Air Collection Piping Pipe
MME-3023-000	Chlorine Contact Tank Skimmer #1
MME-3024-000	Chlorine Contact Tank Skimmer #2

Section 4: Studies and Other Professional Services

4.1 Studies

Studies are completed to provide planning information for maintaining EWA facilities. A description of “Conceptual Studies” related to capital projects that have been prioritized to be funded in the near term are provided in subsection 4.1.1. In subsection 4.1.2, descriptions of “Special Studies” are provided which are studies addressing general EWA or plant-wide issues.

4.1.1 Conceptual Studies

Conceptual studies are designated with an “S” prefix and are numbered corresponding to their associated capital project. For some projects, the scope of work has been defined by staff and is included in the project write-up. For more complex projects, a conceptual study may be planned. A conceptual study may define options to meet project needs, include life-cycle cost analysis of options, and consider non-monetary factors. Descriptions of conceptual studies identified as part of this E-CAMP process are as follows:

S-1.3.020 Dewatering Wells in the Secondary Area

There are existing groundwater dewatering wells in the Secondary Area that are used to pump groundwater and lower its elevation. Lowering the groundwater is important to reduce the pressure on the Secondary Clarifier concrete structure. A condition assessment and structural evaluation of the tanks was previously done to identify the cause of the cracks in the Secondary Clarifier floors.

This study will look at the following:

- Installing new dewatering wells and groundwater pumps to uniformly dewater the Secondary Area and reduce the likelihood of differential settlement.
- Providing a basis for an improvement project to fix the existing cracks and minimize the potential for future cracks.
- Evaluate the existing groundwater pumping operation, including the impact of groundwater in the treatment process and condition of the existing system.
- A scope and capital cost estimate for improvements/repair of the tanks.
- Replacing or repairing groundwater relief valves to operate properly.

S-1.3.021 Return Activated Sludge Solids Deposition

The secondary treatment process includes aeration basins and secondary settlement. Primary effluent (PE) and mixed liquor are conveyed to the process areas via deep open channels that allow the liquids to move via gravity flow. The deep channels include air piping and diffusers to scour the liquid and keep solids in suspension. Over the years, the plant operations have relied less and less on the air scouring to the point that it is no longer used and the air piping may be broken and difficult to fix. There is concern that solids deposition has occurred and reduced the effective depth of the channels. There is also concern that the solids deposition has resulted in septicity and reduced water quality. The concerns have resulted in discussion on whether the

current channel depth is necessary or if the depth could be reduced to increase velocities and discourage solids deposition. This study will provide an investigation to determine a course of action for plant operations to either continue with the current operational strategy by replacing any broken piping, return to using the air scour practice, or reduce the channel depth. EWA may complete this study under ES-8.4.001 Extension of Staff Engineering Services depending on workload needs and if resources allow.

S-1.4.001 Effluent Pumps Improvements

With the installation of additional equalization storage in 2003, the capacity of the existing outfall and pumping equipment is expected to be adequate for the ultimate projected flows of 43.3 MGD.

Piping modifications were recommended in the November 2001 *Phase V Final Preliminary Design Report*, to raise the centerline elevation of the 60-inch discharge header from an elevation of 121.5 feet to 141.5 feet. This was proposed to eliminate the possibility of cavitation and vibration and force the pumps to operate closer to their best efficiency point while maintaining the overall capacity of the Effluent Pump Station (EPS).

However, EWA staff has not noted excessive wear as a result of cavitation or vibration. The effluent pumps are operated infrequently. EWA has identified that these pumps have been in service for a number of years and may be in need of an overhaul soon. EWA staff should monitor the pumps for excessive wear and assess the pumps to determine if they need to be overhauled. This study shall be re-prioritized, and be developed into a project, if the pump condition deteriorates or if it is determined the pumps need to be overhauled.



Figure 4-1: P-1.4.001, Final Effluent Pumps

S-3.3.025 Existing Dryer Components Rehab and Interim Dryer Improvements

The remaining useful life of the existing heat dryer components needs to be assessed to keep major components in working condition and mitigate preventable down time when components reach the end of their useful life. The heat dryer process will be studied to establish the assessed useful life of major process components such as the drum, pre-separator, induced draft fan and cyclone separator.

Additionally, the existing heat dryer is nearing capacity and a project for a second heat dryer has been identified. However, as the existing heat dryer reaches capacity, there will be an interim period when there will be excess solids beyond capacity for the existing heat dryer but not enough capacity to efficiently operate a second heat dryer. For this interim period, EWA will need to produce both Class A and Class B biosolids. The proposed study will determine the feasibility and process modifications required to produce Class A and Class B biosolids and how to optimize the phasing of the existing dryer replacement and the addition of a second heat dryer.

S-4.1.026 Cogen Generator Maintenance

Maintenance work required for the cogen engines is well established by EWA. However, the maintenance work that needs to be done for the generators for the cogen engines is not as well

defined. This study will identify maintenance work that needs to be done for the generators to promote their reliability, proper functioning, and useful service life. This study should also determine the remaining life expectancy of the generators.

S-4.1.027 Cogen Engine Room Ventilation

On hot days, overheating can occur in the Cogen Engine Room. It is assumed this is due to inadequate or improper air flow in the Cogen Engine Room that is exacerbated by hot weather. The proposed study will investigate air turnover, air exchange, and other contributing factors along with possible solutions.

S-5.2.026 Plant Waste Stream Rerouting

The EWPCF generates several waste or recycle streams, which are routed back through the treatment process. The recycling of these waste streams is common practice, but some of the process waste streams can cause treatment difficulties when they are recycled. The centrate is a high-strength waste stream, and the odor reduction facility drainage needs to be re-routed from the effluent pump station. EWA tried routing centrate to the primary influent which caused difficulties due to the dip in the pipeline ahead of the primaries where solids deposit and foam and then restrict flow. Routing the centrate to the PE channel was also investigated but this caused problems with the secondary treatment process.

The proposed study will evaluate waste stream rerouting. At a minimum the study will characterize the major plant waste streams (flow and loading) and evaluate routing alternatives and potential treatment options. Optimization of waste stream routing and treatment (if necessary) will help minimize process impacts from the waste streams and may improve overall treatment process performance. EWA may complete this study under ES-8.4.001 Extension of Staff Engineering Services depending on workload needs and if resources allow.

S-5.2.034 New Potable Water System

The EWPCF has potable water deficiencies including water quality issues and insufficient flow to emergency eye wash/shower stations. This study will consider alternatives to improve water quality by installing a looped potable water system with two distinct connections to the water main. The study should evaluate a new 1 or 2-inch looped potable water pipeline which services the Secondary Clarifier area. A new service connection to the City of Carlsbad will also be considered.

Also, the eye wash and emergency shower stations will be evaluated to verify if the supply configurations are in compliance with current regulations. EWA may complete this study under ES-8.4.001 Extension of Staff Engineering Services depending on workload needs and if resources allow.

S-5.3.015 Dewatering and Secondaries Building Assessment

Aging infrastructure in the Dewatering and Secondaries Buildings needs to be identified. The proposed study will assess the condition of the Dewatering and Secondaries Buildings and identify infrastructure approaching the end of its useful life. These buildings are the same, or near the same, age as the Headworks Building which has been identified to have a roof system that is in poor condition per the August 2018 Headworks Building Rooftop Assessment &

Solution. A similar assessment should be performed on the Dewatering and Secondaries Buildings to determine if repairs, rehabilitation, or replacement is required. EWA may complete this study under ES-8.4.001 Extension of Staff Engineering Services depending on workload needs and if resources allow.

4.1.2 Special Studies

Special studies focus on organizational or facility-wide planning needs. Special studies are also designated with an “S” prefix, similar to conceptual studies, but are numbered beginning with 8.2. Special studies don’t have an impending project associated with them. A description of each near-term special study identified as part of this E-CAMP is as follows.

S-8.2.015 Potable Reuse Study

Indirect potable reuse (IPR) and direct potable reuse (DPR) are becoming increasingly attractive to provide an additional local water supply and to better control the rising costs of imported water to San Diego County. Once the regulations are established and approved, DPR could potentially be implemented in a simpler and less expensive fashion than IPR, since there are no readily useable raw water reservoirs or groundwater basins in close proximity to the EWPCF. One potential concept for DPR is to blend the highly purified effluent from EWPCF with effluent from the Carlsbad Desalination Plant or use EWPCF’s secondary effluent as feed water to the Carlsbad Desalination Plant. IPR could also become feasible if direct connections to imported raw water pipelines were found to be feasible in the areas east of EWA. Both options would require close collaboration with a wide variety of stakeholders, including the San Diego County Water Authority (SDCWA), regional water districts, regional municipalities, the governing regulatory agencies, and several others.

This study will evaluate the most practical approach for implementation of a potable reuse program for EWA as the potable reuse regulations are developed and opportunities for collaboration with regional stakeholders are better understood. This study will also evaluate reverse osmosis brine disposal options (i.e. ocean discharge via outfall or another method) and identification of IPR and DPR permitting approaches based on the current understanding of the regulations.

S-8.2.019 EWA Public Response Plan

This plan will identify and document how to respond publicly to an odor event or similar public nuisance issue. This plan will identify the EWA staff person point of contact and will also develop general responses to frequently asked questions regarding EWA or the EWPCF, how to provide an appropriate social media response, methodology for tracking public complaints, and other options such as temporarily staffing a telephone hotline.

S-8.2.020 Energy and Emissions Strategic Plan Update

EWA focuses on increasing the production and use of self-generated energy with the goal of being energy independent. An Energy and Emissions Strategic Plan was prepared in 2011 to project energy usage, identify opportunities for energy demand reduction, identify technologies for increasing energy production, evaluate air emissions compliance in conjunction with production technologies, and recommend improvements that will work toward achieving

independence. The 2011 Strategic Plan will be updated to provide a current evaluation of energy use and emissions at the EWPCF.

4.2 Other Professional Services

Other professional services may include engineering services, legal services and other services such as materials testing, survey and geotechnical services.

4.2.1 Engineering Services

Projects that are identified as engineering services are completed to support the function and operation of the EWPCF by EWA.

ES-8.3.001 E-CAMP and R-CAMP Update

Every year the E-CAMP or R-CAMP is updated on an alternating basis. In some cases when significant changes are identified, an E-CAMP or R-CAMP update might be provided two years in a row. EWA managers solicit input from staff to determine needs that have surfaced since the previous update. New projects are defined, and projects are ranked and prioritized. Projects completed since the last E-CAMP or R-CAMP are also documented. A six-year implementation plan is recommended and presented for consideration during the budget process.

ES-8.4.001 Extension of Staff Engineering Services

This as-needed services contract is an annual contract for engineering services for needs that develop throughout the fiscal year.

ES-8.4.002 Research and Development Projects Services

Annual research and development (R&D) projects services includes research and development associated with potential energy or resource recovery related facilities. Examples would be alternative methods of gas utilization and other emerging technologies.

ES-8.4.010 Electronic Operations Manual and Document Management Updates

The goal of this annual service is to update the Operations Manual (OM) to incorporate the upgrades made to the EWPCF and to format the material into an electronic format. This service will also upload the updated documents into EWA's LaserFiche electronic document storage and retrieval system.

ES-8.4.012 Air Permitting Assistance

This is an annual service to provide air permitting assistance.

Section 5: Identification of E-CAMP Projects

This section provides an organized reference for E-CAMP projects that are recommended for funding in the next six years and beyond. Some projects that are included in E-CAMP have already been initiated but still require more funding, so they are still included in the E-CAMP. In general, more detail has been developed for the projects that are anticipated for implementation in near term. A more conceptual description is provided for projects currently planned for implementation beyond the next six years. Project descriptions for potential projects that have been identified include a project background, description, justification/consequences, and/or project delivery method. The project delivery methods considered in the E-CAMP include traditional design-bid-build (DBB) as well as alternative delivery methods including design-build (DB), design-build-operate (DBO), design-build-own-operate (DBOO), etc.

E-CAMP projects are developed based on completed condition assessments and facility needs assessments, asset age, or EWA staff observations since the preparation of the previous E-CAMP. Needs based on asset age are assessed through a condition assessment of the equipment, which determines the assessed service life remaining and considers the criticality of the equipment. Some staff observations result in a project with design criteria in which EWA reaches consensus during the E-CAMP process and these projects are added to the list. These projects include a design phase prior to the project implementation phase. Other observations require a special study to address an issue or concern that is identified, which will identify a specific E-CAMP project later.

As projects are fully funded or completed, the project descriptions are removed from this section and projects are listed by year implemented in Appendix A which provides projects completed from 1994 through the present. Projects may be removed from consideration for other reasons; for example, a project may be combined with a different project, or a project may not meet cost/benefit requirements and therefore be eliminated from consideration. A comprehensive list of past, current, future, and eliminated projects is provided in Appendix B.

5.1 Liquid Process

5.1.1 Headworks

P-1.1.005 Primary Area Improvements

Background

Rehabilitation of the Grit and Screenings Handling Facility and Primary Sedimentation Basin have been grouped into one project. The project is in design and scheduled for construction to start in calendar year 2019.

The primary treatment area of the EWPCF is an aging facility operating in a harsh and corrosive environment associated with the presence of hydrogen sulfide off-gassing typical of flow in the front end of a treatment plant. Some facilities such as the influent gates are no longer operable.



Figure 5-1: P-1.1.005, Bar Screen Conveyor

The existing grit and screen handling facilities were installed as part of the 1980 Phase III Expansion. Bar Screen No. 2 was replaced in 1998 and Bar Screen No. 4 was replaced in 2006. Components of Bar Screen No. 4 were also replaced in 2011 after they were damaged. In FY2012, the *Grit and Screenings Handling Study* was completed by Carollo Engineers which included a condition assessment of the facility. In addition to recommendations based on asset condition, the study evaluated alternative screenings removal and handling, grit removal and handling, and ventilation. The study also recommended additional evaluation of odor control requirements which is being studied separately.

Motor control center (MCC) equipment generates heat, and most buildings housing MCCs at the EWPCF are not equipped with climate control such as heating, ventilation, and air-conditioning (HVAC) units. Doors to the MCC buildings can be left open to provide cooling for the equipment and personnel working in the building. However, leaving the door open creates potential for intruders to enter and harm themselves and the facility. Open doors also expose equipment to dust, moisture, vermin, and corrosion which could shorten the life of equipment, particularly electronic equipment. This project will provide climate control on MCCs and other electronic facilities.

Description

Primary Sedimentation Basins

- Rehab concrete in primary sedimentation basins (PSB) Influent Channel and provide means of isolation for future inspection and maintenance.
- PSB Influent Gates – replace all 20 gates. Each gate seals an 18-inch diameter opening.
- PSB Structures – rehabilitate concrete beams and coating.
- Repair Baffle Walls.

Bar Screens and Grit and Screening Building

- Replace existing bar screens with new climber screens with 3/8-inch bar spacing in accordance with the recommendations from the *Grit and Screenings Handling Study*.
- Repair concrete and liner in the bar screen channels.
- Cover channel openings with plates.
- Replace existing belt conveyor with a new screenings sluice for screenings that would convey material to a new screening handling area located west of the building. Provide a diverter chute from each screen.
- Provide a Grit and Screenings Building extension immediately west of the existing Screening Building to house combined grit and screenings handling equipment and roll-off bin.
- Provide two new washer compactors to provide an intermediate level of washing.
- Modify the sloped floor in the existing bin area to match the screenings building floor to improve access.
- Relocate ferric injection for chemically enhanced primary treatment (CEPT) to grit tank influent channel to allow room for future instrumentation to monitor influent water quality.

Grit Washing and Dewatering

- Provide a system of two tri-cyclone classifiers to replace the existing grit washing and dewatering system.
- Demolish the existing mezzanine level since the new grit washing and dewatering equipment will be moved to the new Grit and Screening Building extension.

Odor Control

- Provide enclosures on screens and conveyor to contain odors.
- Modify exhaust ducts to draw off air from covered channels, below the deck level.
- Modify building ventilation system (supply and exhaust fans and ducts) to maintain negative pressure and draw exhaust from covered channels.
- Recommend reducing the air changes for the building from 33 air changes per hour to 15 air changes per hour as a result of changes in ventilation including higher air withdrawal from covered channels.
- Provide ventilation and odor control for the Grit and Screening Building extension. Overall approximately 7,900 cfm of additional odor treatment facilities is needed.

MCCs

Implement the MCC Climate Control recommendations of the 2017 HVAC Site Evaluation summarized below for the Primary/Screenings MCC room:

- Utilize redundant Variable Refrigerant Flow (VRF) systems at all MCC rooms.
- Coat equipment with an aftermarket corrosion protection coating.
- Supply HVAC equipment with Building Management System (BMS) controllers to communicate back to the HVAC front end server located in the administration building.
- Insulate MCC rooms to current code minimums to minimize heat gains from outdoors.
- Weather seal MCC rooms to prevent coastal air infiltration.

Justification/Consequences

Assets are in poor condition because of age and corrosive environment. Improved equipment is available to provide cleaner and dryer grit and screenings. Improvements will facilitate maintenance, provide operational flexibility, and reduce fugitive odors.

Climate control will maintain electronic equipment such as MCCs within design temperature range operating parameters to realize longer service life. Currently, doors are opened to cool the rooms. Maintaining doors closed will minimize exposure of equipment to dust and extend equipment service life. This project will reduce the potential for intruders to enter and cause harm to themselves, equipment or the treatment process.

Project Delivery

Design-Bid-Build

5.1.2 Primary Treatment

P-1.2.002 Primary Sludge Pumping Upgrades

Background

The PSBs are equipped with ten progressive cavity pumps with 125 gpm capacity each. Six of these pumps were installed during Phase III and four were installed during Phase IV. The plant, at times, is unable to maintain a low sludge blanket in the PSBs with all the pumps running continuously. As plant influent increases in the future, this constrained primary sludge pumping capacity will further impact operation.



Figure 5-2: P-1.2.002, Primary Sludge Pump Gallery

Improvements to the primary sludge pump control strategy to improve process performance were recommended in the 2016 Process Master Plan Technical Memorandum No. 4.

Currently:

- There is one dedicated pump for each basin.
- Pumps are controlled with timers for on/off sequencing.
- There is no pump control based on sludge blanket depth or hydraulic flow splitting in individual basins.
- Field staff must carefully monitor the PSB sludge blanket depth and manage the primary influent flow.

Description

- Modify or replace the ten sludge pumps to increase sludge pumping capacity and reliability.
- Update sludge blanket controls to include sludge blanket level meters and sludge density meters on the primary sludge pump discharge. Each basin will have a dedicated pump to control the sludge blanket level. When the pump turns on, it will pump solids into the basin until the sludge density meter measures the desired blanket depth.

Justification/Consequences

This project is required to adequately treat future flows and provide operator flexibility, redundancy, and improved treatment. The existing pumps will be replaced with a more functional model that has a lower life-cycle cost. Additionally, this project will help to maintain a shallow sludge blanket and evenly distribute sludge into each basin while improving level measurement and simplifying operation.

Project Delivery

Design-Bid-Build. Alternatively, EWA may choose to implement this project with P-3.1.002 Solids Thickening Improvements or under P-5.4.006 As-Needed Contractor Services if resources allow.

P-1.2.009 PSB Mechanical Rehab – Short Term

Background

Primary treatment at the EWPCF includes 10 PSBs outfitted with sludge and scum collectors and pumps, as well as chemical facilities to provide coagulation and flocculation for solids settling. The main purpose of primary treatment is to remove as many solids as possible, thereby reducing loadings to the secondary treatment process. One of EWA's main concerns is the age and condition of the PSBs and associated equipment. Previous reports and condition assessments have documented their condition and recommended a phased approach for repair and rehabilitation of the PSBs. Phase 1 and Phase 2 have been completed, and Phase 3 is broken into short-term mechanical (P-1.2.009), medium-term mechanical (P-1.2.013), and structural (P-1.2.014) projects based on accelerated deterioration of sedimentation tank drive mechanisms.

Description

This project will include mechanical rehabilitation of the PSBs that need to be rehabbed in the short-term based on the recommendations from the condition assessments, as outlined in the

2016 PMP, and items not completed in the previous phases. PSBs 1-6 are the oldest and are most in need of rehabilitation. Construction activities will include:

- Replace sludge collectors and scum skimmers.
- Sludge and scum collectors – replace equipment.
- Repair weirs, launders, and rotating mechanisms on the helical skimmers.
- Automate scum flow control.
- Evaluate mitigation options for elevation and scum skimming issue with PSB 5.

Justification/Consequences

Replacement and/or repairs recommended per the 2014 Condition Assessment by RMC.

Project Delivery

Design-Bid-Build

P-1.2.010 Primary Sedimentation Basins Scum and Centrate Pipeline Replacement

The scum and centrate pipeline replacement projects were grouped together due to the locations in the EWPCF.

Background

Primary scum is conveyed to the primary influent gallery through an 8-inch black steel/ductile iron glass-lined pipeline buried in the corridor between PSB 10 and PSB 1, parallel to several pipelines including 10-inch and 12-inch drain lines (Ph IV Sheet PM-1). Based on closed caption television (CCTV) of the drain line from MH-4, settlement in the area has caused a dip in the pipeline, and there is concern that the settlement may have impacted the scum pipeline.

Centrate and dissolved air flotation thickener (DAFT) drainage are conveyed through Manhole No. 4. Valving on the system can be configured to convey flow to the PE pipeline or the primary influent gallery. EWA conducted CCTV of the centrate pipeline to the primary influent gallery. It was observed that the pipeline dips as the CCTV submerged while moving along the alignment. It is assumed that there is settlement along the alignment and the impact to the centrate pipeline is unknown.

Description

This project includes excavation of the area with settling, re-compaction of material, and replacement of a section of the pipeline. An alternative to correction of the settled area and impact on pipelines is to reroute the pipelines.

Justification/Consequences

The primary scum pipeline is a one-of-a kind facility. If the scum cannot be removed from the process, it may impact the PE quality, increase loading on downstream facilities, cause odors and increase maintenance requirements.

Due to the proximity of the pipelines, it is logical to make repairs to the centrate pipeline at the same time as the primary scum pipeline. This project will provide more operational flexibility of centrate discharge.

Project Delivery

Design-Bid-Build. Alternatively, EWA may choose to implement this project under P-5.4.006 As-Needed Contractor Services if resources allow.

P-1.2.013 PSB Mechanical Rehab – Medium Term

Background

Primary treatment at the EWPCF includes 10 PSBs outfitted with sludge and scum collectors and pumps, as well as chemical facilities to provide coagulation and flocculation for solids settling. The main purpose of primary treatment is to remove as many solids as possible, thereby reducing loadings to the secondary treatment process. One of EWA's main concerns is the age and condition of the PSBs and associated equipment. Previous reports and condition assessments have documented their condition and recommended a phased approach for repair and rehabilitation of the PSBs. Phase 1 and Phase 2 have been completed, and Phase 3 is broken into short-term mechanical (P-1.2.009), medium-term mechanical (P-1.2.013), and structural (P-1.2.014) projects based on accelerated deterioration of sedimentation tank drive mechanisms.

Description

This project will include mechanical rehabilitation of the PSBs that need to be rehabbed in the medium-term (those not rehabbed in the short-term) based on the recommendations from the condition assessments, as outlined in the 2016 PMP, and items not completed in the previous phases. This project will include rehabilitation of PSBs 7-10. Construction activities will include:

- Replace sludge collectors and scum skimmers.
- Sludge and scum collectors – replace equipment.
- Repair weirs, launders, and rotating mechanisms on the helical skimmers
- Automate scum flow control.

Justification/Consequences

Replacement and/or repairs recommended per the 2014 Condition Assessment by RMC.

Project Delivery

Design-Bid-Build

P-1.2.014 PSB Structural Rehab

Background

Primary treatment at the EWPCF includes 10 PSBs outfitted with sludge and scum collectors and pumps, as well as chemical facilities to provide coagulation and flocculation for solids settling. The main purpose of primary treatment is to remove as many solids as possible, thereby reducing loadings to the secondary treatment process. One of EWA's main concerns is the age and condition of the PSBs and associated equipment. Previous reports and condition assessments have documented their condition and recommended a phased approach for repair and rehabilitation of the PSBs. Phase 1 and



Figure 5-3: P-1.2.014, Exterior Concrete at PSB #3

Phase 2 have been completed, and Phase 3 is broken into short-term mechanical (P-1.2.009), medium-term mechanical (P-1.2.013), and structural (P-1.2.014) projects based on accelerated deterioration of sedimentation tank drive mechanisms.

Description

This project will include structural rehabilitation of the PSBs based on the recommendations from the condition assessments, as outlined in the 2016 PMP, and items not completed in the previous phases. Construction activities will include:

- Repair and line PSB concrete.
- Repair cracks and provide additional structural support as needed.
- Resolve elevation and scum skimming issue on PSB 5

Justification/Consequences

Replacement and/or repairs are recommended per the 2014 Condition Assessment by RMC.

Project Delivery

Design-Bid-Build

5.1.3 Secondary Treatment

P-1.3.007 Secondary Clarifiers and Strainers Improvements

Projects related to rehabilitation, improvements, and condition assessment of the Secondary Clarifiers have been grouped together including two distinct items:

- Secondary Clarifiers 5, 6, and 8 Mechanical Rehab
- Secondary Clarifiers 1 – 8 Influent and Effluent Gate Rehab/Replacement

Additionally, this project will include replacement of the auto strainers on the 3W, 3WL, and 3WHP plant water systems.



Figure 5-4: P-1.3.007, Secondary Clarifier Nos. 5, 6, & 8 Corrosion

Background

Secondary Clarifier Nos. 5 and 6 were installed in 1992. The structures for Clarifier Nos. 7 and 8 were constructed as part of Phase IV and then used for secondary effluent equalization. In 2006 the mechanism was installed in Clarifier No. 8 so that it could function as a secondary clarifier while Clarifier No. 7 is used for equalization. The condition of the clarifier components was assessed during FY2011 and the mechanical equipment was found to be in corroded and worn. The collection equipment installed in Secondary Clarifier Nos. 5 and 6 is similar to the equipment installed in Secondary Clarifier Nos. 1 through 4. Replacement of Clarifier Nos. 1 through 4 equipment was completed during FY2011 and FY2012, and similar equipment replacement is anticipated for Secondary Clarifier Nos. 5, 6, and 8.

Secondary Clarifier Nos. 1, 2, 3, and 4 were built in 1984 and were rehabilitated during FY2011 and FY2012. The rehabilitation did not address the condition of the influent or the effluent gates. During the Secondary Effluent (SE) Conveyance System condition assessment, the influent and effluent gates were observed to leak and were unable to completely isolate the basins.

The existing strainers on the 3W, 3WL, and 3WHP systems are all in need of replacement.

Issues with conduit have been noted that result in general infiltration problems that result in moisture in the secondaries gallery area.

Description

Project work will include the following:

- Secondary Clarifiers Nos. 1 through 8:
 - Rehabilitation and replacement of influent and effluent gates.
 - Remove and replace all spray and wash systems as needed.
 - Repair, patch, or replace portions of launder trough and support system and weirs as needed.
- Secondary Clarifiers Nos. 5, 6, and 8 mechanical rehabilitation shall include, in addition to the above, the following:
 - Demolish and remove existing clarifier mechanism and appurtenances.
 - Install new clarifier mechanism including all support structures required for the installation of the clarifier mechanism.
 - Remove and replace anchor bolts to install new clarifier mechanism and perform concrete repair.
 - Remove and replace the sludge and scum collector.
 - Assess condition of the existing bridge and repair or replace as appropriate.
 - Remove and replace the drain gates.
- Replace strainers on 3W, 3WL, and 3WHP plant water systems with auto strainers of similar function.
- Assess the conduit moisture issues that have been identified, and repair or replace the conduit.

Justification/Consequences

The clarifier equipment is recommended for replacement based on a condition assessment which concluded that it is in poor condition. Mechanical or corrosion failure would reduce secondary treatment capacity and impact effluent quality. Further evaluation of the secondary clarifier cracking will assist EWA in identifying the most appropriate approach for rehabilitation and repair. The condition of the influent gates impacts the ability to remove the clarifiers from service for maintenance. The effluent gates allow isolation of the clarifiers from the SE conveyance system when the clarifiers are full. The existing strainers have been malfunctioning and are at the end of their useful life.

Project Delivery

Design-Bid-Build

P-1.3.008 SC 7 – Conversion from EQ to Clarifier

Background

There are eight existing secondary clarifier tanks; however, Secondary Clarifier No. 7 is currently not in operation. The tank currently does not have a return activated sludge (RAS) pump or a clarifier mechanism. The tank is currently being used for flow equalization. With completion of the new flow equalization facilities, this tank can be converted for process treatment use. However, operation of Secondary Clarifier No. 7 is currently not required to maintain plant rated capacity. This project will include installation of a new RAS pump and associated controls, new clarifier mechanism, launders, weirs and removal of the equalization pump. Modifications are also required to the Secondary Effluent Equalization Structure.



Figure 5-5: P-1.3.008, Secondary Clarifier No. 7 Tank

P-1.3.010 WAS Pipeline Replacement

Background

The exposed 8-inch waste activated sludge (WAS) pipeline on the south side of the storm channel is observed to have corrosion at fittings and along the pipeline. The condition of the buried piping is unknown, but there is concern given the corrosive characteristics of the soil on the plant site and EWPCF's history of extensive corrosion of buried ferrous pipe systems. The buried WAS piping on the north side of the channel was replaced during the Phase V Expansion Biosolids Facilities Construction (refer to Vol 4, sheet Y15A).

Description

Potholing is recommended to determine the condition of the existing buried piping. Buried ductile iron pipe is generally coated and may be encapsulated in polyethylene wrap.

- If the existing buried piping condition is good, this project should focus on the replacement of exposed fittings in poor condition, and repair and coating of exposed piping.
- If the buried piping is determined to be in poor condition, this project would complete WAS pipeline replacement of the piping across the bridge and from the bridge south to the WAS pumps. The WAS pipeline and alignment north of the bridge is anticipated to be impacted by the modification or replacement of the DAFT system under P-3.1.002 Solids Thickening Improvements due to the rotary drum thickeners (RDTs) location in the Dewatering Building. New sludge thickening equipment options are available that would require a smaller footprint, and the WAS pipeline alignment may change.



Figure 5-6: P-1.3.010, WAS Pipeline

Justification/Consequences

The WAS pipeline is aging, and the condition of buried piping is unknown. Other buried metallic piping at the EWPCF has deteriorated as a result of the corrosive soils on the site. Conveyance of WAS is required to maintain the secondary process in operation.

Project Delivery

Design-Bid-Build. Alternatively, EWA may choose to implement this project with P-3.1.002 Solids Thickening Improvements.

P-1.3.018 AB Anaerobic Selector Zones

Background

EWA has been operating the aeration basins in a quasi-anaerobic selector mode, by turning off the aeration air to the first zone of the aeration basins. As part of the Secondary Aeration Basin (AB) Rehabilitation Study completed in 2011, addition of anaerobic selector zones was recommended by adding stainless steel baffle walls. However, the walls were eventually removed from final design because of high cost and process performance suggested pseudo-selector zones were sufficient.

Description

This project will provide baffles, anaerobic mixers, and other modifications needed to implement a true anaerobic selector. Two anaerobic selector zones will be installed in each of the three active aeration basins. A selector zone is not needed in the fourth basin as it is reserved for flow equalization.



Figure 5-7: P-1.3.018, Example of Geomembrane Baffle

The design phase should include a study to evaluate baffle wall material [stainless steel vs. fiberglass reinforced plastic (FRP)].

Justification/Consequences

Anaerobic selectors will improve sludge settleability and maximize secondary clarifier capacity. These zones “selectively” grow microorganisms which have better settleability.

Project Delivery

Design-Bid-Build

P-1.3.019 Control Strategy Improvements

The 2016 Process Master Plan Technical Memorandum No. 5 recommended modifying the control strategy equation for solids retention time (SRT) in the secondary treatment. EWA has since broadened the interest in implementing other control strategy improvements throughout the plant and is currently working with Trussell Technologies to provide more automation throughout the plant. EWA will incorporate these recommendations into the process model to validate results and prioritize instrumental and control improvements. This effort will also identify critical gaps in the instrumentation. The recommendations will be distributed into existing capital projects.

P-1.3.020 Dewatering Wells in the Secondary Area

This project has currently been identified as a study. Information on this study can be found in Section 4.

P-1.3.021 Return Activated Sludge Solids Deposition

This project has currently been identified as a study. Information on this study can be found in Section 4.

P-1.3.022 Outfall Flow Equalization Basin Settlement

Background

The Outfall Flow Equalization Basin (Basin), constructed in 2004, provides flow equalization for the combined water pump station on the northern edge of the recycled water storage compartment and receives flow from the chlorine contact basin's discharge at the Carlsbad Water Recycling Facility (CWRF). EWA also uses the Basin as a holding tank to send secondary effluent flow to the EWPCF. The Basin is comprised of two rectangular basins, the east and west basins, each designed to hold 4 million gallons. The west basin is used for recycled water storage and the east basin is used for secondary effluent storage.

Several concrete pads and the asphalt paving around the Basin have issues with settlement, raising concerns over the Basin's integrity which were documented in 2008. In 2012 the leaking buried recycled water service line was abandoned in place and rerouted above ground along the perimeter wall with pipe supports. Due to continued settlement, in 2017 Carollo Engineers completed a condition assessment of the Basin and provided recommendations; refer to the April 2017 *Effluent Equalization Facility Settlement Investigation and Recommendation* report by Carollo.

Description

Settlement remediation for the north side of the Basin is recommended to be in situ compaction grouting of the existing backfill where utilities are numerous and can remain in service.

Settlement remediation of the east, south and west sides of the Basin includes:

- Remove the existing backfill to a depth of 10 feet.
- Install an 18-inch thick gravel layer.
- Install three layers of geogrid separated with 12 inches of imported suitable backfill material.
- Final backfill layer extending approximately 5 feet up to AC base course.

Other repairs due to settlement and recommendations from the condition assessment include:

- Replace the recycled water return piping concrete pad.
- Repair the Recycled Water Pump Station Switchboard C.
- Repair capstone at the concrete masonry unit (CMU) east perimeter wall.
- Burn back and grout reinforcing steel at the south wall of the feed well in the east basin.
- Repair exposed and corroding reinforcing at the south wall of the west basin.
- Replace expansion joint sealant in the west basin at the east-west expansion joint where it crosses the trench drain.
- Repair stainless steel wall thimbles at the air gap and feed well.
- Recoat recycled water pump columns at the recycled water pump station sump.
- Replace the 4" sump drain gate valve at the recycled water pump station sump.
- Recoat the 24" chlorine contact basin effluent (CCBE) pipe and flange extending from the west wall of the west basin.
- Install intermediate pipe supports on the 1-1/2" polyvinyl chloride (PVC) exterior UW line.

Justification/Consequences

The Basin has experienced settlement issues which have caused significant concrete and asphalt cracking, pipe leaking, and raised concerns over the Basin's integrity.

Project Delivery

Design-Bid-Build

5.1.4 Effluent

P-1.4.001 Effluent Pumps Improvements

This project has currently been identified as a study. Information on this study can be found in Section 4.

P-1.4.002 Chlorine Building and EPS Improvements

Background

The existing MCCs and conductors for the EPS and the chlorine contact tanks (CCT) were installed as part of Phase III Expansion in 1980 and are reaching the typical life expectancy of MCC equipment. Replacement parts have become difficult to find.

The EPS/CCT MCC room is adjacent to the Chlorination Building. The Chlorination Building requires adequate secondary containment and relocation of the chemical pumps.

MCC equipment generates heat, and most buildings housing MCCs at the EWPCF are not equipped with climate control such as HVAC units. Doors to the MCC buildings can be left open to provide cooling for the equipment and personnel working in the building. However, leaving the door open creates potential for intruders to enter and harm themselves and the facility. Open doors also expose equipment to dust, moisture, vermin, and corrosion which could shorten the life of equipment, particularly electronic equipment. This project will provide climate control on MCCs and other electronic facilities.

Description

The EPS/CCT MCC and conductors will be completely removed and replaced. This project will also include the removal of the wiring and exposed conduit of the abandoned equipment. Verification of wiring replacement during Phase V is required.

The Chlorination Building requires the following improvements:

- Study to evaluate on-site chlorine generation vs existing chlorination system.
- Retrofit the chemical storage area for adequate secondary containment.
- Relocate the chemical pumps into the containment area.



Figure 5-8: P-1.4.002, EPS/CCT MCC Room



Figure 5-9: P-1.4.002, EPS/CCT Chlorination Building

- Concrete repairs and improvements to provide a complete containment area.

Implement the MCC Climate Control recommendations of the 2017 HVAC Site Evaluation summarized below for the Effluent Pump Station Chlorination MCC room:

- Utilize redundant VRF systems at all MCC rooms.
- Equipment should be coated with an aftermarket corrosion protection coating.
- HVAC equipment should be supplied with BMS controllers to communicate back to the HVAC front end server located in the administration building.
- MCC rooms should be insulated to current code minimums to minimize heat gains from outdoors.
- MCC rooms shall be weather sealed to prevent coastal air infiltration.

Justification/Consequences

The replacement of the MCCs at the EPS will provide a more reliable operation. The existing MCCs are reaching their typical useful life and replacement parts are difficult to find.

The existing chlorination building does not have adequate secondary containment.

Climate control will maintain electronic equipment such as MCCs within design temperature range operating parameters to realize longer service life. Currently, doors are opened to cool the rooms. Maintaining doors closed will minimize exposure of equipment to dust and extend equipment service life. This project will reduce the potential for intruders to enter and cause harm to themselves, equipment, or the treatment process.

Project Delivery

Design-Bid-Build

P-1.4.004 EPS Pipe Lining and Abandoned Pipe Coating Repair

Background

The EPS pumps treated effluent through the outfall system when the tide and flow conditions are such that all flow does not discharge by gravity. During the FY2012 land outfall inspection, the lining in the EPS discharge piping was observed to be failing. Additionally, the abandoned PE pipeline from the original effluent discharge configuration was observed to have coating failure. This pipeline passes through the surge tower, and coating separated from the pipeline falls into the structures at the start of the land outfall. The lining and coating systems are concrete mortar. Material that had separated from the piping systems was removed during a follow-up maintenance project in the surge tower.

Description

This project includes rehabilitation of the EPS discharge pipeline lining with a new liner or other method and recoating the abandoned PE pipeline in the surge tower. As an alternative, the abandoned PE pipeline may be removed and the openings blocked. This work will require outage planning.

Justification/Consequences

The pipe lining provides protection to the pipe system, and without this protection the pipe system will corrode and over time may fail. The effluent pumping system is critical to

maintaining the effluent discharge capacity of the EWPCF. Additionally, separated lining and coating must be removed from the outfall system.

Project Delivery

Design-Bid-Build. May combine with P-2.1.007 84-inch Outfall Inspection – Internal or P-2.1.008 Secondary Effluent Land Outfall Improvements.

5.2 Outfall

5.2.1 Outfall

The outfall inspections (P-2.1.002, P-2.1.005, P-2.1.006, and P-2.1.007) follow the schedule in Table 5-1.

Table 5-1: Outfall Inspection Schedule

Project	Frequency	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025
P-2.1.002 Ocean Outfall Maintenance and Inspection – External	2 years	X		X		X	
P-2.1.005 Ocean Outfall Bathymetric Survey – External	6 years		X				
P-2.1.006 Ocean Outfall – Integrity Assessment	6 years		X				
P-2.1.007 84-inch Outfall Inspection - Internal	3 years		X			X	

P-2.1.002 Ocean Outfall Maintenance and Inspection - External

Background

Regularly scheduled ocean outfall inspections are required to monitor the condition of the outfall. Scheduled outfall inspections are every two years for external inspection. This project was last completed in July 2017 (FY2018). This project implements the recommendations for minor repair from the inspection reports.

Description

Study Phase:

- Provide general overview inspection of the pipe exterior including ballast condition.
- Perform condition assessment of the cathodic protection system.
- Clear excessive kelp growth.
- Perform video documentation, outfall monumentation, and cross-section measurements of ballast (rock supporting pipe on ocean floor) and prepare inspection report.



Figure 5-10: P-2.1.002, View Towards Ocean Outfall

Implementation:

- Complete the recommendations provided in the inspection report which may include minor repair or debris removal.

Justification/Consequences

This project will provide regular monitoring of the outfall condition to avoid pipe capacity reduction or failure. Gradual or sudden failure of the outfall asset would be extremely serious. The ability to remove treated water from the site could be interrupted for long periods of time or possibly permanently. This project is a requirement of the General Lease (No. PRC 3097.9) with the State Lands Commission (SLC) to conduct an external inspection using diver/Remotely Operated Vehicle (ROV) video or high-resolution side-scan sonar every two years and when warranted by extraordinary circumstances such as an accident or significant seismic event.

Project Delivery

RFP-Contract

P-2.1.005 Ocean Outfall Bathymetric Survey – External

Background

This project will complete a bathymetric survey of the exterior of the Ocean Outfall which would provide an exact location of the outfall, documentation of the pipeline and ballast material, and a bathymetric chart of the surrounding area. Multi-beam technology measures the depth and quantifies a three-dimensional image of the underwater facility. This information can be used to generate cross-sections and perform other analyses.

Description

Conduct a bathymetric survey of the ocean outfall every six years. This project was last completed in 2015.

Justification/Consequences

The survey will precisely locate the ocean outfall, provide a baseline survey of the pipeline and surrounding area, and indicate overall condition of the pipeline. The baseline survey may be used to compare future surveys against, such as one completed after a seismic event. This project is a requirement of the General Lease with the State Lands Commission.

Project Delivery

RFP-Contract

P-2.1.006 Ocean Outfall – Integrity Assessment

Background

This project will complete an integrity assessment of the Ocean Outfall by a California Registered Civil/Structural Engineer every six years and when warranted by extraordinary circumstances such as an accident or a significant seismic event. This project was last completed 2015.

Description

This project includes performing core sampling of the land outfall and sample analysis for an assessment of the structural integrity. Confined space entry will be required for this project.

Justification/Consequences

This project is part of a comprehensive regiment to monitor the outfall condition to avoid pipe capacity reduction or failure. Gradual or sudden failure of the outfall asset would be extremely serious. The ability to remove treated water from the site could be interrupted for long periods of time or possibly permanently if the ocean outfall is damaged. This project is a requirement of the General Lease with the State Lands Commission.

Project Delivery

RFP-Contract



Figure 5-11: P-2.1.006, Outfall Near Shore

P-2.1.007 84-inch Outfall Inspection – Internal

Background

The 2015 Outfall Integrity Assessment Structural Evaluation Report (Carollo) evaluated the structural condition of the land outfall and in November 2018 V&A Consulting Engineers completed a condition assessment on the Surge Tower and 84-inch Outfall. The land outfall consists of 48-inch diameter reinforced concrete pipe (RCP), 84-inch diameter RCP, and 7-foot square reinforced concrete conduit. The 84-inch RCP and 7-foot square reinforced concrete conduit were identified as points of concern due to the exposed aggregate. It is estimated the reinforcing may begin to be exposed in the next 5 to 10 years from the time of the Carollo evaluation. This project was last completed in 2018.

Description

This project will inspect/assess the concrete every 3 years.

Justification/Consequences

Given the level of exposed aggregate and the age of the structure, the Carollo evaluation estimated that the reinforcing steel may begin to be exposed if left unprotected in 5 to 10 years from the time of the evaluation. Corrosion of reinforcing steel can generate excessive volumetric expansion pressures within the concrete that usually results in concrete cracking, spalling, delamination, and accelerated corrosion of more reinforcing steel. Rehabilitation of the structure will occur through other projects starting with P-2.1.008 Secondary Effluent Land Outfall Improvements. An inspection every 3 years would allow the conduit and pipe to be reviewed

regularly and would fall in line with the 6 year mandatory inspections. Through successful rehabilitation of the structure, the frequency of this inspection can be reevaluated.

Project Delivery
RFP-Contract

P-2.1.008 Secondary Effluent Land Outfall Improvements

Background

A condition assessment on the Surge Tower and 84-inch Outfall was completed in November 2018 by V&A Consulting Engineers. Improvements recommended by the condition assessment will be implemented as part of this project. Please reference the V&A Condition Assessment for additional information.

Description

The November 2018 Condition Assessment recommended the following improvements:

- Surge Tower
 - Resurface concrete with repair mortar and coat the lower 12 feet of the surge tower.
 - Remove coating and recoat the 60-inch PE pipeline which is cracked/spalled.
 - Remove coating and recoat the 60-inch SE pipeline which is delaminated/spalled.
 - Replace corroded 24-inch 3W elbow and coat pipe spools that penetrate the wall.
 - Replace accessible 6-inch drain pipe fittings and coat pipe spools that penetrate the wall.
- 84-inch Outfall
 - Resurface concrete with repair mortar and coat the pipeline (long-term) and/or coat the interior surfaces with a penetrating corrosion inhibiting coating.
 - Seal joints with hydrophilic grout.
 - Remove corrosion and coat the steel joint sleeves at the Surge Tower and 7-foot by 7-foot Conduit and access manway sleeve.
- Investigation of additional improvements that may be required to extend the useful life of the outfall

This project will also include a condition assessment and operability assessment of the secondary effluent slide gates.

Justification/Consequences

Proper maintenance and repair of the Surge Tower and 84-inch Outfall will help maximize the service life of these facilities. The condition and operability assessment of the secondary effluent slide gates will improve efficiency and operations for EWA staff.

Project Delivery
Design-Bid-Build

5.3 Solids Process

5.3.1 Biosolids Thickening

P-3.1.002 Solids Thickening Improvements

Background

Three DAFTs provide thickening of WAS with provisions and space to add a fourth unit. The original two DAFTs were installed in 1982 during the Phase III expansion and the third DAFT was installed in 1984 during the Phase IV expansion.

RDTs have become a common thickening technology installed in the last decade for thickening WAS and primary sludge. Refer to the 2016 Process Master Plan for detailed analysis of RDTs.

Thickened waste activated sludge (TWAS) is currently conveyed from the DAFTs to the digesters by TWAS pumps and an 8-inch TWAS pipeline. The DAFT can produce thicker solids than the existing TWAS pumping system can convey. Improving the TWAS pumping system would allow a higher flowrate of higher concentration solids to be conveyed to the digesters.

Primary sludge is conveyed by dedicated pumps from the primary gallery to the digesters. In-tank thickening is currently being used to minimize the total volume sent to the digesters but is labor intensive due to the manual operations required. Additionally, it has been determined that extensive in-tank thickening can be detrimental to the process due to septicity.

MCC equipment generates heat, and most buildings housing MCCs at the EWPCF are not equipped with climate control such as HVAC units. Doors to the MCC buildings can be left open to provide cooling for the equipment and personnel working in the building. However, leaving the door open creates potential for intruders to enter and harm themselves and the facility. Open doors also expose equipment to dust, moisture, vermin, and corrosion which could shorten the life of equipment, particularly electronic equipment. This project would provide climate control on MCCs and other electronic facilities.

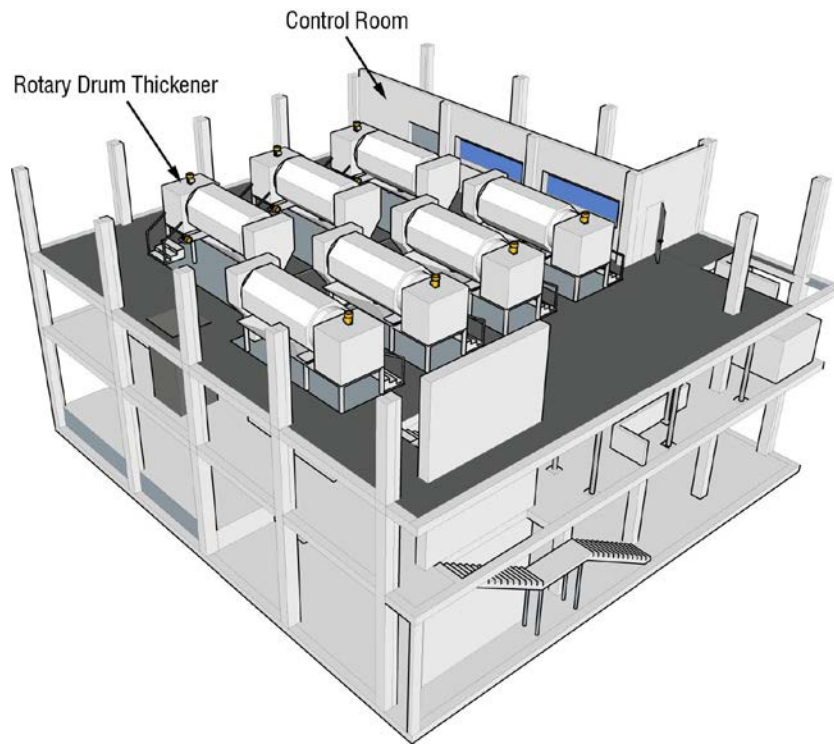


Figure 5-12: P-3.1.002, RDT Layout in Phase IV Dewatering Building, 2016 Master Plan

Description

- Replacement of the DAFT units with RDTs per the recommendation of the 2016 PMP. This project will include installation of new equipment to co-thicken WAS and primary sludge and demolition of old facilities. The 2018 Condition Assessment by V&A noted that no immediate repairs are required to the DAFT units in the next five years, but that improvements should be implemented if kept in service for more than five years.
- Replacement of approximately half the MCCs and conductors (pre-Phase V Expansion) in the Dewatering Building. Removal of wiring and exposed conduit from abandoned equipment.
- Replace approximately 600 feet of existing 8-inch TWAS piping with larger diameter pipe, but the exact size needs to be verified with hydraulic calculations. Eliminate bends, use long radius elbows, and reduce minor losses in pipe system.
- Construct an enclosure for the Dryer Building satellite laboratory.

Implement the MCC Climate Control recommendations of the 2017 HVAC Site Evaluation summarized below for the Dewatering Process MCC Room:

- Utilize redundant VRF systems at all MCC rooms.
- Equipment should be coated with an aftermarket corrosion protection coating.
- HVAC equipment should be supplied with BMS controllers to communicate back to the HVAC front end server located in the administration building.
- MCC rooms should be insulated to current code minimums to minimize heat gains from outdoors.
- MCC rooms shall be weather sealed to prevent coastal air infiltration.

Justification/Consequences

DAFT system replacement or expansion with alternative newer technology may be justified by lower operations and maintenance costs. The DAFT collector is aging and replacement should be implemented when equipment cannot be maintained cost effectively through replacement parts. The following conclusions and recommendations are from the 2016 Process Master Plan:

- RDT is the preferred mechanical thickening technology due to lowest present worth cost, reduced demand on plant water and its ability operate continuously with minimal supervision.
- Replacing the existing DAFT technology for thickening WAS and primary sludge with RDTs saves more than \$2 million in life cycle costs. This replacement is primarily driven by the condition of the DAF units, which are at the end of their useful life and require rehabilitation or replacement.
- The recommendation is to replace the DAFTs with RDT for improving sludge thickening. EWA can consider a phased implementation approach to co-thickening where RDTs are installed initially for WAS thickening to allow operators to become familiar with the operation. Co-thickening can then be tested on site and EWA can decide whether or not to implement co-thickening based on the RDT performance and improved operator familiarity with the new technology.

The MCCs in the Dewatering Building are reaching the end of a typical useful life for MCC equipment and replacement parts are becoming difficult to find. Replacing this equipment will provide a more reliable operation.

Replacing the TWAS pipeline is recommended to increase the flow and solids concentration of thickened sludge to the digesters. The implementation of this project results in increased digester capacity, thicker digested sludge and reduced centrate volumes.

Climate control will maintain electronic equipment such as MCCs within design temperature range operating parameters to realize longer service life. Currently, doors are opened to cool the rooms. Maintaining doors closed will minimize exposure of equipment to dust and extend equipment service life. This project will reduce the potential for intruders to enter and cause harm to themselves, equipment or the treatment process.

The Dryer Lab Enclosure is recommended to be implemented with the Solids Thickening Improvements project due to proximity and mutual benefit to operations of the new thickening system. The lab enclosure would provide separation from the ambient environment to obtain accurate moisture and solids content results.

Project Delivery Design-Bid-Build

5.3.2 Biosolids Digestion

P-3.2.004 Biosolids Screening Facility

Background

The 2010 Basis of Design for the Biosolids Screening Facility by Black & Veatch established a basis of design for a biosolids screening facility. This facility would screen digested sludge prior to the centrifuges and upstream of the dryer. This type of facility would reduce the hair like

material, metal shavings, plastics and other debris that is currently observed in the shaker portion of the dryer system.

A “strainpress” type system was recommended and would require transfer pumps, grinders, screenings handling, odor control, and utilities such as electrical. The recommended location of the facility is between Digester No. 2 and No. 3. The 2012 *Grit and Screenings Handling Study* examined the possibility of using finer screens at the headworks which would likely have eliminated the need for sludge screening. The study found that hydraulic limitations made finer headworks screens not practical.

Description

The project would include the following components:

- Strainpress equipment installed on an elevated platform.
- Debris collection room and bin located below the strainpress.
- Odor control.
- Associated pumps and mechanical piping.
- Associated electrical and instrumentation components.

Justification/Consequences

If pellets from the dryer facility are marketed more as a soil amendment, sludge screening will be required.

Project Delivery

Design-Build

P-3.2.013 Digester Rehabilitation and Improvements

Background

The EWPCF has six anaerobic digester tanks, three of which (Digester Nos. 4, 5, and 6) are currently in service. These digesters are typically used for digestion; however, Digester No. 4 has been used in the past to provide operational storage of digested solids from Digesters Nos. 5 and 6. Digester No. 2 may sometimes be used for storage and pumping to Centrifuge No. 1. Due to current solids loading, all three digesters are operated and they do so as a conventional, mesophilic anaerobic digestion (MAD) process.

The existing pumped mixing systems in Digesters Nos. 5 and 6 were constructed in the 1992 Phase IV Expansion and include four 50-hp centrifugal pumps. Digester No. 4 is mixed using a gas compressor-based mixing system. There has been settlement in the area around Digester Nos. 5 and 6.

Digester Nos. 4, 5 and 6 were last cleaned in 2012. A condition assessment was performed on each digester during that cleaning and identified the gas mixing system in Digester No. 4 as an area of concern. It was also noted that the interior coating of the digester covers and process piping is needed for each digester.

The sludge heating systems for each digester consist of shell and tube heat exchangers that were installed with the digesters when constructed. The heat exchangers have been repaired several times over the years and are approaching the end of their useful life.

The existing waste gas flare is used as a backup to the cogeneration engines and/or biosolids drying system. If the cogeneration engines or heat drying equipment is unavailable to use the digester gas, the waste gas is conveyed to the flare. EWA may expand its alternative fuels receiving facility (AFRF), and it is anticipated that this would continue to increase the gas production at the EWPCF. A second waste gas flare would be needed to provide sufficient flare capacity to match the projected biogas production. The existing waste gas flare was designed and constructed with the anticipation of a second unit.

Recently, EWA changed the process for modifying the EWPCF supervisory control and data acquisition (SCADA) system to maintain better control and achieve uniformity of the end product, in particular the operator interface. This project will include modifications to the SCADA system and electrical system.

Description

The project is anticipated to include the following:

- Digesters Nos. 4, 5, and 6 Interior Coating and Structural Reinforcement/Repairs
 - Clean interior of inert contents that cannot be drained from the tank.
 - Remove debris from digester.
 - Remove existing coating and prepare surface for coating including minor repairs.
 - Seal lids to not be reliant on the water seal.
 - Remove and replace exterior insulation.
 - Address pipe penetrations and evaluate; if deemed appropriate, replace modular wall seals/sleeves on interior and exterior.
 - Install flow meter and methane gas concentration analyzers for digester gas (Digester Nos. 5 and 6).
 - Apply prime coat to all steel surfaces.
 - Apply coating to all digester covers and process piping.
 - Replace flame arrestors and pressure-vacuum relief valves on Digesters Nos. 5 and 6.
 - Repair a soft spot on the roof of Digester No. 6.
- Digesters Nos. 4, 5, and 6 mixing system improvements
 - Evaluate mixing technology alternatives for Digester No. 4 and replace existing gas mixing system with an alternative system.
 - Develop a recommended approach to rehab the pump mix systems at Digester Nos. 5 and 6 including intermittent mixing.
 - Replace MCC K, MCC L, and MCC P which serve the loads from the digester systems (located in Power Building).
 - Replace all programmable logic controllers (PLCs) related to the digester systems following the new SCADA Implementation Approach and add instrumentation to achieve the desired level of automation.
- Rehabilitate or replace the heat exchangers and associated equipment for each digester.
- Conduct a table top evaluation of previous geotechnical studies and historic and current site settlement monitoring data to determine the likelihood and impacts of potential continued settlement near the digesters.
- Identify the cost to rehabilitate the structures for Digester Nos. 1 and 3 suitable for future operation.
- Replace existing digester solids transfer pump with two new progressive cavity pumps.

- Rehabilitate digester area drainage pit.
- Extend piping from existing AFRF to Digester No. 4.
- Waste Gas Flare improvements including design criteria development and installation of a second flare and associated permitting.

Justification/Consequences

Anaerobic digestion occurs in a highly corrosive environment. Regular maintenance including coating of the digester cover is required to maximize the service life of the digesters. The existing digester mixing systems are reaching the end of their useful life and require replacement in kind or replacement with alternative mix technology. The heat exchangers have been repaired several times over the years and are approaching the end of their useful life. A second waste gas flare is needed to provide sufficient flare capacity to match the projected biogas production.

Project Delivery

Design-Bid-Build

5.3.3 Biosolids Dewatering and Drying

P-3.3.001 MCC and Conductors Replacement – Power Building

Background

The existing MCCs and conductors for the Power Building MCCs are reaching the typical life expectancy of MCC equipment. Replacement parts have become difficult to find. The replacement of the MCCs will provide a more reliable operation. The MCCs included in this project face the Cogen window. The MCCs that are near the entrance of the Power Building are being replaced as part of P-3.2.013 Digester Rehabilitation and Improvements and are not included in this project. This project will also include the removal of the wiring and exposed conduit of the abandoned equipment.

P-3.3.004 Pellet Bagging Facilities

Background

Biosolids pellets produced by the dryer are currently hauled off-site for use as an alternative fuel or fertilizer. A pellet bagging facility would allow for increased distribution of the pellets for commercial or local use as a fertilizer. The proposed pellet bagging system includes a portable bagging system with scale, sealer, conveyor and base, stretch wrapper, and a hopper. This facility would require a pellet transporter with appurtenant equipment such as an air compressor. An alternative to onsite bagging is offsite contract bagging.

P-3.3.006 Second Dryer and Centrifuge Replacement

Background

The drying facility was implemented with provisions for a second dryer, which will be needed when plant flows increase in the future. The 2016 Process Master Plan and 2018 Encina Biosolids, Energy and Emissions Plan provided an analysis of the existing dryer capacity, an analysis of the existing centrifuges, and recommendations for a second heat dryer and centrifuges. The summary and recommendations are:

- The centrifuges are currently operated at 50 to 60 percent of capacity. A fourth unit or 3 new, larger capacity units will be required for 2040 loadings. The dewatering process consistently produces 22 percent solids but does not quite meet the design intent of 24 percent solids. This impacts dryer capacity by adding additional water that must be evaporated.
- The dryer is operating within 10 percent of capacity more than 50 percent of the time. Additional capacity is needed to meet future needs. Based on projections and current loadings, the dryer will be at capacity by 2018.
- Increasing the percent solids from 22 percent to 24 percent can prolong the dryer capacity by five to ten years. While this may increase polymer use and put additional stress on staff to balance pellet quality with dewatering cake dryness, this is the most straightforward path to increasing dryer capacity for the short term. Incremental increases of 0.5 to 1 percent may allow adjustments to be more easily made to the operations to achieve the desired goal.
- Operating the dryer longer by moving to a 12-days on, two-days off schedule has increased capacity slightly but has resulted in the need to haul Class B Biosolids occasionally when the dryer is down for more than 2 days.
- It is not recommended to reduce pellet dryness due to the difficulties in handling wet pellets.
- It is recommended to install a second rotary drum heat dryer to increase capacity. A second dryer will maintain pellet quality, and operations personnel are familiar with the operational and maintenance needs. This alternative also avoids installing new equipment, such as a thermal hydrolysis process, that would take up valuable space that may be needed in the future. However, it is not efficient or cost effective to install a new heat dryer when less than 10% of its capacity is required. Delaying the installation until that point and hauling Class B Biosolids during maintenance outages would allow for this but is more odorous and requires management of two different products.

Currently, three centrifuges are available to feed the dryer. When the second dryer is installed, it is anticipated three larger centrifuges will be required. A study or conceptual design will need to be completed to verify the number and sizing of required centrifuges, as well as verify that the approach is still appropriate.

Description

- Install a second dryer.
- Replace centrifuges with higher capacity units.
- Install ancillary equipment including electrical and controls.

Justification/Consequences

A second heat dryer is needed according to the 2040 Master Plan Update, 2016 Process Master Plan, and 2018 Encina Biosolids, Energy and Emissions Plan. The existing centrifuges do not have capacity for a second heat dryer.

Project Delivery Design-Bid-Build

P-3.3.025 Existing Dryer Components Rehab and Interim Dryer Improvements

This project has currently been identified as a study. Information on this project can be found in Section 4.

5.4 Energy Management

Maintenance of the cogen engines (P-4.1.005, P-4.1.006, and P-4.1.007) follows the maintenance schedule in Table 5-2 and is summarized in Table 5-3.

Table 5-2: Cogen Engine Maintenance Schedule

Fiscal Year	Operating Hours for Previous Period / Total Operating Hours			
	Engine #1	Engine #2	Engine #3	Engine #4
	Run Time/Time Until Full Overhaul			
	(Total Run Time) Any Schedule Maintenance			
2020	2,737/58,823 Full	2,737/57,485 Full	8,760/54,408	8,760/57,393
2021	8,760/8,760 (67,583) Top End	8,760/8,760 (66,245) Top End	2,737/57,145 Full	2,737/60,130 Full
2022	2,737/11,497 (70,320)	2,737/11,497 (68,982) Top End	8,760/8,760 (65,905) Top End	8,760/8,760 (68,890) Top End
2023	8,760/20,257 (79,080) Top End	8,760/20,257 (77,742) Top End	2,737/11,497 (68,642)	2,737/11,497 (71,627)
2024	2,737/22,994 (81,817)	2,737/22,994 (80,479)	8,760/20,257 (77,402) Top End	8,760/20,257 (80,387) Top End
2025	8,760/31,754 (90,577) In Frame	8,760/31,754 (89,239) In Frame	2,737/22,994 (80,139)	2,737/22,994 (83,124)

Table 5-3: Cogen Engine Maintenance Schedule Summary

Fiscal Year	Scheduled Maintenance				Total By Year		
	Engine #1	Engine #2	Engine #3	Engine #4	Top End P-4.1.005	In Frame P-4.1.006	Full P-4.1.007
2020	Full	Full					2
2021	Top End		Full	Full	1		2
2022		Top End	Top End	Top End	3		
2023	Top End	Top End			2		
2024			Top End	Top End	2		
2025	In Frame	In Frame				2	

5.4.1 Energy Management

P-4.1.005 Cogen Engine Top-End Overhaul

Background

Four engine-generator sets were installed as part of the Phase V expansion in 2009. The engine-generator manufacturer (Caterpillar) recommends the following routine overhaul maintenance services to be performed on the engines:

1. Top-End overhauls after 8,000 service hours;
2. In-Frame overhauls after 24,000 service hours;
3. Full overhauls after 40,000 service hours.

EWA's existing Air Pollution Control District (APCD) permit allows 280,000,000 cubic feet per year of combined gas consumption for the cogen engines (252,000,000 cubic feet of digester gas and 28,000,000 cubic feet of natural gas). The total engine run hours and overhaul schedule are anticipated to change when Net Metering is implemented.

Description

The top-end overhaul service includes:

- Replacing cylinder heads with remanufactured engine heads.
- Cleaning block deck and manifold flange surfaces.
- Rebuilding exhaust bypass and digester gas regulators.
- Cleaning and testing cooler cores.
- Replacing lube oil temperature regulators.
- Cleaning of the engine oil sump and oil suction screen before refilling the engine with new oil.
- Remanufacturing two engine turbochargers.
- Replacing after-cooler water pumps and jacket water pumps.
- Installing new spark plugs.
- Other cleaning and inspection services.

The heat shield on the engines can only be seen during disassembly during a top-end overhaul, and therefore, it is not possible to know if a heat shield needs to be replaced until the top-end overhaul is underway. A separate service would be needed if replacement of the heat shield is required, due to the lead time involved with obtaining a replacement heat shield. The additional labor for replacing the heat shield could be reduced if a heat shield (~\$10,000) was purchased in advance of the top-end overhaul. If the heat shield does not need to be replaced during the top-end overhaul then the part would be stored for potential use during the next engine top-end overhaul, or the heat shield could be replaced, and the part removed could be salvaged for spare parts or refurbishment and reuse.

Justification/Consequences

The engine overhaul work is necessary to maintain proper operating efficiency, maximize service life of the equipment and to maintain APCD permit compliance.

Project Delivery

RFP-Contract

P-4.1.006 Cogen Engine In-Frame Overhaul

Background

Four engine-generator sets were installed as part of the Phase V expansion in 2009. The engine-generator manufacturer (Caterpillar) recommends the following routine overhaul maintenance services to be performed on the engines:

1. Top-End overhauls after 8,000 service hours;
2. In-Frame overhauls after 24,000 service hours;
3. Full overhauls after 40,000 service hours.

EWA's existing APCD permit allows 280,000,000 cubic feet per year of combined gas consumption for the cogen engines (252,000,000 cubic feet of digester gas and 28,000,000 cubic feet of natural gas). The total engine run hours and overhaul schedule are anticipated to change when Net Metering is implemented.

Description

The in-frame overhaul service includes all the services included with the top-end overhaul plus the following:

- Megger and generator inspection.
- Exhaust bypass and gas regulators rebuild.
- Cleaning/testing oil cooler core.
- Replacement of piston, liner packs, crankshaft bearings, and crankshaft connecting rod bearings.
- Engine oil pump replacement.

Justification/Consequences

The engine overhaul work is necessary to maintain proper operating efficiency, maximize service life of the equipment and to maintain APCD permit compliance.

Project Delivery

RFP-Contract

P-4.1.007 Cogen Engine Full Overhaul

Background

Four engine-generator sets were installed as part of the Phase V expansion in 2009. The engine-generator manufacturer (Caterpillar) recommends the following routine overhaul maintenance services to be performed on the engines:

1. Top-End overhauls after 8,000 service hours;
2. In-Frame overhauls after 24,000 service hours;
3. Full overhauls after 40,000 service hours.

EWA's existing APCD permit allows 280,000,000 cubic feet per year of combined gas consumption for the cogen engines (252,000,000 cubic feet of digester gas and 28,000,000 cubic feet of natural gas). The total engine run hours and overhaul schedule are anticipated to change when Net Metering is implemented.

Description

The full overhaul services are the top-end overhaul and the in-frame overhaul services plus the following:

- Replacement of camshafts with remanufactured camshafts.
- Removal and transport of crankshaft to be cut and polished.

Justification/Consequences

The engine overhaul work is necessary to maintain proper operating efficiency, maximize service life of the equipment and to maintain APCD permit compliance.

Project Delivery

RFP-Contract

P-4.1.008 Cogen Engine 5 Installation

Background

Four engine-generator sets were installed as part of the Phase V expansion in 2009. The installation of the fifth engine-generator set will be necessary in the near future to meet the plant self-generation energy goals as recommended in the *Energy & Emissions Strategic Plan* prepared in 2011.



Figure 5-13: P-4.1.008, Future Cogen Engine 5 Location

P-4.1.010 Cogen Engine 6 Installation

Background

Additional engine-generator capacity is required beyond five engine-generators as established in the 2011 *Energy & Emissions Strategic Plan* to fully utilize projected increases in biogas from waste-to-energy projects. Increasing the capacity of the five engine-generators may be a cost-effective alternative to adding a sixth engine-generator set which would require a building expansion.

P-4.1.012 Heat Loop Bypass Installation

Background

The new plated heat exchangers transfer heat from the cogen cooling water to hot water that is used to heat sludge in the digesters. This project will provide heat loop bypass piping to maintain operation of the cogen facility in the event of a heat exchanger outage. Bypass piping will be installed to bypass the system heat exchanger in the event of a heat exchanger outage. 3WCL water will absorb the heat from the cogen engines and then be discharged to drainage. This system will be permanent, however, repair of the system heat exchangers would be a high priority because the digester sludge heating also relies on the system heat exchangers.



Figure 5-14: P-4.1.012, Plated Heat Exchangers (in Blue)

An extended outage will cause a digester upset and deterioration or failure of the digestion process.

Description

- Modify existing piping with fittings to allow installation of permanent piping to bypass heat exchanger and disposal of 3WCL water from cogen heat exchangers to drainage.
- Provide permanent piping to connect to the existing piping and convey heated 3WCL water from cogen heat exchangers to drainage.
- Investigate ability to use heated 3WCL water as hot water for digester heat exchangers. This may involve blending heated 3WCL water with another plant water supply.

Justification/Consequences

This project will provide permanent heat loop bypass piping to maintain operation of the cogen facility in the event of a heat exchanger outage. The cogen facility provides cost effective power production and uses the digester gas. Provision of a backup heated water supply for the digester heat exchangers will avoid digester upset and deterioration or failure of the digestion process. Failure of the digestion process would impact the ability to dewater and dry biosolids which could result in high cost associated with hauling sludge for disposal and reseedling the digesters. Operation of the heat loop plated heat exchanger, which was installed in 2011, should be monitored. Frequent operational issues or maintenance requirements will provide justification of this bypass system.

Project Delivery

Design-Bid-Build. EWA may choose to implement this project under P-5.4.006 As-Needed Contractor Services if resources allow.

P-4.1.014 Retrofit Miscellaneous Equipment with VFDs

Background

The 2011 *Energy & Emissions Strategic Plan* includes recommendations to improve the energy efficiency of the existing electricity usage within the EWPCF. This project installs Variable Frequency Drive (VFD) units in select locations which can be used as an energy efficiency measure to reduce motor speed where process demands vary and reduce power consumption. Areas with this opportunity include various HVAC equipment and plant water pumping systems.

Description

- Design and install VFD controls for selected HVAC equipment.
- Design and install VFD controls for plant water pumping systems.

Justification/Consequences

This project implements the recommendations of the 2011 *Energy & Emissions Strategic Plan*. VFD installation can reduce electrical power demand without impacting process needs.

Project Delivery

Design-Bid-Build

P-4.1.015 Cogen Engine Catalyst System and Gas Conditioning Facilities

Background

In the past, EWA has reviewed the feasibility of installing gas conditioning and exhaust catalysts to reduce emissions. This is discussed in the 2016 Process Master Plan Technical Memorandum No. 9. The conclusions and recommendations are summarized here:

- The EWPCF produces enough biogas to exceed the carbon monoxide (CO) emissions limit. Excess biogas is used for dryer operation or is flared, which wastes renewable resources.
- Title V permitting can increase the emissions limits and increase power generation by expanding biogas use.
- Projected emissions beyond year 2040 would exceed allowed emissions under a Title V permit. The time of exceeding the emissions limit could occur before 2040 if additional fats, oils and grease (FOG) or food wastes are brought on-site for processing.
- Emissions reduction through gas conditioning and engine exhaust catalysts provide a second option to Title V permitting. With this level of emissions reduction, emissions quantities would no longer be an issue and greenhouse gas emissions would be considered negligible.
- Emissions reductions would include hydrogen sulfide (H₂S) removal, moisture removal, and siloxane removal treatment for biogas before combustion in the engines. Exhaust treatment would include selective catalytic reduction to remove CO, nitrogen oxides (NO_x), and volatile organic compounds (VOC).



Figure 5-15: P-4.1.015, Cogeneration Engine Nos. 1 & 2

Description

The project includes:

- Installation of the cogen engine catalyst system for four engines.
- Constructing an integrated gas conditioning system to remove the moisture, siloxanes, hydrogen sulfide, and other contaminants from the biogas stream.
- Repairing broken conduits in the duct bank near gas management.

Justification/Consequences

- Emissions reduction will significantly reduce engine maintenance needs and increase engine runtime between overhauls.
- Emissions reduction offers a significant annual cost savings due to the additional power generated. The lifecycle analysis estimates a project payback period of eleven years.
- Emissions reductions will significantly reduce greenhouse gas emissions. There are many state and federal funds available to help offset project costs aimed at greenhouse gas emissions.
- Emissions reduction via gas conditioning and exhaust emissions catalyst is recommended to maximize biogas reuse, increase power generation, improve engine operations, and significantly reducing annual power costs and greenhouse gas emissions.

P-4.1.022 Turbo Blower Upgrade

Background

The existing blowers are less efficient than recent technologies. They also have limited turn-down capabilities during low flow periods which wastes air and energy during these periods. Installing high-efficiency turbo blowers can reduce energy demands and provide improved controls. Blower replacement is discussed in detail in the 2016 Process Master Plan. Current air demands can be handled by two (2) turbo blowers with a third unit added to meet projected 2040 air demands.

Description

Replace the existing three large blowers and one small blower with two new Turbo Blowers. The existing aeration blowers can provide standby capacity (these can be replaced with standby Turbo Blowers as they age out). Estimated 2040 air demands would require a third Turbo Blower. At Phase V it is recommended to replace the air header below the building.

EWA changed the process for making modifications to the EWPCF SCADA system to maintain better control and achieve uniformity of the end product. SCADA system modifications and additions will be made by a SCADA Integrator contracted directly to EWA, and SCADA system program management and planning and oversight of the Integrator's work will be performed by a SCADA Consultant. Electrical systems will also be upgraded based on the requirements of the SCADA system.

Justification/Consequences

Turbo Blowers have several advantages:

- They require minimal maintenance from staff, mostly just changing the air filter. Local agents working for the manufacturer perform additional maintenance.
- They can achieve approximately 50 percent capacity with efficiency maintained over the entire range.
- Their footprints are smaller than single and multistage centrifugal blowers.
- The Turbo Blowers are anticipated to result in annual power savings of approximately \$262,000 for current operation and \$374,000 in Phase V per Table 9 of Technical Memorandum 5 of the 2016 Process Master Plan.
- Based on current estimated annual savings, the simple payback period is 8.5 years.

P-4.1.024 Automate Main Breakers in Cogen

Background

Some, but not all of the breakers can be operated from the Master Control Panel (MCP); approximately 13 can be controlled and approximately 19 cannot be controlled from the MCP and there are 5 spares. Communication wire was installed to some of the breakers in a project completed in 2010. Breakers that are not controlled from the MCP must be manually tripped by an operator in case of a power short which introduces the risk of arc flash.



Figure 5-16: P-4.1.024, Main Breakers at Cogen

Description

A pre-design study should be performed to determine which breakers can be controlled by the MCP and which need a dual relay, so they can be controlled by the MCP. An arc flash study should also be performed to determine if the MCP needs to be relocated in a separate room. The finding and recommendations of these studies should be implemented in design and construction.

Justification/Consequences

This work should be completed to mitigate the risk of arc flash from the electrical equipment in Cogen.

Project Delivery

Design-Bid-Build. Alternatively, EWA may consider implementation under planned asset rehabilitation (General Services department), extension of staff engineering services, or under P-5.4.006 As-Needed Contractor Services if resources allow.

P-4.1.025 Combined Generator Control Module Replacement

Background

The Combined Generator Control Modules (CGCM) are an integral part of the Cogen system and they are responsible for managing the exciter on the generators. The existing CGCMs are becoming obsolete and will only be supported until 2021. There are six existing CGCMs.

Description

This project will include the following:

- Identify new CGCMs to replace the existing ones.
- Replace the six CGCMs.

Justification/Consequences

The CGCMs are an integral part of the Cogen system. The existing CGCMs are becoming obsolete and will only be supported until 2021.

Project Delivery

Purchase-Installed by EWA. Alternatively, EWA may consider implementation under planned asset rehabilitation (General Services department).

P-4.1.026 Cogen Generator Maintenance

This project has currently been identified as a study. Information on this project can be found in Section 4.

P-4.1.027 Cogen Engine Room Ventilation

This project has currently been identified as a study. Information on this project can be found in Section 4.

5.5 General

5.5.1 Odor Control

P-5.1.001 ORF I System Rehabilitation

Background

The existing headworks facilities were constructed in 1982 as part of Phase III project and some improvements were completed during Phase IV expansion project. Ductwork modifications were constructed in 1995 and in 1997 to improve odor control in the headworks. The odor reduction facility (ORF) I unit was removed from service for media replacement in June 2017, at which time the unit was assessed to be in good working condition by V&A Consulting Engineers.



Figure 5-17: P-5.1.001, Existing Headworks Facility

Description

The August 2017 EWPCF by V&A Consulting Engineers provided the following recommendations for the ORF I unit:

- Rehabilitate coating on Level 1 and Level 2.
- Perform maintenance coating on roof-top ductwork.

Justification/Consequences

ORF I provides odor control for the headworks to primary treatment process and operation is required by an APCD permit.

Project Delivery

Design-Bid-Build

P-5.1.002 ORF Carbon Media Replacement

Background

ORF I, II, and III require replacement of activated carbon based on sulfur content of carbon sampled. The carbon is sampled on an annual basis and the carbon is replaced on an as-needed basis to meet permitting requirements.

Description

Replacement of activated carbon in ORF I, II, and/or III on an annual basis.

Justification/Consequences

The ORFs provide odor control for multiple treatment processes and replacement of activated carbon is necessary for odor control capacity.

Project Delivery

Design-Bid-Build

P-5.1.013 New Treatment System at ORF I

Background

ORF I is designed to collect and treat 40,000 cubic feet per minute of air drawn from the screenings building, the influent junction structure, the grit tanks, the PSB influent channels, the PSB effluent weir areas, and the PSB effluent channels. The existing system consists of one concrete biological scrubber tower (biotower), a biotower water supply system, one concrete carbon adsorber with four individual beds operated in parallel, one main foul air collection fan, one booster fan located at the PSB effluent channels, and fiberglass ductwork.

Description

The existing biotower, carbon adsorber, and fan located at ORF I will be demolished and replaced with a new biotower and carbon adsorber system sized for 59,000 cfm.

Justification/Consequences

An adequate and reliable odor control system at the Headworks is critical to operations at EWPCF given high hydrogen sulfide concentrations and the plant's proximity to residential areas. The existing system was constructed as part of the Phase III expansion in 1980 and is nearing the end of its useful life.

EWPCF needs odor control for the new Headworks annex and PSB headspace that is not currently treated. The proposed ORF I project would accommodate this additional capacity within one system. The new system would reduce the amount of plant water used in the biotower at ORF I, which currently causes the 3WL water pump and system to reach capacity limits under some circumstances. Carbon media life would be extended with more efficient removal of moisture, dust, and grease after the biotower. The new system would provide improved accessibility for operations staff to replace the carbon media.

Project Delivery

Design-Bid-Build

P-5.1.014 New Treatment System at ORF II

Background

ORF II is designed to collect and treat 31,000 cubic feet per minute of air drawn from the DAFT, the dried product loadout area, the Class B sludge loadout area, the centrifuge dewatering system, the baghouse filter treating air from the pellet silos, the wet scrubber in the Heat Dryer Building, and the FOG alternative fuel tanks. The air collection system has been modified during several phases of expansion to the solids handling system at EWPCF. ORF II consists of one concrete biological scrubber tower (biotower), a biotower water supply system, one concrete carbon adsorber with four individual beds operated in parallel, one main foul air collection fan,

one booster fan located at each of the DAFTs (three fans total), one booster fan located at the FOG tanks, and fiberglass ductwork.

Description

The existing biotower, carbon adsorber, and fan located at ORF II will be demolished and replaced with a new carbon adsorber system (Option A) sized for 50,000 cfm.

Justification/Consequences

An adequate and reliable odor control system for the solids handling facilities is critical to operations at EWPCF given the plant's proximity to residential areas. The existing system is almost 40 years old and nearing the end of its useful life. The air collection system was modified during the Phase V expansion to the solids handling system. ORF II has been experiencing performance challenges with regards to airflow and moisture and dust collecting in the system blinding the fan blades and carbon beds.

Upgrades to replace the existing DAFTs with RDTs and the future expansion of the heat dryer system will require additional odor control treatment. The proposed ORF II project would accommodate this additional capacity within one system.

Due to low concentrations of hydrogen sulfide from the foul air sources, it will difficult to maintain active biology in a biotower system. Carbon treatment is sufficient for odor control at this location. Two layers of different carbon media will allow for the removal of the inorganic hydrogen sulfide in the lower layer of the bed and the removal of organic reduced sulfur compound (RSC) and VOCS in the upper layer of the bed in place of a biotower.

The new system would lower maintenance requirements and provide improved accessibility for operations staff to replace the carbon media.

Project Delivery

Design-Bid-Build

P-5.1.015 New Treatment System at ORF III

Background

ORF III is designed to collect and treat 24,000 cfm of air drawn from the aeration basins, the mixed liquor channel, and the RAS channel. The existing system consists of two fiberglass chemical scrubbers, two 4-bed carbon adsorbers, two foul air fans, and fiberglass ductwork. In 2016, the chemical scrubbers were taken out of service and maintained to act as a dry pass-through for air to the carbon adsorbers. The chemical scrubber components that are no longer in use include recirculation tanks, three sodium hypochlorite feed pumps, one bulk sodium hypochlorite storage tank, three caustic feed pumps, one bulk caustic storage tank, one ion exchange water softener, and one carbon water treatment unit.

Description

The chemical scrubbers, chemical storage and feed system, carbon adsorbers, and fans located at ORF III will be demolished and replaced with a carbon adsorber system sized for 28,000 cfm.

Justification/Consequences

The existing system is almost 40 years old and nearing the end of its useful life. The existing chemical storage and feed equipment not in use is an unnecessary maintenance requirement and a safety risk to operations staff.

Project Delivery

Design-Bid-Build

5.5.2 Plant-Wide Systems

P-5.2.006 Plant Water Functional Improvements

Background

The *Plant and Potable Water System Study* by Dudek in 2013 provides a plant wide system inventory, data and evaluation of the plant water and potable water system at the EWPCF. The 2016 Process Master Plan used the study as a basis of design and provided recommendations for potable water and plant water system improvements. The key issue is summarized below:

- The plant water pump systems have been built in phases over the years and modified to allow space for other facilities. This has resulted in complex piping arrangements that reduce pump hydraulic performance.



Figure 5-18: P-5.2.006, Plant Water System Overview

Description

This project will implement the recommendation from the 2016 Process Master Plan. The following improvements were recommended for each system (refer to 2016 Process Master Plan for more information):

- Improvement A2 – New 1W System distribution network.
- Improvement E4 – Skid mounted centrifugal booster pumps.

Justification/Consequences

Operators experience significant operational issues, such as poor water quality, manual valve(s), and suction piping configurations that are beyond the recommended tolerances of the Hydraulic Institute and industry best practices.

Project Delivery

Design-Bid-Build

P-5.2.012 Site Security Facilities

Background

Access to the EWPCF must be restricted to authorized personnel to ensure the safety of the public and EWA staff, as well as prevention of vandalism or damage to facilities. Severe damage by intruders to areas such as control rooms or MCC facilities could cause a plant shutdown. EWA is seeking to improve the safety and security posture of its facilities to protect staff, property, and assets, and ensure continued and safe operation of the EWPCF.



Figure 5-19: P-5.2.012, Contractor Entrance to Site

TRC prepared a Draft Site Security Assessment of the EWPCF in September 2018 to identify security risks to the EWPCF. The 2018 Draft Site Security Assessment ranked the recommendation in four tiers; projects that reflect operation and constructible improvements that globally affect facility and Layer 1 security posture (Tier 1), upgrades that provide global electronic security improvements for all buildings and assets (Tier 2), additional security measures for high priority buildings and assets (Tier 3), and additional security measures for other buildings and assets (Tier 4).

EWA is planning to phase the security recommendations. This project will implement the Tier 1 recommendations (operational policies and procedures development, site perimeter improvements, and lighting system repairs and improvements). Implementation of Tier 2, Tier 3, and Tier 4 recommendations will be implemented in a later phase(s).

Description

The 2018 Draft Site Security Assessment recommended the following Tier 1 items:

- Develop a set of applicable security policies, procedures, and protocols to address security measures throughout the EWPCF and promulgate and enforce them.
- Establish a Security Management function to address identified security issues and manage the process of program development, upgrades, upkeep, and coordination.
- Replace the existing North and East perimeter fencing with a higher security chain-link type, install a similar type of fence on the South perimeter, and install enhanced security features or replace the West perimeter fence with a more secure type.
- Add illumination behind the Maintenance Annex in the northeast corner, and behind the Digesters and Maintenance Warehouse Building.
- Replace all burned-out light bulbs and repair all lighting circuits and controls that are not currently operable.
- Replace older, electro-mechanical timers with digitally programmable timers. Consider updating to compatible lighting controls that can be digitally managed by SCADA or TAC Management software.
- Ensure all light fixtures associated with camera deployment are kept on at night.

The 2018 Draft Site Security Assessment recommended the following Tier 2, Tier 3, and Tier 4 items:

- Deploy new cameras consistently throughout facilities providing coverage, and expand the existing network-based video recording and management system and integrate it

with the access control system to support the upgrades and simplify the distribution of system information and control.

- Expand Video Surveillance Systems (VSS) to support live surveillance and recording, automated, event-initiated monitoring, situation assessment, and forensic analysis modes of operation. Integrate with the Access Control System (ACS) to support passive monitoring modes, with intrusion detection devices configured to call-up appropriate cameras and push imaging onto control room monitors.
- Expand the ACS system to take full control of monitoring and managing portals for monitoring all security inputs, including intrusion detectors and door position switches.
- Integrate the ACS with the VSS to automate camera call-up, initiate alarm imaging, and push information to response personnel.
- Provide an ACS/VSS client monitoring workstation in the Operator Control Room.
- Add door/gate/hatch position monitoring devices where needed to complete the respective security layer monitoring.
- Add ACS card reader control to server, electrical, and other rooms.
- Install fence sensors on fences, motion/presence detection in exterior areas around critical assets, and interior motion or glass-break sensors to detect individuals.
- Provide operators a single user interface for the video, intrusion, and electronic ACS.

Justification/Consequences

This project is justified based on the safety of the public and EWA staff, as well as prevention of vandalism that could cause a plant shutdown.

Project Delivery

Design-Bid-Build

P-5.2.017 Instrument Air Piping Repairs

Background

High pressure service and instrument air systems serve instruments and support maintenance at locations throughout the EWPCF. Given the high level of corrosion observed at other buried ferrous pipe systems within the Plant site, there is concern regarding the condition of the instrument air piping system. Additionally, some of the needs of the system may have changed over the years as upgrades have been implemented, such as with ultrasonic level sensors having replaced bubblers for level instrumentation. This study will identify the current and future uses of instrument air as well as consideration of options such as repair or replacement of the system.

Description

A conceptual study was completed in 2014 to:

- Document current instrument air requirements.
- Determine condition of the existing system.
- Identify replacement piping configuration, pipe materials, and capacity requirements.
- Develop costs for proposed upgrades.
- Implement recommendations of the conceptual study.



Figure 5-20: P-5.2.017, Service Air/Washdown Station

Justification/Consequences

Failure of the instrument air system supporting monitoring such as level sensors could result in process disruption or overflow of basins on the Plant site. Unavailable instrument air utility stations may prevent the ability to maintain treatment facilities.

Project Delivery

Design-Bid-Build. Alternatively, EWA may choose to implement this project under P-5.4.006 As-Needed Contractor Services if resources allow.

P-5.2.019 Plant Landscaping

Background

New landscaping and irrigation systems were installed surrounding the Administration Building, Maintenance Building, main entrance and parking area, and employee parking area as part of the Building Program in 2006. EWA has also recently installed a new recycled water service. EWA is experiencing problems on the south side of the EWPCF with irrigation systems failing and being out of service. EWA has a need for erosion resistant, cost effective over the life cycle, low maintenance, possibly drought tolerant ground cover throughout the EWPCF.

Description

This project will assess the entire EWPCF and create sustainable landscaping and irrigation design guidelines for EWA's facilities transition to a sustainable, low-maintenance landscaped environment that is regionally appropriate, utilizes sustainable materials and construction practices, and conserves water resources. The design guidelines in this project should consider the existing soils, source and quality of irrigation water, water and soil requirements of selected plants, and plant material's ability to tolerate wind and coastal exposure and sun. The guidelines should promote landscaping integration with the overall aesthetic of EWA's facilities, reflect functional requirements of the EWPCF landscaping, minimize the potential for erosion, ensure low maintenance, and discourage pests.

Justification/Consequences

EWA is experiencing problems on the south side of the EWPCF with irrigation systems failing and being out of service. This project will provide for EWA's facilities transition to a sustainable, low-maintenance landscaped environment that is regionally appropriate, utilizes sustainable materials and construction practices, and conserves water resources.

Project Delivery

Design-Bid-Build

P-5.2.021 Climate Control at MCCs and Cogen Building

Background

MCC equipment generates heat, and most buildings housing MCCs at the EWPCF are not equipped with climate control such as HVAC units. Doors to the MCC buildings can be left open to provide cooling for the equipment and personnel working in the building. However, leaving the door open creates potential for intruders to enter and harm themselves and the facility. Open doors also expose equipment to dust, moisture, vermin, and corrosion which could shorten the life of equipment, particularly electronic equipment. This project would provide climate control on MCCs and other electronic facilities.



Figure 5-21: P-5.2.021, SEEPS MCC Facility

The Cogen Engine Building is served by a chiller which does not function properly due to a few issues. The existing chiller at the Cogen Building was originally sized to serve the old administration and dewatering buildings. It is oversized for the existing load. The EWA operations have to increase the load artificially to get the unit operational. The 2017 HVAC Site Evaluation by DEC Engineers determined the chiller should be demolished based on the age of the equipment and the extent of the system currently abandoned.

Description

Implement the MCC Climate Control recommendations of the 2017 HVAC Site Evaluation summarized below:

- Utilize redundant VRF systems at all MCC rooms.
- Equipment should be coated with an aftermarket corrosion protection coating.
- HVAC equipment should be supplied with BMS controllers to communicate back to the HVAC front end server located in the administration building.
- MCC rooms should be insulated to current code minimums to minimize heat gains from outdoors.
- MCC rooms shall be weather sealed to prevent coastal air infiltration.

Below are the following MCC building and facility locations that are included in this project. The administration building improvements will be implemented under P-5.3.004 Admin Building Chiller Replacement.

- Cogen/Power MCC Room.
- Warehouse Building.

The following MCC HVAC improvements will be implemented as part of other CIPs:

- Primary/Screenings MCC Room (P-1.1.005 Primary Area Improvements).
- Secondary Process MCC Room (P-6.1.206 Secondaries Electrical and Control Improvements).
- Dewatering Process MCC Room (P-3.1.002 Solids Thickening Improvements).
- Combined Pump Station (CPS)/Secondary Effluent Equalization Pump Station (SEEPS) MCC Room (Done).

- Effluent Pump Station Chlorination MCC Room (P-1.4.002 Chlorine Building and EPS Improvements).

Justification/Consequences

Climate control will maintain electronic equipment such as MCCs within design temperature range operating parameters to realize longer service life. Currently, doors are opened to cool the rooms. Maintaining doors closed will minimize exposure of equipment to dust and extend equipment service life. This project will reduce the potential for intruders to enter and cause harm to themselves, equipment or the treatment process.

The Cogen Engine Building Chiller is reaching its typical useful life and it is oversized for current use.

Project Delivery
Design-Bid-Build

P-5.2.026 Plant Waste Stream Rerouting

This project has currently been identified as a study. Information on this project can be found in Section 4.

P-5.2.027 Plant-Wide Seal Coating

Background

A large portion of the EWPCF is covered with asphalt pavement. Periodic re-sealing (slurry seal) of the asphalt is required to maximize the service life of the pavement.

Description

- Joint seal existing cracks.
- Re-seal the existing paved areas.
- Re-paint parking outlines and other road markings.

Justification/Consequences

Asphalt pavement maintenance is required to provide safe and adequate access to the treatment plant facilities. Proper maintenance and repair will help maximize the service life of the existing pavement.

Project Delivery
Design-Bid-Build

P-5.2.032 Plant-Wide Asset Painting and Protective Coating

Background

This project will provide painting and protective coating to all outside piping and equipment for asset corrosion control on an annual basis.

P-5.2.033 Plant-Wide Abandoned Equipment Removal

Background

This project will provide services for proper removal of the abandoned equipment at the EWPCF. A study has been performed to inventory all obsolete and abandoned equipment that will be removed and recommended a protocol for abandonment. Implementation of these recommendations is intended to occur with other capital improvement projects as well as independently at critical locations. This project may be completed through other capital projects occurring in the vicinity of the abandoned equipment or under P-5.4.006 As-Needed Contractor Services if resources allow.

P-5.2.034 New Potable Water System

This project has currently been identified as a study. Information on this project can be found in Section 4.

P-5.2.035 Storm Drainage Pump Station Improvements

Background

The Storm Drainage Pump Station (SDPS) was constructed circa 1983 to convey storm water runoff from the southern portion of the Plant, including the CWRF, to the Flood Control Channel (FCC) that bisects the Plant from east to west. The SDPS was evaluated in the 2017 Condition Assessment which can be referenced for more information.

Description

- Wet well and bypass channel
 - Repair exposed rebar.
 - Add 2 inches of grout to the bottom and sides of the beams using forms and grout.
- Discharge pipe thrust blocks and walkway slabs
 - Investigate if the settlement issue is active and stabilize if necessary.
 - Repair damaged thrust blocks and walkway slab.
- Discharge pipes
 - Replace discharge pipe elbows when thrust blocks are repaired.
- Pumps/motors/piping
 - Perform maintenance coating on areas exhibiting corrosion with a compatible, ultraviolet (UV) resistant coating.
 - Re-level pump mounting plate and check for misalignment.
- 24-inch sluice gate and flap gate
 - Check gate seats and repair if necessary.
 - Recoat gates.
- Perform study to evaluate overall operation of the SDPS including improvements to eliminate standing water following rain events.



Figure 5-22: P-5.2.035, Storm Drainage Pump Station after rain event

Justification/Consequences

Recommended improvements are from the 2017 Condition Assessment and should be implemented to prevent failure of the SDPS.

Project Delivery

Design-Bid-Build

P-5.2.036 Digester Area Drainage Improvements

Background

The existing Digester Area Storm Drain Pump Station handles runoff in the digester area and has the following deficiencies:

- The capacity of the wet well cannot handle peak storms.
- The pump has priming issues.
- System is not reliable.

Description

- Remove existing pump station manhole including the pumps.
- Install a new packaged lift station with adequate capacity to handle runoff from peak storms.

Justification/Consequences

Recommended improvements should be implemented to maximize the service life and prevent failure of the Digester Area Storm Drain Pump Station.

Project Delivery

Design-Bid-Build

P-5.2.037 2W System and Sand Filter Replacement

Background

The *Plant and Potable Water System Study* by Dudek in 2013 provides a plant wide system inventory, data and evaluation of the plant water and potable water system at the EWPCF. The 2016 Process Master Plan used the study as a basis of design and provided recommendations for potable water and plant water system improvements. The key issue is summarized below:

- The plant water pump systems have been built in phases over the years and modified to allow space for other facilities. This has resulted in complex piping arrangements that reduce pump hydraulic performance.



Figure 5-23: P-5.2.037, Plant Water System Overview

The 2014 Condition Assessment by RMC and the 2013 Dudek study evaluated the existing 2W Sand Filter. The existing sand filter (Parkson Dynasand Filter) processes 3WHP chlorinated plant secondary effluent to produce 2W water. The sand filter is not functioning properly as it is broken on the inside and water flows backwards through the filter. The water quality is

questionable. An assessment may need to be completed for a better or more appropriate technology.

Description

This project will implement the recommendation from the 2016 Process Master Plan. The following improvement was recommended for the 2W System (refer to 2016 Process Master Plan for more information):

- Improvement B1 – 2W System demand reduction.

The existing sand filter should be maintained per the recommendations of the 2014 Condition Assessment:

- Establish a sampling program to track water quality and monitor head loss.
- Replace filter media and float switch and assess the internal elements of the sand filter.
- Recoat the piping, valves, and appurtenances.
- Assessed replacement date of 2023.

Justification/Consequences

Operators experience significant operational issues, such as poor water quality, manual valve(s), and suction piping configurations that are beyond the recommended tolerances of the Hydraulic Institute and industry best practices.

The existing Parkson Dynasand Filter was installed in 1993 with an assumed service life of 25 years. Poor water quality of the 2W system has been noted and requires super chlorination to resolve red worm issues.

Project Delivery

Design-Bid-Build

P-5.2.038 Underground Electrical Structures Repair

Background

An Underground Electrical Structures Condition Assessment was prepared for the EWPCF in August 2016 by RMC Water and Environment. This assessment determined the remaining service life of 35 underground electrical structures including manholes (15) and handholes (20). The manholes and handholes evaluated in the 2016 Condition Assessment by RMC were constructed during the Phase III expansion to the EWPCF (circa 1981). Several additional underground electrical structures were constructed as part of the Phase V Administration and Operations Building project (circa 2008), so those relatively new structures were not included in the 2016 Condition Assessment by RMC as they were assumed to not require a condition assessment.

EWA has identified an area northeast of AB 4 where there is a problematic conduit that is presumed to be broken. EWA has had trouble in the past pulling wire for an equalization pump. The broken conduit appears to be broken between AB 4 and Electrical Manhole #2.

Description

The August 2016 Condition Assessment concluded the following:

- Electrical manholes (EMH)

- The manholes are in fair condition and some major cracks and water in vaults and splices/outlets that aren't waterproof were observed with noted maintenance.
- Extend the remaining useful service life for 10 years.
- Implement electrical code compliance items and non-code items.
- Establish quarterly inspection of electrical manholes specifically of sump pump operations.
- Electrical handholes (HH)
 - The handholes are in good to fair condition and few major cracks and water in vaults and splices/outlets that aren't waterproof were observed.
 - Extend the remaining useful service life for 10 years with noted maintenance.
 - Implement electrical code compliance items and non-code items.
 - Establish annual inspection of electrical handholes including checking for siltation.

This project will repair the electrical manholes and handholes. EWA is considering phasing the repair of these structures by addressing the top priority structures in the first phase (EMHs-12, 13, 14, and 15; and HHs-08 and 09). Repair of the remaining structures will be implemented in a later phase(s).

This project will also determine the location of the broken conduit between AB 4 and EMH #2 and repair it. EWA will repair the broken conduit along with the repair of the top priority structures in the first phase of work.

Justification/Consequences

Any interruption to the electrical supply of structures critical to conveying power to the EWPCF equipment and facilities could significantly disrupt operations. The broken conduit will be repaired so it can be used as a corridor for wires to be pulled through.

Project Delivery

Design-Bid-Build. Alternatively, EWA may choose to implement this project under P-5.4.006 As-Needed Contractor Services if resources allow.

P-5.2.039 E&I Manhole Monitoring

Background

There are 19 EMHs located at the EWPCF and each one is approximately 10 to 15 feet deep. The manholes are not sealed well, and they experience issues with rainwater intrusion or runoff from streets. EWA staff looks at the manholes approximately once per year.

Description

This project will include the following:

- Assess the feasibility of installing equipment in the manholes to monitor items such as water intrusion and temperature throughout the year.
- Install equipment in the manholes for monitoring activities.
- Reseal manholes as recommended in the assessment.

Justification/Consequences

Installing equipment to allow for monitoring the manholes throughout the year would be beneficial rather than once a year. The manholes should be resealed to promote prevention of rainwater and runoff intrusion.

Project Delivery

Design-Bid-Build

5.5.3 Buildings

P-5.3.004 Admin Building Chiller Replacement

Background

The administration building was constructed in 2005 and serves as a multi-purpose building and houses offices, a breakroom, lockers and showers, laboratories, and conference rooms. The HVAC system in the administration building is the most complex HVAC system at the EWPCF. The 2017 HVAC Site Evaluation by DEC Engineers evaluated the administration building HVAC system and known issues to provide recommendations for system optimization and building growth.

Description

This project will implement the recommendations for the administration building from the 2017 HVAC Site Evaluation as summarized below. The HVAC Site Evaluation should be referenced for more detailed information.

- Replace the existing boiler with a new boiler.
- Test and Balance existing air and hydronic systems.
- Replace faulty VFD drives.
- Upgrade BMS.
- Add variable air volume (VAV) diffusers to individual rooms.
- Replace leaking grooved pipe fittings.
- Provide specialized Outside Air Systems (OSA) intake filters.
- Provide spot cooling/heating to receptionist, dedicated system to incubator rooms, and backup system for control room.

Justification/Consequences

Ongoing problems have plagued the administration building and are beginning to negatively impact building performance and operations within the building. Additionally, system deficiencies have been negatively impacting operations since the first year in service. EWA has also identified HVAC modifications due to changes in building operations and modifications to include increased personnel and updated functional needs.

Project Delivery

Design-Bid-Build

P-5.3.013 Headworks Building Roof

Background

The Headworks Building (Screenings Building) was constructed in the 1980s and roof leaks during rain events have been observed by staff. A roof assessment by visual inspection was

performed by The Garland Company on August 23, 2018 and an Inspection Report was provided. The overall roofing condition was rated "Poor" and the roof perimeter is considered to be in failed condition. The Garland Company Inspection Report can be referenced for more information on the visual inspection. Replacement of the roof was recommended.

Description

Solution for a new roofing system shall consists of:

- Wind Uplift Calculations up to 120mph.
- Local Fire Ratings.
- Title 24 Compliance.
- Asbestos Removal.
- Cold Applied Modified Roofing System.
- Metal Wall Panels replacing tile on steep slope.
- Project Management by Garland Manufacturer.
- 30-year warranty product and labor warranty for low slope roofing.
- Specific details and specifications will be provided.

Justification/Consequences

The Headworks Building roof is in poor condition with a failed perimeter and leaks during rain events.

Project Delivery

Design-Bid-Build. EWA may choose to implement this project with P-1.1.005 Primary Area Improvements depending on the progress of the project.

P-5.3.014 Cogen Building Roof

Background

The Cogen Building (Power Building) was constructed in the 1980s and it is anticipated the roof condition is similar to that of the Headworks Building. The Cogen Building roof has three separate areas that each need assessment and likely replacement. It is anticipated this work would be grouped with the Climate Control at MCCs and Cogen Building (P-5.2.021).

Description

An assessment by visual inspection should be performed to determine recommended repairs. This project will implement the recommendations of the assessment by visual inspection which are yet to be determined.

Justification/Consequences

The Cogen Building roof is aging and is believed to be in poor condition. Leaks in the roof have been identified during rain events.

Project Delivery

Design-Bid-Build. EWA may choose to implement this project with P-5.2.021 Climate Control at MCCs and Cogen Building depending on the progress of the project.

P-5.3.015 Dewatering and Secondaries Building Assessment

This project has currently been identified as a study. Information on this project can be found in Section 4.

P-5.3.016 Cogen Wall Repair

Background

The Cogen Building is a two-story structure that was originally constructed during the Phase III Enlargement and Upgrading Project in 1980. The building houses a Shop and Storage Room, a MCC and Switchgear Room, a Blower Room, and an Engine Room on the ground floor as well as a second floor Ventilation Room. The building is comprised of 12-inch thick (nominal) reinforced solid-grouted non-bearing CMU walls that act as the lateral force-resisting system (LFRS). The building has a separate gravity-resisting system comprised of steel beams and columns embedded within the CMU block walls. The building is supported by a 12-inch thick concrete mat foundation with a thickened footing along the perimeter and beneath all interior 12 inches CMU walls that have embedded steel framing.

Investigation into the wall structural damage led to the discovery of corroded air intake louvers and shrouds at the Ventilation Room. The corrosion allowed water to leak into the wall where it led to the corrosion of the CMU block and steel framing members. The loose masonry and stucco were removed to expose corroded reinforcing steel and corroded webs and flanges of the embedded columns and beams that support the roof and floor levels. Refer to the *Encina Wastewater Authority Power Building Wall Structural Repair – Preliminary Design Report* by Carollo Engineers, Draft October 2018 for additional information.

Description

Structural Repairs:

- Sawcut around the deteriorated concrete a minimum of 3/4 inch and remove all deteriorated concrete and all signs of corrosion from the exposed steel elements.
- Supplemental bars shall be installed as required where existing reinforcement has lost a significant percentage of its cross-sectional area.
- The embedded steel beams and columns in the wall are beyond repair and require replacing.
- The ground floor columns will be replaced with new columns located on the interior of the building.
- Further analyze the extent of the deterioration of the Ventilation Room floor metal deck.
- Install a new connection along the north wall to increase the shear capacity of the Ventilation Room floor to transfer seismic shears.
- Install a roll-up door.

Mechanical Repairs:

- Replace the louvers with a wind-driven rain type louver.
- Install a rain gutter on the exterior wall, below the louvers, to catch the moisture that falls off the sills and drain it away from the building.
- Replace the plenums due to the corrosion and lack of drainability.

- Replace the fans since the fans are nearing their end of life and the vibration dampers are worn out.
- Modify/shift Blower Room ducts to allow for installation of the columns.

Justification/Consequences

The Cogen Building exterior wall has significant deterioration of the west wall that requires immediate repair.

Project Delivery

Design-Bid-Build

5.5.4 Miscellaneous

P-5.4.004 Vallecitos Sample Vault Installation

Background

Vallecitos Water District, one of the EWA's member agencies, is located east of the EWPCF and treats wastewater to produce secondary effluent. The treated secondary effluent is conveyed to EWPCF and enters the outfall pipeline. Secondary effluent from Vallecitos' Meadowlark Water Reclamation Facility travels through a 24-inch pipe, enters the east side of the EWPCF and heads toward the west side of the property. The 24-inch line runs in front of the maintenance building to a failsafe vault where it turns into a 30-inch line and travels to a surge tower. The surge tower collects the secondary effluent from Vallecitos and the EWPCF and discharges it into the 84-inch ocean outfall pipeline. The existing sampling station is located along the 84-inch ocean outfall pipeline.

Description

Currently there is no water quality testing on the secondary effluent from Vallecitos. This project will provide the second sampling station along the 24-inch Vallecitos line.

Justification/Consequences

For EWA to have a better understanding of all the water quality constituents that are discharged, testing of the secondary effluent from Vallecitos is necessary.

Project Delivery

Design-Bid-Build

P-5.4.005 Implement Minor Condition Assessment Recommendations

Background

Condition assessments are routinely performed at the EWPCF and various project are identified from the report recommendations.

Descriptions

This project implements miscellaneous, small cost recommendations from the condition assessment process on an annual basis.

Justification/Consequences

Small cost recommendations from the condition assessment process should be implemented on an as-needed basis.

Delivery

As-Needed Contract

P-5.4.006 As-Needed Contractor Services

Background

An As-Needed Contractor will provide on-call construction services. The as-needed services contract is an annual contract for contractor services for needs that develop throughout the fiscal year.

Description

The As-Needed Contractor will perform construction activities at the EWPCF as directed by EWA.

Justification/Consequences

Various construction projects are needed through the fiscal year and can be performed by the As-Needed Contractor without a formal bidding process. This project gives EWA the opportunity to more efficiently proceed with high impact, lower value items that come out of the annual condition assessments and do not easily fit within existing CIPs. There are many minor improvements/rehabilitations that have been able to be executed with the addition of this project, and this effort addresses the backlog.

Delivery

As-Needed Contract

P-5.4.007 Miscellaneous Building Rehabilitation

Background

There are several buildings located at the EWPCF which may require miscellaneous rehabilitation and repair at times.

Description

This project implements, on an annual basis, small cost miscellaneous building rehabilitation and repair that may be identified throughout the fiscal year. These projects may include temporary facilities if necessary.

Justification/Consequences

Small cost miscellaneous building rehabilitation recommendations should be implemented on an as-needed basis.

Delivery

As-Needed Contract

5.6 Technology

5.6.1 Operations Technology

5.6.1.1 Special Studies

Not used.

5.6.1.2 Enterprise SCADA

P-6.1.205 Network Improvements

Background

Recently, EWA changed the process for modifying the EWPCF SCADA system to replace obsolete controls systems, maintain better control, and achieve uniformity of the end product, in particular the operator interface. A new plant-wide network, control room, and server rooms are required to support this. Refer to the *Plant-wide Network Design* Technical Memorandum by Enterprise Automation (January 25, 2019) for detailed information on the Network Improvements. This project will include a SCADA Integrator contracted directly to EWA, and SCADA system program management and planning and oversight of the Integrator's work will be performed by a SCADA Consultant that is contracted directly to EWA.

Description

This project will include the following:

- Install a new fiber backbone running to all process areas and server rooms located throughout the plant.
- Improvements to the existing Control Room
- Construct a new Primary Server Room (at the existing Maintenance Storage Room of the Cogen Building)
- Construct a Secondary Server Room (at the existing General Services Building server room)
- Replace and upgrade electrical systems and instrumentation as required.

Justification/Consequences

Network Improvements are required to replace aging critical infrastructure and achieve the desired level of automation as part of the Operational Technology (OT) System Implementation Plan.

Project Delivery

Design-Build

P-6.1.206 Secondaries Electrical and Controls Improvements

Background

Recently, EWA changed the process for modifying the EWPCF SCADA system to replace obsolete controls systems, maintain better control, and achieve uniformity of the end product, in particular the operator interface. SCADA system modifications and additions will be made by a SCADA Integrator contracted directly to EWA, and SCADA system program management and planning and oversight of the Integrator's work will be performed by a SCADA Consultant that is

contracted directly to EWA. This project will include modifications to the Secondaries SCADA system and electrical system.

MCC equipment generates heat, and most buildings housing MCCs at the EWPCF are not equipped with climate control such as HVAC units. Doors to the MCC buildings can be left open to provide cooling for the equipment and personnel working in the building. However, leaving the door open creates potential for intruders to enter and harm themselves and the facility. Open doors also expose equipment to dust, moisture, vermin, and corrosion which could shorten the life of equipment, particularly electronic equipment. This project will provide climate control on MCCs and other electronic facilities.

Description

This project will include replacing the aging MCCs, instrumentation, PLCs, etc. required for the new SCADA system. The project also includes implementing the MCC Climate Control recommendations of the 2017 HVAC Site Evaluation summarized below for the Secondary Process MCC room:

- Utilize redundant VRF systems at all MCC rooms.
- Equipment should be coated with an aftermarket corrosion protection coating.
- HVAC equipment should be supplied with BMS controllers to communicate back to the HVAC front end server located in the administration building.
- MCC rooms should be insulated to current code minimums to minimize heat gains from outdoors.
- MCC rooms shall be weather sealed to prevent coastal air infiltration.

Justification/Consequences

SCADA and electrical upgrades are required to replace aging critical infrastructure and achieve the desired level of automation as part of the OT System Implementation Plan.

Climate control will maintain electronic equipment such as MCCs within design temperature range operating parameters to realize longer service life. Currently, doors are opened to cool the rooms. Maintaining doors closed will minimize exposure of equipment to dust and extend equipment service life. This project will reduce the potential for intruders to enter and cause harm to themselves, equipment or the treatment process.

Project Delivery

Design-Bid-Build

P-6.1.207 Cogen Electrical and Controls Improvements

Background

Recently, EWA changed the process for modifying the EWPCF SCADA system to replace obsolete controls systems, maintain better control and achieve uniformity of the end product, in particular the operator interface. SCADA system modifications and additions will be made by a SCADA Integrator contracted directly to EWA, and SCADA system program management and planning and oversight of the Integrator's work will be performed by a SCADA Consultant that is contracted directly to EWA. This project will include modifications to the Cogen SCADA system and electrical system.

Description

This project will include the following:

- Assess the SCADA and electrical upgrades required to achieve the desired level of automation.
- Replace aging MCCs, instrumentation, PLCs, etc. as identified.
- Upgrade electrical systems to adequately supply power to the SCADA upgrades.

Justification/Consequences

SCADA and electrical upgrades are required to replace aging critical infrastructure and achieve the desired level of automation as part of the OT System Implementation Plan.

Project Delivery

Design-Bid-Build

P-6.1.208 CPS/SEEPS Electrical and Controls Improvements

Background

Recently, EWA changed the process for modifying the EWPCF SCADA system to replace obsolete controls systems, maintain better control and achieve uniformity of the end product, in particular the operator interface. SCADA system modifications and additions will be made by a SCADA Integrator contracted directly to EWA, and SCADA system program management and planning and oversight of the Integrator's work will be performed by a SCADA Consultant that is contracted directly to EWA. This project will include modifications to the CPS/SEEPS SCADA system and electrical system. These systems are tied to the CWRF just south of the EWPCF.

Description

This project will include the following:

- Assess the SCADA and electrical upgrades required to achieve the desired level of automation.
- Replace aging MCCs, instrumentation, PLCs, etc. as identified.
- Upgrade electrical systems to adequately supply power to the SCADA upgrades.

Justification/Consequences

SCADA and electrical upgrades are required to replace aging critical infrastructure and achieve the desired level of automation as part of the OT System Implementation Plan.

Project Delivery

Design-Bid-Build

5.6.1.3 Information Driven

Not used.

5.6.1.4 Operations Improvement

P-6.1.408 Business and SCADA Wireless Networks

Background

EWA is looking to upgrade both the business and SCADA wireless networks throughout the EWPCF. EWA would like to achieve better service and connectivity throughout the EWPCF.

Additionally, EWA is looking to upgrade the current paging system to an Internet Protocol (IP) based paging system. The software system to support this is already in place, but the hardware (IP horns and speakers), licensing, and wiring is needed.

Description

This project will include the following:

- Upgrade the business wireless network.
- Upgrade the SCADA wireless network.
- Replace paging system to an IP based system for the EWPCF.

Justification/Consequences

Upgrading the business and SCADA wireless networks will allow for better connectivity throughout the EWPCF, allow staff to take tablets into the field, and promote overall efficiency. The core of the current paging system resides in the server room, but the distribution of the signal comes from a 'shack' connected to the effluent building that is infested with termites. EWA cannot transition easily from the currently used technology but moving to an IP based paging system would ease this transition.

Project Delivery

Design-Bid-Build

5.6.1.5 SCADA Asset Management

P-6.1.514 As-Needed Integration Services

Background

The EWPCF SCADA system will be upgraded per the OT System Implementation Plan. An As-Needed Integration Contractor will provide on-call integration services. The as-needed services contract is an annual contract for contractor services for needs that develop throughout the fiscal year.

Description

The As-Needed Integration Contractor will perform small cost integration work at the EWPCF as directed by EWA.

Justification/Consequences

Various integration services and projects are needed through the fiscal year and can be performed by the As-Needed Integration Contractor without a formal bidding process.

Project Delivery

As-Needed Contract

5.6.2 Business Technology

5.6.2.1 Technology and Data Governance

Not used.

5.6.2.2 Business Management Enhancements

Not used.

5.6.2.3 Regulatory Compliance

Not used.

5.6.2.4 Asset Management

Not used.

5.6.2.5 Capital Program Management

Not used.

5.6.2.6 Document/Records Management

Not used.

5.6.2.7 Information Technology Infrastructure

P-6.2.705 Host Server Replacement - IT

Background

EWA uses two sets of host servers and there are four to a set. The first set of servers is for IT. The host servers should be replaced every six years based on need and needs changes. The Information Technology (IT) servers are reaching their useful life and should be replaced in FY2020.

Description

This project will include the following:

- Prepare a schedule for replacement of the IT host servers.
- Replace the IT servers.

Justification/Consequences

The IT host servers are vital for communication activities at the EWPCF. These servers should be replaced on a regularly scheduled basis.

Project Delivery

Purchase and installation by EWA

P-6.2.706 Host Server Replacement - OT

Background

EWA uses two sets of host servers and there are four to a set. The second set of servers is for SCADA. The host servers should be replaced every six years based on need and needs changes. The OT servers were recently replaced and should be scheduled for replacement in FY2025.

Description

This project will include the following:

- Prepare a schedule for replacement of the SCADA host servers.
- Replace the OT servers.

Justification/Consequences

The OT host servers are vital for communication activities at the EWPCF. These servers should be replaced on a regularly scheduled basis.

Project Delivery

Purchase and installation by EWA

P-6.2.707 Storage Area Network Replacement

Background

The Storage Area Network (SAN) provides storage for emails, files, server operating systems, and other computer and electronic data. The SAN should be replaced every six years. The current SAN has been in operation for approximately one year and should be scheduled for replacement in FY2024.

Description

This project will include the following:

- Prepare a schedule for replacement of the SAN.
- Replace the SAN.

Justification/Consequences

The SAN is vital for data and information storage for the EWPCF. The SAN should be replaced on a regularly scheduled basis.

Project Delivery

Purchase and installation by EWA

Section 6: Project Evaluation and Prioritization

After the E-CAMP projects have been identified, each project is individually evaluated, ranked, and scored based on a set of selected evaluation criteria. The projects are then prioritized using a comparison of project scores versus project costs. This section describes the process of evaluating and prioritizing projects which is a step towards development of a project schedule and cash flow.

6.1 Evaluation Criteria

The six evaluation criteria for evaluating projects are listed and defined below.

1. **Safety** – This criterion assesses improvements required to maintain a safe working environment for EWA personnel and visitors as well as the impact that a project will have on the risk of an accident occurring.
2. **Regulatory Compliance** – This criterion assesses the ability of a project to impact compliance with current and/or anticipated regulatory requirements.
3. **Reliability** – This criterion assesses the timeframe in which existing assets related to a project will reach the end of their useful life and the potential consequence of the assets reaching the end of their useful life before replacement or rehabilitation.
4. **Public and EWA Impacts** – This criterion assesses the impact that a project will have on odor conditions, sound levels, appearance (sight), and traffic levels to EWA and the public at and beyond the EWPCF.
5. **Energy Efficiency** – This criterion assesses the energy effectiveness and benefits of implementing a project through a reduction in energy usage and increase in energy self-sufficiency.
6. **Organizational Efficiency** – This criterion assesses the ability of a project to impact EWA's capacity to manage resources, achieve goals, and create a positive working environment for personnel.

The six evaluation criteria have been assigned a criticality factor from 1 to 6 with 1 representing the lowest level of importance and 6 representing the highest. Each criticality factor has been uniquely assigned to each evaluation criteria. The assigned criticality factors stay with their corresponding evaluation criteria throughout the project evaluation process. The criticality factor assigned to an evaluation criterion reflects the relative level of importance of each criterion. Table 6-1 provides the evaluation criteria and their assigned criticality factors.

Table 6-1: Evaluation Criteria

Evaluation Criteria	Criticality Factor
Safety	6
Regulatory Compliance	5
Reliability	4
Public and EWA Impacts	3
Energy Efficiency	2
Organizational Efficiency	1

6.2 Impact Factors

Each project has been assigned an impact factor across each of the six defined evaluation criteria from 0 to 5. An impact factor of 0 represents the lowest (minimum) factor and 5 represents the highest (maximum) factor. The impact factors provide a relative comparison of each project's ability to satisfy each of the defined evaluation criteria. Table 6-2 provides the parameters that were used for assigning impact factors to projects against the evaluation criteria.

6.3 Evaluation Scoring Results

The impact factors assigned to a project for each evaluation criteria are then multiplied by the criticality factor of the evaluation criteria to calculate criteria scores as seen in the formula below.

$$\text{Criteria Score} = \text{Criticality Factor} * \text{Impact Factor}$$

The six criteria scores are then summed to determine the evaluation score for each project. The scoring results for FY2020 E-CAMP projects are provided in Table 6-3 by ascending project number and in Table 6-4 by descending score. These scoring results demonstrate the overall beneficial impact to the EWA organization in meeting its mission, goals and objectives.

Projects in the E-CAMP may either need to be funded and initiated or may have already been initiated but still require more funding. Projects that have already been initiated but still require more funding are not scored in the E-CAMP since they have previously been selected for implementation. Projects that are reoccurring, such as on an annual basis, need to be funded and initiated each time they are scheduled to occur. Reoccurring projects are not scored in the E-CAMP as they are operationally necessary or regulatorily required. Additionally, condition assessments, engineering services, special studies, and other services are not scored.

Table 6-2: Project Impact Factor Parameters

Impact Factor	Evaluation Criteria					
	Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency
5	Significant improvements to safe working conditions and/or reduction in risk of an accident occurring	Significant beneficial impact to complying with current and/or future regulatory requirements	Asset end of useful life is imminent and has significant/major consequences if reached	Significant beneficial impact to odor conditions, sound levels, appearance, and/or traffic levels at and beyond the EWPCF.	Significant reduction in energy usage and increase in self-sufficiency	Significant beneficial impacts to resource management, achieving goals, and creating a positive working environment
4	Major improvements to safe working conditions and/or reduction in risk of an accident occurring	Major beneficial impact to complying with current and/or future regulatory requirements	Asset end of useful life is nearing and has significant/major consequences if reached	Major beneficial impact to odor conditions, sound levels, appearance, and/or traffic levels at and beyond the EWPCF.	Major reduction in energy usage and increase in self-sufficiency	Major beneficial impacts to resource management, achieving goals, and creating a positive working environment
3	Moderate improvements to safe working conditions and/or reduction in risk of an accident occurring	Moderate beneficial impact to complying with current and/or future regulatory requirements	Asset end of useful life is imminent and has moderate/minor consequences if reached	Moderate beneficial impact to odor conditions, sound levels, appearance, and/or traffic levels at and beyond the EWPCF.	Moderate reduction in energy usage and increase in self-sufficiency	Moderate beneficial impacts to resource management, achieving goals, and creating a positive working environment
2	Minor improvements to safe working conditions and/or reduction in risk of an accident occurring	Minor beneficial impact to complying with current and/or future regulatory requirements	Asset end of useful life is nearing and has moderate/minor consequences if reached	Minor beneficial impact to odor conditions, sound levels, appearance, and/or traffic levels at and beyond the EWPCF.	Minor reduction in energy usage and increase in self-sufficiency	Minor beneficial impacts to resource management, achieving goals, and creating a positive working environment
1	Insignificant improvements to safe working conditions and/or reduction in risk of an accident occurring	Insignificant beneficial impact to complying with current and/or future regulatory requirements	Asset end of useful life is far-off and has minor or greater consequences if reached	Insignificant beneficial impact to odor conditions, sound levels, appearance, and/or traffic levels at and beyond the EWPCF.	Insignificant reduction in energy usage and increase in self-sufficiency	Insignificant beneficial impacts to resource management, achieving goals, and creating a positive working environment
0	No improvements to safe working conditions and/or reduction in risk of an accident occurring	No beneficial impact to complying with current and/or future regulatory requirements	Asset end of useful life is far-off and has insignificant/no consequences if reached	No beneficial impact to odor conditions, sound levels, appearance, and/or traffic levels at and beyond the EWPCF.	No reduction in energy usage and increase in self-sufficiency	No beneficial impacts to resource management, achieving goals, and creating a positive working environment

Table 6-3: Project Scoring - Ascending Project Number (continued)

Project No.	Capital Project	Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency	Total Score	FY2020 ECAMP Costs
		6	5	4	3	2	1	105 Max	
P - 2.1.002	Ocean Outfall Maintenance and Inspection - External	These projects were not scored as they are reoccurring.						NS	\$ 103,000
P - 2.1.005	Ocean Outfall Bathymetric Survey - External							NS	\$ 109,000
P - 2.1.006	Ocean Outfall - Integrity Assessment							NS	\$ 226,000
P - 2.1.007	84-inch Outfall Inspection - Internal							NS	\$ 170,000
P - 4.1.005	Cogen Engine Top-End Overhaul							NS	\$ 169,000
P - 4.1.006	Cogen Engine In-Frame Overhaul							NS	\$ 429,000
P - 4.1.007	Cogen Engine Full Overhaul							NS	\$ 505,000
P - 5.1.002	ORF Carbon Media Replacement							NS	\$ 101,000
P - 5.2.032	Plant-Wide Asset Painting and Protective Coating							NS	\$ 155,000
P - 5.4.005	Implement Minor Condition Assessment Recommendations							NS	\$ 150,000
P - 5.4.006	As-Needed Contractor Services							NS	\$ 1,000,000
P - 5.4.007	Miscellaneous Building Rehabilitation							NS	\$ 150,000
P - 6.1.514	As-Needed Integration Services							NS	\$ 200,000
P - 6.2.705	Host Server Replacement - IT							NS	\$ 89,000
P - 6.2.706	Host Server Replacement - OT							NS	\$ 89,000
P - 6.2.707	Storage Area Network Replacement							NS	\$ 166,000
P - 1.1.005	Primary Area Improvements	This project was not scored as it is already in progress.						NS	\$ 17,478,000
P - 1.2.002	Primary Sludge Pumping Upgrades	0	1	3	2	3	5	34	\$ 653,000
P - 1.2.009	PSB Mechanical Rehab - Short Term	0	0	5	0	0	5	25	\$ 3,910,000
P - 1.2.010	Primary Sedimentation Basins Scum and Centrate Pipeline Replacement	0	2	5	0	2	5	39	\$ 273,000
P - 1.2.013	PSB Mechanical Rehab - Medium Term	0	0	3	0	0	3	15	\$ 2,610,000
P - 1.2.014	PSB Structural Rehab	0	0	2	0	0	3	11	\$ 12,167,000
P - 1.3.007	Secondary Clarifiers and Strainers Improvements	This project was not scored as it is already in progress.						NS	\$ 5,501,000
P - 1.3.008	SC 7 - Conversion from EQ to Clarifier	0	0	0	0	0	2	2	\$ 2,719,000
P - 1.3.010	WAS Pipeline Replacement	0	0	3	0	0	1	13	\$ 448,000
P - 1.3.018	AB Anaerobic Selector Zones	0	2	0	0	5	2	22	\$ 1,239,000
P - 1.3.019	Control Strategy Improvements	0	0	0	0	0	2	2	\$ 101,000
P - 1.3.020	Dewatering Wells in the Secondary Area	0	0	0	0	0	3	3	\$ 25,000
P - 1.3.021	Return Activated Sludge Solids Deposition	0	0	4	3	0	4	29	\$ 42,000
P - 1.3.022	Outfall Flow Equalization Basin Settlement	2	3	2	2	0	0	41	\$ 1,005,000
P - 1.4.001	Effluent Pumps Improvements	0	0	2	0	3	2	16	\$ 25,000
P - 1.4.002	Chlorine Building and EPS Improvements	3	0	4	0	2	2	40	\$ 4,080,000

Table 6-3: Project Scoring - Ascending Project Number (continued)

Project No.	Capital Project	Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency	Total Score	FY2020 ECAMP Costs
		6	5	4	3	2	1	105 Max	
P - 1.4.004	EPS Pipe Lining and Abandoned Pipe Coating Repair	0	2	4	0	0	4	30	\$ 1,457,000
P - 2.1.008	Secondary Effluent Land Outfall Improvements	2	2	3	2	0	4	44	\$ 567,000
P - 3.1.002	Solids Thickening Improvements	This project was not scored as it is already in progress.						NS	\$ 14,937,000
P - 3.2.004	Biosolids Screening Facility	0	0	0	1	1	4	9	\$ 3,734,000
P - 3.2.013	Digester Rehabilitation and Improvements	This project was not scored as it is already in progress.						NS	\$ 14,753,000
P - 3.3.001	MCC and Conductors Replacement - Power Building	2	0	4	0	0	3	31	\$ 3,004,000
P - 3.3.004	Pellet Bagging Facilities	2	0	0	0	0	4	16	\$ 478,000
P - 3.3.006	Second Dryer and Centrifuge Replacement	0	2	3	0	2	3	29	\$ 38,644,000
P - 3.3.025	Existing Dryer Components Rehab and Interim Dryer Improvements	2	0	4	3	0	3	40	\$ 50,000
P - 4.1.008	Cogen Engine 5 Installation	0	0	0	0	3	3	9	\$ 2,527,000
P - 4.1.010	Cogen Engine 6 Installation	0	0	0	0	0	2	2	\$ 2,527,000
P - 4.1.012	Heat Loop Bypass Installation	0	2	0	0	5	5	25	\$ 225,000
P - 4.1.014	Retrofit Miscellaneous Equipment with VFDs	0	0	1	0	2	4	12	\$ 945,000
P - 4.1.015	Cogen Engine Catalyst System and Gas Conditioning Facilities	0	2	0	0	4	3	21	\$ 4,621,000
P - 4.1.022	Turbo Blower Upgrade	0	0	2	0	5	5	23	\$ 3,822,000
P - 4.1.024	Automate Main Breakers in Cogen	5	0	0	0	0	5	35	\$ 69,000
P - 4.1.025	Combined Generator Control Module Replacement	0	0	4	0	3	4	26	\$ 201,000
P - 4.1.026	Cogen Generator Maintenance	0	0	3	0	3	4	22	\$ 25,000
P - 4.1.027	Cogen Engine Room Ventilation	0	0	3	0	3	4	22	\$ 25,000
P - 5.1.001	ORF I System Rehabilitation	0	2	4	3	0	2	37	\$ 107,000
P - 5.1.013	New Treatment System at ORF I	0	1	3	3	0	1	27	\$ 13,146,000
P - 5.1.014	New Treatment System at ORF II	0	1	3	3	0	1	27	\$ 6,310,000
P - 5.1.015	New Treatment System at ORF III	0	1	2	2	0	1	20	\$ 4,106,000
P - 5.2.006	Plant Water Functional Improvements	0	0	3	0	1	4	18	\$ 1,216,000
P - 5.2.012	Site Security Facilities	3	1	0	0	0	3	26	\$ 439,000
P - 5.2.017	Instrument Air Piping Repairs	0	0	5	0	4	3	31	\$ 322,000
P - 5.2.019	Plant Landscaping	0	0	2	2	0	3	17	\$ 192,000
P - 5.2.021	Climate Control at MCCs and Cogen Building	1	2	4	0	2	4	40	\$ 798,000
P - 5.2.026	Plant Waste Stream Rerouting	0	2	1	2	2	3	27	\$ 25,000
P - 5.2.027	Plant-Wide Seal Coating	0	0	3	0	0	3	15	\$ 192,000
P - 5.2.033	Plant-Wide Abandoned Equipment Removal	2	0	0	0	0	3	15	\$ 435,000
P - 5.2.034	New Potable Water System	2	1	3	0	0	4	33	\$ 25,000
P - 5.2.035	Storm Drainage Pump Station Improvements	2	3	3	0	0	2	41	\$ 164,000

Table 6-3: Project Scoring - Ascending Project Number (continued)

Project No.	Capital Project	Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency	Total Score	FY2020 ECAMP Costs	
		6	5	4	3	2	1	105 Max		
P - 5.2.036	Digester Area Drainage Improvements	This project was not scored as it is already in progress.							NS	\$ 192,000
P - 5.2.037	2W System and Sand Filter Replacement	0	0	4	0	0	3	19	\$ 1,126,000	
P - 5.2.038	Underground Electrical Structures Repair	3	3	3	0	0	0	45	\$ 891,000	
P - 5.2.039	E&I Manhole Monitoring	0	0	0	0	0	4	4	\$ 785,000	
P - 5.3.004	Admin Building Chiller Replacement	0	0	4	0	0	3	19	\$ 1,227,000	
P - 5.3.013	Headworks Building Roof	3	0	4	0	0	4	38	\$ 251,000	
P - 5.3.014	Cogen Building Roof	2	0	4	0	0	4	32	\$ 667,000	
P - 5.3.015	Dewatering and Secondaries Building Assessment	2	0	4	0	0	3	31	\$ 25,000	
P - 5.3.016	Cogen Wall Repair	This project was not scored as it is already in progress.							NS	\$ 1,482,000
P - 5.4.004	Vallecitos Sample Vault Installation	0	2	0	0	0	0	10	\$ 92,000	
P - 6.1.205	Network Improvements	This project was not scored as it is already in progress.							NS	\$ 3,060,000
P - 6.1.206	Secondaries Electrical and Controls Improvements	0	0	4	0	0	4	20	\$ 2,344,000	
P - 6.1.207	Cogen Electrical and Controls Improvements	0	0	3	0	0	4	16	\$ 4,003,000	
P - 6.1.208	CPS/SEEPS Electrical and Controls Improvements	0	0	2	0	0	3	11	\$ 3,028,000	
P - 6.1.408	Business and SCADA Wireless Networks	0	0	3	0	0	5	17	\$ 201,000	

Costs shown in December 2018 dollars

NS = Not Scored

Table 6-4: Project Scoring - Descending Score (continued)

Project No.	Capital Project	Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency	Total Score	FY2020 ECAMP Costs
		6	5	4	3	2	1	105 Max	
P - 2.1.002	Ocean Outfall Maintenance and Inspection - External	These projects were not scored as they are reoccurring.						NS	\$ 103,000
P - 2.1.005	Ocean Outfall Bathymetric Survey - External							NS	\$ 109,000
P - 2.1.006	Ocean Outfall - Integrity Assessment							NS	\$ 226,000
P - 2.1.007	84-inch Outfall Inspection - Internal							NS	\$ 170,000
P - 4.1.005	Cogen Engine Top-End Overhaul							NS	\$ 169,000
P - 4.1.006	Cogen Engine In-Frame Overhaul							NS	\$ 429,000
P - 4.1.007	Cogen Engine Full Overhaul							NS	\$ 505,000
P - 5.1.002	ORF Carbon Media Replacement							NS	\$ 101,000
P - 5.2.032	Plant-Wide Asset Painting and Protective Coating							NS	\$ 155,000
P - 5.4.005	Implement Minor Condition Assessment Recommendations							NS	\$ 150,000
P - 5.4.006	As-Needed Contractor Services							NS	\$ 1,000,000
P - 5.4.007	Miscellaneous Building Rehabilitation							NS	\$ 150,000
P - 6.1.514	As-Needed Integration Services							NS	\$ 200,000
P - 6.2.705	Host Server Replacement - IT							NS	\$ 89,000
P - 6.2.706	Host Server Replacement - OT							NS	\$ 89,000
P - 6.2.707	Storage Area Network Replacement							NS	\$ 166,000
P - 5.2.038	Underground Electrical Structures Repair	3	3	3	0	0	0	45	\$ 891,000
P - 2.1.008	Secondary Effluent Land Outfall Improvements	2	2	3	2	0	4	44	\$ 567,000
P - 1.3.022	Outfall Flow Equalization Basin Settlement	2	3	2	2	0	0	41	\$ 1,005,000
P - 5.2.035	Storm Drainage Pump Station Improvements	2	3	3	0	0	2	41	\$ 164,000
P - 1.4.002	Chlorine Building and EPS Improvements	3	0	4	0	2	2	40	\$ 4,080,000
P - 3.3.025	Existing Dryer Components Rehab and Interim Dryer Improvements	2	0	4	3	0	3	40	\$ 50,000
P - 5.2.021	Climate Control at MCCs and Cogen Building	1	2	4	0	2	4	40	\$ 798,000
P - 1.2.010	Primary Sedimentation Basins Scum and Centrate Pipeline Replacement	0	2	5	0	2	5	39	\$ 273,000
P - 5.3.013	Headworks Building Roof	3	0	4	0	0	4	38	\$ 251,000
P - 5.1.001	ORF I System Rehabilitation	0	2	4	3	0	2	37	\$ 107,000
P - 4.1.024	Automate Main Breakers in Cogen	5	0	0	0	0	5	35	\$ 69,000
P - 1.2.002	Primary Sludge Pumping Upgrades	0	1	3	2	3	5	34	\$ 653,000
P - 5.2.034	New Potable Water System	2	1	3	0	0	4	33	\$ 25,000
P - 5.3.014	Cogen Building Roof	2	0	4	0	0	4	32	\$ 667,000
P - 3.3.001	MCC and Conductors Replacement - Power Building	2	0	4	0	0	3	31	\$ 3,004,000
P - 5.2.017	Instrument Air Piping Repairs	0	0	5	0	4	3	31	\$ 322,000

Table 6-4: Project Scoring - Descending Score (continued)

Project No.	Capital Project	Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency	Total Score	FY2020 ECAMP Costs
		6	5	4	3	2	1	105 Max	
P - 5.3.015	Dewatering and Secondaries Building Assessment	2	0	4	0	0	3	31	\$ 25,000
P - 1.4.004	EPS Pipe Lining and Abandoned Pipe Coating Repair	0	2	4	0	0	4	30	\$ 1,457,000
P - 1.3.021	Return Activated Sludge Solids Deposition	0	0	4	3	0	4	29	\$ 42,000
P - 3.3.006	Second Dryer and Centrifuge Replacement	0	2	3	0	2	3	29	\$ 38,644,000
P - 5.1.013	New Treatment System at ORF I	0	1	3	3	0	1	27	\$ 13,146,000
P - 5.1.014	New Treatment System at ORF II	0	1	3	3	0	1	27	\$ 6,310,000
P - 5.2.026	Plant Waste Stream Rerouting	0	2	1	2	2	3	27	\$ 25,000
P - 4.1.025	Combined Generator Control Module Replacement	0	0	4	0	3	4	26	\$ 201,000
P - 5.2.012	Site Security Facilities	3	1	0	0	0	3	26	\$ 439,000
P - 1.2.009	PSB Mechanical Rehab - Short Term	0	0	5	0	0	5	25	\$ 3,910,000
P - 4.1.012	Heat Loop Bypass Installation	0	2	0	0	5	5	25	\$ 225,000
P - 4.1.022	Turbo Blower Upgrade	0	0	2	0	5	5	23	\$ 3,822,000
P - 1.3.018	AB Anaerobic Selector Zones	0	2	0	0	5	2	22	\$ 1,239,000
P - 4.1.026	Cogen Generator Maintenance	0	0	3	0	3	4	22	\$ 25,000
P - 4.1.027	Cogen Engine Room Ventilation	0	0	3	0	3	4	22	\$ 25,000
P - 4.1.015	Cogen Engine Catalyst System and Gas Conditioning Facilities	0	2	0	0	4	3	21	\$ 4,621,000
P - 5.1.015	New Treatment System at ORF III	0	1	2	2	0	1	20	\$ 4,106,000
P - 6.1.206	Secondaries Electrical and Controls Improvements	0	0	4	0	0	4	20	\$ 2,344,000
P - 5.2.037	2W System and Sand Filter Replacement	0	0	4	0	0	3	19	\$ 1,126,000
P - 5.3.004	Admin Building Chiller Replacement	0	0	4	0	0	3	19	\$ 1,227,000
P - 5.2.006	Plant Water Functional Improvements	0	0	3	0	1	4	18	\$ 1,216,000
P - 5.2.019	Plant Landscaping	0	0	2	2	0	3	17	\$ 192,000
P - 6.1.408	Business and SCADA Wireless Networks	0	0	3	0	0	5	17	\$ 201,000
P - 1.4.001	Effluent Pumps Improvements	0	0	2	0	3	2	16	\$ 25,000
P - 3.3.004	Pellet Bagging Facilities	2	0	0	0	0	4	16	\$ 478,000
P - 6.1.207	Cogen Electrical and Controls Improvements	0	0	3	0	0	4	16	\$ 4,003,000
P - 1.2.013	PSB Mechanical Rehab - Medium Term	0	0	3	0	0	3	15	\$ 2,610,000
P - 5.2.027	Plant-Wide Seal Coating	0	0	3	0	0	3	15	\$ 192,000
P - 5.2.033	Plant-Wide Abandoned Equipment Removal	2	0	0	0	0	3	15	\$ 435,000
P - 1.3.010	WAS Pipeline Replacement	0	0	3	0	0	1	13	\$ 448,000
P - 4.1.014	Retrofit Miscellaneous Equipment with VFDs	0	0	1	0	2	4	12	\$ 945,000
P - 1.2.014	PSB Structural Rehab	0	0	2	0	0	3	11	\$ 12,167,000
P - 6.1.208	CPS/SEEPS Electrical and Controls Improvements	0	0	2	0	0	3	11	\$ 3,028,000
P - 5.4.004	Vallecitos Sample Vault Installation	0	2	0	0	0	0	10	\$ 92,000

Table 6-4: Project Scoring - Descending Score (continued)

Project No.	Capital Project	Safety	Regulatory Compliance	Reliability	Public and EWA Impacts	Energy Efficiency	Organizational Efficiency	Total Score	FY2020 ECAMP Costs
		6	5	4	3	2	1	105 Max	
P - 3.2.004	Biosolids Screening Facility	0	0	0	1	1	4	9	\$ 3,734,000
P - 4.1.008	Cogen Engine 5 Installation	0	0	0	0	3	3	9	\$ 2,527,000
P - 5.2.039	E&I Manhole Monitoring	0	0	0	0	0	4	4	\$ 785,000
P - 1.3.020	Dewatering Wells in the Secondary Area	0	0	0	0	0	3	3	\$ 25,000
P - 1.3.008	SC 7 - Conversion from EQ to Clarifier	0	0	0	0	0	2	2	\$ 2,719,000
P - 1.3.019	Control Strategy Improvements	0	0	0	0	0	2	2	\$ 101,000
P - 4.1.010	Cogen Engine 6 Installation	0	0	0	0	0	2	2	\$ 2,527,000
P - 1.1.005	Primary Area Improvements	This project was not scored as it is already in progress.						NS	\$ 17,478,000
P - 1.3.007	Secondary Clarifiers and Strainers Improvements	This project was not scored as it is already in progress.						NS	\$ 5,501,000
P - 3.1.002	Solids Thickening Improvements	This project was not scored as it is already in progress.						NS	\$ 14,937,000
P - 3.2.013	Digester Rehabilitation and Improvements	This project was not scored as it is already in progress.						NS	\$ 14,753,000
P - 5.2.036	Digester Area Drainage Improvements	This project was not scored as it is already in progress.						NS	\$ 192,000
P - 5.3.016	Cogen Wall Repair	This project was not scored as it is already in progress.						NS	\$ 1,482,000
P - 6.1.205	Network Improvements	This project was not scored as it is already in progress.						NS	\$ 3,060,000

Costs shown in December 2018 dollars

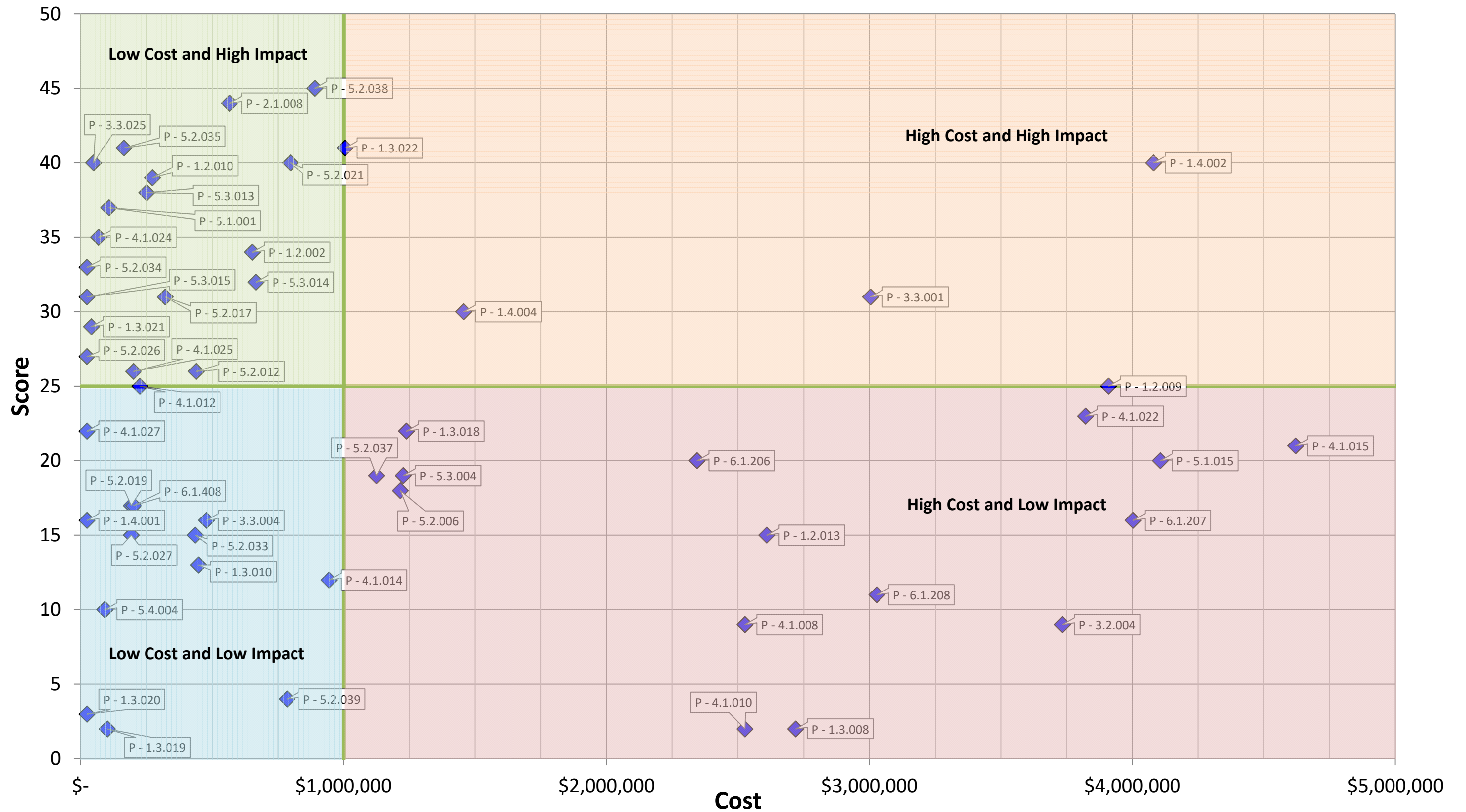
NS = Not Scored

6.4 Project Prioritization

The projects in the FY2020 E-CAMP are prioritized by taking into consideration the evaluation scoring results (organization impact) and costs, as illustrated in Figure 6-1. Not all projects are provided on this figure due to their higher costs which impacts the scale of the figure. However, these projects are still evaluated and compared to the other projects in the E-CAMP. Through this comparison, projects may be assigned to one of the following four categories:

- Low cost and high impact – Highest Priority Projects provide EWA with the highest organization impact relative to their cost. Due to their relatively lower costs such projects may be more readily implemented than projects requiring greater capital. These may constitute, “near-term” project priorities to be implemented quickly and efficiently.
- High cost and high impact – Priority Projects are those projects that provide a high organization impact, but because of their relatively high cost, may require additional time to implement due to the complexities inherent in larger capital projects. These projects may garner the most attention in EWA’s CIP.
- Low cost and low impact – Mid-Priority Projects are those projects in which their relative low cost is matched by their relatively low organization impact. Such projects should be prioritized after addressing the above two categories of projects.
- High cost and low impact – Low Priority Projects deliver relatively low organization impact relative to their cost and should be considered only after the above-listed categories of projects are addressed, or in combination with other projects (which may improve their cost/benefit).

The comparison of project costs and organization impact allows EWA to consider both costs and scoring results in prioritizing, funding and scheduling its CIP.



NOTE: Projects P-1.2.014, P-3.3.006, P-5.1.013, P-5.1.014 are not graphed due to their higher cost (>\$5,000,000).
Projects that are reoccurring or already in progress are not graphed.

Section 7: Recommended Project Implementation Schedule & Cost Summary

7.1 Implementation Schedule and Cost Summary

The recommended project implementation schedule and cost summary is based upon the project evaluation and prioritization process presented in this E-CAMP. The implementation schedule and cost summary provides a breakdown of projects based on the category they are assigned to and the year(s) they are assigned to. The recommended project implementation schedule for prioritized projects for FY2020 through FY2025 is presented as Figure 7-1. The projected cost by fiscal year for prioritized projects is presented in Table 7-1. Anticipated project expenditures are distributed over the anticipated schedule presented in Figure 7-1 to develop Table 7-1. The capital improvement budgets for projects planned for execution over the next six years, FY2020 through FY2025, are summarized in Table 7-2 by category related to the EWPCF.

7.2 What's Next

The recommended project implementation schedule and projected cost summary is provided to give EWA staff information that can be leveraged during the budgeting process. EWA staff will leverage this information and use it as a roadmap in their upcoming budgeting process.

Every year the E-CAMP or R-CAMP is updated on an alternating basis. In FY2020, EWA will update the R-CAMP, and will then return to updating the E-CAMP in FY2021.

Subsequent E-CAMPs will monitor and re-evaluate projects in and beyond the six year implementation schedule provided in this E-CAMP. Common themes of these projects that should continue to be evaluated and considered include:

- Rehabilitation and replacement
- Solids process improvements
- Improvements to impacts to the public and EWA (such as odor, sound, appearance, and traffic)
- Efficiency optimization
- Future regulatory and industry trends (such as water reuse)

Project Numbers and Titles		FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	≥FY2026
Liquid Process (1.X)								
P-1.1.005	Primary Area Improvements							
P-1.2.009	PSB Mechancial Rehab - Short Term							
P-1.3.007	Secondary Clarifiers and Strainers Improvements							
P-1.3.018	AB Anaerobic Selector Zones							
P-1.3.022	Outfall Flow Equalization Basin Settlement							
P-1.4.002	Chlorine Building and EPS Improvements							
Outfall (2.X)								
P - 2.1.002	Ocean Outfall Maintenance and Inspection - External							
P - 2.1.005	Ocean Outfall Bathymetric Survey - External							
P - 2.1.006	Ocean Outfall - Integrity Assessment							
P - 2.1.007	84-inch Outfall Inspection - Internal							
P - 2.1.008	Secondary Effluent Land Outfall Improvements							
Solids Process (3.X)								
P - 3.1.002	Solids Thickening Improvements							
P - 3.2.013	Digester Rehabilitation and Improvements							
P - 3.3.006	Second Dryer and Centrifuge Replacement							
Energy Management (4.X)								
P - 4.1.005	Cogen Engine Top-End Overhaul							
P - 4.1.006	Cogen Engine In-Frame Overhaul							
P - 4.1.007	Cogen Engine Full Overhaul							
P - 4.1.015	Cogen Engine Catalyst System and Gas Conditioning Facilities							
P - 4.1.022	Turbo Blower Upgrade							
General (5.X)								
P - 5.1.001	ORF I System Rehabilitation							
P - 5.1.002	ORF Carbon Media Replacement							
P - 5.1.014	New Treatment System at ORF II							
P - 5.2.006	Plant Water Functional Improvements							
P - 5.2.012	Site Security Facilities							
P - 5.2.019	Plant Landscaping							
P - 5.2.021	Climate Control at MCCs and Cogen Building							
P - 5.2.032	Plant-Wide Asset Painting and Protective Coating							
P - 5.2.035	Storm Drainage Pump Station Improvements							
P - 5.2.037	2W System and Sand Filter Replacement							
P - 5.3.004	Admin Building Chiller Replacement							
P - 5.3.016	Cogen Wall Repair							
P - 5.4.005	Implement Minor Condition Assessment Recommendations							
P - 5.4.006	As-Needed Contractor Services							
P - 5.4.007	Miscellaneous Building Rehabilitation							

Figure 7-1: Recommended Implementation Schedule for Prioritized Projects

Project Numbers and Titles		FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	≥FY2026
Technology (6.X)								
P - 6.1.205	Network Improvements							
P - 6.1.206	Secondaries Electrical and Controls Improvements							
P - 6.1.207	Cogen Electrical and Controls Improvements							
P - 6.1.208	CPS/SEEPS Electrical and Controls Improvements							
P - 6.1.514	As-Needed Integration Services							
Professional Services (8.X)								
CA - 8.1.012-017	Asset Condition Assessments - EWPCF							
ES - 8.3.001	E-CAMP and R-CAMP Update							
ES - 8.4.001	Extension of Staff Engineering Services							
ES - 8.4.002	Research and Development Projects Services							
ES - 8.4.010	Electronic Operations Manual and Document Management Updates							
ES - 8.4.012	Air Permitting Assistance							
S - 3.3.025	Existing Dryer Components Rehab and Interim Dryer Improvements							
S - 8.2.015	Potable Reuse Study							

Figure 7-1: Recommended Implementation Schedule for Prioritized Projects (continued)

Project Numbers and Titles		FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total (FY20 - FY25)	≥FY2026	Total (All Years)
Liquid Process (1.X)		\$ 14,400,000	\$ 9,600,000	\$ 1,100,000	\$ 4,200,000	\$ 2,000,000	\$ 2,000,000	\$ 33,200,000	\$ -	\$ 33,200,000
P - 1.1.005	Primary Area Improvements	\$ 9,962,460	\$ 7,515,540	\$ -	\$ -	\$ -	\$ -	\$ 17,478,000	\$ -	\$ 17,478,000
P - 1.2.009	PSB Mechanical Rehab - Short Term	\$ -	\$ -	\$ -	\$ -	\$ 1,955,000	\$ 1,955,000	\$ 3,910,000	\$ -	\$ 3,910,000
P - 1.3.007	Secondary Clarifiers and Strainers Improvements	\$ 3,410,620	\$ 2,090,380	\$ -	\$ -	\$ -	\$ -	\$ 5,501,000	\$ -	\$ 5,501,000
P - 1.3.018	AB Anaerobic Selector Zones	\$ -	\$ -	\$ 718,620	\$ 520,380	\$ -	\$ -	\$ 1,239,000	\$ -	\$ 1,239,000
P - 1.3.022	Outfall Flow Equalization Basin Settlement	\$ 1,005,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,005,000	\$ -	\$ 1,005,000
P - 1.4.002	Chlorine Building and EPS Improvements	\$ -	\$ -	\$ 408,000	\$ 3,672,000	\$ -	\$ -	\$ 4,080,000	\$ -	\$ 4,080,000
Outfall (2.X)		\$ 700,000	\$ 500,000	\$ 100,000	\$ -	\$ 300,000	\$ -	\$ 1,600,000	\$ -	\$ 1,600,000
P - 2.1.002	Ocean Outfall Maintenance and Inspection - External	\$ 103,000	\$ -	\$ 103,000	\$ -	\$ 103,000	\$ -	\$ 309,000	\$ -	\$ 309,000
P - 2.1.005	Ocean Outfall Bathymetric Survey - External	\$ -	\$ 109,000	\$ -	\$ -	\$ -	\$ -	\$ 109,000	\$ -	\$ 109,000
P - 2.1.006	Ocean Outfall - Integrity Assessment	\$ -	\$ 226,000	\$ -	\$ -	\$ -	\$ -	\$ 226,000	\$ -	\$ 226,000
P - 2.1.007	84-inch Outfall Inspection - Internal	\$ -	\$ 170,000	\$ -	\$ -	\$ 170,000	\$ -	\$ 340,000	\$ -	\$ 340,000
P - 2.1.008	Secondary Effluent Land Outfall Improvements	\$ 567,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 567,000	\$ -	\$ 567,000
Solids Process (3.X)		\$ 8,100,000	\$ 12,200,000	\$ 7,200,000	\$ 7,300,000	\$ 13,100,000	\$ 13,100,000	\$ 61,000,000	\$ 7,300,000	\$ 68,300,000
P - 3.1.002	Solids Thickening Improvements	\$ 1,045,590	\$ 4,481,100	\$ 7,169,760	\$ 2,240,550	\$ -	\$ -	\$ 14,937,000	\$ -	\$ 14,937,000
P - 3.2.013	Digester Rehabilitation and Improvements	\$ 7,081,440	\$ 7,671,560	\$ -	\$ -	\$ -	\$ -	\$ 14,753,000	\$ -	\$ 14,753,000
P - 3.3.006	Second Dryer and Centrifuge Replacement	\$ -	\$ -	\$ -	\$ 5,023,720	\$ 13,138,960	\$ 13,138,960	\$ 31,301,640	\$ 7,342,360	\$ 38,644,000
Energy Management (4.X)		\$ 1,000,000	\$ 1,200,000	\$ 500,000	\$ 300,000	\$ 2,900,000	\$ 4,200,000	\$ 10,100,000	\$ 2,600,000	\$ 12,700,000
P - 4.1.005	Cogen Engine Top-End Overhaul	\$ -	\$ 169,000	\$ 507,000	\$ 338,000	\$ 338,000	\$ -	\$ 1,352,000	\$ -	\$ 1,352,000
P - 4.1.006	Cogen Engine In-Frame Overhaul	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 858,000	\$ 858,000	\$ -	\$ 858,000
P - 4.1.007	Cogen Engine Full Overhaul	\$ 1,010,000	\$ 1,010,000	\$ -	\$ -	\$ -	\$ -	\$ 2,020,000	\$ -	\$ 2,020,000
P - 4.1.015	Cogen Engine Catalyst System and Gas Conditioning Facilities	\$ -	\$ -	\$ -	\$ -	\$ 2,310,500	\$ 2,310,500	\$ 4,621,000	\$ -	\$ 4,621,000
P - 4.1.022	Turbo Blower Upgrade	\$ -	\$ -	\$ -	\$ -	\$ 229,320	\$ 993,720	\$ 1,223,040	\$ 2,598,960	\$ 3,822,000
General (5.X)		\$ 4,500,000	\$ 3,100,000	\$ 4,800,000	\$ 5,200,000	\$ 3,300,000	\$ 1,600,000	\$ 22,500,000	\$ -	\$ 22,500,000
P - 5.1.001	ORF I System Rehabilitation	\$ 107,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 107,000	\$ -	\$ 107,000
P - 5.1.002	ORF Carbon Media Replacement	\$ 202,000	\$ 101,000	\$ 101,000	\$ 101,000	\$ 101,000	\$ 101,000	\$ 707,000	\$ -	\$ 707,000
P - 5.1.014	New Treatment System at ORF II	\$ 126,200	\$ 504,800	\$ 2,839,500	\$ 2,839,500	\$ -	\$ -	\$ 6,310,000	\$ -	\$ 6,310,000
P - 5.2.006	Plant Water Functional Improvements	\$ -	\$ -	\$ -	\$ 304,000	\$ 912,000	\$ -	\$ 1,216,000	\$ -	\$ 1,216,000
P - 5.2.012	Site Security Facilities	\$ -	\$ -	\$ 219,500	\$ 219,500	\$ -	\$ -	\$ 439,000	\$ -	\$ 439,000
P - 5.2.019	Plant Landscaping	\$ -	\$ -	\$ 192,000	\$ -	\$ -	\$ -	\$ 192,000	\$ -	\$ 192,000
P - 5.2.021	Climate Control at MCCs and Cogen Building	\$ 399,000	\$ 399,000	\$ -	\$ -	\$ -	\$ -	\$ 798,000	\$ -	\$ 798,000
P - 5.2.032	Plant-Wide Asset Painting and Protective Coating	\$ 155,000	\$ 155,000	\$ 155,000	\$ 155,000	\$ 155,000	\$ 155,000	\$ 930,000	\$ -	\$ 930,000
P - 5.2.035	Storm Drainage Pump Station Improvements	\$ 164,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 164,000	\$ -	\$ 164,000
P - 5.2.037	2W System and Sand Filter Replacement	\$ -	\$ -	\$ -	\$ 281,500	\$ 844,500	\$ -	\$ 1,126,000	\$ -	\$ 1,126,000
P - 5.3.004	Admin Building Chiller Replacement	\$ 613,500	\$ 613,500	\$ -	\$ -	\$ -	\$ -	\$ 1,227,000	\$ -	\$ 1,227,000
P - 5.3.016	Cogen Wall Repair	\$ 1,482,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,482,000	\$ -	\$ 1,482,000
P - 5.4.005	Implement Minor Condition Assessment Recommendations	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 900,000	\$ -	\$ 900,000
P - 5.4.006	As-Needed Contractor Services	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 6,000,000	\$ -	\$ 6,000,000
P - 5.4.007	Miscellaneous Building Rehabilitation	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 900,000	\$ -	\$ 900,000

Table 7-1: Projected Cost by Fiscal Year for Prioritized Projects (continued)											
Project Numbers and Titles		FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total (FY20 - FY25)	≥FY2026	Total (All Years)	
Technology (6.X)		\$ 3,300,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 3,600,000	\$ 4,100,000	\$ 11,600,000	\$ 2,000,000	\$ 13,600,000	
P - 6.1.205	Network Improvements	\$ 3,060,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,060,000	\$ -	\$ 3,060,000	
P - 6.1.206	Secondaries Electrical and Controls Improvements	\$ -	\$ -	\$ -	\$ -	\$ 1,406,400	\$ 937,600	\$ 2,344,000	\$ -	\$ 2,344,000	
P - 6.1.207	Cogen Electrical and Controls Improvements	\$ -	\$ -	\$ -	\$ -	\$ 2,001,500	\$ 2,001,500	\$ 4,003,000	\$ -	\$ 4,003,000	
P - 6.1.208	CPS/SEEPS Electrical and Controls Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 999,240	\$ 999,240	\$ 2,028,760	\$ 3,028,000	
P - 6.1.514	As-Needed Integration Services	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 1,200,000	\$ -	\$ 1,200,000	
Professional Services (8.X)		\$ 1,100,000	\$ 1,100,000	\$ 900,000	\$ 1,100,000	\$ 900,000	\$ 1,100,000	\$ 6,100,000	\$ -	\$ 6,100,000	
CA - 8.1.012-017	Asset Condition Assessments - EWPCF	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 600,000	\$ -	\$ 600,000	
ES - 8.3.001	E-CAMP and R-CAMP Update	\$ -	\$ 150,000	\$ -	\$ 150,000	\$ -	\$ 150,000	\$ 450,000	\$ -	\$ 450,000	
ES - 8.4.001	Extension of Staff Engineering Services	\$ 650,000	\$ 650,000	\$ 650,000	\$ 650,000	\$ 650,000	\$ 650,000	\$ 3,900,000	\$ -	\$ 3,900,000	
ES - 8.4.002	Research and Development Projects Services	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 600,000	\$ -	\$ 600,000	
ES - 8.4.010	Electronic Operations Manual and Document Management Updates	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 300,000	\$ -	\$ 300,000	
ES - 8.4.012	Air Permitting Assistance	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 150,000	\$ -	\$ 150,000	
S - 3.3.025	Existing Dryer Components Rehab and Interim Dryer Improvements	\$ 50,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 50,000	\$ -	\$ 50,000	
S - 8.2.015	Potable Reuse Study	\$ 75,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 75,000	\$ -	\$ 75,000	
Totals		\$ 33,100,000	\$ 27,900,000	\$ 14,800,000	\$ 18,300,000	\$ 26,100,000	\$ 26,100,000	\$ 146,300,000	\$ 11,900,000	\$ 158,200,000	

1. Summary costs are rounded to the nearest hundred thousand dollars.
2. Costs shown in December 2018 dollars.
3. The E-CAMP is a living, dynamic document that is updated every two years and this table is updated as part of that process.

Table 7-2: Overview of Recommended Implementation Schedule for Prioritized Projects (FY2020 - FY2025)

Project Category	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total FY2020-FY2025	≥FY2026	Total All Years
Liquid Process	\$ 14,400,000	\$ 9,600,000	\$ 1,100,000	\$ 4,200,000	\$ 2,000,000	\$ 2,000,000	\$ 33,200,000	\$ -	\$ 33,200,000
Outfall	\$ 700,000	\$ 500,000	\$ 100,000	\$ -	\$ 300,000	\$ -	\$ 1,600,000	\$ -	\$ 1,600,000
Solids Process	\$ 8,100,000	\$ 12,200,000	\$ 7,200,000	\$ 7,300,000	\$ 13,100,000	\$ 13,100,000	\$ 61,000,000	\$ 7,300,000	\$ 68,300,000
Energy Management	\$ 1,000,000	\$ 1,200,000	\$ 500,000	\$ 300,000	\$ 2,900,000	\$ 4,200,000	\$ 10,100,000	\$ 2,600,000	\$ 12,700,000
General	\$ 4,500,000	\$ 3,100,000	\$ 4,800,000	\$ 5,200,000	\$ 3,300,000	\$ 1,600,000	\$ 22,500,000	\$ -	\$ 22,500,000
Technology	\$ 3,300,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 3,600,000	\$ 4,100,000	\$ 11,600,000	\$ 2,000,000	\$ 13,600,000
Professional Services	\$ 1,100,000	\$ 1,100,000	\$ 900,000	\$ 1,100,000	\$ 900,000	\$ 1,100,000	\$ 6,100,000	\$ -	\$ 6,100,000
Total	\$ 33,100,000	\$ 27,900,000	\$ 14,800,000	\$ 18,300,000	\$ 26,100,000	\$ 26,100,000	\$ 146,300,000	\$ 11,900,000	\$ 158,200,000

Notes:

1. Costs in ≥FY2026 are projected future expenditures for prioritized projects identified in FY2020 through FY2025.
2. Costs are rounded to the nearest hundred thousand dollars.
3. Costs shown in December 2018 dollars.
4. Projected capital expenditures do not account for carry forward funds.

Appendix A: Historical Project List

FISCAL YEAR 2019 PROJECTS

Projects selected for implementation during FY2019 are listed below. These projects have been completed unless otherwise noted.

1. P - 1.2.006 Primary Effluent Conveyance (ongoing)
2. P - 2.1.002 Ocean Outfall Maintenance and Inspection – External (ongoing)
3. P - 2.1.007 84-inch Outfall Inspection – Internal
4. P - 4.1.005 Cogen Engine Top-End Overhaul
5. P - 4.1.018 Lighting and Controls Improvements (ongoing)
6. P - 4.1.019 Chilled Water and Hot Water Systems (ongoing)
7. P - 5.1.002 ORF Carbon Media Replacement
8. P - 5.1.012 Odor Management Master Plan
9. P - 5.2.015 Northwest Storm Water Drain Sump to South DAF Pit (ongoing)
10. P - 5.2.032 Plant-Wide Asset Painting and Protective Coating
11. P - 5.3.003 Construction Office and Storage Building Demo
12. P - 6.1.101 Process Control Narrative/Automation Study (ongoing)
13. P - 6.1.501 SCADA Design Guidelines (ongoing)
14. P - 6.1.502 SCADA Software Standards (ongoing)
15. P - 6.1.508 SCADA Governance (ongoing)

FISCAL YEAR 2018 PROJECTS

Projects selected for implementation during FY2018 are listed below. These projects have been completed unless otherwise noted.

1. P - 1.3.003 AB Rehab Projects
2. P - 3.3.009 Drying Safety Upgrades
3. P - 4.1.018 Lighting and Controls Improvements (continued in FY2019)
4. P - 4.1.019 Chilled Water and Hot Water Systems (continued in FY2019)
5. P - 5.1.002 ORF I Carbon Replacement (annually)
6. P - 5.3.006 Secondary Scum Pit Roof Removal
7. P - 6.1.101 Process Control Narrative/Automation Study (continued in FY2019)
8. P - 6.1.501 SCADA Design Guidelines (continued in FY2019)
9. P - 6.1.502 SCADA Software Standards (continued in FY2019)
10. P - 6.1.508 SCADA Governance (continued in FY2019)
11. P - 6.2.101 IT Governance Policies

FISCAL YEAR 2017 PROJECTS

Projects selected for implementation during FY2017 are listed below. These projects have been completed unless otherwise noted.

1. P - 2.1.005 Ocean Outfall Bathymetric Survey – External
2. P - 2.1.006 Ocean Outfall – Integrity Assessment per SLC Lease
3. P - 3.3.009 Drying Safety Upgrades (Continued in FY 2018)
4. P - 4.1.006 Cogeneration Engine In-Frame Overhaul (Year 2 of 2)
5. P - 4.1.018 Lighting and Controls Improvements (Continued in FY 2018)
6. P - 4.1.019 Chilled Water and Hot Water Systems (Continued in FY 2018)
7. P - 5.1.002 ORF I Carbon Replacement (annually)
8. P - 5.3.006 Secondary Scum Pit Roof Removal (Continued in FY 2018)
9. P - 6.1.101 Process Control Narrative/Automation Study (Continued in FY 2018)
10. P - 6.1.501 SCADA Design Guidelines (Continued in FY 2018)
11. P - 6.1.502 SCADA Software Standards (Continued in FY 2018)
12. P - 6.1.508 SCADA Governance (Continued in FY 2018)
13. P - 6.2.101 IT Governance Policies (Continued in FY 2018)
14. P - 6.2.301 LIMS Enhancements

FISCAL YEAR 2016 PROJECTS

Projects selected for implementation during FY2016 are listed below. These projects have been completed unless otherwise noted.

1. P – 1.1.001 IJS Rehab (Completed FY 2016)
2. P - 3.2.001 Biofuel Receiving Facilities (Completed FY 2016)
3. P - 3.3.009 Drying Safety Upgrades (continued in FY2017)
4. P - 3.3.021 Pyrolysis Facilities (Pilot Study Abandoned)
5. P - 4.1.006 Cogeneration Engine In-Frame Overhaul (Year 2 of 2)
6. P - 4.1.018 Lighting and Controls Improvements (continued in FY2017)
7. P - 4.1.019 Chilled Water and Hot Water Systems (continued in FY2017)
8. P - 4.1.021 Cogen NG Line Meter (Completed FY 2016)
9. P - 5.1.002 ORF I Carbon Replacement (annually)
10. P - 5.1.008 ORF III Chem Feed System Improvements (Completed FY 2016)
11. P - 5.1.010 ORF I, ORF II, ORF III Process Improvements (Completed FY 2016)
12. P - 5.3.006 Secondary Scum Pit Roof Removal (continued in FY2017)
13. P - 6.1.101 Process Control Narrative/Automation Study (continued in FY2017)
14. P - 6.1.501 SCADA Design Guidelines (continued in FY2017)
15. P - 6.1.502 SCADA Software Standards (continued in FY2017)
16. P - 6.1.508 SCADA Governance (continued in FY2017)
17. P - 6.2.101 IT Governance Policies (continued in FY2017)
18. P - 6.2.301 LIMS Enhancements (continued in FY2017)
19. S - 8.4.009 Pyrolosis Pilot Study Support (Pilot Study abandoned)

FISCAL YEAR 2015 PROJECTS

Projects selected for implementation during FY2015 are listed below. These projects have been completed unless otherwise noted.

1. P – 1.1.001 IJS Rehab (continued in FY2016)
2. P - 2.1.005 Ocean Outfall Bathymetric Survey – External
3. P - 2.1.006 Ocean Outfall – Integrity Assessment per SLC Lease
4. P - 3.2.001 Biofuel Receiving Facilities (continued in FY2016)
5. P - 3.3.009 Drying Safety Upgrades (continued in FY2016)
6. P - 3.3.021 Pyrolysis Facilities
7. P - 4.1.006 Cogeneration Engine In-Frame Overhaul (Year 2 of 2)
8. P - 4.1.018 Lighting and Controls Improvements (continued in FY2016)
9. P - 4.1.019 Chilled Water and Hot Water Systems (continued in FY2016)
10. P - 4.1.021 Cogen NG Line Meter (continued in FY2016)
11. P - 5.1.002 ORF I Carbon Replacement (annually)
12. P - 5.1.008 ORF III Chem Feed System Improvements (continued in FY2016)
13. P - 5.1.010 ORF I, ORF II, ORF III Process Improvements (continued in FY2016)
14. P - 5.3.006 Secondary Scum Pit Roof Removal (continued in FY2016)
15. P - 6.1.101 Process Control Narrative/Automation Study (continued in FY2016)
16. P - 6.1.501 SCADA Design Guidelines (continued in FY2016)
17. P - 6.1.502 SCADA Software Standards (continued in FY2016)
18. P - 6.1.508 SCADA Governance (continued in FY2016)
19. P - 6.2.101 IT Governance Policies (continued in FY2016)
20. P - 6.2.301 LIMS Enhancements (continued in FY2016)
21. S - 8.4.009 Pyrolosis Pilot Study Support

FISCAL YEAR 2014 PROJECTS

Projects selected for implementation during FY 2014 are listed below. These projects have been completed unless otherwise noted.

1. P - 1.1.001 IJS Rehab (2012 Major Plant Rehab) (Part 1, continued in FY 2015)
2. P - 1.1.002 HW Ag/Aer Piping and Diffusers Replacement (with P-1.1.001)
3. P - 1.1.007 Vactor Receiving Station (with P-1.1.001)
4. P - 1.1.010 Influent Pipelines Rehab (with P-1.1.001)
5. P - 2.1.002 Ocean Outfall Maintenance and Inspection - External – PM
6. P - 2.1.003 Outfall ARV Vault Replacement (with P-1.1.001)
7. P - 3.3.010 Drying Building Coded Locks (PAR)
8. P - 3.3.011 Drying Safety Upgrades Incl Recycle Bin Purge vent relocation (Phase 1)
9. P - 3.3.012 RTO Media Replacement
10. P - 3.3.014 RTO Flush Drain Relocation
11. P - 3.3.015 RTO Equipment Corrosion Control (PAR)
12. P - 4.1.004 NG Dilution Equipment Servicing
13. P - 5.2.004 CoGen Engine In-Frame Overhaul (2014, 2015, 2 engines each year)
14. P - 4.1.013 CoGen Bldg Floor Repair (PAR)
15. P - 5.1.006 IJS Odor Control Improvements (with P-1.1.001)
16. P - 5.2.001 Natural Gas Pipeline Replacement
17. P - 5.2.004 3WLC Strainer Replacement
18. P - 5.3.009 DW Bldg Roof Repair (PAR)
19. S - 8.2.001 EWPCF 204 Facility Master Plan
20. S - 8.2.010 Plant Flooding Study

FISCAL YEAR 2013 PROJECTS

Projects selected for implementation during FY 2013 are listed below. These projects have been completed unless otherwise noted.

1. P - 1.1.004 Grit Separator Nos.1 and 2 Replacement
2. P - 1.3.001 Blower Electrical Improvements
3. P - 2.1.001 Land Outfall Inspection and Cleaning - Internal – PM
4. P - 3.2.002 Digesters 5 and 6 Cleaning (finished in FY 2014)
5. P - 4.1.002 Cogen UPS Upgrade - completed in house
6. P - 4.1.005 Cogen Engine Top-End Overhaul (2012, 2013, 2 engines each year)
7. P - 5.1.002 ORF I Carbon Replacement – PM
8. P - 5.2.023 South Parcel Fence
9. P - 5.3.008 Roof Access Safety Facilities (continued in FY 2014)
10. S – 8.2.002 Plant and Non-Potable Water Study

FISCAL YEAR 2012 PROJECTS

Projects selected for implementation during FY 2012 are listed below. These projects have been completed unless otherwise noted.

1. Biogas Treatment Facilities (EMP3)
2. Cogen Communications Redundancy (POW3)
3. Digester 4 Rehab (D5)
4. Third Centrifuge Facilities (DRY2)
5. Cogen Engines Catalyst (Part A) (EMP2A)
6. Cake Pump Bleedoff Line (DRY4)
7. Centrate Polymer Control System Upgrades (DRY5)
8. Cogen Engine Top-End OH1 and 2 - PM (PV1C)
9. Centrifuge Polymer Storage Tank Expansion (DRY7)

FISCAL YEAR 2011 PROJECTS

Projects selected for implementation during FY 2011 are listed below. These projects have been completed unless otherwise noted.

1. Cogeneration Engine Top-End OH 3 and 4 (PV1B)
2. Rehab of 42" Aeration Air Piping (AIR3)
3. ORF I Carbon Replacement Project - PM (ORF1)
4. Grit Screw Nos. 1 and 2 (HW4)
5. Centrate Line Improvement Project (DRY2)
6. Agitation Air Blower conversion to Aeration Air Blower (POW1)
7. Primary Clarifier Cover Replacement (Tanks 1-6) (PC16)
8. Regenerated Thermal Oxidizer Media Replacement (DRY1)
9. Energy Mgmt - Miscellaneous Energy Efficiency Project (EMP3)
10. Post Phase V Site Improvements – Plant Paving Repair (PVS11)
11. Misc Plant Improvements - Additional Bulk Hypochlorite Storage Tank Chlorine Contact Basin (MPI1)
12. Rehabilitate of Digester No. 4 Gas Mixing System – Design Only (D5)
13. Gas Compressors Control Upgrades (MCU1)
14. Aeration Basin Rehabilitation – Design Only (A13)
15. Plant Safety Projects (SFTY2)
16. Post Phase V Follow-Up Improvements (IMP4)
17. Equalization Storage 2011 Update

FISCAL YEAR 2010 PROJECTS

Projects selected for implementation during FY 2010 are listed below. These projects have been completed unless otherwise noted.

1. Waste Gas Flare System Replacement (Final Design, Bid and Construction) (FLR1)
2. ORF III Rehabilitation (East Tower) (ORF III)
3. Co-Gen Engines, Top End Overhaul, Engines 1 and 2
4. Safety Enhancements (fall protection and platform by wet bins area, rebuild steps from first floor of dewatering, task lighting and receptacles at dryer platforms, polymer area secondary containment and drains – Phase III Building)
5. Secondary Clarifier Nos. 1 through 4

FISCAL YEAR 2009 PROJECTS

Projects selected for implementation during FY 2009 are listed below. These projects have been completed unless otherwise noted.

1. Waste Gas Flare System Replacement (Preliminary Design only) (FLR1)
2. ORF III Rehabilitation (West Tower Only) (ORF III)

FISCAL YEAR 2008 PROJECTS

Projects selected for implementation during FY 2008 are listed below. These projects have been completed unless otherwise noted.

1. Starting Air System (Cogeneration) (AIR1)
2. Rehabilitation of Aeration Blower 4006 (BLR1)

FISCAL YEAR 2007 PROJECTS

Projects selected for implementation during FY 2007 are listed below. These projects have been completed unless otherwise noted.

1. Cogeneration Engine Overhaul (4) (CG2)

FISCAL YEAR 2006 PROJECTS

Projects selected for implementation during FY 2006 are listed below. These projects have been completed unless otherwise noted.

1. Replace Media in ORF III (OD6)
2. Rehab Clarifier Mechanism for Basin No. 8 (SC5)
3. Replace Bar Screen No. 4 (HW5)
4. Replace Dome Cover Insulation for Digester Nos. 4, 5 and 6 (D4)
5. Replace Grit Drain Line (G5)
6. Replace Dome Diffusers in Aeration Basin No. 3 (A12)
7. Roof Replacement/Repair on Select Buildings (R1)

FISCAL YEAR 2005 PROJECTS

Projects selected for implementation during FY 2005 are listed below. These projects have been completed unless otherwise noted.

1. Replace Secondary MCCs and RAS Pump VFDs (SC6)

FISCAL YEAR 2004 PROJECTS

Projects selected for implementation during FY 2004 are listed below. These projects have been completed unless otherwise noted.

1. Replace and Upgrade the Skylights and Roof Hatches Throughout the Plant (SFTY1)
2. Replace Building Fresh Ductwork (HVAC9)

FISCAL YEAR 2003 PROJECTS

Projects selected for implementation during FY 2003 are listed below. These projects have been completed unless otherwise noted.

1. Clean Digester Nos. 5 and 6 (D3)
2. Replace Aeration Air Header to Aeration Basin Nos. 1 and 2 (A11)

FISCAL YEAR 2002 PROJECTS

Projects selected for implementation during FY 2002 are listed below. These projects have been completed unless otherwise noted.

1. Replace Dome Diffusers in Aeration Basin No. 2 (A9)
2. Supply 2W Softened Water to Secondary Area (SFT1)

FISCAL YEAR 2001 PROJECTS

Projects selected for implementation during FY 2001 are listed below. These projects have been completed unless otherwise noted.

1. Rebuild Three (3) Cogeneration System Engines (CG1)
2. Replace Dome Diffusers in Aeration Basin No. 1 (A8)

FISCAL YEAR 2000 PROJECTS

Projects selected for implementation during FY 2000 are listed below. These projects have been completed unless otherwise noted.

1. Groundwater Infiltration Through Electrical Conduits into Secondary Gallery (GW1)
2. Replace V-Notch Weir Plates in Primary Clarifier Nos. 1 through 6 (PC14)
3. Replace Effluent Troughs – Primary Clarifier Nos. 1, 2 and 3 (PC15)
4. Replace Mechanical Bar Screen No. 1 (HW3)
5. Replace Air Handling Unit – Cogen Building (HVAC1)
6. Replace Air Handling Unit – Headworks Building (HVAC2)
7. Replace Air Handling Unit – Dewatering Building (HVAC3)
8. Aeration Basin Channel Piping Rehabilitation (A4)
9. Improve Drainage System at DAF Thickener and Chlorine Building Areas (DRN1)

FISCAL YEAR 1999 PROJECTS

Projects selected for implementation during FY 1999 are listed below. These projects have been completed unless otherwise noted.

1. Primary Clarifier Nos. 1, 2 and 3 Scum Removal Mechanism (PC1-3)
2. Replace Dilute Natural Gas Mix. and Associated Equipment (CS3)
3. Replace Carbon and Carbon Bed Support Beams ORT-I & ORT IIA (OD5)
4. Replace Influent Gates – Grit Tank Nos. 1 and 2 (G3)
5. Replace Influent Junction Gate (HW4)
6. Replace Influent Flow Dist. In Primary Clarifier Nos. 1 through 6 (PC13)
7. Replace Wall Bearings and Shafting for Primary Clarifier No. 3 (PC8)

FISCAL YEAR 1998 PROJECTS

Projects selected for implementation during FY 1998 are listed below. These projects have been completed unless otherwise noted.

1. Upgrade Electrical System for Cogeneration (CS1)
2. Provide Additional Adsorption Chiller Capacity (CS2)
3. Modify Ductwork in Dewatering Building to Improve Air Quality (DW3)
4. Replace Mechanical Bar Screen No. 2 (HW2)
5. Recoat Secondary Clarifier Nos. 1 and 3 Hardware (SC2)
6. Recoat Secondary Clarifier Nos. 2 and 4 Hardware (SC1)

FISCAL YEAR 1997 PROJECTS

Projects selected for implementation during FY 1997 are listed below. These projects have been completed unless otherwise noted.

1. Modify Supply and Exhaust Ductwork in Headworks (HW1)
2. Install Foul Air Ducting to Influent Junction Structure (OD2)
3. Repair Carbon Towers (OD4)
4. Replace Chlorine Gas with Hydrogen Peroxide and Sodium Hypochlorite

FISCAL YEAR 1996 PROJECTS

Projects selected for implementation during FY 1996 are listed below. These projects have been completed unless otherwise noted.

1. Recoat Interior of Grit Chamber No. 2 (G2)
2. Replace Steel Floor Rails for Primary Clarifier No. 2 (PC7)
3. Replace Scum Skimmer Mechanism in Primary Clarifier No. 4 (PC4)
4. Replace Scum Skimmer Mechanism in Primary Clarifier No. 5 (PC5)
5. Replace Scum Skimmer Mechanism in Primary Clarifier No. 6 (PC6)
6. Recoat the Interior of Digester No. 4 (D1)

FISCAL YEAR 1995 PROJECTS

Projects selected for implementation during FY 1995 are listed below. These projects have been completed unless otherwise noted.

1. Replace Aeration Basin Nos. 1 and 2 Diffuser Air Piping (A1 and A2)
2. Rehabilitation of DAF Hardware (DAF2)
3. Screenings Building Ductwork Rehabilitation (HVAC2)

FISCAL YEAR 1994 PROJECTS

Projects selected for implementation during FY 1994 are listed below. These projects have been completed unless otherwise noted.

1. Process and Channel Air Cross Connection (A3)
2. Repair Process and Channel Air Piping (A4)
3. Rehabilitation of DAF Hardware (DAF1)
4. Underground Storage Tank Removal and Replacement (U1)

Appendix B: Capital Project List

ENCINA WASTEWATER AUTHORITY
APPENDIX B - FY2020 E-CAMP HISTORICAL, CURRENT AND FUTURE PROJECT LIST

Ref	Project No.	Capital Project	E-CAMP Rev Year Project Added	Actual Const FY Start
		Black = Previously Identified E-CAMP Project Green = New E-CAMP Project Blue = Project Funded or Completed Red = Project Eliminated from E-CAMP or Combined with Another Project		
1.0 Liquid Process Improvements				
1.1 Headworks				
1	P - 1.1.001	Infl Junction Structure Rehab (contingency)	pre-2014	2014
2	P - 1.1.002	HW Ag/Aer Piping and Diffusers Replacement	pre-2014	2014
3	P - 1.1.003	HW CEPT Sys Air Delivery Rehab - (w/P-1.1.002)	pre-2014	Eliminated
4	P - 1.1.004	Grit Separators 1 and 2 Replacement	pre-2014	2014
5	P - 1.1.005	Primary Area Improvements	pre-2014	2019
6	P - 1.1.006	GRS Isolation Improvements w/GRS 3 Inf Gate (w/ P-1.1.005)	pre-2014	Combined
7	P - 1.1.007	Vactor Receiving Station	pre-2014	2014
8	P - 1.1.008	GRS Rehab	pre-2014	Eliminated
9	P - 1.1.009	Influent Flow Metering Installation	pre-2014	2015
10	P - 1.1.010	Influent Pipeline Rehab w/Addl 2012 Major Rehab	2014	2014
11	P - 1.1.011	Influent Real-Time Monitoring	2015	Eliminated
12	P - 1.1.012	Off-Site Fermentation and Odor Control	2015	Eliminated
1.2 Primary Treatment				
13	P - 1.2.001	Primary Process Annunciator Panel Replacement (w/P-1.1.005)	pre-2014	Eliminated
14	P - 1.2.002	Primary Sludge Pumping Upgrades	pre-2014	Pending
15	P - 1.2.003	PE Second Pipeline	pre-2014	Eliminated
16	P - 1.2.004	PE Emergency Discharge Pipeline Rehab (w/ P-1.2.006)	pre-2014	Combined
17	P - 1.2.005	PSB Helical Scum Skimmer Replace - (w/P-1.2.009,P-1.2.013)	pre-2014	Combined
18	P - 1.2.006	Primary Effluent Conveyance	pre-2014	2019
19	P - 1.2.007	CEPT Neat Polymer Flow Meter Installation - eliminated	pre-2014	Eliminated
20	P - 1.2.008	PSB Influent Gate Replacement - (w/P-1.1.005)	pre-2014	Combined
21	P - 1.2.009	PSB Mechancial Rehab - Short Term	pre-2014	Pending
22	P - 1.2.010	Primary Sedimentation Basins Scum and Centrate Pipeline Replacement	2014	Pending
23	P - 1.2.011	PE Meter Replacement	2015	Eliminated
24	P - 1.2.012	PSB 1-10 Influent Gate Replacement (w/ P-1.1.005)	2016	Combined
25	P - 1.2.013	PSB Mechancial Rehab - Medium Term	pre-2014	Pending
26	P - 1.2.014	PSB Strucutral Rehab	pre-2014	Pending
1.3 Secondary Treatment				
27	P - 1.3.001	Blower Electrical Improvements	pre-2014	2013
28	P - 1.3.002	Annunciator Panels Replace - Second Process (w/P-1.3.004)	pre-2014	Combined
29	P - 1.3.003	AB Selector Implementation and Cover Replacement (renamed below)	pre-2014	Eliminated
30	P - 1.3.003	AB Rehab Projects	2016	2016
31	P - 1.3.004	AB Mech Rehab and RAS Pump Addition	pre-2014	Eliminated
32	P - 1.3.005	AB Diffuser Membrane Replacement	pre-2014	2015
33	P - 1.3.006	Secondary Polymer System Replacement (no longer used)	pre-2014	Eliminated
34	P - 1.3.007	Secondary Clarifiers and Strainers Improvements	pre-2014	Pending
35	P - 1.3.008	SC 7 - Conversion from EQ to Clarifier	pre-2014	Pending
36	P - 1.3.009	Sec Splitter Box Gate Motor Operators Install - eliminated	pre-2014	Eliminated
37	P - 1.3.010	WAS Pipeline Replacement	pre-2014	Pending
38	P - 1.3.011	AB No. 3 Diffusers Membr Repl -(duplicate, see P-1.3.005)	pre-2014	Eliminated
39	P - 1.3.012	AB DO Probe Replacement	2014	2016
40	P - 1.3.013	SC Concrete Cracking Prevention (w/ P-1.3.007)	2014	Combined
41	P - 1.3.014	SCs 1 - 8 Infl and Effl Gate Rehab/Replacement (w/ P-1.3.007)	2014	Combined
42	P - 1.3.015	AB Flow Eq Feed and Return Pipeline Rehab (w/ P-1.2.006)	2014	Combined
43	P - 1.3.016	AB Efficiency Optimization	2015	2015

ENCINA WASTEWATER AUTHORITY
APPENDIX B - FY2020 E-CAMP HISTORICAL, CURRENT AND FUTURE PROJECT LIST

Ref	Project No.	Capital Project Black = Previously Identified E-CAMP Project Green = New E-CAMP Project Blue = Project Funded or Completed Red = Project Eliminated from E-CAMP or Combined with Another Project	E-CAMP Rev Year Project Added	Actual Const FY Start
44	P - 1.3.017	AB FRP Cover Replacement	2016	2016
45	P - 1.3.018	AB Anaerobic Selector Zones	2016	Pending
46	P - 1.3.019	Control Strategy Improvements	2019	Pending
47	P - 1.3.020	Dewatering Wells in the Secondary Area	2020	Pending
48	P - 1.3.021	Return Activated Sludge Solids Deposition	2020	Pending
49	P - 1.3.022	Outfall Flow Equalization Basin Settlement	2020	Pending
1.4 Effluent				
50	P - 1.4.001	Effluent Pumps Improvements	pre-2014	Pending
51	P - 1.4.002	Chlorine Building and EPS Improvements	pre-2014	Pending
52	P - 1.4.003	SE Gate Motor Operator Installation	pre-2014	Eliminated
53	P - 1.4.004	EPS Pipe Lining and Abandoned Pipe Coating Repair	2014	Pending
54	P - 1.4.005	PD Blower Addition, Aeration/Agitation	2014	Eliminated
2.0 Outfall				
2.1 Outfall				
55	P - 2.1.001	Land Outfall Inspection and Cleaning - Internal - Complete	pre-2014	2013
56	P - 2.1.002	Ocean Outfall Maintenance and Inspection - External	pre-2014	Reoccurring
57	P - 2.1.003	Outfall ARV Vault Replacement - (w/P-1.1.001)	pre-2014	2014
58	P - 2.1.004	Ocean Outfall Ballast Restoration	pre-2014	Eliminated
59	P - 2.1.005	Ocean Outfall Bathymetric Survey - External	2014	Reoccurring
60	P - 2.1.006	Ocean Outfall - Integrity Assessment	2015	Reoccurring
61	P - 2.1.007	84-inch Outfall Inspection - Internal	2019	Reoccurring
62	P - 2.1.008	Secondary Effluent Land Outfall Improvements	2020	Pending
3.0 Solids Processing Improvements				
3.1 Biosolids Thickening				
63	P - 3.1.001	DAFT Rehab	2019	Eliminated
64	P - 3.1.002	Solids Thickening Improvements	2019	Pending
65	P - 3.1.003	TWAS Pipeline Replacement (w/ P-3.1.002)	pre-2014	Combined
66	P - 3.1.004	DAF Polymer System Replacement	pre-2014	Eliminated
3.2 Biosolids Digestion				
67	P - 3.2.001	Biofuel Receiving Facilities (Addl budget)	pre-2014	2014
68	P - 3.2.002	Digesters 5 and 6 Cleaning	pre-2014	2013
69	P - 3.2.003	Digesters 5 and 6 Pump/Piping Foundation Stabilization	pre-2014	Eliminated
70	P - 3.2.004	Biosolids Screening Facility	pre-2014	Pending
71	P - 3.2.005	Digesters 5 and 6 Mixing Pumps Replacement	pre-2014	Eliminated
72	P - 3.2.006	Cell Lysis Facilities	pre-2014	Eliminated
73	P - 3.2.007	Digesters 1 and 3 Retrofit for Sludge/Gas storage	pre-2014	Eliminated
74	P - 3.2.008	Waste Gas Flare Operation Mods	pre-2014	Eliminated
75	P - 3.2.009	Digester 4, 5 and 6 Covers - Interior Coating, Struct Reinf (w/ P-3.2.013)	2014	Combined
76	P - 3.2.010	Digesters 5 and 6 Covers - Interior Coating (comb w/3.2.009)	2014	Combined
77	P - 3.2.011	Second Waste Gas Flare and Pipeline (comb w/3.2.013)	pre-2014	Combined
78	P - 3.2.012	Digester 4 - Dewatering	2015	Eliminated
79	P - 3.2.013	Digester Rehabilitation and Improvements	2019	Pending
80	P - 3.2.014	Digester Gas Pipeline Replacement	2015	--

ENCINA WASTEWATER AUTHORITY
APPENDIX B - FY2020 E-CAMP HISTORICAL, CURRENT AND FUTURE PROJECT LIST

Ref	Project No.	Capital Project Black = Previously Identified E-CAMP Project Green = New E-CAMP Project Blue = Project Funded or Completed Red = Project Eliminated from E-CAMP or Combined with Another Project	E-CAMP Rev Year Project Added	Actual Const FY Start
3.3 Biosolids Dewatering and Drying				
81	P - 3.3.001	MCC and Conductors Replacement - Power Building	pre-2014	Pending
82	P - 3.3.002	Pellet Storage Facility Improvements (w/P-3.3.009)	pre-2014	Combined
83	P - 3.3.003	Struvite Control Facilities (eliminate, Ostara)	pre-2014	Eliminated
84	P - 3.3.004	Pellet Bagging Facilities	pre-2014	Pending
85	P - 3.3.005	Cake Pump Mods - eliminated	pre-2014	Eliminated
86	P - 3.3.006	Second Dryer and Centrifuge Replacement	pre-2014	Pending
87	P - 3.3.007	Centrifuges Major Maint	pre-2014	Eliminated
88	P - 3.3.008	Dryer Major Maint	pre-2014	Eliminated
89	P - 3.3.009	Drying Safety Upgrades	pre-2014	2014
90	P - 3.3.010	Drying Building Coded Locks (PAR)	pre-2014	Eliminated
91	P - 3.3.011	Recycle Bin Purge Vent Relocation - (w/P-3.3.009)	pre-2014	Combined
92	P - 3.3.012	RTO Media Replacement	pre-2014	2014
93	P - 3.3.013	RTO Process Upgrades	pre-2014	Eliminated
94	P - 3.3.014	RTO Flush Drain Relocation	pre-2014	2014
95	P - 3.3.015	RTO Equipment Corrosion Control	pre-2014	2014
96	P - 3.3.016	Cake Conveyance Equipment Improvements	pre-2014	Combined
97	P - 3.3.017	DW Polymer Storage Tank Replacement	pre-2014	Eliminated
98	P - 3.3.018	Centrate Pipeline Replacement (w/P-1.2.010)	2014	Combined
99	P - 3.3.019	Centrifuge Drive Replacement	2014	Eliminated
100	P - 3.3.020	Dryer Drum Repair	2014	2014
101	P - 3.3.021	Pyrolysis Facilities	2015	Eliminated
102	P - 3.3.022	Loadout Facility Secondary Control	2015	2015
103	P - 3.3.023	Centrate Line TSS Probes - PAR	2015	Eliminated
104	P - 3.3.024	Centrifuge Remote Control Addition (combined with 3.3.006)	2015	Combined
105	P - 3.3.025	Existing Dryer Components Rehab and Interim Dryer Improvements	2019	Pending
4.0 Energy Management				
4.1 Energy Management				
106	P - 4.1.001	Cogen Communications Redundancy (incorp w/Tech MP)	pre-2014	Combined
107	P - 4.1.002	Cogen UPS Upgrade - completed in house.	pre-2014	2012
108	P - 4.1.003	Cogen Engine Catalyst (w/ P-4.1.015)	pre-2014	Combined
109	P - 4.1.004	NG Dilution Equipment Servicing	pre-2014	2014
110	P - 4.1.005	Cogen Engine Top-End Overhaul	pre-2014	Reoccurring
111	P - 4.1.006	Cogen Engine In-Frame Overhaul	pre-2014	Reoccurring
112	P - 4.1.007	Cogen Engine Full Overhaul	pre-2014	Reoccurring
113	P - 4.1.008	Cogen Engine 5 Installation	pre-2014	Pending
114	P - 4.1.009	Cogen Top-End OH 1 and 2 - (w/P-4.1.005)	pre-2014	Combined
115	P - 4.1.010	Cogen Engine 6 Installation	pre-2014	Pending
116	P - 4.1.011	ORC Generator	pre-2014	Eliminated
117	P - 4.1.012	Heat Loop Bypass Installation	pre-2014	Pending
118	P - 4.1.013	Cogen Bldg Floor Repair (PAR)	pre-2014	2014
119	P - 4.1.014	Retrofit Miscellaneous Equipment with VFDs	2015	Pending
120	P - 4.1.015	Cogen Engine Catalyst System and Gas Conditioning Facilities	pre-2014	Pending
121	P - 4.1.016	Blower Replacement with High Efficiency Type	pre-2014	Eliminated
122	P - 4.1.017	Annunciator Panels Replacement - Power Bldg (by GS)	pre-2014	Eliminated
123	P - 4.1.018	Lighting and Controls Improvements	2014	2015
124	P - 4.1.019	Chilled Water and Hot Water Systems	2014	2015
125	P - 4.1.020	Energy Independence Upgrades	2014	Eliminated

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126	P - 4.1.021	Cogen NG Line Meter	2015	2015
127	P - 4.1.022	Turbo Blower Upgrade	2019	Pending
128	P - 4.1.023	Alternative Fuels Receiving Facility Improvements	2019	Eliminated
129	P - 4.1.024	Automate Main Breakers in Cogen	2019	Pending
130	P - 4.1.025	Combined Generator Control Module Replacement	2020	Pending
131	P - 4.1.026	Cogen Generator Maintenance	2020	Pending
132	P - 4.1.027	Cogen Engine Room Ventilation	2020	Pending
5.0 General Improvements				
5.1 Odor Control				
133	P - 5.1.001	ORF I System Rehabilitation	pre-2014	Pending
134	P - 5.1.002	ORF Carbon Media Replacement	pre-2014	Reoccurring
135	P - 5.1.003	ORF III Carbon Replacement	pre-2014	Eliminated
136	P - 5.1.004	Odor Monitoring Facilities	pre-2014	Eliminated
137	P - 5.1.005	HW/GRT/PSB Odor Control Improvements (w/ P-1.2.006)	pre-2014	Combined
138	P - 5.1.006	IJS Odor Control Improvements - complete	pre-2014	--
139	P - 5.1.007	Drying Bldg Odor Control Improvements (w/ P-5.2.004)	pre-2014	Combined
140	P - 5.1.008	ORF III Chem Feed System Improvements	pre-2014	2015
141	P - 5.1.009	ORF III Recirc Pump Facility Repairs - (w/P-5.1.008)	pre-2014	Combined
142	P - 5.1.010	ORF I, ORF II, and ORF III Process Improvements	2015	2015
143	P - 5.1.011	MH No. 4 Odor Control	pre-2014	Eliminated
144	P - 5.1.012	Odor Management Master Plan	2019	2019
145	P - 5.1.013	New Treatment System at ORF I	2020	Pending
146	P - 5.1.014	New Treatment System at ORF II	2020	Pending
147	P - 5.1.015	New Treatment System at ORF III	2020	Pending
5.2 Plant-Wide Systems				
148	P - 5.2.001	Natural Gas Pipeline Replacement	pre-2014	2014
149	P - 5.2.002	High Risk and Critical Asset Rehabilitation (w/misc projects)	pre-2014	Eliminated
150	P - 5.2.003	High Risk & Critical Asset Rehab- (w/P-5.2.002)	pre-2014	Eliminated
151	P - 5.2.004	3WLC Strainer Replacement	pre-2014	2014
152	P - 5.2.005	3WHP Strainer Replacement (w/ P-5.2.006)	pre-2014	Combined
153	P - 5.2.006	Plant Water Functional Improvements	pre-2014	Pending
154	P - 5.2.007	3WL Pump No. 3 Installation (w/ P-5.2.006)	pre-2014	Combined
155	P - 5.2.008	Underground Piping Rehabilitation - comb w/misc projects	pre-2014	Combined
156	P - 5.2.009	Structure Settlement Stabilization (w/ 3.2.003)	pre-2014	Combined
157	P - 5.2.010	3WHP Pump Control Improvements (w/ P-5.2.006)	pre-2014	Combined
158	P - 5.2.011	1W System Rehab (w/ P-5.2.006)	pre-2014	Combined
159	P - 5.2.012	Site Security Facilities	pre-2014	Pending
160	P - 5.2.013	Crane Truck Replacement - elim., veh replace PAR	pre-2014	Eliminated
161	P - 5.2.014	Perimeter Fence Replacement (w/ P-5.2.012)	pre-2014	Combined
162	P - 5.2.015	Northwest Storm Water Drain Sump to South DAF Pit	pre-2014	2019
163	P - 5.2.016	2W System Upgrades (w/ P-5.2.006)	pre-2014	Combined
164	P - 5.2.017	Service Air and Instrument Air Piping Repairs	pre-2014	Eliminated
165	P - 5.2.017	Instrument Air Piping Repairs	pre-2014	Pending
166	P - 5.2.018	UG piping to new pipe galleries - eliminated, not practical	pre-2014	Eliminated
167	P - 5.2.019	Plant Landscaping	2014	Pending
168	P - 5.2.020	Facility Vehicle Replacement - eliminated, veh replace PAR	pre-2014	Eliminated
169	P - 5.2.021	Climate Control at MCCs and Cogen Building	pre-2014	Pending

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170	P - 5.2.022	Coded Entry at MCCs - (w/P-5.2.012)	pre-2014	Combined
171	P - 5.2.023	South Parcel Fence	pre-2014	2013
172	P - 5.2.024	Exterior Asset Corrosion Control - PAR	2014	Eliminated
173	P - 5.2.025	Technology Master Plan Recommendations Implementation	2014	Eliminated
174	P - 5.2.026	Plant Waste Stream Rerouting	2015	Pending
175	P - 5.2.027	Plant-Wide Seal Coating	pre-2015	Pending
176	P - 5.2.028	Flooding Mitigation	2015	2017
177	P - 5.2.029	3WL - Flow Control Valves on ORFs I & II Spray Water Lines	2015	Eliminated
178	P - 5.2.030	3WHP - Install Solenoid Valves and Local Controllers	2015	Eliminated
179	P - 5.2.031	Arc Flash Hazard Assessment	2016	2018
180	P - 5.2.032	Plant-Wide Asset Painting and Protective Coating	2016	Reoccurring
181	P - 5.2.033	Plant-Wide Abandoned Equipment Removal	2016	Pending
182	P - 5.2.034	New Potable Water System	2019	Pending
183	P - 5.2.035	Storm Drainage Pump Station Improvements	2019	Pending
184	P - 5.2.036	Digester Area Drainage Improvements	2019	Pending
185	P - 5.2.037	2W System and Sand Filter Replacement	2020	Pending
186	P - 5.2.038	Underground Electrical Structures Repair	2020	Pending
187	P - 5.2.039	E&I Manhole Monitoring	2020	Pending
5.3 Buildings				
188	P - 5.3.001	Ops Bldg Locker Replacement	pre-2014	Eliminated
189	P - 5.3.002	Ops Bldg Air Intake Relocation	pre-2014	Eliminated
190	P - 5.3.003	Construction Office and Storage Building Demo	pre-2014	2019
191	P - 5.3.004	Admin Building Chiller Replacement	pre-2014	Pending
192	P - 5.3.005	Chlorine Storage Facility Floor Repairs - (PAR)	pre-2014	Eliminated
193	P - 5.3.006	Secondary Scum Pit Roof Removal	pre-2014	2017
194	P - 5.3.007	RAS Channel Vapor Barrier (w/P-1.3.004)	pre-2014	Combined
195	P - 5.3.008	Roof Access Safety Facilities	pre-2014	2014
196	P - 5.3.009	DW Bldg Roof Repair (PAR)	pre-2014	2014
197	P - 5.3.010	Dryer Lab Enclosure (w/ P-3.1.002)	2015	Combined
198	P - 5.3.011	Pure Green Storage Facility	2015	Eliminated
199	P - 5.3.012	Chiller for Cogen Engine Building (w/ P-5.2.021)	2016	Combined
200	P - 5.3.013	Headworks Building Roof	2020	Pending
201	P - 5.3.014	Cogen Building Roof	2020	Pending
202	P - 5.3.015	Dewatering and Secondaries Building Assessment	2020	Pending
203	P - 5.3.016	Cogen Wall Repair	2020	Pending
5.4 Miscellaneous				
204	P - 5.4.001	Treatment Plant Model - eliminated, <\$50k	pre-2014	Eliminated
205	P - 5.4.002	Lateral File Cabinets in Vault - eliminated, not E-CAMP project	pre-2014	Eliminated
206	P - 5.4.003	Document Management - moved to ES project	pre-2014	Eliminated
207	P - 5.4.004	Vallecitos Sample Vault Installation	pre-2014	Pending
208	P - 5.4.005	Implement Minor Condition Assessment Recommendations	2020	Reoccurring
209	P - 5.4.006	As-Needed Contractor Services	2020	Reoccurring
210	P - 5.4.007	Miscellaneous Building Rehabilitation	2020	Reoccurring
6.0 Technology				
6.1 Operations Technology				
6.1.1 Special Studies				

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211	P - 6.1.101	Process Control Narrative and Automation Study (OT_SS01)	2015	Pending
212	P - 6.1.102	Optimization Feasibility Study (OT_SS02)	2015	Eliminated
213	P - 6.1.103	SCADA Knowledge Management Plan (OT_SS03)	2015	Eliminated
6.1.2 Enterprise SCADA				
214	P - 6.1.201	SCADA Network and Computer Room Upgrades (OT_ES01)	2015	Pending
215	P - 6.1.202	SCADA Pilot Project (OT_ES02)	2016	Eliminated
216	P - 6.1.203	SCADA Upgrade Plant and Remote Fac (OT_ES03)	2015	Eliminated
217	P - 6.1.204	Co-Gen Facility and Biosolids SCADA Integration (OT_ES04)	2015	Pending
218	P - 9.6.121	SCADA Upgrade for CWRP Facility (OT_ES05) (R-CAMP)	2015	Eliminated
219	P - 6.1.205	Network Improvements	2020	Pending
220	P - 6.1.206	Secondaries Electrical and Controls Improvements	2020	Pending
221	P - 6.1.207	Cogen Electrical and Controls Improvements	2020	Pending
222	P - 6.1.208	CPS/SEEPS Electrical and Controls Improvements	2020	Pending
6.1.3 Information Driven				
223	P - 6.1.301	Implement ODMS Layer 1 (SCADA Historian) (OT_ID01)	2015	Pending
224	P - 6.1.302	SCADA Integration with WIMS and Dashboards (OT_ID03)	2015	Pending
225	P - 6.1.303	ODMS Management and Data Validation (OT_ID02)	2015	Eliminated
226	P - 6.1.304	Automated Data Validation (OT_ID04)	2015	Eliminated
227	P - 6.1.305	Tablet Access to Electronic Documentation (OT_ID05)	2015	Eliminated
228	P - 6.1.306	Inventory, Collate and Load Documentation (OT_ID06)	2015	Eliminated
229	P - 6.1.307	EWA Staff Wiki (OT_ID07)	2015	Eliminated
6.1.4 Operations Improvement				
230	P - 6.1.401	Electronic Operator Logbook and Pass-Down (OT_OI03)	2016	Pending
231	P - 6.1.402	Optimization Implementation (OT_OI01)	2015	Pending
232	P - 6.1.403	O&M Performance Management (OT_OI02)	2015	Eliminated
233	P - 6.1.404	Automated Workflow Management (OT_OI04)	2015	Eliminated
234	P - 6.1.405	Electronic O&M/Context Sensitive Help (OT_OI05)	2015	Eliminated
235	P - 6.1.406	Equipment Condition Based Monitoring (OT_OI06)	2015	Eliminated
236	P - 6.1.407	Automation Study Implementation	2016	Pending
237	P - 6.1.408	Business and SCADA Wireless Networks	2020	Pending
6.1.5 SCADA Asset Management				
238	P - 6.1.501	SCADA Design Guidelines (OT_AM01)	2015	Pending
239	P - 6.1.502	SCADA Software Standards (OT_AM02)	2015	Pending
240	P - 6.1.503	HMI and PLC Procurement Agreements (OT_AM05)	2015	Eliminated
241	P - 6.1.504	Alarm Remediation (Biannual) (OT_AM10)	2015	Eliminated
242	P - 6.1.505	SCADA Cyber Security VA (Biannual) (OT_AM12)	2015	Eliminated
243	P - 6.1.506	SCADA Project Development Methodologies (OT_AM03)	2015	Eliminated
244	P - 6.1.507	Standard Division 17 Specifications (OT_AM04)	2015	Eliminated
245	P - 6.1.508	SCADA Governance (OT_AM06)	2015	Pending
246	P - 6.1.509	Organization and Support Plan (OT_AM07)	2015	Eliminated
247	P - 6.1.510	SCADA Disaster Recovery/Business Continuity (OT_AM08)	2015	Eliminated
248	P - 6.1.511	SCADA Software Change Management (OT_AM09)	2015	Eliminated
249	P - 6.1.512	SCADA Lifecycle Management (OT_AM11)	2015	Eliminated
250	P - 6.1.513	Critical Instrument Calibration Procedure (OT_AM13)	2015	Eliminated
251	P - 6.1.514	As-Needed Integration Services	2020	Reoccurring

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6.2 Business Technology				
6.2.1 Technology & Data Governance				
252	P - 6.2.101	IT Governance Policies (BT_TDG01)	2015	Pending
253	P - 6.2.102	Technology Master Plan Updates (BT_TDG02) (every 5 yrs)	2015	Pending
254	P - 6.2.103	Data Management Standards (BT_TDG03)	2015	Pending
6.2.2 Business Management Enhancements				
255	P - 6.2.201	HR Implementation (BT_BME03)	2015	Eliminated
256	P - 6.2.202	Management Reporting Enhancements (BT_BME08)(5yrs)	2015	Pending
257	P - 6.2.203	Financial Enhancements (BT_BME01)	2015	Eliminated
258	P - 6.2.204	Payroll Enhancements (BT_BME02)	2015	Eliminated
259	P - 6.2.205	Project Accounting Enhancements (BT_BME04)	2015	Eliminated
260	P - 6.2.206	Procurement Enhancements (BT_BME05)	2015	Eliminated
261	P - 6.2.207	Inventory Enhancements (BT_BME06)	2015	Eliminated
262	P - 6.2.208	Fixed Assets Enhancements (BT_BME07)	2015	Eliminated
6.2.3 Regulatory Compliance				
263	P - 6.2.301	LIMS Enhancements (BT_RC01) (annual x5)	2015	Pending
264	P - 6.2.302	WIMS Enhancements (BT_RC02) (annual x5)	2015	Pending
265	P - 6.2.303	Regulatory SOP Enhancements (BT_RC03)	2015	Eliminated
6.2.4 Asset Management				
266	P - 6.2.401	CMMS Enhancements (BT_AM01) (annual)	2015	Pending
267	P - 6.2.402	Maintenance SOPs (BT_AM02)	2015	Eliminated
268	P - 6.2.403	GIS Implementation & Integration (BT_AM03)	2015	Eliminated
269	P - 6.2.404	Capital Asset Planning (BT_AM04)	2015	Eliminated
270	P - 6.2.405	Mobile Electronic Forms (BT_AM05)	2015	Eliminated
6.2.5 Capital Program Management				
271	P - 6.2.501	Capital Program Management (BT_CPM01)	2015	Eliminated
6.2.6 Document/Records Management				
272	P - 6.2.601	Public Website Enhancements (BT_DM02)	2015	Pending
273	P - 6.2.602	Collaboration/Content Portal (BT_DM01)	2015	Eliminated
274	P - 6.2.603	EDMS Update & Enhancements (BT_DM03)	2015	Eliminated
6.2.7 Information Technology Infrastructure				
275	P - 6.2.701	Mobile Computing Deployments (BT_ITI01) (annual x3)	2015	Eliminated
276	P - 6.2.702	Cyber-Security Assess/Improve/Updates (BT_ITI04) (annual x4)	2015	Eliminated
277	P - 6.2.703	Business Continuity Readiness (BT_ITI03)	2015	Pending
278	P - 6.2.704	Telecommunications Upgrades (BT_ITI02)	2015	Pending
279	P - 6.2.705	Host Server Replacement - IT	2020	Reoccurring
280	P - 6.2.706	Host Server Replacement - OT	2020	Reoccurring
281	P - 6.2.707	Storage Area Network Replacement	2020	Reoccurring
7.0 Reserved for Future				
8.0 Professional Services				
8.1 Condition Assessments				

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282	CA - 8.1.001	FY 2013 Asset Condition Assessments	2014	2013
283	CA - 8.1.002	Fire Main Supply	2014	2014
284	CA - 8.1.003	FY 2014 Assessments Triggered by Asset Age	2014	2014
285	CA - 8.1.004	FY 2015 Assessments Triggered by Asset Age	2014	2015
286	CA - 8.1.005	Underground Structures (Elect MHs)	2014	2016
287	CA - 8.1.006	FY 2016 Assessments Triggered by Asset Age	2014	2016
288	CA - 8.1.007	Underground Structures - Part 2 - eliminated	2014	Eliminated
289	CA - 8.1.008	Bridges	2014	2018
290	CA - 8.1.009	FY 2017 Assessments Triggered by Asset Age	2014	2017
291	CA - 8.1.010	FY 2018 Assessments Triggered by Asset Age	2014	2018
292	CA - 8.1.011	FY 2019 Assessments Triggered by Asset Age	2015	Pending
293	CA - 8.1.012	FY 2020 Assessments Triggered by Asset Age	2015	Pending
294	CA - 8.1.013	FY 2021 Assessments Triggered by Asset Age	2019	Pending
295	CA - 8.1.014	FY 2022 Assessments Triggered by Asset Age	2019	Pending
296	CA - 8.1.015	FY 2023 Assessments Triggered by Asset Age	2019	Pending
297	CA - 8.1.016	FY 2024 Assessments Triggered by Asset Age	2019	Pending
298	CA - 8.1.017	FY 2025 Assessments Triggered by Asset Age	2020	Pending
8.2 Studies and Updates				
299	S - 8.2.001	EWPCF 2040 Facility Master Plan Study	2014	2014
300	S - 8.2.002	Plant and Non-Potable Water Study	2014	2013
301	S - 8.2.003	Biosolids Management Business Plan Update	2014	2016
302	S - 8.2.004	Comprehensive Energy Rates Study (see P-4.1.020)	2014	Eliminated
303	S - 8.2.005	Wastewater Characterization Study	2014	2016
304	S - 8.2.006	Exterior Asset Corrosion Control (PAR)	2014	Eliminated
305	S - 8.2.007	Offsite Wetlands Restoration	2014	2016
306	S - 8.2.008	R&D Projects Support (moved to ES-8.4.002)	2014	Eliminated
307	S - 8.2.009	Agency Merger Studies - not part of capital program	2014	Eliminated
308	S - 8.2.010	Plant Flooding Study	2014	2015
309	S - 8.2.011	Technology Assessment Group Project Feasibility Study	2015	Eliminated
310	S - 8.2.012	Sludge / Biosolids Screening Facility	2015	Eliminated
311	S - 8.2.013	Process Master Plan (Solids, Air, Title V, CEPT, efficiency)	2015	2016
312	S - 8.2.014	CEPT Evaluation	2015	Eliminated
313	S - 8.2.015	Potable Reuse Study	2015	Pending
314	S - 8.2.016	Phosphorus Removal Study	2016	Eliminated
315	S - 8.2.017	Secondary Treatment Replacement Alternatives Study	2016	2016
316	S - 8.2.018	Pure Green Demonstration Garden Master Plan	2016	Eliminated
317	S - 8.2.019	EWA Public Response Plan	2020	Pending
318	S - 8.2.020	Energy and Emissions Strategic Plan Update	2020	Pending
8.3 E-CAMP Updates				
319	ES - 8.3.001	E-CAMP and R-CAMP Update	2013	Reoccurring
8.4 Engineering Services				
320	ES - 8.4.001	Extension of Staff Engineering Services	2014	Reoccurring
321	ES - 8.4.002	Research and Development Projects Services	2014	Reoccurring
322	ES - 8.4.003	Map Underground Piping ≤ 12-inch	2014	2013

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323	ES - 8.4.004	Map Underground Piping > 12-inch	2014	Eliminated
324	ES - 8.4.005	Electronic O&M and Document Management - Phase 1	2014	2013
325	ES - 8.4.006	Electronic O&M and Document Management - Phase 2	2014	2014
326	ES - 8.4.007	Electronic O&M and Document Management - Phase 3	2014	--
327	ES - 8.4.008	Electronic O&M and Document Management - Phase 4	2015	Eliminated
328	ES - 8.4.009	Pyrolysis Pilot Study Support	2015	2016
329	ES - 8.4.010	Electronic O&M and Document Management Updates	2016	Reoccurring
330	ES - 8.4.011	Service Area Ordinance Alignment	2016	Eliminated
331	ES - 8.4.012	Air Permitting Assistance	2019	Reoccurring
332	ES - 8.4.0xx	Misc. Professional Studies	2016	Eliminated
8.5 Other Services				
333	OS - 8.5.001	Legal and Misc Services (Annual)	2014	Eliminated
334	OS - 8.5.002	Settlement Study	2015	2014
335	OS - 8.5.003	Printing, Shipping, and Advertising	2015	2015
336	OS - 8.5.004	Capital Improvement Management Assessment	2015	2015
9.0 Remote Major Rehab Improvements - Refer to R-CAMP				

Appendix C: Basis of Estimate

Appendix C
BASIS OF ESTIMATE

KENNEDY JENKS CONSULTANTS
OPINION OF PROBABLE CONSTRUCTION COST

PROJECT INFORMATION:

Client:	Encina Wastewater Authority
Project:	FY2020 E-CAMP
KJ Job No.:	1844103*00
Estimate Date:	12/31/2018
Prepared By:	JLH/TW/NK
Reviewed By:	JLH/TW/NK
Estimate Type:	Preliminary
AACEI Class Level Estimate :	4

PROJECT DESCRIPTION:

The E-CAMP and related documentation is updated to provide a current, organized register of major assets and associated estimated asset service life remaining for the major equipment and materials at the EWPCF. Through the E-CAMP, EWA staff projects short and long-term future expenditures for capital improvement projects. Scope of projects included are described in the E-CAMP under Section 4 and Section 5. Projects vary in nature from studies to major plant process renovations. Estimates are provided to provide planning level order of magnitude costs.

ESTIMATE DOCUMENTS:

DRAWINGS: N/A

DOCUMENTS:

2016 Process Master Plan for the EWPCF
FY 2016 ECAMP Report
FY 2018 Capital Improvements Budget
FY2019 ECAMP Report
Ventilation and Climate Control Report cost estimate (July 2017)
2014 Condition Assessment Report (Jan 2014)
EWPCF Condition Assessment (Dec 2017)
FY2018 Condition Assessment Draft Report (Nov 2018)
2018 Headworks Building - Rooftop Assessment & Solution (Aug 2018)
FY2015 Underground Electrical Structures CA Report (Aug 2016)
EWPCF Draft Site Security Assessment (Sep 2018)
Power Building Structural Repairs Cost Estimate (Oct 2018)
SCADA Upgrades Project Preliminary OPCC (Oct 2016)
Odor Control Master Plan (Dec 2018)
181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input
Bagging Facility Equipment Quote (Jan 2018)
Outfall Vault Repairs Quote (May 2017)

COSTS PROVIDED BY OTHERS:

The Garland Company, Inc.
CDM Smith
Carollo Engineers
RMC Water and Environment
Encina Wastewater Authority
TRC
Premier Tech Chronos
DEC Engineers
V&A Consulting Engineers
J.R. Filanc
Enterprise Automation
Timberline Engineering
CDW

SOURCE OF COST DATA:

Costs for previously estimated projects were obtained from documents listed above with adjustment to current ENR CCI as described below under escalation.

New projects were estimated using RS Means CostWorks 2017 and 2019 data and similar project data. Allowances were used for items where scope was less defined.

ESTIMATE ASSUMPTIONS:

The followings assumptions were made in the preparation of this estimate:

For purpose of these estimates the following conditions were assumed unless specifically called out otherwise in the individual project estimate.

Appendix C BASIS OF ESTIMATE

KENNEDY JENKS CONSULTANTS OPINION OF PROBABLE CONSTRUCTION COST

*Project will be publicly bid and prevailing wage requirements will apply.
Regular working hours will be allowed (7:00am - 5:00pm).
Geotechnical investigations have not yet been completed
No significant dewatering of groundwater will be required.
Existing excavated material is suitable for backfill of structures and in pipe trenches above the pipe bedding zones.
Excess excavated materials will be stockpiled / disposed of onsite.
No compressible, collapsible, or otherwise difficult soil conditions*

SPECIFIC INCLUSIONS:

See individual project scope descriptions.
Projects include costs for shipping of materials. These were figured based on percentages based upon a estimation of material to be shipped.
Projects include costs for sales tax on materials.
Additional project phase costs for condition assessments, studies, design engineering, construction management, and electrical, instrument and control (EI&C) were included in the cost estimates as listed on the individual project sheets. These were determined using percentage factors of the construction cost as shown on the individual estimates unless otherwise noted.

SPECIFIC EXCLUSIONS:

The estimate does not include the following:

*Contaminated soils removal or disposal not included unless specifically listed in project descriptions.
Hazardous or Special Waste removal or disposal not included unless specifically listed in project descriptions.
No special foundations or piles are included unless specifically listed in project descriptions.
Owners Costs for program management, legal and administration costs, agency funding coordination, permitting, and public outreach are not included.*

DESIGN CONTINGENCY:

A project contingency is included for each project. This contingency is to include an allowance for indeterminates, and work items where scope is not fully detailed at this stage of design. Typically as design level progresses the contingency is reduced. For projects which do not yet have a preliminary design completed a project contingency of 30% was used. Some specific projects that have a more defined and limited scope defined a lower project contingency was used. The percentage used for each project is shown on the individual project estimate.

Note: This allowance is intended to provide a Design Contingency allowance. It is not intended to provide for a Construction Contingency for change orders during construction or to cover unforeseen conditions.

ESCALATION:

An escalation factor has not been included. Owner should include escalation to adjust cost to project schedules.
The owner is cautioned that the project cost should be adjusted for any changes in the project schedule.

Current ENR CCI

12011.85

Dec-18

Los Angeles

Annual Inflation Escalation Factor:

Not included

ACCURACY:

The level of accuracy is commensurate with levels developed by the AACE, the Association for the Advancement of Cost Engineering International. At increasing levels of design completion, the narrower the range between upper and lower limits and the greater the accuracy of the estimate. These estimates are considered a Class 4 level estimate in accordance with AACE guidelines. Typically this level of estimate has an expected accuracy range of +50 to +20% on high side and -15 to -30% on low side. This estimate is based upon a project with multiple bidders.
The enclosed Engineer's Estimate of Probable Construction Cost is only an opinion of possible items that maybe considered for budgeting purposes. These Project Estimates are limited to the conditions existing at issuance and is not a guaranty of actual construction cost or schedule. Uncertain market conditions such as, but not limited to, local labor or contractor availability, wages, other work, material market fluctuations, price escalations, force majeure events and developing bidding conditions, etc. may affect the accuracy of this review. Kennedy Jenks is not responsible for any variance from this Project Estimate or actual prices and conditions obtained.

Appendix D: Project Cost Tables

ENCINA WASTEWATER AUTHORITY
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Project No.	Capital Project	FY Project Start Date	Page No.
1.0 Liquid Process Improvements			
1.1 Headworks			
P - 1.1.005	Primary Area Improvements	FY2020	D-1
1.2 Primary Treatment			
P - 1.2.002	Primary Sludge Pumping Upgrades	≥FY2026	D-2
P - 1.2.009	PSB Mechanical Rehab - Short Term	FY2024	D-3
P - 1.2.010	Primary Sedimentation Basins Scum and Centrate Pipeline Replacement	≥FY2026	D-4
P - 1.2.013	PSB Mechanical Rehab - Medium Term	≥FY2026	D-5
P - 1.2.014	PSB Structural Rehab	≥FY2026	D-6
1.3 Secondary Treatment			
P - 1.3.007	Secondary Clarifiers and Strainers Improvements	FY2020	D-7
P - 1.3.008	SC 7 - Conversion from EQ to Clarifier	≥FY2026	D-8
P - 1.3.010	WAS Pipeline Replacement	≥FY2026	D-9
P - 1.3.018	AB Anaerobic Selector Zones	FY2022	D-10
P - 1.3.019	Control Strategy Improvements	≥FY2026	D-11
P - 1.3.020	Dewatering Wells in the Secondary Area	≥FY2026	D-12
P - 1.3.021	Return Activated Sludge Solids Deposition	≥FY2026	D-13
P - 1.3.022	Outfall Flow Equalization Basin Settlement	FY2020	D-14
1.4 Effluent			
P - 1.4.001	Effluent Pumps Improvements	≥FY2026	D-15
P - 1.4.002	Chlorine Building and EPS Improvements	FY2022	D-16
P - 1.4.004	EPS Pipe Lining and Abandoned Pipe Coating Repair	≥FY2026	D-17
2.0 Outfall			
2.1 Outfall			
P - 2.1.002	Ocean Outfall Maintenance and Inspection - External	FY2020, FY2022, FY2024	D-18
P - 2.1.005	Ocean Outfall Bathymetric Survey - External	FY2021	D-19
P - 2.1.006	Ocean Outfall - Integrity Assessment	FY2021	D-20
P - 2.1.007	84-inch Outfall Inspection - Internal	FY2021, FY2024	D-21
P - 2.1.008	Secondary Effluent Land Outfall Improvements	FY2020	D-22
3.0 Solids Process Improvements			
3.1 Biosolids Thickening			
P - 3.1.002	Solids Thickening Improvements	FY2020	D-23
3.2 Biosolids Digestion			
P - 3.2.004	Biosolids Screening Facility	≥FY2026	D-24
P - 3.2.013	Digester Rehabilitation and Improvements	FY2020	D-25
3.3 Biosolids Dewatering and Drying			
P - 3.3.001	MCC and Conductors Replacement - Power Building	≥FY2026	D-26
P - 3.3.004	Pellet Bagging Facilities	≥FY2026	D-27
P - 3.3.006	Second Dryer and Centrifuge Replacement	FY2023	D-28
P - 3.3.025	Existing Dryer Components Rehab and Interim Dryer Improvements	FY2020	D-29
4.0 Energy Management			
4.1 Energy Management			
P - 4.1.005	Cogen Engine Top-End Overhaul	FY2021, FY2022, FY2023, FY2024	D-30
P - 4.1.006	Cogen Engine In-Frame Overhaul	FY2025	D-31

ENCINA WASTEWATER AUTHORITY
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Project No.	Capital Project	FY Project Start Date	Page No.
P - 4.1.007	Cogen Engine Full Overhaul	FY2020, FY2021	D-32
P - 4.1.008	Cogen Engine 5 Installation	≥FY2026	D-33
P - 4.1.010	Cogen Engine 6 Installation	≥FY2026	D-34
P - 4.1.012	Heat Loop Bypass Installation	≥FY2026	D-35
P - 4.1.014	Retrofit Miscellaneous Equipment with VFDs	≥FY2026	D-36
P - 4.1.015	Cogen Engine Catalyst System and Gas Conditioning Facilities	FY2024	D-37
P - 4.1.022	Turbo Blower Upgrade	FY2024	D-38
P - 4.1.024	Automate Main Breakers in Cogen	≥FY2026	D-39
P - 4.1.025	Combined Generator Control Module Replacement	≥FY2026	D-40
P - 4.1.026	Cogen Generator Maintenance	≥FY2026	D-41
P - 4.1.027	Cogen Engine Room Ventilation	≥FY2026	D-42
5.0 General Improvements			
5.1 Odor Control			
P - 5.1.001	ORF I System Rehabilitation	FY2020	D-43
P - 5.1.002	ORF Carbon Media Replacement	Annual	D-44
P - 5.1.013	New Treatment System at ORF I	≥FY2026	D-45
P - 5.1.014	New Treatment System at ORF II	FY2020	D-46
P - 5.1.015	New Treatment System at ORF III	≥FY2026	D-47
5.2 Plant-Wide Systems			
P - 5.2.006	Plant Water Functional Improvements	FY2023	D-48
P - 5.2.012	Site Security Facilities	FY2022	D-49
P - 5.2.017	Instrument Air Piping Repairs	≥FY2026	D-50
P - 5.2.019	Plant Landscaping	FY2022	D-51
P - 5.2.021	Climate Control at MCCs and Cogen Building	FY2020	D-52
P - 5.2.026	Plant Waste Stream Rerouting	≥FY2026	D-53
P - 5.2.027	Plant-Wide Seal Coating	≥FY2026	D-54
P - 5.2.032	Plant-Wide Asset Painting and Protective Coating	Annual	D-55
P - 5.2.033	Plant-Wide Abandoned Equipment Removal	≥FY2026	D-56
P - 5.2.034	New Potable Water System	≥FY2026	D-57
P - 5.2.035	Storm Drainage Pump Station Improvements	FY2020	D-58
P - 5.2.036	Digester Area Drainage Improvements	≥FY2026	D-59
P - 5.2.037	2W System and Sand Filter Replacement	FY2023	D-60
P - 5.2.038	Underground Electrical Structures Repair	≥FY2026	D-61
P - 5.2.039	E&I Manhole Monitoring	≥FY2026	D-62
5.3 Buildings			
P - 5.3.004	Admin Building Chiller Replacement	FY2020	D-63
P - 5.3.013	Headworks Building Roof	≥FY2026	D-64
P - 5.3.014	Cogen Building Roof	≥FY2026	D-65
P - 5.3.015	Dewatering and Secondaries Building Assessment	≥FY2026	D-66
P - 5.3.016	Cogen Wall Repair	FY2020	D-67
5.4 Miscellaneous			
P - 5.4.004	Vallecitos Sample Vault Installation	≥FY2026	D-68
P - 5.4.005	Implement Minor Condition Assessment Recommendations	Annual	D-69
P - 5.4.006	As-Needed Contractor Services	Annual	D-70
P - 5.4.007	Miscellaneous Building Rehabilitation	Annual	D-71

ENCINA WASTEWATER AUTHORITY
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Project No.	Capital Project	FY Project Start Date	Page No.
6.0 Technology Upgrades			
6.1 Operations Technology			
6.1.2 Enterprise SCADA			
P - 6.1.205	Network Improvements	FY2020	D-72
P - 6.1.206	Secondaries Electrical and Controls Improvements	FY2024	D-73
P - 6.1.207	Cogen Electrical and Controls Improvements	FY2024	D-74
P - 6.1.208	CPS/SEEPS Electrical and Controls Improvements	FY2025	D-75
6.1.4 Operations Improvement			
P - 6.1.408	Business and SCADA Wireless Networks	≥FY2026	D-76
6.1.5 SCADA Asset Management			
P - 6.1.514	As-Needed Integration Services	Annual	D-77
6.2 Business Technology			
6.2.7 Information Technology Infrastructure			
P - 6.2.705	Host Server Replacement - IT	≥FY2026	D-78
P - 6.2.706	Host Server Replacement - OT	≥FY2026	D-79
P - 6.2.707	Storage Area Network Replacement	≥FY2026	D-80

Project 1.1.005

Primary Area Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
Screening & Screenings/Grit Handling Improvements							
Grit Chambers 1 & 2 Improvements							
Grit Chamber 3 Improvements							
Primary Sedimentation Basin Improvements							
Screening Building Electrical Room Improvements							
Site Work							
Headworks and Screenings Buildings							
Bypass Vault - MD-1							
Retrofit Existing Grit Pumps							
Parking Improvements	1	LS	\$ 11,200,000	\$ 11,200,000	0%	\$ -	\$ 11,200,000
Subcontractor Markup							
Insurance and Bond							
GC General Conditions							
Contractor Total OH&P							
Construction Contingency							
Escalation to Mid Point of Construction (Summer 2019)							

Subtotal \$ 11,200,000

Contractor Overhead & Profit @	0%	(Included)	\$ -
Shipping Rate	0%	of total is shipped @	\$ -
Sales Tax	0%	of total is taxed @	\$ -
Project Contingency @	10%		\$ 1,120,000

Total Main Project Cost (Year of Estimate or Estimate Update) \$ 12,320,000

ENR CCI Corresponding to Year of Estimate LA CCI Dec-2018 12012

ENR CCI Corresponding to CAMP Report Year LA CCI Dec-2018 12012 1.000

Total Main Project Cost (CAMP Report Year) \$ 12,320,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design		\$ -	15%	\$ -	\$ -	\$ -
EDC	Engr During Construction	6.25%	\$ 770,000	10%	\$ 77,000	\$ 847,000	\$ 847,000
CM	Construction Mgt		\$ 1,800,000	10%	\$ 180,000	\$ 1,980,000	\$ 1,980,000
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction		\$ 2,118,708	10%	\$ 211,871	\$ 2,331,000	\$ 2,331,000

Total Project Cost (Present Value in Dec-2018 Dollars) \$ 17,478,000

Notes:

- 1) Project Task Elements Cost from February 5, 2019 project bid opening (low bid)
- 2) An additional 10% contingency was added to the bid per Encina
- 3) Rates for Project Phases Cost are percent of Total Main Project Cost
- 4) CM cost is from Encina per CM negotiations
- 5) EI&C construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input and a 10% contingency was added per EWA
- 6) EI&C design from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input removed per Encina

Project 1.2.002

Primary Sludge Pumping Upgrades

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jul-16
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
			Sludge Density Meters	10	Ea	\$ 5,000	\$ 50,000		\$ -	\$ 50,000
			Sludge Blanket Level Measurement	10	Ea	\$ 5,000	\$ 50,000		\$ -	\$ 50,000
			Pipe Modifications	1	LS	\$ 100,000	\$ 100,000		\$ -	\$ 100,000
			Electrical Conduit & Wiring	1	LS	\$ 50,000	\$ 50,000		\$ -	\$ 50,000
			PLC & SCADA Upgrades	1	LS	\$ 50,000	\$ 50,000		\$ -	\$ 50,000
Subtotal									\$ 300,000	
Contractor Overhead & Profit @			15%						\$ 45,000	
Shipping Rate		25%	of total is shipped @		5%					\$ 4,000
Sales Tax		25%	of total is taxed @		7.75%					\$ 6,000
Project Contingency @			30%						\$ 107,000	
Total Main Project Cost(Year of Estimate or Estimate Update)									\$ 462,000	
ENR CCI Corresponding to Year of Estimate			LA CCI Jul-2016		11155					
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018		12012		1.077			
Total Main Project Cost (CAMP Report Year)									\$ 498,000	
Project Phases Cost			Rate	Amount	Contingency	Subtotal	Minimum	Total		
CA	Condition Assessment			\$ -	20%	\$ -	\$ -	\$ -		
CS	Conceptual Study			\$ -	20%	\$ -	\$ -	\$ -		
DS	Design		8.0%	\$ 39,799	15%	\$ 5,970	\$ 46,000	\$ 46,000		
EDC	Engr During Construction		4.5%	\$ 22,387	15%	\$ 3,358	\$ 26,000	\$ 26,000		
CM	Construction Mgt		5.5%	\$ 27,362	20%	\$ 5,472	\$ 33,000	\$ 33,000		
EICD	EI&C - Design		5.0%	\$ 24,874		\$ 25,000	NA	\$ 25,000		
EICC	EI&C - Construction		5.0%	\$ 24,874		\$ 25,000	NA	\$ 25,000		
Total Project Cost (Present Value in Dec-2018 Dollars)									\$ 653,000	
Notes:										
1) Project Task Element costs from November 2016 Process Master Plan for the EWPCF, TM4, Table 6										
2) Rates for Project Phases cost are percent of Total Main Project Cost										
3) A 5% adder for EI&C design and construction has been included per Encina for automation requirements										
Project 1.2.002										

Project 1.2.009

PSB Mechanical Rehab - Short Term

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	FY2024

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total	
Project Task Elements							
PSBs 1-6 Mech Rehab							
R/R Sludge collectors	6	EA	\$ 44,000	\$ 264,000	75%	\$ 198,000	\$ 462,000
R/R Scum Skimmers	6	EA	\$ 53,000	\$ 318,000	75%	\$ 238,500	\$ 556,500
Repair Effluent Weirs	6	EA	\$ 10,000	\$ 60,000	100%	\$ 60,000	\$ 120,000
Repair Launderers	6	EA	\$ 10,000	\$ 60,000	100%	\$ 60,000	\$ 120,000
E I&C	6	EA	\$ 50,000	\$ 300,000	100%	\$ 300,000	\$ 600,000

Subtotal **\$ 1,859,000**

Contractor Overhead & Profit @	27%		\$ 502,000
Shipping Rate	20%	of total is shipped @	\$ 19,000
Sales Tax	20%	of total is taxed @	\$ 29,000
Project Contingency @	30%		\$ 723,000

Total Main Project Cost (Year of Estimate or Estimate Update) **\$ 3,132,000**

ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017	11936	
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018	12012	1.006

Total Main Project Cost (CAMP Report Year) **\$ 3,152,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 252,156	15%	\$ 37,823	\$ 290,000	\$ 290,000
EDC	Engr During Construction	4.5%	\$ 141,838	15%	\$ 21,276	\$ 164,000	\$ 164,000
CM	Construction Mgt	5.5%	\$ 173,357	20%	\$ 34,671	\$ 209,000	\$ 209,000
EICD	EI&C - Design	3.0%	\$ 94,559		\$ 95,000	NA	\$ 95,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) **\$ 3,910,000**

Notes:

- 1) Rates for Project Phases cost are percent of Total Main Project Cost
- 2) A 3% adder for EI&C design has been included per Encina for automation requirements

Project 1.2.010

Primary Sedimentation Basins Scum and Centrate Pipeline Replacement

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost	
	No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total		
Project Task Elements								
PSB Scum Pipeline								
Pipe 8" Lined (including trenching thru existing plant areas)	250	LF	\$ 80	\$ 20,000	\$ 64	\$ 16,000	\$ 36,000	
Demo & dispose Existing Pipe	250	LF		\$ -	\$ 12	\$ 3,000	\$ 3,000	
Connections to existing	2	EA	\$ 500	\$ 1,000	100%	\$ 1,000	\$ 2,000	
Centrate Pipeline								
Pipe 12" Lined (including trenching thru existing plant)	250	LF	\$ 120	\$ 30,000	\$ 96	\$ 24,000	\$ 54,000	
Demo & dispose Existing Pipe	250	LF		\$ -	\$ 15	\$ 3,750	\$ 3,750	
Connections to existing	2	EA	\$ 500	\$ 1,000	100%	\$ 1,000	\$ 2,000	
Both								
Allowance to address settlement	1	LS	\$ 10,000	\$ 10,000	100%	\$ 10,000	\$ 20,000	
Surface Paving Restoration (both pipes)	167	SY	\$ 45	\$ 7,500	\$ 30	\$ 5,000	\$ 12,500	
Subtotal							\$ 134,000	
Contractor Overhead & Profit @		27%					\$ 37,000	
Shipping Rate	35%	of total is shipped @	5%					\$ 3,000
Sales Tax	35%	of total is taxed @	7.75%					\$ 4,000
Project Contingency @		25%					\$ 45,000	
Total Main Project Cost(Year of Estimate or Estimate Update)							\$ 223,000	
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017		11936				
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.006		
Total Main Project Cost (CAMP Report Year)							\$ 225,000	
Project Phases Cost		Rate	Amount	Contingency		Subtotal	Minimum Total	
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -	
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -	
DS	Design	8.0%	\$ 17,954	15%	\$ 2,693	\$ 21,000	\$ 21,000	
EDC	Engr During Construction	4.5%	\$ 10,099	15%	\$ 1,515	\$ 12,000	\$ 12,000	
CM	Construction Mgt	5.5%	\$ 12,343	20%	\$ 2,469	\$ 15,000	\$ 15,000	
EICD	EI&C - Design		\$ -			\$ -	\$ -	
EICC	EI&C - Construction		\$ -			\$ -	\$ -	
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 273,000	
Notes:								
1) Rates for Project Phases cost are percent of Total Main Project Cost								

Project 1.2.013

PSB Mechanical Rehab - Medium Term

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total	
Project Task Elements							
PSBs 7-10 Mech Rehab							
R/R Sludge collectors	4	EA	\$ 44,000	\$ 176,000	75%	\$ 132,000	\$ 308,000
R/R Scum Skimmers	4	EA	\$ 53,000	\$ 212,000	75%	\$ 159,000	\$ 371,000
Repair Effluent Weirs	4	EA	\$ 10,000	\$ 40,000	100%	\$ 40,000	\$ 80,000
Repair Launderers	4	EA	\$ 10,000	\$ 40,000	100%	\$ 40,000	\$ 80,000
E I&C	4	EA	\$ 50,000	\$ 200,000	100%	\$ 200,000	\$ 400,000

Subtotal **\$ 1,239,000**

Contractor Overhead & Profit @	27%		\$ 335,000
Shipping Rate	20%	of total is shipped @	\$ 13,000
Sales Tax	20%	of total is taxed @	\$ 20,000
Project Contingency @	30%		\$ 483,000

Total Main Project Cost (Year of Estimate or Estimate Update) **\$ 2,090,000**

ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017	11936	
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018	12012	1.006

Total Main Project Cost (CAMP Report Year) **\$ 2,104,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 168,265	15%	\$ 25,240	\$ 194,000	\$ 194,000
EDC	Engr During Construction	4.5%	\$ 94,649	15%	\$ 14,197	\$ 109,000	\$ 109,000
CM	Construction Mgt	5.5%	\$ 115,682	20%	\$ 23,136	\$ 139,000	\$ 139,000
EICD	EI&C - Design	3.0%	\$ 63,099		\$ 64,000	NA	\$ 64,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) **\$ 2,610,000**

Notes:

- 1) Rates for Project Phases cost are percent of Total Main Project Cost
- 2) A 3% adder for EI&C design has been included per Encina for automation requirements

Project 1.2.014

PSB Structural Rehab							
Main Project Type				Key Dates			
New Facility				CAMP Report	2020		
Facility Rehabilitation	X			Initial Estimate	Jan-18		
Major Maintenance				Estimate Update	Dec-18		
Asset Replacement				Project Start	≥FY2026		
Special Study							
Main Project Cost		Quantity		Material Cost		Labor Cost	
	No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total	Total Cost
Project Task Elements							
PSB Struct Rehab							
Structural Repair	10	EA	\$ 200,000	\$ 2,000,000	100%	\$ 2,000,000	\$ 4,000,000
Concrete repair and lining	64,400	SF	\$ 15	\$ 966,000	100%	\$ 966,000	\$ 1,932,000
Subtotal							
							\$ 5,932,000
Contractor Overhead & Profit @		27%				\$ 1,602,000	
Shipping Rate		20%	of total is shipped @	5%		\$ 60,000	
Sales Tax		20%	of total is taxed @	7.75%		\$ 92,000	
Project Contingency @		30%				\$ 2,306,000	
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 9,992,000
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017		11936			
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.006	
Total Main Project Cost (CAMP Report Year)							\$ 10,056,000
Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 804,452	15%	\$ 120,668	\$ 926,000	\$ 926,000
EDC	Engr During Construction	4.5%	\$ 452,504	15%	\$ 67,876	\$ 521,000	\$ 521,000
CM	Construction Mgt	5.5%	\$ 553,061	20%	\$ 110,612	\$ 664,000	\$ 664,000
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 12,167,000
Notes:							
1) Rates for Project Phases cost are percent of Total Main Project Cost							

Project 1.3.007

Secondary Clarifiers and Strainers Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost	
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total		
Project Task Elements								
SC 5,6,&8 Rehab:								
Bonds and Insurance	1	LS	\$ 21,853	\$ 22,000		\$ -	\$ 22,000	
Mobilization	1	LS	\$ 19,538	\$ 20,000		\$ -	\$ 20,000	
Fab & Deliver Clarifier Mechanism	3	EA	\$ 232,100	\$ 697,000		\$ -	\$ 697,000	
Demo Existing Clarifier Mechanism	3	EA	\$ 20,762	\$ 63,000		\$ -	\$ 63,000	
Install New Clarifier Mechanisms - includes coating	3	EA	\$ 232,100	\$ 697,000		\$ -	\$ 697,000	
Repair Cracks	3	EA	\$ 4,205	\$ 13,000		\$ -	\$ 13,000	
Repair Concrete Holes	3	EA	\$ 3,346	\$ 11,000		\$ -	\$ 11,000	
Replace Launderers / Trough	3	EA	\$ 24,625	\$ 74,000		\$ -	\$ 74,000	
Replace Launder Supports	3	EA	\$ 8,233	\$ 25,000		\$ -	\$ 25,000	
Abbrasive Blast/ Coat Ext Knee brackets, Troughs , Bridges	3	EA	\$ 71,231	\$ 214,000		\$ -	\$ 214,000	
Replace Weirs	3	EA	\$ 14,313	\$ 43,000		\$ -	\$ 43,000	
Replace Drain Gates	3	EA	\$ 7,652	\$ 23,000		\$ -	\$ 23,000	
Replace Influent Gates (actuated)	3	EA	\$ 10,922	\$ 33,000	50%	\$ 16,500	\$ 49,500	
Rehab Effluent Gates	3	EA	\$ 3,553	\$ 11,000		\$ -	\$ 11,000	
Electrical for Mechanism	1	LS	\$ 60,496	\$ 61,000		\$ -	\$ 61,000	
(Cost Estimate Based on Filanc Pay Request Clarifier 1-4) Adjusted from ENR 10077 to Estimate Date below								
Strainer Improvements								
Automatic Strainers (up to three)	1	LS	\$ 334,000	\$ 334,000	0%	\$ -	\$ 334,000	
(Cost for 3W system adjusted from EWPCF PMP) Adjusted from ENR 11155 to Estimate Date below								
SC 1-4 Gates:								
SC Influent Gate R/R	4	EA	\$ 17,422	\$ 70,000		\$ -	\$ 70,000	
SC Effluent Gate R/R	6	EA	\$ 17,422	\$ 105,000		\$ -	\$ 105,000	
Groundwater Relief Valves	72	EA	\$ 500.00	\$ 36,000	100%	\$ 36,000	\$ 72,000	
Subtotal							\$ 2,605,000	
Contractor Overhead & Profit @		27%						\$ 704,000
Shipping Rate		40%	of total is shipped @		15%			\$ 157,000
Sales Tax		50%	of total is taxed @		7.75%			\$ 101,000
Project Contingency @		30%						\$ 1,071,000
Total Main Project Cost(Year of Estimate or Estimate Update)							\$ 4,638,000	
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017		11936				
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.006		
Total Main Project Cost (CAMP Report Year)							\$ 4,668,000	

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -		\$ -
CS	Conceptual Study		\$ -	20%	\$ -		\$ -
DS	Design		\$ -	15%	\$ -		\$ -
EDC	Engr During Construction	4.5%	\$ 210,039	15%	\$ 31,506	\$ 242,000	\$ 242,000
CM	Construction Mgt	5.5%	\$ 256,715	20%	\$ 51,343	\$ 309,000	\$ 309,000
EICD	EI&C - Design	3.0%	\$ 140,026		\$ 141,000	NA	\$ 141,000
EICC	EI&C - Construction	3.0%	\$ 140,026		\$ 141,000	NA	\$ 141,000
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 5,501,000

Notes:

- 1) Project Task Elements cost for SC 5 & 6 Rehab from FY2016 ECAMP Report and adjusted for ENR from Nov 2011 & FY2018 CIP Budget
- 2) Rehab of Secondary Clarifier 8 has been added to this project and the SC Rehab costs have been ratioed accordingly
- 3) EPS 3W System Improvements cost included in Strainer Improvements and are from November 2016 Process Master Plan for the EWPCF, TM10, Table 6 and adjusted for ENR from July 2016
- 4) Electrical costs for actuating SC Gates removed per Encina and added back as additional strainer improvements cost
- 5) Rates for Project Phases cost are percent of Total Main Project Cost
- 6) A 3% adder for EI&C design and construction has been included per Encina for automation requirements

Project 1.3.008

SC 7 - Conversion from EQ to Clarifier

Main Project Type			Key Dates	
New Facility			CAMP Report	2020
Facility Rehabilitation	X		Initial Estimate	Jan-18
Major Maintenance			Estimate Update	Dec-18
Asset Replacement			Project Start	≥FY2026
Special Study				

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	
Project Task Elements							
Clarifier Mechanism	1	EA	\$ 232,100	\$ 233,000	\$ 232,100	\$ 233,000	\$ 466,000
Launders / Trough	1	EA	\$ 24,625	\$ 25,000		\$ -	\$ 25,000
Weirs	1	EA	\$ 14,313	\$ 15,000		\$ -	\$ 15,000
Laundry Supports	1	EA	\$ 8,233	\$ 9,000		\$ -	\$ 9,000
Coat Ext Knee brackets, Troughs , Bridges	1	EA	\$ 35,760	\$ 36,000		\$ -	\$ 36,000
Drain Gates	1	EA	\$ 7,700	\$ 8,000		\$ -	\$ 8,000
Influent Gates (actuated)	1	EA	\$ 12,460	\$ 13,000	100%	\$ 13,000	\$ 26,000
Effluent Gates (actuated)	1	EA	\$ 12,460	\$ 13,000	100%	\$ 13,000	\$ 26,000
Demo EQ Pump and Piping	1	EA		\$ -	\$ 5,000	\$ 5,000	\$ 5,000
RAS Pump	2	EA	\$ 75,000	\$ 150,000	50%	\$ 75,000	\$ 225,000
RAS Piping	1	LS	\$ 25,000	\$ 25,000	100%	\$ 25,000	\$ 50,000
12" RAS Flow Meter	1	EA	\$ 8,000	\$ 8,000	100%	\$ 8,000	\$ 16,000
E&I/C	30%		\$ -	\$ -		\$ -	\$ 272,100
Sec Eff Eq structure modifications	1	LS	\$ 25,000	\$ 25,000	100%	\$ 25,000	\$ 50,000

Subtotal					\$ 1,230,000
Contractor Overhead & Profit @		27%		\$ 333,000	
Shipping Rate	45%	of total is shipped @	5%	\$ 28,000	
Sales Tax	45%	of total is taxed @	7.75%	\$ 43,000	
Project Contingency @		30%		\$ 491,000	
Total Main Project Cost(Year of Estimate or Estimate Update)					\$ 2,125,000
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017	11936		
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018	12012	1.006	
Total Main Project Cost (CAMP Report Year)					\$ 2,139,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study	2.5%	\$ 53,463	20%	\$ 10,693	\$ 65,000	\$ 65,000
DS	Design	8.0%	\$ 171,083	15%	\$ 25,662	\$ 197,000	\$ 197,000
EDC	Engr During Construction	4.5%	\$ 96,234	15%	\$ 14,435	\$ 111,000	\$ 111,000
CM	Construction Mgt	5.5%	\$ 117,619	20%	\$ 23,524	\$ 142,000	\$ 142,000
EICD	EI&C - Design	3.0%	\$ 64,156		\$ 65,000	NA	\$ 65,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 2,719,000

Notes:

1) Rates for Project Phases cost are percent of Total Main Project Cost

Project 1.3.010

WAS Pipeline Replacement

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Nov-12
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements									
Trench excavation, backfilling, shoring, pipe sub-base, etc. Assumed average 8 feet depth and 3 feet wide trench			250	LF	\$ 200	\$ 50,000	0%	\$ -	\$ 50,000
Temporary bypass piping			1	LS	\$ 40,000	\$ 40,000	0%	\$ -	\$ 40,000
New WAS pipe (8" DI pipe)			250	LF	\$ 160	\$ 40,000	0%	\$ -	\$ 40,000
Paving/restoration			750	SF	\$ 5	\$ 3,750	0%	\$ -	\$ 3,750
Existing piping and pavement demolition			1	LS	\$ 20,000	\$ 20,000	0%	\$ -	\$ 20,000

AB Anaerobic Selector Zones							
Main Project Type						Key Dates	
New Facility	X	CAMP Report	2020				
Facility Rehabilitation		Initial Estimate	Jun-17				
Major Maintenance		Estimate Update	Dec-18				
Asset Replacement		Project Start	FY2022				
Special Study							
Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
Baffle Walls Additional Structural Modifications	1	LS	\$ 550,000	\$ 550,000	0%	\$ -	\$ 550,000
Subtotal							\$ 550,000
Contractor Overhead & Profit @		27%					\$ 149,000
Shipping Rate	35%	of total is shipped @	5%				\$ 10,000
Sales Tax	35%	of total is taxed @	7.75%				\$ 15,000
Project Contingency @		30%					\$ 218,000
Total Main Project Cost(Year of Estimate or Estimate Update)							\$ 942,000
ENR CCI Corresponding to Year of Estimate		LA CCI Jun-2017		11636			
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012	1.032		
Total Main Project Cost (CAMP Report Year)							\$ 973,000
Project Phases Cost			Rate	Amount	Contingency	Subtotal	Minimum Total
CA	Condition Assessment			\$ -	20%	\$ -	\$ -
CS	Conceptual Study			\$ -	20%	\$ -	\$ -
DS	Design		8.0%	\$ 77,791	15%	\$ 11,669	\$ 90,000
EDC	Engr During Construction		4.5%	\$ 43,757	15%	\$ 6,564	\$ 51,000
CM	Construction Mgt		5.5%	\$ 53,481	20%	\$ 10,696	\$ 65,000
EICD	EI&C - Design		3.0%	\$ 29,172		\$ 30,000	NA \$ 30,000
EICC	EI&C - Construction		3.0%	\$ 29,172		\$ 30,000	NA \$ 30,000
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 1,239,000
Notes:							
1) Project Task Elements Cost from FY2018 Capital Improvements Budget							
2) Rates for Project Phases Cost are percent of Total Main Project Cost							
3) Rates and Minimums for Project Phases Cost were adjusted to match FY2018 Capital Improvements Budget							
4) A 3% adder for EI&C design and construction has been included per Encina for automation requirements							

Project 1.3.019

Control Strategy Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Nov-16
Estimate Update	Jan-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
Implement Control Strategy			1	LS	\$ -	\$ -	\$ 53,000	\$ 53,000		\$ 53,000

Project 1.3.020

Dewatering Wells in the Secondary Area

Main Project Type		Key Dates	
New Facility		CAMP Report	2020
Facility Rehabilitation		Initial Estimate	Dec-18
Major Maintenance		Estimate Update	Dec-18
Asset Replacement		Project Start	≥FY2026
Special Study	X		

	Quantity		Material Cost		Labor Cost		
Main Project Cost	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	Total Cost
Project Task Elements This project is currently a study	-	LS	\$ -	\$ -	50%	\$ -	\$ -

Subtotal				\$	-
Contractor Overhead & Profit @		0%		\$	-
Shipping Rate	0%	of total is shipped @	15%	\$	-
Sales Tax	0%	of total is taxed @	7.75%	\$	-
Project Contingency @		40%		\$	-
Total Main Project Cost(Year of Estimate or Estimate Update)				\$	-
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2018	12012		
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018	12012	1.000	
Total Main Project Cost (CAMP Report Year)				\$	-

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -		\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$25,000	\$ 25,000
DS	Design		\$ -	15%	\$ -		\$ -
EDC	Engr During Construction		\$ -	15%	\$ -		\$ -
CM	Construction Mgt		\$ -	20%	\$ -		\$ -
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 25,000

Notes:

- 1) Rates for Project Phases cost are percent of Total Main Project Cost
- 2) Per Encina, this project currently includes a study

Project 1.3.021

Return Activated Sludge Solids Deposition

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Unit Cost	Total	

Project Task Elements

This project is currently a study

Subtotal \$ -

Contractor Overhead & Profit @ 27% \$ -

Shipping Rate 35% of total is shipped @ 5% \$ -

Sales Tax 35% of total is taxed @ 7.75% \$ -

Project Contingency @ 30% \$ -

Total Main Project Cost (Year of Estimate or Estimate Update) \$ -

ENR CCI Corresponding to Year of Estimate LA CCI Dec-2018 12012

ENR CCI Corresponding to CAMP Report Year LA CCI Dec-2018 12012 1.000

Total Main Project Cost (CAMP Report Year) \$ -

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -		\$ -
CS	Conceptual Study		\$ -		\$ -	\$42,000	\$ 42,000
DS	Design	0.0%	\$ -	15%	\$ -		\$ -
EDC	Engr During Construction	0.0%	\$ -	15%	\$ -		\$ -
CM	Construction Mgt	0.0%	\$ -	20%	\$ -		\$ -
EICD	EI&C - Design	0.0%			\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%			\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) \$ 42,000

Notes:

1) Rates for Project Phases cost are percent of Total Main Project Cost

2) Per Encina, this project currently includes a study

Project 1.3.022

Outfall Flow Equalization Basin Settlement

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements									
Rehabilitation of Secondaries EQ Basin			1	LS	\$ 310,000	\$ 310,000	50%	\$ 155,000	\$ 465,000

Project 1.4.001

Effluent Pumps Improvements								
Main Project Type					Key Dates			
New Facility					CAMP Report	2020		
Facility Rehabilitation					Initial Estimate	Jan-18		
Major Maintenance					Estimate Update	Dec-18		
Asset Replacement					Project Start	≥FY2026		
Special Study		X						
Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost	
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total		
Project Task Elements								
Project is a study and will not have construction cost.	-	LS	\$ -	\$ -	50%	\$ -	\$ -	
Subtotal							\$ -	
Contractor Overhead & Profit @	0%						\$ -	
Shipping Rate	0%	of total is shipped @	15%					\$ -
Sales Tax	0%	of total is taxed @	7.75%					\$ -
Project Contingency @	40%						\$ -	
Total Main Project Cost(Year of Estimate or Estimate Update)							\$ -	
ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017		11936					
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018		12012				1.006	
Total Main Project Cost (CAMP Report Year)							\$ -	
Project Phases Cost	Rate	Amount	Contingency	Subtotal	Minimum	Total		
CA	Condition Assessment	\$ -	20%	\$ -		\$ -		
CS	Conceptual Study	\$ -	20%	\$ -	\$25,000	\$ 25,000		
DS	Design	\$ -	15%	\$ -		\$ -		
EDC	Engr During Construction	\$ -	15%	\$ -		\$ -		
CM	Construction Mgt	\$ -	20%	\$ -		\$ -		
EICD	El&C - Design	0.0%		\$ -	NA	\$ -		
EICC	El&C - Construction	0.0%		\$ -	NA	\$ -		
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 25,000	
Notes:								
1) Rates for Project Phases cost are percent of Total Main Project Cost								
2) Per Encina, this project currently includes a study								

Project 1.4.002

Chlorine Building and EPS Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	FY2022

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	
Project Task Elements							
EPS & Chlorine Bldg MCC and Conductors Replacement:							
Remove/ Replace conductors to equipment	1	LS	\$ 38,000	\$ 38,000	\$ 114,000	\$ 114,000	\$ 152,000
MCC-D & E in Chlorination bldg Demo and Replace	26	SCT	\$ 34,600	\$ 899,600	\$ 6,000	\$ 156,000	\$ 1,055,600
Climate Control Improvements for MCC (Cost from DEC Climate Control Report) Adjusted from ENR 11636 to Estimate Date below	1	LS	\$ 54,355	\$ 54,355	\$ 32,091	\$ 32,091	\$ 86,446
Chlorination Building							
Improvements Allowance	1	LS	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 50,000

Subtotal \$ 1,345,000

Contractor Overhead & Profit @	27%	\$ 364,000
Shipping Rate	40% of total is shipped @	\$ 81,000
Sales Tax	50% of total is taxed @	\$ 53,000
Project Contingency @	40%	\$ 738,000

Total Main Project Cost (Year of Estimate or Estimate Update) \$ 2,581,000

ENR CCI Corresponding to Year of Estimate LA CCI Dec-2017 11936

ENR CCI Corresponding to CAMP Report Year LA CCI Dec-2018 12012 1.006

Total Main Project Cost (CAMP Report Year) \$ 2,598,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$25,000	\$ 25,000
DS	Design	8.0%	\$ 207,795	15%	\$ 31,169	\$ 239,000	\$ 239,000
EDC	Engr During Construction	4.5%	\$ 116,885	15%	\$ 17,533	\$ 135,000	\$ 135,000
CM	Construction Mgt	5.5%	\$ 142,859	20%	\$ 28,572	\$ 172,000	\$ 172,000
EICD	EI&C - Design		\$ 213,521		\$ 214,000	NA	\$ 214,000
EICC	EI&C - Construction		\$ 696,769		\$ 697,000	NA	\$ 697,000

Total Project Cost (Present Value in Dec-2018 Dollars) \$ 4,080,000

Notes:

- 1) Climate Control Improvements cost from DEC Engineers Ventilation and Climate Control Report cost estimate (July 2017) and adjusted for ENR from July 2017
- 2) The Conceptual Study cost is for the On-Site Chlorine Generation Study
- 3) Rates for Project Phases cost are percent of Total Main Project Cost
- 4) EI&C design and construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input

Project 1.4.004

EPS Pipe Lining and Abandoned Pipe Coating Repair

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	
Project Task Elements							
Environmental Controls/ Ventilation	1	LS	\$ 10,000	\$ 10,000	\$ 25,000	\$ 25,000	\$ 35,000
Rescue Services/ Safety Provisions	1	LS	\$ 10,000	\$ 10,000	\$ 50,000	\$ 50,000	\$ 60,000
Prep Existing Surfaces for Liner	5,244	SF		\$ -	\$ 20.00	\$ 104,888	\$ 104,888
84" dia spray on liner	3,956	SF	\$ 20.00	\$ 79,128	\$ 20.00	\$ 79,128	\$ 158,256
7' sq spray on liner	1,288	SF	\$ 20.00	\$ 25,760	\$ 20.00	\$ 25,760	\$ 51,520
Bypass Pumping	1	LS		\$ -	\$ 500,000	\$ 500,000	\$ 500,000

Subtotal							\$ 710,000
Contractor Overhead & Profit @	27%						\$ 192,000
Shipping Rate	0%	of total is shipped @	5%				\$ -
Sales Tax	30%	of total is taxed @	7.75%				\$ 17,000
Project Contingency @	30%						\$ 276,000
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 1,195,000
ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017			11936			
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018			12012	1.006		
Total Main Project Cost (CAMP Report Year)							\$ 1,203,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 96,209	15%	\$ 14,431	\$ 111,000	\$ 111,000
EDC	Engr During Construction	4.5%	\$ 54,118	15%	\$ 8,118	\$ 63,000	\$ 63,000
CM	Construction Mgt	5.5%	\$ 66,144	20%	\$ 13,229	\$ 80,000	\$ 80,000
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 1,457,000

Notes:

1) Rates for Project Phases cost are percent of Total Main Project Cost

Project 2.1.002

Ocean Outfall Maintenance and Inspection - External

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	X
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jun-17
Estimate Update	Dec-18
Project Start	FY2020, FY2022, FY2024

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
Underwater inspection and minor maintenance	1	LS	\$ 62,000	\$ 62,000	0%	\$ -	\$ 62,000

Subtotal							\$ 62,000
Contractor Overhead & Profit @		27%					\$ 17,000
Shipping Rate	0%	of total is shipped @	15%				\$ -
Sales Tax	0%	of total is taxed @	7.75%				\$ -
Project Contingency @		25%					\$ 20,000
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 99,000
ENR CCI Corresponding to Year of Estimate	LA CCI Jun-2017			11636			
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018			12012	1.032		
Total Main Project Cost (CAMP Report Year)							\$ 103,000

Project Phases Cost			Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment			\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study			\$ -	20%	\$ -	\$ -	\$ -
DS	Design			\$ -	15%	\$ -	\$ -	\$ -
EDC	Engr During Construction			\$ -	15%	\$ -	\$ -	\$ -
CM	Construction Mgt			\$ -	20%	\$ -	\$ -	\$ -
EICD	EI&C - Design	0.0%		\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%		\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)								\$ 103,000

Notes:

- 1) Project Task Elements cost from FY2018 Capital Improvements Budget
- 2) Rates for Project Phases cost are percent of Total Main Project Cost

Project 2.1.005

Ocean Outfall Bathymetric Survey - External

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Nov-14
Estimate Update	Dec-18
Project Start	FY2021

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
Bathymetric Survey			1	LS	\$ 54,174	\$ 54,174	0%	\$ -		\$ 54,174
Subtotal										
Contractor Overhead & Profit @			27%							\$ 55,000
Shipping Rate			0%	of total is shipped @	15%					\$ 15,000
Sales Tax			0%	of total is taxed @	7.75%					\$ -
Project Contingency @			25%							\$ 18,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 88,000
ENR CCI Corresponding to Year of Estimate			LA CCI Jan-2015			10999				
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.092		
Total Main Project Cost (CAMP Report Year)										\$ 97,000
Project Phases Cost			Rate		Amount		Contingency		Subtotal	Minimum Total
CA	Condition Assessment				\$ -	20%	\$ -	\$ -	\$ -	\$ -
CS	Conceptual Study				\$ -	20%	\$ -	\$ -	\$ -	\$ -
DS	Design				\$ -	15%	\$ -	\$ -	\$ -	\$ -
EDC	Engr During Construction		4.5%		\$ 4,325	15%	\$ 649	\$ 5,000		\$ 5,000
CM	Construction Mgt		5.5%		\$ 5,286	20%	\$ 1,057	\$ 7,000		\$ 7,000
EICD	EI&C - Design		0.0%		\$ -			\$ -	NA	\$ -
EICC	EI&C - Construction		0.0%		\$ -			\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 109,000
Notes:										
1) Project Task Element Costs from FY2016 ECAMP Report										
2) Rates for Project Phases Cost are percent of Total Main Project Cost										

Project 2.1.006

Ocean Outfall - Integrity Assessment

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Jun-17
Estimate Update	Dec-18
Project Start	FY2021

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements Integrity Assessment Including: Mob/Demob Confined Space Entry Crew into Land Outfall Core Sampling CCTV Assessment			1	LS	\$ 125,000	\$ 125,000	0%	\$ -	\$ 125,000	
Subtotal										\$ 125,000
Contractor Overhead & Profit @			27%							\$ 34,000
Shipping Rate		0%	of total is shipped @		15%					\$ -
Sales Tax		0%	of total is taxed @		7.75%					\$ -
Project Contingency @			25%							\$ 40,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 199,000
ENR CCI Corresponding to Year of Estimate			LA CCI Jun-2017			11636				
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.032		
Total Main Project Cost (CAMP Report Year)										\$ 206,000
Project Phases Cost			Rate		Amount		Contingency		Subtotal	Minimum Total
CA	Condition Assessment				\$ -	20%	\$ -	\$ -	\$ -	
CS	Conceptual Study				\$ -	20%	\$ -	\$ -	\$ -	
DS	Design				\$ -	15%	\$ -	\$ -	\$ -	
EDC	Engr During Construction				\$ -	15%	\$ -	\$ -	\$9,000 \$ 9,000	
CM	Construction Mgt				\$ -	20%	\$ -	\$ -	\$11,000 \$ 11,000	
EICD	EI&C - Design		0.0%		\$ -		\$ -	NA	\$ -	
EICC	EI&C - Construction		0.0%		\$ -		\$ -	NA	\$ -	
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 226,000
Notes:										
1) Project Task Elements cost from FY2018 Capital Improvements Budget										
2) Rates for Project Phases cost are percent of Total Main Project Cost										
3) Rates and Minimums for Project Phases Cost were adjusted to match FY2018 Capital Improvements Budget										

84-inch Outfall Inspection - Internal

[illegible]

Subtotal	\$ 84,000
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Total Main Project Cost(Year of Estimate or Estimate Update)	\$ 150,000
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Total Main Project Cost (CAMP Report Year)	\$ 155,000
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Total Project Cost (Present Value in Dec-2018 Dollars)	\$ 170,000
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- 1) Project Task Elements Cost from FY2018 Capital Improvements Budget
- 2) Rates for Project Phases Cost are percent of Total Main Project Cost
- 3) Rates and Minimums for Project Phases Cost were adjusted to match FY2018 Capital Improvements Budget

Project 2.1.008

Secondary Effluent Land Outfall Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Nov-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
84-inch RCP							
Coat the interior surfaces of the RCP	1	LS	\$ 50,000	\$ 50,000			\$ 50,000
Seal joints with hydrophilic grout injection	1	LS	\$ 85,000	\$ 85,000			\$ 85,000
Steel joint sleeves - remove corrosion and coat	1	LS	\$ 10,000	\$ 10,000			\$ 10,000
Surge Tower							
Resurface concrete and coat lower 12 feet	1	LS	\$ 20,000	\$ 20,000			\$ 20,000
Remove coating and recoat 60 inch PE Pipeline	1	LS	\$ 15,000	\$ 15,000			\$ 15,000
Remove coating and recoat 60 inch SE Pipeline	1	LS	\$ 15,000	\$ 15,000			\$ 15,000
Replace corroded 24 inch 3W elbow and coat pipe spools	1	LS	\$ 10,000	\$ 10,000			\$ 10,000
Replace 6 inch drain pipe fittings and coat pipe spools	1	LS	\$ 5,000	\$ 5,000			\$ 5,000
Vault Settlement Repairs	1	LS	\$ 71,948	\$ 71,948			\$ 71,948
(Cost from Filanc May 2017 quote) Adjusted from ENR 11636 to Estimate Date below							

Subtotal				\$	282,000
Contractor Overhead & Profit @		27%		\$	77,000
Shipping Rate	0%	of total is shipped @	15%	\$	-
Sales Tax	0%	of total is taxed @	7.75%	\$	-
Project Contingency @		30%		\$	108,000
Total Main Project Cost (Year of Estimate or Estimate Update)				\$	467,000
ENR CCI Corresponding to Year of Estimate		LA CCI Nov-2018	12006		
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018	12012	1.000	
Total Main Project Cost (CAMP Report Year)				\$	468,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study			20%	\$ -	\$10,000	\$ 10,000
DS	Design	6.0%	\$ 28,033	15%	\$ 4,205	\$ 33,000	\$ 33,000
EDC	Engr During Construction	4.5%	\$ 21,025	15%	\$ 3,154	\$ 25,000	\$ 25,000
CM	Construction Mgt	5.5%	\$ 25,697	20%	\$ 5,139	\$ 31,000	\$ 31,000
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 567,000

Notes:

- 1) 84-inch RCP and surge tower cost from FY 2018 Condition Assessment Draft Report (V&A Nov-2018)
- 2) Vault settlement repairs cost from J.R. Filanc Encina Outfall Vault Repairs quote (May 2017) and adjusted for ENR from May 2017
- 3) Bypass operations cost is not included per Encina
- 4) Shipping and sales tax removed per Encina
- 5) Rates for Project Phases Cost are percent of Total Main Project Cost
- 6) Project Phase Cost includes a \$10,000 study for operability assessment of secondary effluent slide gates
- 7) Project phase cost for design reduced to 6% per Encina

Project 3.1.002

Solids Thickening Improvements								
Main Project Type			Key Dates					
New Facility	X				CAMP Report	2020		
Facility Rehabilitation	X				Initial Estimate	Jan-18		
Major Maintenance					Estimate Update	Dec-18		
Asset Replacement					Project Start	FY2020		
Special Study								
Main Project Cost		Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total		
Project Task Elements								
Thickened Sludge Pipeline Replacement								
Pipe 10" Lined (including Trenching thru existing plant areas)	600	LF	\$ 100	\$ 60,000	\$ 80	\$ 48,000	\$ 108,000	
Demo & dispose Existing Pipe	600	LF		\$ -	\$ 15	\$ 9,000	\$ 9,000	
Surface Restoration	200	SY		\$ -	\$ 75	\$ 15,000	\$ 15,000	
(Cost from FY2019 ECAMP) Adjusted from ENR 11936 to Estimate Date below								
Dryer Lab Enclosure (exisiting satellite lab area)	1	LS	\$ 166,701	\$ 166,701	0%	\$ -	\$ 166,701	
includes wall structure / ventilation/& lighting								
(Cost from FY2016 ECAMP) Adjusted from ENR 10740 to Estimate Date below								
Rotary Drum Thickener								
WAS Thickening:								
Thickening Equipment	3	EA	\$ 160,619	\$ 481,857	100%	\$ 481,857	\$ 963,715	
Polymer System	3	EA	\$ 26,770	\$ 80,310	100%	\$ 80,310	\$ 160,619	
TWAS Pumps	2	EA	\$ 26,770	\$ 53,540	100%	\$ 53,540	\$ 107,079	
Structural Modifiations to Dewatering Building :								
Mezzanine	1	LS	\$ 428,318	\$ 428,318	100%	\$ 428,318	\$ 856,635	
Mechanical	1	LS	\$ 481,857	\$ 481,857	100%	\$ 481,857	\$ 963,715	
E I&C	1	LS	\$ 160,619	\$ 160,619	100%	\$ 160,619	\$ 321,238	
Additional Cost for Primary Thickening:								
Thickening Equipment	2	EA	\$ 160,619	\$ 321,238	100%	\$ 321,238	\$ 642,476	
Polymer System	2	EA	\$ 26,770	\$ 53,540	100%	\$ 53,540	\$ 107,079	
TWAS Pumps	2	EA	\$ 26,770	\$ 53,540	100%	\$ 53,540	\$ 107,079	
Structural Modifiations to Dewatering Building :								
Mezzanine	1	LS	\$ 64,248	\$ 64,248	100%	\$ 64,248	\$ 128,495	
Mechanical	1	LS	\$ 96,371	\$ 96,371	100%	\$ 96,371	\$ 192,743	
E I&C	1	LS	\$ 53,540	\$ 53,540	100%	\$ 53,540	\$ 107,079	
(Cost from PMP) Adjusted from ENR 11146 to Estimate Date below								
Demo existing Facilities :								
DAFT Tanks Internal Equipment Piping and Supports Demo	3	EA		\$ -	\$ 25,000	\$ 75,000	\$ 75,000	
E I&C Demo	3	EA		\$ -	\$ 7,500	\$ 22,500	\$ 22,500	
Cut and Cap Piping	3	EA	\$ 2,000	\$ 6,000	\$ 2,500	\$ 7,500	\$ 13,500	
(Cost from FY2019 ECAMP) Adjusted from ENR 11936 to Estimate Date below								
MCC and Conductor Replacement (Dewatering Bldg)								
Remove/Replace Conductors to equipment (half of MCCs)	25	EA	\$ 1,000	\$ 25,000	\$ 3,000	\$ 75,000	\$ 100,000	
MCC Replacement (Half)	16	SCT	\$ 34,000	\$ 544,000	\$ 6,000	\$ 96,000	\$ 640,000	
Remove wiring and exposed conduit for abandoned equip.	1	LS			\$ 25,000	\$ 25,000	\$ 25,000	
(Cost from FY2019 ECAMP) Adjusted from ENR 11936 to Estimate Date below								
Climate Control Improvements for MCC (Dewatering Bldg)	1	LS	\$ 62,243	\$ 62,243	\$ 34,191	\$ 34,191	\$ 96,434	
(Cost from DEC Climate Control Report) Adjusted from ENR 11636 to Estimate Date below								
Subtotal								\$ 5,930,000
Contractor Overhead & Profit @		27%		\$ 1,602,000				
Shipping Rate		30%	of total is shipped @	5%		\$ 89,000		
Sales Tax		50%	of total is taxed @	7.75%		\$ 230,000		
Project Contingency @		30%		\$ 2,356,000				
Total Main Project Cost (Year of Estimate or Estimate Update)								\$ 10,207,000
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017		11936				
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012				
Total Main Project Cost (CAMP Report Year)				1.006				
								\$ 10,273,000
Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total	
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -	
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -	
DS	Design	8.0%	\$ 821,761	15%	\$ 123,264	\$ 946,000	\$ 946,000	
EDC	Engr During Construction	4.5%	\$ 462,241	15%	\$ 69,336	\$ 532,000	\$ 532,000	
CM	Construction Mgt	5.5%	\$ 564,961	20%	\$ 112,992	\$ 678,000	\$ 678,000	
EICD	EI&C - Design		\$ 310,000		\$ 310,000	NA	\$ 310,000	
EICC	EI&C - Construction		\$ 2,197,813		\$ 2,198,000	NA	\$ 2,198,000	
Total Project Cost (Present Value in Dec-2018 Dollars)								\$ 14,937,000
Notes:								
1) TWAS Pipeline Replacement and Demo Existing Facilities costs from FY2019 ECAMP Report and adjusted for ENR from December 2017								
2) Dryer Lab Enclosure cost from FY2016 ECAMP Report and adjusted for ENR from November 2013								
3) Rotary Drum Thickener cost from November 2016 Process Master Plan for the EWPCF, TM6, Appendix A and adjusted for ENR from February 2016								
4) Climate Control Improvements cost from DEC Engineers Ventilation and Climate Control Report cost estimate (July 2017) and adjusted for ENR from July 2017								
5) MCC and Conductor Replacement (Dewatering Bldg) costs from FY2019 ECAMP Report and adjusted for ENR from December 2017								
6) Rates for Project Phases cost are percent of Total Main Project Cost								
7) EI&C design and construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input								

Project 3.2.004

Biosolids Screening Facility							
Main Project Type				Key Dates			
New Facility	<input checked="" type="checkbox"/>			CAMP Report	2020		
Facility Rehabilitation	<input type="checkbox"/>			Initial Estimate	Jun-17		
Major Maintenance	<input type="checkbox"/>			Estimate Update	Dec-18		
Asset Replacement	<input type="checkbox"/>			Project Start	≥FY2026		
Special Study	<input type="checkbox"/>						
Main Project Cost		Quantity		Material Cost		Labor Cost	
		No.	Units	Unit Cost	Total	% of Mat'l	Total
Project Task Elements							
Biosolids Screening Facility including:							
Temporary Utilities							
Sludge Screening Platform							
Strainpress							
Sludge Feed Pump							
Grinder							
Odor Control							
Mechanical Piping and Valves							
Instrumentation							
Electrical							
Debris Collection Room							
		1	LS	\$ 1,760,000	\$ 1,760,000	0%	\$ -
							\$ 1,760,000
Subtotal							
						\$ 1,760,000	
Contractor Overhead & Profit @		27%				\$ 476,000	
Shipping Rate		20%	of total is shipped @	5%			\$ 18,000
Sales Tax		40%	of total is taxed @	7.75%			\$ 55,000
Project Contingency @		30%				\$ 693,000	
Total Main Project Cost (Year of Estimate or Estimate Update)						\$ 3,002,000	
ENR CCI Corresponding to Year of Estimate		LA CCI Jun-2017		11636			
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.032	
Total Main Project Cost (CAMP Report Year)						\$ 3,099,000	
Project Phases Cost		Rate	Amount	Contingency		Subtotal	Minimum Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design		\$ -	15%	\$ -	\$ -	\$ 240,000
EDC	Engr During Construction		\$ -	15%	\$ -	\$ -	\$ 136,000
CM	Construction Mgt		\$ -	20%	\$ -	\$ -	\$ 166,000
EICD	EI&C - Design	3.0%	\$ 92,965			\$ 93,000	NA
EICC	EI&C - Construction	0.0%	\$ -			\$ -	NA
Total Project Cost (Present Value in Dec-2018 Dollars)						\$ 3,734,000	
Notes:							
1) Project Task Elements cost from FY2018 Capital Improvements Budget							
2) Rates for Project Phases cost are percent of Total Main Project Cost							
3) Rates and Minimums for Project Phases Cost were adjusted to match FY2018 Capital Improvements Budget							

Project 3.2.013

Digester Rehabilitation and Improvements

Main Project Type

New Facility	X
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Varies
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost

Project Task Elements	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Interior Coating and Structural Reinforcements							
Draining Digesters	3	LS	\$ 153,220	\$ 459,659	0%	\$ -	\$ 459,659
Scaffolding	3	LS	\$ 20,750	\$ 62,249	0%	\$ -	\$ 62,249
Sandblasting	3	LS	\$ 99,789	\$ 299,368	0%	\$ -	\$ 299,368
Coating	3	LS	\$ 319,326	\$ 957,978	0%	\$ -	\$ 957,978
Steel Stiffeners	3	LS	\$ 68,616	\$ 205,847	0%	\$ -	\$ 205,847
Soft Spot Repairs (Digester 6)	1	LS	\$ 54,604	\$ 54,604	0%	\$ -	\$ 54,604
(Cost from FY2016 ECAMP) Adjusted from ENR 10999 to Estimate Date below							
Cleaning Digesters	3	LS	\$ 260,000	\$ 780,000	0%	\$ -	\$ 780,000
Digester Mixing							
Digester 4	1	LS	\$ 979,900	\$ 979,900			\$ 979,900
Digester 5 & 6	1	LS	\$ 982,054	\$ 982,054			\$ 982,054
(Cost from PMP) Adjusted from ENR 11155 to Estimate Date below							
Heat Exchangers							
Digester 4, 5, & 6	3	EA	\$ 166,667	\$ 500,000			\$ 500,000
Second Waste Gas Flare and Pipeline including: Furnish Contract Bonds, Project Insurance & Permits Mob/Demob including Closeout/Cleanup Excavation Safety Measures Demolition One New Flare, Digester Gas Handling Equip, Appurt Installation of New Flare, Digester Equip, Appurt Electrical and Installation Coordination of Flare Permitting and Source Tests Piping from Digester 3 to New Flare (Cost from FY2018 CIP Budget) Adjusted from ENR 11636 to Estimate Date below	1	LS	\$ 996,170	\$ 996,170	0%	\$ -	\$ 996,170

Subtotal							\$ 6,278,000
Contractor Overhead & Profit @	27%						\$ 1,696,000
Shipping Rate	25%	of total is shipped @	5%				\$ 79,000
Sales Tax	40%	of total is taxed @	7.75%				\$ 195,000
Project Contingency @	30%						\$ 2,475,000
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 10,723,000
ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2018			12012			
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018			12012	1.000		
Total Main Project Cost (CAMP Report Year)							\$ 10,723,000

Project Phases Cost	Rate	Amount	Contingency	Subtotal	Minimum	Total
CA Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS Design		\$ -	15%	\$ -	\$ -	\$ -
EDC Engr During Construction	4.5%	\$ 482,535	15%	\$ 72,380	\$ 555,000	\$ 555,000
CM Construction Mgt	5.5%	\$ 589,765	20%	\$ 117,953	\$ 708,000	\$ 708,000
EICD EI&C - Design		\$ 310,000		\$ 310,000	NA	\$ 310,000
EICC EI&C - Construction		\$ 2,144,943		\$ 2,145,000	NA	\$ 2,145,000
Class B Hauling		\$ 312,000		\$ 312,000	NA	\$ 312,000
Total Project Cost (Present Value in Dec-2018 Dollars)						\$ 14,753,000

Notes:

- 1) Interior Coating and Structural Reinforcement costs from FY2016 ECAMP Report and adjusted for ENR from January 2015
- 2) Digester cleaning costs provided by Encina
- 3) Heat exchanger costs provided by Encina
- 4) Digester Mixing costs from November 2016 Process Master Plan for EWPCF; TM 7 Table 9 and adjusted for ENR from July 2016
- 5) Digester Mixing Cost reduced to match a subtotal of \$4,000,000 with Interior Coating and Structural Reinforcement costs advised by Encina
- 6) Second Waste Gas Flare and Pipeline cost from FY2018 CIP Budget per Encina and adjusted for ENR from June 2017
- 7) Rates for Project Phases Cost are percent of Total Main Project Cost
- 8) Design removed per Encina as it has already been encumbered
- 9) EI&C design and construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input
- 10) Hauling of four extra Class B trucks per day every other week while only two digesters are in operation (approximately 9 months for cleaning and coating and 3 months for Digester 4 improvements), cost assumed at \$1,000 per truck for 4 trucks 3 days every two weeks

Project 3.3.001

MCC and Conductors Replacement - Power Building

Main Project Type

New Facility
Facility Rehabilitation
Major Maintenance
Asset Replacement
Special Study

X

Key Dates

CAMP Report 2020
Initial Estimate Jan-18
Estimate Update Dec-18
Project Start ≥FY2026

Main Project Cost		Quantity		Material Cost		Labor Cost		Total Cost
		No.	Units	Unit Cost	Total	Mat'l or Unit	Total	
Project Task Elements								
Remove/ Replace conductors to equipment		29	EA	\$ 1,000	\$ 29,000	\$ 3,000	\$ 87,000	\$ 116,000
MCC (Power Bldg)		29	SCT	\$ 34,000	\$ 986,000	\$ 6,000	\$ 174,000	\$ 1,160,000
Remove wiring and exposed conduit for abandoned equip.		1	LS			\$ 50,000	\$ 50,000	\$ 50,000

Project 3.3.004

Pellet Bagging Facilities							
Main Project Type				Key Dates			
New Facility	<input checked="" type="checkbox"/>			CAMP Report	2020		
Facility Rehabilitation	<input type="checkbox"/>			Initial Estimate	Jan-18		
Major Maintenance	<input type="checkbox"/>			Estimate Update	Dec-18		
Asset Replacement	<input type="checkbox"/>			Project Start	≥FY2026		
Special Study	<input type="checkbox"/>						
Main Project Cost		Quantity		Material Cost		Labor Cost	
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	Total Cost
Project Task Elements							
Portable Bagging Facility Equipment	1	LS	\$ 100,000	\$ 100,000	50%	\$ 50,000	\$ 150,000
Air Compressor	1	LS	\$ 7,500	\$ 7,500	\$ 5,000	\$ 5,000	\$ 12,500
Electrical / I&C	30%						\$ 48,750
Subtotal							
							\$ 212,000
Contractor Overhead & Profit @		27%				\$ 58,000	
Shipping Rate		50% of total is shipped @		5%		\$ 6,000	
Sales Tax		50% of total is taxed @		7.75%		\$ 9,000	
Project Contingency @		30%				\$ 86,000	
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 371,000
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017		11936			
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.006	
Total Main Project Cost (CAMP Report Year)							\$ 374,000
Project Phases Cost							
		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study	2.5%	\$ 9,334	20%	\$ 1,867	\$ 12,000	\$ 12,000
DS	Design	8.0%	\$ 29,869	15%	\$ 4,480	\$ 35,000	\$ 35,000
EDC	Engr During Construction	4.5%	\$ 16,801	15%	\$ 2,520	\$ 20,000	\$ 20,000
CM	Construction Mgt	5.5%	\$ 20,535	20%	\$ 4,107	\$ 25,000	\$ 25,000
EICD	EI&C - Design	3.0%	\$ 11,201		\$ 12,000	NA	\$ 12,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 478,000
Notes:							
1) Portable Bagging Facility Equipment cost based on quote from Premier Tech Chronos (January 25, 2018)							
2) Rates for Project Phases cost are percent of Total Main Project Cost							

Project 3.3.006

Second Dryer and Centrifuge Replacement

Main Project Type

New Facility	X
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	X
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Feb-16
Estimate Update	Dec-18
Project Start	FY2023

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
Centrifuges Installation Heat Dryer No. 2 (Andritz DDS-40) Dyer Install Mechanical EI&C	1	LS	\$ 16,990,000	\$ 16,990,000	0%	\$ -	\$ 16,990,000
Conduit Repair	1	LS	\$ 10,000	\$ 10,000	0%	\$ -	\$ 10,000

Subtotal							\$ 17,000,000
Contractor Overhead & Profit @		15%					\$ 2,550,000
Shipping Rate	25%	of total is shipped @	5%				\$ 213,000
Sales Tax	40%	of total is taxed @	7.75%				\$ 527,000
Project Contingency @		30%					\$ 6,087,000
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 26,377,000
ENR CCI Corresponding to Year of Estimate	LA CCI Feb-2016			11147			
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018			12012		1.078	
Total Main Project Cost (CAMP Report Year)							\$ 28,425,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 2,273,940	15%	\$ 341,091	\$ 2,616,000	\$ 2,616,000
EDC	Engr During Construction	4.5%	\$ 1,279,091	15%	\$ 191,864	\$ 1,471,000	\$ 1,471,000
CM	Construction Mgt	5.5%	\$ 1,563,334	20%	\$ 312,667	\$ 1,877,000	\$ 1,877,000
EICD	EI&C - Design		\$ 335,000		\$ 335,000	NA	\$ 335,000
EICC	EI&C - Construction		\$ 3,919,635		\$ 3,920,000	NA	\$ 3,920,000
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 38,644,000

Notes:

- 1) Centrifuge and heat dryer cost from November 2016 Process Master Plan for the EWPCF, TM8, Appendix A
- 2) MCC and Conductor Replacement (Dewatering Bldg) costs removed per Encina
- 3) Rates for Project Phases cost are percent of Total Main Project Cost
- 4) EI&C design and construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input

Project 3.3.025

Existing Dryer Components Rehab and Interim Dryer Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
This project is currently a study										

Project 4.1.005

Cogen Engine Top-End Overhaul

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	X
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jun-17
Estimate Update	Dec-18
Project Start	FY2021, FY2022, FY2023, FY2024

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
Top-end overhaul for one engine (reqd after 8,000 service hours for each engine). Includes: - Spare heat shield (in case replacement is needed) - Auxillary Equipment	1	LS	\$ 94,000	\$ 94,000	0%	\$ -	\$ 94,000

Subtotal							\$ 94,000
Contractor Overhead & Profit @		27%					\$ 26,000
Shipping Rate	40%	of total is shipped @	15%				\$ 6,000
Sales Tax	50%	of total is taxed @	7.75%				\$ 4,000
Project Contingency @		25%					\$ 33,000
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 163,000
ENR CCI Corresponding to Year of Estimate	LA CCI Jun-2017			11636			
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018			12012	1.032		
Total Main Project Cost (CAMP Report Year)							\$ 169,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -		\$ -
CS	Conceptual Study		\$ -	20%	\$ -		\$ -
DS	Design		\$ -	15%	\$ -		\$ -
EDC	Engr During Construction		\$ -	15%	\$ -		\$ -
CM	Construction Mgt		\$ -	20%	\$ -		\$ -
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 169,000

Notes:

- 1) Project Task Elements cost from FY2018 Capital Improvements Budget
- 2) Rates for Project Phases cost are percent of Total Main Project Cost

Project 4.1.006

Cogen Engine In-Frame Overhaul

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	X
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Apr-14
Estimate Update	Dec-18
Project Start	FY2025

Main Project Cost				Quantity		Material Cost		Labor Cost		Total Cost		
				No.	Units	Unit Cost	Total	% of Mat'l	Total			
Project Task Elements												
In-frame overhaul for one engines (required after 24,000 service hours for each engine) Price includes replacing the exhaust bellows and heat shields as well as replacing the generator coupler and new turbochargers				1	EA	\$ 173,000	\$ 173,000	20.7%	\$ 35,811	\$ 208,811		
Subtotal										\$ 209,000		
Contractor Overhead & Profit @				27%							\$ 57,000	
Shipping Rate		40%	of total is shipped @		15%						\$ 13,000	
Sales Tax		50%	of total is taxed @		7.75%						\$ 9,000	
Project Contingency @				25%							\$ 72,000	
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 360,000		
ENR CCI Corresponding to Year of Estimate				LA CCI Nov-2011			10088					
ENR CCI Corresponding to CAMP Report Year				LA CCI Dec-2018			12012		1.191			
Total Main Project Cost (CAMP Report Year)										\$ 429,000		
Project Phases Cost				Rate		Amount		Contingency		Subtotal	Minimum	Total
CA		Condition Assessment			\$ -		20%		\$ -	\$ -	\$ -	\$ -
CS		Conceptual Study			\$ -		20%		\$ -	\$ -	\$ -	\$ -
DS		Design			\$ -		15%		\$ -	\$ -	\$ -	\$ -
EDC		Engr During Construction			\$ -		15%		\$ -	\$ -	\$ -	\$ -
CM		Construction Mgt			\$ -		20%		\$ -	\$ -	\$ -	\$ -
EICD		EI&C - Design			0.0%		\$ -		\$ -		NA	\$ -
EICC		EI&C - Construction			0.0%		\$ -		\$ -		NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 429,000		
Notes:												
1) Project Task Element costs from FY2016 ECAMP Report (portion of P-4.1.007 Cogen Engine Full Overhaul)												
2) Rates for Project Phases cost are percent of Total Main Project Cost												

Project 4.1.007

Cogen Engine Full Overhaul

Main Project Type			Key Dates	
New Facility			CAMP Report	2020
Facility Rehabilitation			Initial Estimate	Apr-14
Major Maintenance	X		Estimate Update	Dec-18
Asset Replacement			Project Start	FY2020, FY2021
Special Study				

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
In-frame Overhaul for one engine (req'd after 24,000 service hours for each engine)	1	EA	\$ 173,000	\$ 173,000	20.7%	\$ 35,811	\$ 208,811
Price includes replacing the exhaust bellows and heat shields as well as replacing the generator coupler and new turbochargers							
Full overhaul includes the in-frame overhaul plus: Replacement of Camshafts and Lifters as-needed	1	EA	\$ 30,000	\$ 30,000	25.0%	\$ 7,500	\$ 37,500
Based on observations during in-frame overhauls, the crankshafts will be evaluated. Replacement is not anticipated but may be required.							

Subtotal **\$ 247,000**

Contractor Overhead & Profit @	27%		\$ 67,000
Shipping Rate	40%	of total is shipped @	\$ 15,000
Sales Tax	50%	of total is taxed @	\$ 10,000
Project Contingency @	25%		\$ 85,000

Total Main Project Cost (Year of Estimate or Estimate Update) **\$ 424,000**

ENR CCI Corresponding to Year of Estimate	LA CCI Nov-2011	10088	
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018	12012	1.191

Total Main Project Cost (CAMP Report Year) **\$ 505,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design		\$ -	15%	\$ -	\$ -	\$ -
EDC	Engr During Construction		\$ -	15%	\$ -	\$ -	\$ -
CM	Construction Mgt		\$ -	20%	\$ -	\$ -	\$ -
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) **\$ 505,000**

Notes:

- 1) Project Task Elements cost from FY2016 ECAMP Report
- 2) Rates for Project Phases cost are percent of Total Main Project Cost

Project 4.1.008

Cogen Engine 5 Installation

Main Project Type

New Facility	X
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	
Project Task Elements							
Add Cogen Engine 5	900	KW	\$ 1,000	\$ 900,000		\$ -	\$ 900,000
Piping Connections	10%			\$ 90,000		\$ -	\$ 90,000
Electrical / I&C	20%						\$ 180,000

Subtotal **\$ 1,170,000**

Contractor Overhead & Profit @ 27% \$ 316,000

Shipping Rate 40% of total is shipped @ 5% \$ 24,000

Sales Tax 50% of total is taxed @ 7.75% \$ 46,000

Project Contingency @ 30% \$ 467,000

Total Main Project Cost (Year of Estimate or Estimate Update) **\$ 2,023,000**

ENR CCI Corresponding to Year of Estimate LA CCI Dec-2017 11936

ENR CCI Corresponding to CAMP Report Year LA CCI Dec-2018 12012 1.006

Total Main Project Cost (CAMP Report Year) **\$ 2,036,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 162,871	15%	\$ 24,431	\$ 188,000	\$ 188,000
EDC	Engr During Construction	4.5%	\$ 91,615	15%	\$ 13,742	\$ 106,000	\$ 106,000
CM	Construction Mgt	5.5%	\$ 111,974	20%	\$ 22,395	\$ 135,000	\$ 135,000
EICD	EI&C - Design	3.0%	\$ 61,077		\$ 62,000	NA	\$ 62,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) **\$ 2,527,000**

Notes:

1) Rates for Project Phases cost are percent of Total Main Project Cost

Project 4.1.010

Cogen Engine 6 Installation

Main Project Type

New Facility	X
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	
Project Task Elements							
Add Cogen Engine 6	900	KW	\$ 1,000	\$ 900,000		\$ -	\$ 900,000
Piping Connections	10%			\$ 90,000		\$ -	\$ 90,000
Electrical / I&C	20%						\$ 180,000

Subtotal **\$ 1,170,000**

Contractor Overhead & Profit @	27%		\$ 316,000
Shipping Rate	40% of total is shipped @	5%	\$ 24,000
Sales Tax	50% of total is taxed @	7.75%	\$ 46,000
Project Contingency @	30%		\$ 467,000

Total Main Project Cost (Year of Estimate or Estimate Update) **\$ 2,023,000**

ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017	11936	
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018	12012	1.006

Total Main Project Cost (CAMP Report Year) **\$ 2,036,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 162,871	15%	\$ 24,431	\$ 188,000	\$ 188,000
EDC	Engr During Construction	4.5%	\$ 91,615	15%	\$ 13,742	\$ 106,000	\$ 106,000
CM	Construction Mgt	5.5%	\$ 111,974	20%	\$ 22,395	\$ 135,000	\$ 135,000
EICD	EI&C - Design	3.0%	\$ 61,077		\$ 62,000	NA	\$ 62,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) **\$ 2,527,000**

Notes:

1) Rates for Project Phases cost are percent of Total Main Project Cost

Project 4.1.012

Heat Loop Bypass Installation

Main Project Type		Key Dates	
New Facility	X	CAMP Report	2020
Facility Rehabilitation		Initial Estimate	Jan-18
Major Maintenance		Estimate Update	Dec-18
Asset Replacement		Project Start	≥FY2026
Special Study			

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total	
Project Task Elements							
Bypass Piping 10"	150	LF	\$ 150	\$ 22,500	\$ 120	\$ 18,000	\$ 40,500
10" 90	4	EA	\$ 900	\$ 3,600	\$ 900	\$ 3,600	\$ 7,200
10" manual valve	2	EA	\$ 1,000		\$ 500	\$ 1,000	\$ 1,000
Insulation and Jacketing	150	LF			\$ 30	\$ 4,500	\$ 4,500
Pipe Bridge	150	LF	\$ 100	\$ 15,000	100%	\$ 15,000	\$ 30,000
3WCL Piping Connection to Drain	1	LS	\$ 2,500	\$ 2,500	100%	\$ 2,500	\$ 5,000

Subtotal				\$ 89,000
Contractor Overhead & Profit @		27%		\$ 25,000
Shipping Rate	25%	of total is shipped @	5%	\$ 2,000
Sales Tax	25%	of total is taxed @	7.75%	\$ 2,000
Project Contingency @		30%		\$ 36,000
Total Main Project Cost (Year of Estimate or Estimate Update)				\$ 154,000
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017	11936	
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018	12012	1.006
Total Main Project Cost (CAMP Report Year)				\$ 155,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study	2.5%	\$ 3,875	20%	\$ 775	\$ 5,000	\$ 10,000
DS	Design	8.0%	\$ 12,398	15%	\$ 1,860	\$ 15,000	\$ 20,000
EDC	Engr During Construction	4.5%	\$ 6,974	15%	\$ 1,046	\$ 9,000	\$ 10,000
CM	Construction Mgt	5.5%	\$ 8,524	20%	\$ 1,705	\$ 11,000	\$ 30,000
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 225,000

Notes:

1) Rates for Project Phases cost are percent of Total Main Project Cost

Project 4.1.014

Retrofit Miscellaneous Equipment with VFDs

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost	
	No.	Units	Unit Cost	Total	Mat'l or Unit	Total		
Project Task Elements								
Design VFD systems for HVAC Equipment								
VFD 100 HP	1	EA	\$ 8,500	\$ 8,500	\$ 5,000	\$ 5,000	\$ 13,500	
VFD 60 HP	2	EA	\$ 7,000	\$ 14,000	\$ 5,000	\$ 10,000	\$ 24,000	
VFD 30 HP	1	Ea	\$ 6,500	\$ 6,500	\$ 5,000	\$ 5,000	\$ 11,500	
VFD 10 -20 HP	4	Ea	\$ 6,000	\$ 24,000	\$ 5,000	\$ 20,000	\$ 44,000	
VFD 5-7.5 HP	3	EA	\$ 5,000	\$ 15,000	\$ 5,000	\$ 15,000	\$ 30,000	
VFD 3 HP	2	EA	\$ 3,000	\$ 6,000	\$ 3,000	\$ 6,000	\$ 12,000	
Control Systems	13	EA			\$ 4,500	\$ 58,500	\$ 58,500	
Startup & Test	13	EA			\$ 2,000	\$ 26,000	\$ 26,000	
Design VFD systems for Plant Water Pumping Systems								
VFD 75 HP	1	EA	\$ 8,000	\$ 8,000	\$ 5,000	\$ 5,000	\$ 13,000	
VFD 60 HP	1	EA	\$ 7,000	\$ 7,000	\$ 5,000	\$ 5,000	\$ 12,000	
VFD 50 HP	3	EA	\$ 7,000	\$ 21,000	\$ 5,000	\$ 15,000	\$ 36,000	
VFD 25 HP	4	EA	\$ 6,500	\$ 26,000	\$ 5,000	\$ 20,000	\$ 46,000	
VFD 15 HP	2	EA	\$ 6,000	\$ 12,000	\$ 5,000	\$ 10,000	\$ 22,000	
Control Systems	11	EA			\$ 4,500	\$ 49,500	\$ 49,500	
Startup & Test	11	EA			\$ 2,000	\$ 22,000	\$ 22,000	
Subtotal							\$ 420,000	
Contractor Overhead & Profit @		27%					\$ 114,000	
Shipping Rate	35%	of total is shipped @	5%					\$ 8,000
Sales Tax	35%	of total is taxed @	7.75%					\$ 12,000
Project Contingency @		30%					\$ 167,000	
Total Main Project Cost(Year of Estimate or Estimate Update)							\$ 721,000	
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2017		11936				
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.006		
Total Main Project Cost (CAMP Report Year)							\$ 726,000	

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study	2.5%	\$ 18,140	20%	\$ 3,628	\$ 22,000	\$ 22,000
DS	Design	8.0%	\$ 58,047	15%	\$ 8,707	\$ 67,000	\$ 67,000
EDC	Engr During Construction	4.5%	\$ 32,652	15%	\$ 4,898	\$ 38,000	\$ 38,000
CM	Construction Mgt	5.5%	\$ 39,908	20%	\$ 7,982	\$ 48,000	\$ 48,000
EICD	EI&C - Design	3.0%	\$ 21,768		\$ 22,000	NA	\$ 22,000
EICC	EI&C - Construction	3.0%	\$ 21,768		\$ 22,000	NA	\$ 22,000
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 945,000

Notes:

- 1) Rates for Project Phases cost are percent of Total Main Project Cost
- 2) A 3% adder for EI&C design and construction has been included per Encina for automation requirements

Project 4.1.015

Cogen Engine Catalyst System and Gas Conditioning Facilities

Main Project Type			Key Dates	
New Facility	<input checked="" type="checkbox"/>		CAMP Report	2020
Facility Rehabilitation	<input type="checkbox"/>		Initial Estimate	Jun-17
Major Maintenance	<input type="checkbox"/>		Estimate Update	Dec-18
Asset Replacement	<input type="checkbox"/>		Project Start	FY2024
Special Study	<input type="checkbox"/>			

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements							
Civil and Structural							
Equipment							
Hydrogen Sulfide Removal							
Gas Compression/Moisture Removal							
Siloxane Removal	1	LS	\$ 2,310,000	\$ 2,310,000	0%	\$ -	\$ 2,310,000
Exhaust Catalyst							
Piping							
Site Work							
E&IC							
Conduit Repair	1	LS	\$ 10,000	\$ 10,000	0%	\$ -	\$ 10,000
		</					

Subtotal					\$ 2,320,000
Contractor Overhead & Profit @		15%			\$ 348,000
Shipping Rate	20%	of total is shipped @	5%		\$ 24,000
Sales Tax	50%	of total is taxed @	7.75%		\$ 90,000
Project Contingency @		30%			\$ 835,000
Total Main Project Cost(Year of Estimate or Estimate Update)					\$ 3,617,000
ENR CCI Corresponding to Year of Estimate		LA CCI Jun-2017		11636	
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012	1.032
Total Main Project Cost (CAMP Report Year)					\$ 3,734,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	\$ -	\$ -		\$ -
CS	Conceptual Study		\$ -	20%	\$ -		\$ -
DS	Design		\$ -	15%	\$ -	\$80,000	\$ 80,000
EDC	Engr During Construction		\$ -	15%	\$ -	\$162,000	\$ 162,000
CM	Construction Mgt		\$ -	20%	\$ -	\$198,000	\$ 198,000
EICD	EI&C - Design		\$ 81,420		\$ 82,000	NA	\$ 82,000
EICC	EI&C - Construction		\$ 364,662		\$ 365,000	NA	\$ 365,000
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 4,621,000

Notes:							
1) Project Task Elements Cost from FY2018 Capital Improvements Budget							
2) Rates for Project Phases cost are percent of Total Main Project Cost							
3) Rates and Minimums for Project Phases Cost were adjusted to match FY2018 Capital Improvements Budget							
4) EI&C design and construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input							

Project 4.1.022

Turbo Blower Upgrade				Key Dates							
Main Project Type											
New Facility				CAMP Report	2020						
Facility Rehabilitation	X			Initial Estimate	Jun-17						
Major Maintenance				Estimate Update	Dec-18						
Asset Replacement				Project Start	FY2024						
Special Study											
Main Project Cost				Quantity		Material Cost		Labor Cost		Total Cost	
				No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements											
Aeration Blowers - 2040 Demand											
Demolish Agitation Blowers											
Demolish Aeration Blowers											
Neuros Blowers Model NX350-C070				1	LS	\$ 1,274,838	\$ 1,274,838	0%	\$ -	\$ 1,274,838	
Strucutral Repairs											
Mechanical											
Electrical & Instrumentation											
(Cost from PMP) Adjusted from ENR 11636 to Estimate Date below											
MCC Sections											
500 HP				2	LS	\$ 25,000	\$ 50,000	50%	\$ 25,000	\$ 75,000	
350 HP				2	LS	\$ 15,000	\$ 30,000	50%	\$ 15,000	\$ 45,000	
350 HP ancillary equipment				1	LS	\$ 15,000	\$ 15,000	50%	\$ 7,500	\$ 22,500	

Project 4.1.024

Automate Main Breakers in Cogen

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jun-17
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
Automate Main Breakers			1	LS	\$ 34,000	\$ 34,000	0%	\$ -		\$ 34,000

Project 4.1.025

Combined Generator Control Module Replacement

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	X
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost		Quantity		Material Cost		Labor Cost		Total Cost
		No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements								
Replace the six CGCMs		1	LS	\$ 115,000	\$ 115,000			\$ 115,000
Purchase spare CGCMs before product is discontinued								
Determine a permanent replacement for obsolete CGCMs								
Subtotal								\$ 115,000
Contractor Overhead & Profit @			27%					\$ 32,000
Shipping Rate	35% of total is shipped @		5%					\$ 3,000
Sales Tax	35% of total is taxed @		7.75%					\$ 4,000
Project Contingency @			30%					\$ 47,000
Total Main Project Cost (Year of Estimate or Estimate Update)								\$ 201,000
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2018		12012				
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.000		
Total Main Project Cost (CAMP Report Year)								\$ 201,000
Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total	
CA	Condition Assessment		\$ -	20%	\$ -		\$ -	
CS	Conceptual Study		\$ -	20%	\$ -		\$ -	
DS	Design	0.0%	\$ -	15%	\$ -		\$ -	
EDC	Engr During Construction	0.0%	\$ -	15%	\$ -		\$ -	
CM	Construction Mgt	0.0%	\$ -	20%	\$ -		\$ -	
EICD	El&C - Design	0.0%	\$ -		\$ -	NA	\$ -	
EICC	El&C - Construction	0.0%	\$ -		\$ -	NA	\$ -	
Total Project Cost (Present Value in Dec-2018 Dollars)								\$ 201,000
Notes:								
1) Project Task Element costs from Encina								
2) Project Phases Cost not included								

Project 4.1.026

Cogen Generator Maintenance

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
This project is currently a study										
						</				

Project 4.1.027

Cogen Engine Room Ventilation

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements									
This project is currently a study									

Project 5.1.001

ORF I System Rehabilitation

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost		
			No.	Units	Unit Cost	Total	Unit Cost	Total			
Project Task Elements ORF 1 : Rehabilitate Coating on Level 1 & Level 2 Perform maintenace coating on roof top ductwork											
			2	LS	\$ 20,000	\$ 40,000			\$ 40,000		
			1	LS	\$ 1,000	\$ 1,000	\$ 6,800	\$ 6,800	\$ 7,800		
Subtotal											\$ 48,000
Contractor Overhead & Profit @			27%								\$ 13,000
Shipping Rate		35%	of total is shipped @		5%						\$ 1,000
Sales Tax		35%	of total is taxed @		7.75%						\$ 2,000
Project Contingency @			40%								\$ 26,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 90,000	
ENR CCI Corresponding to Year of Estimate			LA CCI Dec-2018			12012					
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.000			
Total Main Project Cost (CAMP Report Year)										\$ 90,000	
Project Phases Cost			Rate	Amount		Contingency		Subtotal	Minimum	Total	
CA	Condition Assessment			\$ -		20%	\$ -	\$ -		\$ -	
CS	Conceptual Study			\$ -		20%	\$ -	\$ -		\$ -	
DS	Design		5.0%	\$ 4,500		15%	\$ 675	\$ 6,000		\$ 6,000	
EDC	Engr During Construction		4.5%	\$ 4,050		15%	\$ 608	\$ 5,000		\$ 5,000	
CM	Construction Mgt		5.5%	\$ 4,950		20%	\$ 990	\$ 6,000		\$ 6,000	
EICD	EI&C - Design		0.0%	\$ -			\$ -		NA	\$ -	
EICC	EI&C - Construction		0.0%	\$ -			\$ -		NA	\$ -	
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 107,000	
Notes:											
1) Rates for Project Phases cost are percent of Total Main Project Cost											
2) Per Encina, the rate for the Design Project Phase cost was reduced to 5%											

Project 5.1.002

ORF Carbon Media Replacement

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	X
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	Annual

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements									
Carbon Replacement, market price			1	LS	\$ 77,000	\$ 77,000	0%	\$ -	\$ 77,000

Project 5.1.013

New Treatment System at ORF I

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total		
Project Task Elements										
			Equipment Cost	1	LS	\$ 2,500,000	\$ 2,500,000			\$ 2,500,000
			Structural Modifications (25% of equipment)	1	LS	\$ 625,000	\$ 625,000			\$ 625,000
			Mechanical Modifications (50% of equipment)	1	LS	\$ 1,250,000	\$ 1,250,000			\$ 1,250,000
			Electrical (50% of equipment)	1	LS	\$ 1,250,000	\$ 1,250,000			\$ 1,250,000
			Instrument and Controls (25% of equipment)	1	LS	\$ 625,000	\$ 625,000			\$ 625,000

Notes:

- 1) Project task element costs from Carollo EWPCF Odor Control Master Plan (December 7, 2018)
- 2) Rates for Project Phases cost are percent of Total Main Project Cost
- 3) Per Encina, the rate for the EI&C - Design Project Phase cost is 0% as it is included in the construction cost
- 4) Per Encina, the rate for the EI&C - Construction Project Phase cost is 1%

Project 5.1.013

Project 5.1.014

New Treatment System at ORF II

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total		
Project Task Elements										
			Equipment Cost	1	LS	\$ 1,200,000	\$ 1,200,000			\$ 1,200,000
			Structural Modifications (25% of equipment)	1	LS	\$ 300,000	\$ 300,000			\$ 300,000
			Mechanical Modifications (50% of equipment)	1	LS	\$ 600,000	\$ 600,000			\$ 600,000
			Electrical (50% of equipment)	1	LS	\$ 600,000	\$ 600,000			\$ 600,000
			Instrument and Controls (25% of equipment)	1	LS	\$ 300,000	\$ 300,000			\$ 300,000
								</		

Notes:

- 1) Project task element costs from Carollo EWPCF Odor Control Master Plan (December 7, 2018)
- 2) Rates for Project Phases cost are percent of Total Main Project Cost
- 3) Per Encina, the rate for the EI&C - Design Project Phase cost is 0% as it is included in the construction cost
- 4) Per Encina, the rate for the EI&C - Construction Project Phase cost is 1%

Project 5.1.015

New Treatment System at ORF III

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total		
Project Task Elements										
Equipment Cost			1	LS	\$ 780,000	\$ 780,000				\$ 780,000
Structural Modifications (25% of equipment)			1	LS	\$ 195,000	\$ 195,000				\$ 195,000
Mechanical Modifications (50% of equipment)			1	LS	\$ 390,000	\$ 390,000				\$ 390,000
Electrical (50% of equipment)			1	LS	\$ 390,000	\$ 390,000				\$ 390,000
Instrument and Controls (25% of equipment)			1	LS	\$ 195,000	\$ 195,000				\$ 195,000
Subtotal										
										\$ 1,950,000
Contractor Overhead & Profit @			27%							\$ 527,000
Shipping Rate 50% of total is shipped @			5%							\$ 49,000
Sales Tax 40% of total is taxed @			7.75%							\$ 61,000
Project Contingency @			30%							\$ 777,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 3,364,000
ENR CCI Corresponding to Year of Estimate			LA CCI Dec-2018			12012				
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.000		
Total Main Project Cost (CAMP Report Year)										\$ 3,364,000
Project Phases Cost			Rate		Amount	Contingency		Subtotal	Minimum	Total
CA Condition Assessment					\$ -	20%	\$ -	\$ -		\$ -
CS Conceptual Study					\$ -	20%	\$ -	\$ -		\$ -
DS Design			8.0%		\$ 269,120	15%	\$ 40,368	\$ 310,000		\$ 310,000
EDC Engr During Construction			4.5%		\$ 151,380	15%	\$ 22,707	\$ 175,000		\$ 175,000
CM Construction Mgt			5.5%		\$ 185,020	20%	\$ 37,004	\$ 223,000		\$ 223,000
EICD EI&C - Design			0.0%		\$ -			\$ -	NA	\$ -
EICC EI&C - Construction			1.0%		\$ 33,640			\$ 34,000	NA	\$ 34,000
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 4,106,000

Notes:

- 1) Project task element costs from Carollo EWPCF Odor Control Master Plan (December 7, 2018)
- 2) Rates for Project Phases cost are percent of Total Main Project Cost
- 3) Per Encina, the rate for the EI&C - Design Project Phase cost is 0% as it is included in the construction cost
- 4) Per Encina, the rate for the EI&C - Construction Project Phase cost is 1%

Project 5.2.006

[illegible]

Project 5.2.012

Site Security Facilities

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Sep-18
Estimate Update	Dec-18
Project Start	FY2022

Main Project Cost				Quantity		Material Cost		Labor Cost		Total Cost	
				No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements <u>Tier 1 Items</u> Operational Policies and Procedures Development Site Perimeter (Fence) Improvements Includes Perimeter Boundaries of South Parcel Lighting System Repairs and Improvements Repair Fixtures and Automate Controls											
				1	LS	\$ 25,000	\$ 25,000				\$ 25,000
				1	LS	\$ 355,000	\$ 355,000				\$ 355,000
				1	LS	\$ 75,000	\$ 75,000				\$ 75,000

Project 5.2.017

Instrument Air Piping Repairs

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Nov-11
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	

Project Task Elements							
Air Compressor	1	LS	\$ 20,000	\$ 20,000	60%	\$ 12,000	\$ 32,000
1-inch galv steel instrumentation air aboveground piping	1,000	LF	\$ 20	\$ 20,000	50%	\$ 10,000	\$ 30,000
Milltronics Ultrasonic Level Transducers	9	EA	\$ 3,000	\$ 27,000	60%	\$ 16,200	\$ 43,200
Electrical and Controls	1	LS	\$ 16,000	\$ 16,000	0%	\$ -	\$ 16,000

Subtotal **\$ 122,000**

Contractor Overhead & Profit @	27%		\$ 33,000
Shipping Rate	40%	of total is shipped @	\$ 8,000
Sales Tax	50%	of total is taxed @	\$ 5,000
Project Contingency @	40%		\$ 68,000

Total Main Project Cost (Year of Estimate or Estimate Update) **\$ 236,000**

ENR CCI Corresponding to Year of Estimate	LA CCI Jan-2015	10999	
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018	12012	1.092

Total Main Project Cost (CAMP Report Year) **\$ 258,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 20,619	15%	\$ 3,093	\$ 24,000	\$ 24,000
EDC	Engr During Construction	4.5%	\$ 11,598	15%	\$ 1,740	\$ 14,000	\$ 14,000
CM	Construction Mgt	5.5%	\$ 14,175	20%	\$ 2,835	\$ 18,000	\$ 18,000
EICD	EI&C - Design	3.0%	\$ 7,732		\$ 8,000	NA	\$ 8,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) **\$ 322,000**

Notes:

- 1) Project Task Element costs from FY2016 ECAMP Report
- 2) Rates for Project Phases cost are percent of Total Main Project Cost

Project 5.2.019

Plant Landscaping				Key Dates				
Main Project Type				CAMP Report				
New Facility				2020				
Facility Rehabilitation	X			Initial Estimate				
Major Maintenance				Estimate Update				
Asset Replacement				Dec-18				
Special Study				Project Start				
				FY2022				
Main Project Cost		Quantity		Material Cost		Labor Cost		Total Cost
		No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements								
Replace Irrigation Piping (assume 1.5-inch piping)		20,000	SF	\$ 1.16	\$ 23,200	0%	\$ -	\$ 24,000
Replace Irrigation Heads		300	EA	\$ 18.00	\$ 5,400	0%	\$ -	\$ 6,000
New Landscaping		75,000	SF	\$ 1.00	\$ 75,000	0%	\$ -	\$ 75,000

Project 5.2.021

Climate Control at MCCs and Cogen Building

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jul-17
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements									
Climate Control Improvements for Cogen Bldg									
General			1	LS	\$ 135,000	\$ 135,000	\$ 19,845	\$ 19,845	\$ 154,845
For MCCs			1	LS	\$ 128,051	\$ 128,051	\$ 40,708	\$ 40,708	\$ 168,759
Climate Control Improvements for Warehouse			1	LS	\$ 24,218	\$ 24,218	\$ 14,061	\$ 14,061	\$ 38,279
Subtotal									\$ 362,000
Contractor Overhead & Profit @			27%						\$ 98,000
Shipping Rate 35% of total is shipped @			5%						\$ 7,000
Sales Tax 35% of total is taxed @			7.75%						\$ 10,000
Project Contingency @			30%						\$ 144,000
Total Main Project Cost(Year of Estimate or Estimate Update)									\$ 621,000
ENR CCI Corresponding to Year of Estimate			LA CCI Jul-2017			11636			
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.032	
Total Main Project Cost (CAMP Report Year)									\$ 642,000
Project Phases Cost			Rate		Amount	Contingency		Subtotal	Minimum Total
CA	Condition Assessment				\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study				\$ -	20%	\$ -	\$ -	\$ -
DS	Design		8.0%		\$ 51,283	15%	\$ 7,692	\$ 59,000	\$ 59,000
EDC	Engr During Construction		4.5%		\$ 28,846	15%	\$ 4,327	\$ 34,000	\$ 34,000
CM	Construction Mgt		5.5%		\$ 35,257	20%	\$ 7,051	\$ 43,000	\$ 43,000
EICD	EI&C - Design		3.0%		\$ 19,231			\$ 20,000	\$ 20,000
EICC	EI&C - Construction		0.0%		\$ -			\$ -	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)									\$ 798,000

Notes:

- 1) Project Task Element costs from DEC Engineers Ventilation and Climate Control Report cost estimate (July 2017)
- 2) Rates for Project Phases Cost are percent of Total Main Project Cost

Project 5.2.026

Plant Waste Stream Rerouting

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost					
			No.	Units	Unit Cost	Total	% of Mat'l	Total						
Project Task Elements														
This project is currently a study														
Subtotal										\$	-			
Contractor Overhead & Profit @			27%							\$	-			
Shipping Rate		40%	of total is shipped @		5%					\$	-			
Sales Tax		50%	of total is taxed @		7.75%					\$	-			
Project Contingency @			30%							\$	-			
Total Main Project Cost(Year of Estimate or Estimate Update)										\$	-			
ENR CCI Corresponding to Year of Estimate			LA CCI Dec-2018			12012								
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.000						
Total Main Project Cost (CAMP Report Year)										\$	-			
Project Phases Cost			Rate		Amount		Contingency		Subtotal		Minimum	Total		
	CA	Condition Assessment			\$	-	20%	\$	-	\$	-	\$	-	
	CS	Conceptual Study			\$	-	20%	\$	-	\$	-	\$25,000	\$	25,000
	DS	Design		0.0%	\$	-	15%	\$	-	\$	-		\$	-
	EDC	Engr During Construction		0.0%	\$	-	15%	\$	-	\$	-		\$	-
	CM	Construction Mgt		0.0%	\$	-	20%	\$	-	\$	-		\$	-
	EICD	EI&C - Design		0.0%	\$	-			\$	-	NA		\$	-
	EICC	EI&C - Construction		0.0%	\$	-			\$	-	NA		\$	-
Total Project Cost (Present Value in Dec-2018 Dollars)												\$	25,000	
Notes:														
1) Rates for Project Phases cost are percent of Total Main Project Cost														
2) Per Encina, this project currently includes a study														

Plant-Wide Seal Coating						
Main Project Type						
New Facility				CAMP Report	2020	
Facility Rehabilitation	X			Initial Estimate	Jan-18	
Major Maintenance				Estimate Update	Dec-18	
Asset Replacement				Project Start	≥FY2026	
Special Study						
Main Project Cost	No.	Units	Unit Cost	Total	Labor Cost Unit cost Total	Total Cost
Project Task Elements						
Joint Seal Existing Cracks	5,000	LF	\$ 0.37	\$ 1,850	\$ 1.19 \$ 5,925	\$ 7,775
Slurry Seal Existing Paving	40,000	SY	\$ 1.32	\$ 52,800	\$ 0.39 \$ 20,566	\$ 73,366
Replace Surface Markings	100	STALL	\$ 9.35	\$ 935	\$ 9.05 \$ 8,462	\$ 9,397
Subtotal						\$ 91,000
Contractor Overhead & Profit @	27%					\$ 25,000
Shipping Rate 0% of total is shipped @	5%					\$ -
Sales Tax 50% of total is taxed @	7.75%					\$ 4,000
Project Contingency @	30%					\$ 36,000
Total Main Project Cost(Year of Estimate or Estimate Update)						\$ 156,000
ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017			11936		
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018			12012	1.006	
Total Main Project Cost (CAMP Report Year)						\$ 157,000
Project Phases Cost	Rate	Amount	Contingency	Subtotal	Minimum	Total
CA Condition Assessment		\$ -	20%	\$ -	-	\$ -
CS Conceptual Study		\$ -	20%	\$ -	-	\$ -
DS Design	8.0%	\$ 12,559	15%	\$ 1,884	\$ 15,000	\$ 15,000
EDC Engr During Construction	4.5%	\$ 7,065	15%	\$ 1,060	\$ 9,000	\$ 9,000
CM Construction Mgt	5.5%	\$ 8,635	20%	\$ 1,727	\$ 11,000	\$ 11,000
EICD EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)						\$ 192,000
Notes:						
1) Rates for Project Phases cost are percent of Total Main Project Cost						

Project 5.2.032

Plant-Wide Asset Painting and Protective Coating

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	X
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jun-17
Estimate Update	Dec-18
Project Start	Annual

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
Asset Painting and Protective Coating			1	LS	\$ 84,000	\$ 84,000	0%	\$ -		\$ 84,000
Subtotal \$ 84,000										
Contractor Overhead & Profit @			27%						\$ 23,000	
Shipping Rate		0%	of total is shipped @		5% (included)				\$ -	
Sales Tax		0%	of total is taxed @		7.75% (included)				\$ -	
Project Contingency @			40%						\$ 43,000	
Total Main Project Cost (Year of Estimate or Estimate Update)										\$ 150,000
ENR CCI Corresponding to Year of Estimate			LA CCI Jun-2017			11636				
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.032		
Total Main Project Cost (CAMP Report Year)										\$ 155,000
Project Phases Cost			Rate		Amount		Contingency		Subtotal	Minimum Total
CA	Condition Assessment				\$ -	20%	\$ -	\$ -		\$ -
CS	Conceptual Study				\$ -	20%	\$ -	\$ -		\$ -
DS	Design				\$ -	15%	\$ -	\$ -		\$ -
EDC	Engr During Construction				\$ -	15%	\$ -	\$ -		\$ -
CM	Construction Mgt				\$ -	20%	\$ -	\$ -		\$ -
EICD	EI&C - Design		0.0%		\$ -			\$ -	NA	\$ -
EICC	EI&C - Construction		0.0%		\$ -			\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 155,000
Notes:										
1) Project Task Elements Cost from FY2018 Capital Improvements Budget										
2) Rates for Project Phases cost are percent of Total Main Project Cost										
3) Rates and Minimums for Project Phases Cost were adjusted to match FY2018 Capital Improvements Budget										

Project 5.2.033

Plant-Wide Abandoned Equipment Removal

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	X
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Nov-14
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	% of Mat'l	Total	
Project Task Elements									
Equipment Abandonment			1	LS	\$ 200,000	\$ 200,000	0%	\$ -	\$ 200,000

Project 5.2.034

New Potable Water System

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	% of Mat'l	Total		
Project Task Elements										
Project is currently a study			-	LS	\$ -	\$ -	50%	\$ -		\$ -
									</	

Project 5.2.035

Storm Drainage Pump Station Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-17
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total	
Project Task Elements							
Repair exposed rebar wetwell roof beams	1	LS	\$ 500	\$ 500	\$ 3,700	\$ 3,700	\$ 4,200
Add 2" of grout to side and bottom of wetwell roof beams	72	SF	\$ 20	\$ 1,444	100%	\$ 1,444	\$ 2,888
Investigate settlement & stabilize if neccesary	1	LS	\$ 5,000	\$ 5,000	100%	\$ 5,000	\$ 10,000
Remove & Replace Discharge pipe thrust blocks	3	EA	\$ 500	\$ 1,500	100%	\$ 1,500	\$ 3,000
Remove & Replace walkway slab	68	SF	\$ 20	\$ 1,360	100%	\$ 1,360	\$ 2,720
Replace discharge pipe elbows 16"	6	EA	\$ 1,500	\$ 9,000	30%	\$ 2,700	\$ 11,700
Replace discharge pipe elbow grooved cplgs	9	EA	\$ 400	\$ 3,600	30%	\$ 1,080	\$ 4,680
Perform maintenance coating Discharge Pipe	60	LF	\$ 15	\$ 900	100%	\$ 900	\$ 1,800
Perform maintenance coating pumps	3	EA	\$ 500	\$ 1,500	100%	\$ 1,500	\$ 3,000
Remove/ Replace pumps for leveling/ alignment	3	EA		\$ -	\$ 2,100	\$ 6,300	\$ 6,300
24" sluice gate seat inspection/ repair	1	EA	\$ 500	\$ 500	100%	\$ 500	\$ 1,000
24" flap gate inspection/ repair seats	1	EA	\$ 500	\$ 500	100%	\$ 500	\$ 1,000
Recoat gates	2	EA	\$ 300	\$ 600	100%	\$ 600	\$ 1,200

Subtotal							\$ 54,000
Contractor Overhead & Profit @		27%					\$ 15,000
Shipping Rate	0%	of total is shipped @	5%				\$ -
Sales Tax	50%	of total is taxed @	7.75%				\$ 3,000
Project Contingency @		40%					\$ 29,000
Total Main Project Cost (Year of Estimate or Estimate Update)							\$ 101,000
ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017			11936			
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018			12012		1.006	
Total Main Project Cost (CAMP Report Year)							\$ 102,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$25,000	\$ 25,000
DS	Design	8.0%	\$ 8,131	15%	\$ 1,220	\$20,000	\$ 20,000
EDC	Engr During Construction	4.5%	\$ 4,574	15%	\$ 686	\$10,000	\$ 10,000
CM	Construction Mgt	5.5%	\$ 5,590	20%	\$ 1,118		\$ 7,000
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 164,000

Notes:

- 1) Project Task Elements cost from V&A EWPCF Condition Assessment, December 2017
- 2) Rates for Project Phases cost are percent of Total Main Project Cost
- 3) Per Encina, project includes a \$25,000 study
- 4) Per Encina, the minimum for CM was removed as there will be fewer ramp up fixed costs with the programmatic CM

Project 5.2.036

Digester Area Drainage Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	% of Mat'l or Unit Cost	Total	
Project Task Elements									
Remove Existing PS Manhole including pumps etc.			1	LS		\$ -	\$ 5,000	\$ 5,000	\$ 5,000
Disposal			1	LS		\$ -	\$ 1,000	\$ 1,000	\$ 1,000
Excavation			48.1	CY		\$ -	\$ 25	\$ 1,204	\$ 1,204
Packaged Lift Station			1	EA	\$ 25,000	\$ 25,000	50%	\$ 12,500	\$ 37,500
Piping re-connections			1	LS	\$ 1,500	\$ 1,500	100%	\$ 1,500	\$ 3,000
Surface paving restoration			1	LS		\$ -	\$ 2,000	\$ 2,000	\$ 2,000
E&I/C			1	LS		\$ -	25%	\$ 12,426	\$ 12,426
Subtotal									\$ 63,000
Contractor Overhead & Profit @			27%						\$ 18,000
Shipping Rate 40%			of total is shipped @ 5%						\$ 2,000
Sales Tax 50%			of total is taxed @ 7.75%						\$ 3,000
Project Contingency @			30%						\$ 26,000
Total Main Project Cost (Year of Estimate or Estimate Update)									\$ 112,000
ENR CCI Corresponding to Year of Estimate			LA CCI Dec-2017			11936			
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.006	
Total Main Project Cost (CAMP Report Year)									\$ 113,000
Project Phases Cost			Rate		Amount	Contingency		Subtotal	Minimum Total
CA	Condition Assessment		1.5%	\$	1,691	20%	\$ 338	\$ 2,100	\$ 5,000 5,000
CS	Conceptual Study		2.5%	\$	2,818	20%	\$ 564	\$ 4,000	\$ 10,000 10,000
DS	Design		8.0%	\$	9,017	15%	\$ 1,353	\$ 11,000	\$ 20,000 20,000
EDC	Engr During Construction		4.5%	\$	5,072	15%	\$ 761	\$ 6,000	\$ 10,000 10,000
CM	Construction Mgt		5.5%	\$	6,199	20%	\$ 1,240	\$ 8,000	\$ 30,000 30,000
EICD	EI&C - Design		3.0%	\$	3,381			\$ 4,000	NA 4,000
EICC	EI&C - Construction		0.0%	\$	-			\$ -	NA -
Total Project Cost (Present Value in Dec-2018 Dollars)									\$ 192,000

Notes:

1) Rates for Project Phases cost are percent of Total Main Project Cost

Project 5.2.037

2W System and Sand Filter Replacement

Main Project Type

New Facility
 Facility Rehabilitation **X**
 Major Maintenance
 Asset Replacement
 Special Study

Key Dates

CAMP Report **2020**
 Initial Estimate **Dec-18**
 Estimate Update **Dec-18**
 Project Start **FY2023**

Main Project Cost

Project Task Elements	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	% of Mat'l	Total	
2W System Improvements							
Improvement B1 (Cost from EWPCF PMP) Adjusted from ENR 11155 to Estimate Date below	1	LS	\$ 387,652	\$ 387,652		\$ -	\$ 387,652
Sand Filter							
Replacement (Cost from 2014 Condition Assessment) Adjusted from ENR 10736 to Estimate Date below	1	LS	\$ 134,583	\$ 134,583		\$ -	\$ 134,583

Subtotal \$ **523,000**

Contractor Overhead & Profit @ 27% \$ 142,000
 Shipping Rate 40% of total is shipped @ 5% \$ 11,000
 Sales Tax 50% of total is taxed @ 7.75% \$ 21,000
 Project Contingency @ 30% \$ 210,000

Total Main Project Cost (Year of Estimate or Estimate Update) \$ **907,000**

ENR CCI Corresponding to Year of Estimate LA CCI July-2016 12012

ENR CCI Corresponding to CAMP Report Year LA CCI Dec-2018 12012 1.000

Total Main Project Cost (CAMP Report Year) \$ **907,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 72,560	15%	\$ 10,884	\$ 84,000	\$ 84,000
EDC	Engr During Construction	4.5%	\$ 40,815	15%	\$ 6,122	\$ 47,000	\$ 47,000
CM	Construction Mgt	5.5%	\$ 49,885	20%	\$ 9,977	\$ 60,000	\$ 60,000
EICD	EI&C - Design	3.0%	\$ 27,210		\$ 28,000	NA	\$ 28,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars) \$ **1,126,000**

Notes:

- 1) 2W System Improvements cost from November 2016 Process Master Plan for the EWPCF, TM10, Table 6 and adjusted for ENR from July 2016
- 2) Sand filter cost from 2014 Condition Assessment Report by RMC and adjusted for ENR from January 2014
- 3) Rates for Project Phases cost are percent of Total Main Project Cost

Project 5.2.038

Underground Electrical Structures Repair

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements							
Top Priority Structures							
Electrical Manholes Repair (EMH-12,13,14,15)	4	EA	\$ 4,000	\$ 16,000		\$ -	\$ 16,000
Electrical Handholes Repair (HH-08,09)	2	EA	\$ 4,000	\$ 8,000		\$ -	\$ 8,000
Interior coating	6	EA	\$ 6,600	\$ 39,600		\$ -	\$ 39,600
Remaining Structures							
Electrical Manholes Repair	15	EA	\$ 4,000	\$ 60,000		\$ -	\$ 60,000
Electrical Handholes Repair	18	EA	\$ 4,000	\$ 72,000		\$ -	\$ 72,000
Interior coating	33	EA	\$ 6,600	\$ 217,800		\$ -	\$ 217,800
Broken Conduit/Duct Bank Northeast of AB4 (Top Priority)	1	LS	\$ 10,000	\$ 10,000		\$ -	\$ 10,000

Subtotal					\$	424,000
Contractor Overhead & Profit @		27%			\$	115,000
Shipping Rate	40%	of total is shipped @	5%		\$	9,000
Sales Tax	50%	of total is taxed @	7.75%		\$	17,000
Project Contingency @		30%			\$	170,000
Total Main Project Cost (Year of Estimate or Estimate Update)					\$	735,000
ENR CCI Corresponding to Year of Estimate		LA CCI Dec-2018	12012			
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018	12012	1.000		
Total Main Project Cost (CAMP Report Year)					\$	735,000

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -		\$ -
CS	Conceptual Study		\$ -	20%	\$ -		\$ -
DS	Design	8.0%	\$ 58,800	15%	\$ 8,820	\$ 68,000	\$ 68,000
EDC	Engr During Construction	4.5%	\$ 33,075	15%	\$ 4,961	\$ 39,000	\$ 39,000
CM	Construction Mgt	5.5%	\$ 40,425	20%	\$ 8,085	\$ 49,000	\$ 49,000
EICD	EI&C - Design	0.0%	\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 891,000

Notes:

- 1) Project Task Element work was referenced from cost from RMC FY2015 Underground Electrical Structures CA Report (August 2016) and from Encina
- 2) Rates for Project Phases Cost are percent of Total Main Project Cost

Project 5.2.039

E&I Manhole Monitoring

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	Unit Cost	Total		
Project Task Elements										
Manhole Monitoring:										
Manhole monitoring instruments : Temp			19	EA	\$ 2,000	\$ 38,000			\$	38,000
Manhole monitoring instruments : Level Transmitter			19	EA	\$ 3,500	\$ 66,500			\$	66,500
Conduit and Wire to EMH's			19	EA	\$ 10,000	\$ 190,000			\$	190,000
Connection to monitoring system			19	EA	\$ 1,000	\$ 19,000			\$	19,000
Testing			19	EA	\$ 1,000	\$ 19,000			\$	19,000

Project 5.3.004

Admin Building Chiller Replacement

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	X
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jul-17
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost		
			No.	Units	Unit Cost	Total	Unit Cost	Total			
Project Task Elements											
Replace existing boiler with new boiler			1	LS	\$ 57,375	\$ 57,375	\$ 14,528	\$ 14,528	\$ 71,903		
Test and Balance existing air and hydronic systems			1	LS	\$ -	\$ -	\$ 51,799	\$ 51,799	\$ 51,799		
Replace faulty VFD drives			1	LS	\$ 10,500	\$ 10,500	\$ 15,645	\$ 15,645	\$ 26,145		
Upgrade BMS			1	LS	\$ 222,840	\$ 222,840	\$ -	\$ -	\$ 222,840		
Add VAV diffusers to individual rooms			1	LS	\$ 18,000	\$ 18,000	\$ 26,520	\$ 26,520	\$ 44,520		
Replace leaking grooved pipe fittings			1	LS	\$ 3,665	\$ 3,665	\$ 426	\$ 426	\$ 4,091		
Provide specialized OSA intake filters			1	LS	\$ 31,500	\$ 31,500	\$ 1,950	\$ 1,950	\$ 33,450		
Provide spot cooling/heating to receptionist, dedicated system to incubator rooms, and backup system for control room			1	LS	\$ 76,332	\$ 76,332	\$ 27,546	\$ 27,546	\$ 103,878		
Subtotal									\$ 559,000		
Contractor Overhead & Profit @			27%						\$ 151,000		
Shipping Rate		35%	of total is shipped @		5%					\$ 10,000	
Sales Tax		35%	of total is taxed @		7.75%					\$ 16,000	
Project Contingency @			30%						\$ 221,000		
Total Main Project Cost(Year of Estimate or Estimate Update)									\$ 957,000		
ENR CCI Corresponding to Year of Estimate			LA CCI Jul-2017			11636					
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.032			
Total Main Project Cost (CAMP Report Year)									\$ 988,000		
Project Phases Cost			Rate		Amount		Contingency		Subtotal	Minimum	Total
CA		Condition Assessment				\$ -	20%	\$ -	\$ -		\$ -
CS		Conceptual Study				\$ -	20%	\$ -	\$ -		\$ -
DS		Design		8.0%		\$ 79,030	15%	\$ 11,854	\$ 91,000		\$ 91,000
EDC		Engr During Construction		4.5%		\$ 44,454	15%	\$ 6,668	\$ 52,000		\$ 52,000
CM		Construction Mgt		5.5%		\$ 54,333	20%	\$ 10,867	\$ 66,000		\$ 66,000
EICD		EI&C - Design		3.0%		\$ 29,636			\$ 30,000	NA	\$ 30,000
EICC		EI&C - Construction		0.0%		\$ -			\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 1,227,000	
Notes:											
1) Project Task Element costs from DEC Engineers Ventilation and Climate Control Report cost estimate (July 2017)											
2) Rates for Project Phases Cost are percent of Total Main Project Cost											

Project 5.3.013

Headworks Building Roof

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Aug-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	Unit Cost	Total		
Project Task Elements Roof Replacement (Approximately 4000 Square Feet) Includes: Wind Uplift Calculations up to 120mph Local Fire Ratings Title 24 Compliance Asbestos Removal Cold Applied Modified Roofing System Metal Wall Panels replacing tile on steep slope Project Management by Garland Manufacturer 30 year warranty product and labor warranty for low slope roofing			1	LS	\$ 117,500	\$ 117,500			\$ 117,500	
Subtotal										\$ 118,000
Contractor Overhead & Profit @			27%							\$ 32,000
Shipping Rate		40%	of total is shipped @		5%					\$ 3,000
Sales Tax		50%	of total is taxed @		7.75%					\$ 5,000
Project Contingency @			30%							\$ 48,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 206,000
ENR CCI Corresponding to Year of Estimate			LA CCI Aug-2018			12000				
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.001		
Total Main Project Cost (CAMP Report Year)										\$ 207,000
Project Phases Cost			Rate		Amount		Contingency		Subtotal	Minimum Total
	CA	Condition Assessment			\$ -	20%	\$ -	\$ -	\$ -	\$ -
	CS	Conceptual Study			\$ -	20%	\$ -	\$ -	\$ -	\$ -
	DS	Design	8.0%		\$ 16,496	15%	\$ 2,474	\$ 19,000		\$ 19,000
	EDC	Engr During Construction	4.5%		\$ 9,279	15%	\$ 1,392	\$ 11,000		\$ 11,000
	CM	Construction Mgt	5.5%		\$ 11,341	20%	\$ 2,268	\$ 14,000		\$ 14,000
	EICD	EI&C - Design	0.0%		\$ -			\$ -	NA	\$ -
	EICC	EI&C - Construction	0.0%		\$ -			\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 251,000
Notes:										
1) Project Task Element costs from The Garland Company 2018 Headworks Building - Rooftop Assessment & Solution (August 2018)										
2) Rates for Project Phases Cost are percent of Total Main Project Cost										

Project 5.3.014

Cogen Building Roof								
Main Project Type				Key Dates				
New Facility				CAMP Report		2020		
Facility Rehabilitation	X			Initial Estimate		Aug-18		
Major Maintenance				Estimate Update		Dec-18		
Asset Replacement				Project Start		≥FY2026		
Special Study								
Main Project Cost		Quantity		Material Cost		Labor Cost		Total Cost
		No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements								
Roof Replacement (Approximately 10,000 Square Feet)		1	LS	\$ 293,750	\$ 293,750			\$ 293,750
Includes:								
Wind Uplift Calculations up to 120mph								
Local Fire Ratings								
Title 24 Compliance								
Asbestos Removal								
Cold Applied Modified Roofing System								
Metal Wall Panels replacing tile on steep slope								
Project Management by Garland Manufacturer								
30 year warranty product and labor warranty for low slope roofing								
Subtotal								\$ 294,000
Contractor Overhead & Profit @		27%						\$ 80,000
Shipping Rate	40%	of total is shipped @	5%					\$ 6,000
Sales Tax	50%	of total is taxed @	7.75%					\$ 12,000
Project Contingency @		40%						\$ 157,000
Total Main Project Cost(Year of Estimate or Estimate Update)								\$ 549,000
ENR CCI Corresponding to Year of Estimate		LA CCI Aug-2018		12000				
ENR CCI Corresponding to CAMP Report Year		LA CCI Dec-2018		12012		1.001		
Total Main Project Cost (CAMP Report Year)								\$ 550,000
Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total	
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -	
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -	
DS	Design	8.0%	\$ 43,962	15%	\$ 6,594	\$ 51,000	\$ 51,000	
EDC	Engr During Construction	4.5%	\$ 24,729	15%	\$ 3,709	\$ 29,000	\$ 29,000	
CM	Construction Mgt	5.5%	\$ 30,224	20%	\$ 6,045	\$ 37,000	\$ 37,000	
EICD	El&C - Design	0.0%	\$ -		\$ -	NA	\$ -	
EICC	El&C - Construction	0.0%	\$ -		\$ -	NA	\$ -	
Total Project Cost (Present Value in Dec-2018 Dollars)								\$ 667,000
Notes:								
1) Project Task Element costs ratioed from The Garland Company 2018 Headworks Building - Rooftop Assessment & Solution (August 2018)								
2) Rates for Project Phases Cost are percent of Total Main Project Cost								

Project 5.3.015

Dewatering and Secondaries Building Assessment

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	
Special Study	X

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements									
This project is currently a study									

Project 5.3.016

Cogen Wall Repair

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Oct-18
Estimate Update	Dec-18
Project Start	FY2020

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements									
General Conditions			1	LS	\$ 30,000	\$ 30,000			\$ 30,000
Structural Repairs			1	LS	\$ 138,889	\$ 138,889			\$ 138,889
HVAC Reparis			1	LS	\$ 368,313	\$ 368,313			\$ 368,313
EI&C			1	LS	\$ 100,000	\$ 100,000			\$ 100,000
Construction Contingency			1	LS	30%	\$ 191,161			\$ 191,161
Subtotal									
									\$ 829,000
Contractor Overhead & Profit @			27%						\$ 224,000
Shipping Rate		40%	of total is shipped @		5%		\$ 17,000		
Sales Tax		50%	of total is taxed @		7.75%		\$ 33,000		
Project Contingency @			20%						\$ 221,000
Total Main Project Cost (Year of Estimate or Estimate Update)									\$ 1,324,000
ENR CCI Corresponding to Year of Estimate			LA CCI Oct-2018			12010			
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.000	
Total Main Project Cost (CAMP Report Year)									\$ 1,325,000
Project Phases Cost			Rate		Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment				\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study				\$ -	20%	\$ -	\$ -	\$ -
DS	Design				\$ -	15%	\$ -	\$ -	\$ -
EDC	Engr During Construction		4.5%		\$ 59,591	15%	\$ 8,939	\$ 69,000	\$ 69,000
CM	Construction Mgt		5.5%		\$ 72,834	20%	\$ 14,567	\$ 88,000	\$ 88,000
EICD	EI&C - Design		0.0%		\$ -		\$ -	NA	\$ -
EICC	EI&C - Construction		0.0%		\$ -		\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)									\$ 1,482,000
Notes:									
1) Project Task Element costs from Power Building Structural Repairs Cost Estimate (October 28, 2018) by Carollo									
2) An additional contingency of 20% was added to the construction cost per Encina									
3) Rates for Project Phases Cost are percent of Total Main Project Cost									

Project 5.4.004

Vallecitos Sample Vault Installation

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Jan-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Unit cost	Total	
Project Task Elements							
Sample Tap Connection in Existing 24" Pipe	1	LS	\$ 2,000	\$ 2,000	\$ 2,500	\$ 2,500	\$ 4,500
Rehab existing Vault (liner, plug penetrations)	1	EA	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 10,000
Sample Valve and Pipe / Fittings	1	LS	\$ 500	\$ 500	\$ 500	\$ 500	\$ 1,000
Pipe Coatings	1	LS	\$ 250	\$ 250	\$ 500	\$ 500	\$ 750
Automatic Sampler	1	LS	\$ 5,000	\$ 5,000	\$ 2,000	\$ 2,000	\$ 7,000
E I&C to sampler	1	LS	\$ 2,500	\$ 2,500	\$ 5,000	\$ 5,000	\$ 7,500
	</						

Subtotal

							\$ 31,000
Contractor Overhead & Profit @	27%						\$ 9,000
Shipping Rate	30%	of total is shipped @	5%				\$ 1,000
Sales Tax	30%	of total is taxed @	7.75%				\$ 1,000
Project Contingency @	40%						\$ 17,000

Total Main Project Cost (Year of Estimate or Estimate Update)

ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2017	11936		
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018	12012	1.006	

Total Main Project Cost (CAMP Report Year)

							\$ 60,000
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Project Phases Cost

		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 4,750	15%	\$ 713	\$15,000	\$ 15,000
EDC	Engr During Construction	4.5%	\$ 2,672	15%	\$ 401	\$5,000	\$ 5,000
CM	Construction Mgt	5.5%	\$ 3,266	20%	\$ 653	\$10,000	\$ 10,000
EICD	EI&C - Design	3.0%	\$ 1,781		\$ 2,000	NA	\$ 2,000
EICC	EI&C - Construction	0.0%	\$ -		\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars)

							\$ 92,000
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Notes:

- 1) Sample Tap Connection and Rehab Existing Vault costs from December 2017 V&A Condition Assessment
- 2) Rates for Project Phases Cost are percent of Total Main Project Cost

Project 5.4.005

Implement Minor Condition Assessment Recommendations

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	Annual

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements									
Condition Assessment Recommendations			1	EA	\$ 88,000	\$ 88,000			\$ 88,000

Project 5.4.006

As-Needed Contractor Services

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	Annual

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements									
Contractor Services			1	EA	\$ 725,000	\$ 725,000			\$ 725,000

Project 5.4.007

Miscellaneous Building Rehabilitation

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	Annual

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	Unit Cost	Total		
Project Task Elements										
Building Rehabilitation			1	EA	\$ 88,000	\$ 88,000				\$ 88,000
</										

Project 6.1.205

Network Improvements								
Main Project Type				Key Dates				
New Facility		X		CAMP Report		2020		
Facility Rehabilitation				Initial Estimate		Dec-18		
Major Maintenance				Estimate Update		Dec-18		
Asset Replacement				Project Start		FY2020		
Special Study								
Main Project Cost		Quantity		Material Cost		Labor Cost		Total Cost
		No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements								
Install Fiber-optic backbone loop :								
Above grade exposed conduit	365	LF	\$ 16	\$ 5,856	\$ 28	\$ 10,194	\$ 16,050	
New ductbank	1,710	LF	\$ 21	\$ 35,910	\$ 52	\$ 88,065	\$ 123,975	
Handholes	4	EA	\$ 5,000	\$ 20,000	\$ 5,000	\$ 20,000	\$ 40,000	
Paving restoration	950	SY	\$ 40	\$ 38,000	\$ 35	\$ 33,250	\$ 71,250	
Fiber optic Cables	10,000	LF	\$ 6	\$ 58,350	\$ 4	\$ 38,192	\$ 96,542	
Fiber optic connections /Marking/ Terminatinos	1	LS	\$ 8,487	\$ 8,487	\$ 10,185	\$ 10,185	\$ 18,672	
Fiber optic Testing	1	LS		\$ -	\$ 98,239	\$ 98,239	\$ 98,239	
FOTC Panel Installation	11	EA	\$ 3,000	\$ 33,000	\$ 1,000	\$ 11,000	\$ 44,000	
Control Room								
Improvements	1	LS	\$ 405,904	\$ 405,904		\$ -	\$ 405,904	
Primary Server Room								
Demo Existing Items in Maint Storage Room	1	LS		\$ -	\$ 2,500	\$ 2,500	\$ 2,500	
Enclose Room	406	SF	\$ 50	\$ 20,300	\$ 50	\$ 20,300	\$ 40,600	
HVAC	406	SF	\$ 25	\$ 10,150	\$ 25	\$ 10,150	\$ 20,300	
Lighting	406	SF	\$ 8	\$ 3,045	\$ 8	\$ 3,045	\$ 6,090	
Fire Protection System	4,060	CF	\$ 3	\$ 12,180	\$ 3	\$ 12,180	\$ 24,360	
Secondary Server Room								
Architectural modifications/ Repairs	200	SF	\$ 10	\$ 1,995	\$ 10	\$ 1,995	\$ 3,990	
Demo Existing HVAC	1	LS		\$ -	\$ 2,000	\$ 2,000	\$ 2,000	
HVAC	200	SF	\$ 25	\$ 4,988	\$ 25	\$ 4,988	\$ 9,975	
Lighting Control Additions	1	LS	\$ 500	\$ 500	\$ 500	\$ 500	\$ 1,000	
Fire Protection System - Testing/ Resealing	1	LS	\$ 1,000	\$ 1,000	\$ 4,000	\$ 4,000	\$ 5,000	
Subtotal								\$ 1,031,000
Contractor Overhead & Profit @		27%	\$ 279,000					
Shipping Rate		40%	of total is shipped @	5%	\$ 21,000			
Sales Tax		50%	of total is taxed @	7.75%	\$ 40,000			
Project Contingency @		40%	\$ 549,000					
Total Main Project Cost(Year of Estimate or Estimate Update)								\$ 1,920,000
ENR CCI Corresponding to Year of Estimate			LA CCI Dec-2018		12012			
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018		12012		1.000	
Total Main Project Cost (CAMP Report Year)								\$ 1,920,000
Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total	
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -	
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -	
DS	Design	8.0%	\$ 153,600	15%	\$ 23,040	\$ 177,000	\$ 177,000	
EDC	Engr During Construction	4.5%	\$ 86,400	15%	\$ 12,960	\$ 100,000	\$ 100,000	
CM	Construction Mgt	5.5%	\$ 105,600	20%	\$ 21,120	\$ 127,000	\$ 127,000	
EICD	EI&C - Design	0.0%	\$ 49,120	15%	\$ 7,368	\$ 57,000 NA	\$ 57,000	
EICC	EI&C - Construction	0.0%	\$ 589,638	15%	\$ 88,446	\$ 679,000 NA	\$ 679,000	
Total Project Cost (Present Value in Dec-2018 Dollars)								\$ 3,060,000
Notes:								
1) Control Room improvements cost from CDM Smith SCADA Upgrades Project Preliminary OPCC (October 2016), per Encina used CDM cost with markups								
2) Rates for Project Phases cost are percent of Total Main Project Cost								
3) EI&C design costs for Timberline are from 190128 - Timberline - Network Improvements - Design Phase Services estimate								
4) EI&C construction costs for Timberline are from 190128 - Timberline - Network Improvements - Construction Phase Services estimate								
5) EI&C construction costs are from EWA Network Construction Estimate 1.0.0 - EA Server Room Estimates by EA								

Project 6.1.206

Secondaries Electrical and Controls Improvements

Main Project Type

New Facility
 Facility Rehabilitation **X**
 Major Maintenance
 Asset Replacement
 Special Study

Key Dates

CAMP Report 2020
 Initial Estimate Dec-18
 Estimate Update Dec-18
 Project Start FY2024

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements							
Replace MCC-B	12	SCT	\$ 10,000	\$ 120,000	50%	\$ 60,000	\$ 180,000
Replace MCC-C	11	SCT	\$ 10,000	\$ 110,000	50%	\$ 55,000	\$ 165,000
<u>Climate Control Improvements</u>							
Secondaries Bldg MCCs	1	LS	\$ 59,280	\$ 59,280	\$ 19,378	\$ 19,378	\$ 78,658
(Cost from DEC Climate Control Report) Adjusted from ENR 11636 to Estimate Date below							

Subtotal \$ **424,000**

Contractor Overhead & Profit @ 27% \$ 115,000
 Shipping Rate 40% of total is shipped @ 5% \$ 9,000
 Sales Tax 50% of total is taxed @ 7.75% \$ 17,000
 Project Contingency @ 30% \$ 170,000

Total Main Project Cost (Year of Estimate or Estimate Update) \$ **735,000**

ENR CCI Corresponding to Year of Estimate LA CCI Dec-2018 12012

ENR CCI Corresponding to CAMP Report Year LA CCI Dec-2018 12012 1.000

Total Main Project Cost (CAMP Report Year) \$ **735,000**

Project Phases Cost		Rate	Amount	Contingency	Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -	\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -	\$ -
DS	Design	8.0%	\$ 58,800	15%	\$ 8,820	\$ 68,000	\$ 68,000
EDC	Engr During Construction	4.5%	\$ 33,075	15%	\$ 4,961	\$ 39,000	\$ 39,000
CM	Construction Mgt	5.5%	\$ 40,425	20%	\$ 8,085	\$ 49,000	\$ 49,000
EICD	EI&C - Design	0.0%	\$ 264,140		\$ 265,000	NA	\$ 265,000
EICC	EI&C - Construction	0.0%	\$ 1,187,349		\$ 1,188,000	NA	\$ 1,188,000
Total Project Cost (Present Value in Dec-2018 Dollars)							\$ 2,344,000

Notes:

- 1) Climate Control Improvements cost from DEC Engineers Ventilation and Climate Control Report cost estimate (July 2017) and adjusted for ENR from July 2017
- 2) Rates for Project Phases cost are percent of Total Main Project Cost
- 3) EI&C design and construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implementation Plan 2.0.5 with Timberline Input

Project 6.1.207

Cogen Electrical and Controls Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	FY2024

Main Project Cost				Quantity		Material Cost		Labor Cost		Total Cost
				No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements				1	LS	\$ 650,000	\$ 650,000			\$ 650,000
Electrical upgrades										
Subtotal \$ 650,000										
Contractor Overhead & Profit @				27%						\$ 176,000
Shipping Rate		40% of total is shipped @		5%						\$ 13,000
Sales Tax		50% of total is taxed @		7.75%						\$ 26,000
Project Contingency @				30%						\$ 260,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 1,125,000
ENR CCI Corresponding to Year of Estimate				LA CCI Dec-2018		12012				
ENR CCI Corresponding to CAMP Report Year				LA CCI Dec-2018		12012		1.000		
Total Main Project Cost (CAMP Report Year)										\$ 1,125,000
Project Phases Cost				Rate		Amount		Contingency		Subtotal Minimum Total
CA		Condition Assessment				\$ -		20%		\$ - \$ - \$ -
CS		Conceptual Study				\$ -		20%		\$ - \$ - \$ -
DS		Design		8.0%		\$ 90,000		15%		\$ 13,500 \$ 104,000 \$ 104,000
EDC		Engr During Construction		4.5%		\$ 50,625		15%		\$ 7,594 \$ 59,000 \$ 59,000
CM		Construction Mgt		5.5%		\$ 61,875		20%		\$ 12,375 \$ 75,000 \$ 75,000
EICD		EI&C - Design		0.0%		\$ 225,000				\$ 225,000 NA \$ 225,000
EICC		EI&C - Construction		0.0%		\$ 2,414,726				\$ 2,415,000 NA \$ 2,415,000
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 4,003,000
Notes:										
1) Project task element costs from Encina to match FY2020 CIP Budget										
2) Rates for Project Phases cost are percent of Total Main Project Cost										
3) EI&C design and construction costs are from 181129 - EA18EWA037 BUDGETS OT System Implemenation Plan 2.0.5 with Timberline Input										

Project 6.1.208

CPS/SEEPS Electrical and Controls Improvements

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	FY2025

Main Project Cost				Quantity		Material Cost		Labor Cost		Total Cost	
				No.	Units	Unit Cost	Total	Unit Cost	Total		
Project Task Elements											
				Replace MCC-C	2	SCT	\$ 10,000	\$ 20,000	50%	\$ 10,000	\$ 30,000
				Electrical upgrades	1	LS	\$ 850,000	\$ 850,000			\$ 850,000
						</					

Project 6.1.408

Business and SCADA Wireless Networks

Main Project Type		Key Dates	
New Facility		CAMP Report	2020
Facility Rehabilitation		Initial Estimate	Dec-18
Major Maintenance		Estimate Update	Dec-18
Asset Replacement	X	Project Start	≥FY2026
Special Study			

Main Project Cost	Quantity		Material Cost		Labor Cost		Total Cost
	No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements Upgrade the business wireless network Upgrade the SCADA wireless network Replace paging system with an IP based system	1	LS	\$ 115,000	\$ 115,000			\$ 115,000

Subtotal				\$	115,000
Contractor Overhead & Profit @		27%		\$	32,000
Shipping Rate	35%	of total is shipped @	5%	\$	3,000
Sales Tax	35%	of total is taxed @	7.75%	\$	4,000
Project Contingency @		30%		\$	47,000

Total Main Project Cost(Year of Estimate or Estimate Update)			\$ 201,000
ENR CCI Corresponding to Year of Estimate	LA CCI Dec-2018	12012	
ENR CCI Corresponding to CAMP Report Year	LA CCI Dec-2018	12012	1.000
Total Main Project Cost (CAMP Report Year)			\$ 201,000

Project Phases Cost		Rate	Amount	Contingency		Subtotal	Minimum	Total
CA	Condition Assessment		\$ -	20%	\$ -	\$ -		\$ -
CS	Conceptual Study		\$ -	20%	\$ -	\$ -		\$ -
DS	Design	0.0%	\$ -	15%	\$ -	\$ -		\$ -
EDC	Engr During Construction	0.0%	\$ -	15%	\$ -	\$ -		\$ -
CM	Construction Mgt	0.0%	\$ -	20%	\$ -	\$ -		\$ -
EICD	EI&C - Design	0.0%	\$ -			\$ -	NA	\$ -
EICC	EI&C - Construction	0.0%	\$ -			\$ -	NA	\$ -

Total Project Cost (Present Value in Dec-2018 Dollars)	\$ 201,000
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Notes:

- 1) Project Task Element costs from Encina
- 2) Project Phases Cost not included

Project 6.1.514

As-Needed Integration Services

Main Project Type

New Facility	
Facility Rehabilitation	X
Major Maintenance	
Asset Replacement	
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	Annual

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements									
Integration Services			1	EA	\$ 145,000	\$ 145,000			\$ 145,000

Project 6.2.705

Host Server Replacement - IT

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	X
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	Unit Cost	Total		
Project Task Elements										
Replace IT servers			4	EA	\$ 15,000	\$ 60,000				\$ 60,000
Subtotal										\$ 60,000
Contractor Overhead & Profit @			0%							\$ -
Shipping Rate 100% of total is shipped @			5%							\$ 3,000
Sales Tax 100% of total is taxed @			7.75%							\$ 5,000
Project Contingency @			30%							\$ 21,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 89,000
ENR CCI Corresponding to Year of Estimate			LA CCI Dec-2018			12012				
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.000		
Total Main Project Cost (CAMP Report Year)										\$ 89,000
Project Phases Cost			Rate		Amount		Contingency		Subtotal	Minimum Total
CA	Condition Assessment				\$ -		20%	\$ -	\$ -	\$ -
CS	Conceptual Study				\$ -		20%	\$ -	\$ -	\$ -
DS	Design		0.0%		\$ -		15%	\$ -	\$ -	\$ -
EDC	Engr During Construction		0.0%		\$ -		15%	\$ -	\$ -	\$ -
CM	Construction Mgt		0.0%		\$ -		20%	\$ -	\$ -	\$ -
EICD	EI&C - Design		0.0%		\$ -			\$ -	NA	\$ -
EICC	EI&C - Construction		0.0%		\$ -			\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 89,000
Notes:										
1) Project Task Element costs from Encina										
2) Project Phases Cost not included										

Project 6.2.706

Host Server Replacement - OT

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	X
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost	
			No.	Units	Unit Cost	Total	Unit Cost	Total		
Project Task Elements										
Replace OT servers			4	EA	\$ 15,000	\$ 60,000				\$ 60,000
Subtotal										\$ 60,000
Contractor Overhead & Profit @			0%							\$ -
Shipping Rate 100% of total is shipped @			5%							\$ 3,000
Sales Tax 100% of total is taxed @			7.75%							\$ 5,000
Project Contingency @			30%							\$ 21,000
Total Main Project Cost(Year of Estimate or Estimate Update)										\$ 89,000
ENR CCI Corresponding to Year of Estimate			LA CCI Dec-2018			12012				
ENR CCI Corresponding to CAMP Report Year			LA CCI Dec-2018			12012		1.000		
Total Main Project Cost (CAMP Report Year)										\$ 89,000
Project Phases Cost			Rate		Amount		Contingency		Subtotal	Minimum Total
CA	Condition Assessment				\$ -		20%	\$ -	\$ -	\$ -
CS	Conceptual Study				\$ -		20%	\$ -	\$ -	\$ -
DS	Design		0.0%		\$ -		15%	\$ -	\$ -	\$ -
EDC	Engr During Construction		0.0%		\$ -		15%	\$ -	\$ -	\$ -
CM	Construction Mgt		0.0%		\$ -		20%	\$ -	\$ -	\$ -
EICD	EI&C - Design		0.0%		\$ -			\$ -	NA	\$ -
EICC	EI&C - Construction		0.0%		\$ -			\$ -	NA	\$ -
Total Project Cost (Present Value in Dec-2018 Dollars)										\$ 89,000
Notes:										
1) Project Task Element costs from Encina										
2) Project Phases Cost not included										

Project 6.2.707

Storage Area Network Replacement

Main Project Type

New Facility	
Facility Rehabilitation	
Major Maintenance	
Asset Replacement	X
Special Study	

Key Dates

CAMP Report	2020
Initial Estimate	Dec-18
Estimate Update	Dec-18
Project Start	≥FY2026

Main Project Cost			Quantity		Material Cost		Labor Cost		Total Cost
			No.	Units	Unit Cost	Total	Unit Cost	Total	
Project Task Elements									
Storage Area Network			1	EA	\$ 112,000	\$ 112,000			\$ 112,000