ENCINA WASTEWATER AUTHORITY

# FY 2016

# ENCINA WATER POLLUTION CONTROL FACILITY

## COMPREHENSIVE ASSET MANAGEMENT PLAN (E-CAMP)

*"With a comprehensive asset management plan we remain steadfast in meeting our commitment to the EWA Mission"*

**This page intentionally left blank**

# ENCINA WATER POLLUTION CONTROL FACILITY COMPREHENSIVE ASSET MANAGEMENT PLAN (E-CAMP)

Kevin M. Hardy
General Manager
Encina Wastewater Authority
6200 Avenida Encinas
Carlsbad, California 92011-1095

RMC Water and Environment
15510-C Rockfield Blvd, Suite 200
Irvine, CA 92618

**This page intentionally left blank**

# Table of Contents

## Table of Contents

# Table of Contents

# Table of Contents

# Abbreviations and Acronyms List

EWA Process and Facility Abbreviations

| | |
|---|---|
| 1W | Potable Water (City Water) |
| 1WS | Potable Water (Softened) |
| 2W | Filtered Secondary Effluent |
| 2WS | Filtered Secondary Effluent (Softened) |
| 3W | Plant Water (Secondary Effluent) |
| 3WCL | Plant Water (Secondary Effluent), Chlorinated, Low Pressure |
| 3WHP | Plant Water (Secondary Effluent), High Pressure |
| 3WL | Plant Water (Secondary Effluent), Low Pressure |
| 3WS | Plant Water (Secondary Effluent), Spray Water |
| A | Aeration Air System (Process) |
| AA | Agitation Air System (Mixing) |
| AB | Aeration Basin |
| AFE | Dissolved Air Flotation Effluent |
| ARV | Air Relief Valve |
| APCD | Air Pollution Control District |
| CCC | Chlorine Contact Chamber |
| CMMS | Computerized Maintenance Management System |
| CEPT | Chemical Enhanced Primary Treatment |
| CG | Cogeneration System |
| CIP | Capital Improvement Projects |
| CLS | Chlorine Solution |
| CWR | Chilled Water Return |
| CWRF | Carlsbad Water Reclamation Facility |
| CWS | Chilled Water Supply |
| D | Digester, Drain |
| DAF | Dissolved Air Flotation (Process) |
| DAFT | Dissolved Air Flotation Thickener (Tank) |
| DRY | Drying Building |
| DS | Digested Sludge |
| DW | Dewatering Building |
| E | Effluent |
| E-CAMP | EWPCF Comprehensive Asset Management Plan |
| EMP | Energy Management Project |
| ES | Engineering Services |
| EWA | Encina Wastewater Authority |
| EWPCF | Encina Water Pollution Control Facility |
| FA | Foul Air |
| FC | Ferrous Chloride Solution |
| FY | Fiscal Year |
| G | Grit |
| GRS | Grit Removal System |
| GRT | Grit Removal Tank |
| GS | Grit Separators |
| HRR | Heat Reservoir Return |
| HRS | Heat Reservoir Supply |

# Abbreviations and Acronyms List

| | |
|---|---|
| HVAC | Heating, Ventilation and Air Conditioning |
| HW | Headworks |
| IA | Instrument Air |
| IC | Internal Combustion |
| IJS | Influent Junction Structure |
| LAENRCCI | Los Angeles Engineering News Record Construction Cost Index |
| LSG | Low Pressure Sludge Gas |
| MCC | Motor Control Center |
| MCU | Miscellaneous Control Upgrades |
| MIS | Management Information Systems |
| MjA | Major Assets |
| ML | Mixed Liquor |
| MPI | Miscellaneous Plant Improvements |
| MRO | Maintenance Repair and Operations Software |
| MS | Mixed Sludge |
| NG | Natural Gas |
| NPDES | National Pollutant Discharge Elimination System |
| O&M | Operations and Maintenance |
| OF | Overflow |
| ORC | Organic Rankine Cycle Engine |
| ORF | Odor Reduction Facility |
| PAR IMPR | Planned Asset Replacement Implementation |
| PSB | Primary Sedimentation Basins |
| PD | Pumped Drainage |
| PE | Primary Effluent |
| POL | Polyelectrolyte (Polymer) |
| POW | Power Building |
| PS | Primary Sludge |
| PSC | Primary Scum |
| PV | Phase V related facility |
| PVSI | Phase V Site Improvements |
| RAS | Return activated sludge |
| RTO | Regenerative Thermal Oxidizer |
| S | Study |
| SA | Service Air |
| SC | Secondary Clarifier, Scum |
| SD | Sanitary Drain |
| SCADA | Supervisory Control and Data Acquisition |
| SCM | Scum Collection System |
| SE | Secondary Effluent |
| SFTY | Safety |
| SPTG | Septage Receiving |
| SS | Site security |
| SSC | Secondary Scum |
| TBD | To be determined |
| TD | Tank Drain |
| TWAS | Thickened Waste Activated Sludge |

| | |
|---|---|
| VFD | Variable frequency drive |
| W | Plant Water (see 3WHP, 3W, 3WLC) |
| WAS | Waste Activated Sludge |
| VC | Vista Carlsbad pipeline |

General Abbreviations

| | |
|---|---|
| AHUs | air handling units |
| cfm | cubic feet per minute |
| CIPP | cured-in-place-piping |
| CISP | cast iron soil pipe |
| CPVC | chlorinated polyvinyl chloride |
| DIP, DI | ductile iron pipe |
| ft | feet or foot |
| FRP | fiberglass reinforced plastic |
| gpm | gallons per minute |
| hp | horsepower |
| mgd | million gallons per day |
| OSHA | Occupational Safety and Health Administration |
| ppm | parts per million |
| psi | pounds per square inch |
| PVC | polyvinyl chloride |
| RCP | reinforced concrete pipe |
| scfm | standard cubic feet per minute |
| sf | square feet |
| SSP | stainless steel pipe |
| STL | steel pipe |

**This page intentionally left blank**

# ENCINA WATER POLLUTION CONTROL FACILITY
# COMPREHENSIVE ASSET MANAGEMENT PLAN
# (E-CAMP)

## SECTION 1: EXECUTIVE SUMMARY

The Encina Wastewater Authority (EWA) is a public joint powers authority located in the City of Carlsbad that provides regulatory and wastewater treatment services to approximately 325,000 North San Diego County residents and industrial users. The EWA is owned by six member agencies that include the City of Carlsbad, City of Vista, City of Encinitas, the Buena Sanitation District, the Leucadia Wastewater District, and the Vallecitos Water District.

The Encina Water Pollution Control Facility (EWPCF) was constructed in 1963 to treat wastewater from the Cities of Carlsbad and Vista. Original construction of the EWPCF consisted of preliminary treatment facilities, anaerobic digesters, sludge drying beds, and an ocean outfall. Since its original design and construction, the EWPCF has completed five major expansion phases with the latest major expansion (Phase V) construction completed in 2009. Phase V upgrades included enhanced solids processing and significant improvements to energy management facilities. The EWPCF current capacity is 40.5 million gallons per day (mgd) of liquid treatment and 43.3 mgd of solids treatment.

The Encina Comprehensive Asset Management Plan (E-CAMP) for the EWPCF. It is updated annually prior to establishing the capital budget for the upcoming fiscal year. The annual E-CAMP update process consists of conducting condition assessments, facility needs assessments, developing and maintaining project lists including cost estimates, and prioritizing and scheduling capital project improvements. The annual update is used in planning capital rehabilitation projects with the consideration of anticipated changes in regulatory compliance, cost-saving opportunities, upgrades needed and ongoing operations and maintenance (O&M) requirements. The implementation schedule is prepared after considering the project priority ranking and other factors, such as regulatory compliance deadlines and economy of scale.

The E-CAMP provides the EWA the ability to forecast and schedule the replacement, modifications and/or rehabilitation of EWPCF major assets. The E-CAMP contains detailed supporting documents that provide an organized register of major assets, estimated service life of each asset, and scheduled replacement or rehabilitation of each asset. The E-CAMP allows EWA to project future expenditures for capital improvement projects, in both the short and long term, and communicate the proposed improvements to the Member Agency Managers, EWA Board of Directors, and Encina Joint Advisory Committee.

Capital improvement budgets for projects planned for execution over the next five years are presented in Table 1-1 categorized into different areas of the EWPCF. Table 1-2 provides details of the FY 2016 budget by project category. Table 1-3 presents brief descriptions for each of the projects planned for FY 2016.

## TABLE 1-1: E-CAMP FY16-FY20 Scheduled Projects Budget Summary (in Thousands of Dollars)

| Project Category | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | TOTAL |
|---|---|---|---|---|---|---|
| Liquid Process Improvements | $ 6,482 | $ 5,750 | $ 11,176 | $ 1,341 | $ 7,342 | ***$ 32,091*** |
| Outfall | -- | $ 76 | -- | $ 76 | $ 217 | ***$ 369*** |
| Solid Process Improvements | $ 1,839 | -- | $ 484 | $ 9,066 | $ 14,559 | ***$ 25,948*** |
| Energy Management | $ 275 | $ 275 | $ 924 | $ 924 | $ 5,319 | ***$ 7,717*** |
| General Improvements | $ 816 | $ 869 | $ 1,193 | $ 1,293 | $ 840 | ***$ 5,011*** |
| Technology Master Plan | $ 613 | $ 4,206 | $ 1,102 | $ 1,998 | $ 719 | ***$ 8,638*** |
| Professional Services | $ 1,215 | $ 650 | $ 650 | $ 650 | $ 650 | ***$ 3,915*** |
| **Total** | **$ 11,240** | **$ 11,826** | **$ 15,529** | **$ 15,348** | **$ 29,646** | ***$ 83,689*** |

## TABLE 1-2: E-CAMP FY16 Individual Scheduled Projects

| Project No | Project Name | Project Phase | Budget (thousands of dollars) |
|---|---|---|---|
| **Liquid Process Improvements** | | | |
| P-1.2.005 | Grit and Screening Handling Facility Rehab | Design | $ 800 |
| P-1.2.012 | PSB 1-10 Influent Gate Replacement | Design | $ 88 |
| P-1.3.003 | AB Rehab Projects | Construction | $ 5,166 |
| P-1.3.005 | AB Diffuser Membrane Replacement | Construction | $ 390 |
| P-1.3.017 | AB FRP Cover Replacement with Aluminum – Basin 1 | Study | $ 38 |
| **Solid Process Improvements** | | | |
| P-3.3.009 | Drying Safety Upgrades | Construction | $ 1,839 |
| **Energy Management** | | | |
| P-4.1.005 | Cogeneration Engine Top-End Overhaul | Construction | $ 275 |
| **General Improvements** | | | |
| P-5.1.001 | ORF I Carbon Media Replacement (Annually) | Construction | $ 100 |
| P-5.2.012 | Site Security Facilities | Study | $ 27 |
| P-5.2.017 | Instrument Air Piping Rehabilitation | Design, Const. | $ 312 |
| P-5.2.031 | Arc Flash Hazard Assessment | Study | $ 75 |
| P-5.2.032 | Plant Wide Asset Painting and Protective Coating | Design, Const. | $ 149 |
| P-5.2.033 | Plant Wide Abandoned Equipment Removal | Study | $ 22 |
| P-5.3.012 | Chiller for Cogeneration Engine Building | Design, Const. | $ 131 |
| **Technology Master Plan** | | | |
| P-6.1.401 | Electronic Operator Logbook and Pass-Down (OT_OI03) | Construction | $ 124 |
| P-6.1.407 | Automation Study Implementation | Construction | $ 347 |
| P-6.2.103 | Data Management Standards (BT_TDG03) | Construction | $ 80 |
| P-6.2.302 | WIMS Enhancements (BT_RC02) | Construction | $ 62 |

| Professional Services | | | | |
|---|---|---|---|---|
| CA - 8.1.006 | FY 2016 Asset Condition Assessments - EWPCF | Condition Assessment | $ | 50 |
| CA - 8.1.008 | Bridges Condition Assessments | Condition Assessment | $ | 10 |
| CA - 8.1.012 | Building Condition Assessments | Condition Assessment | $ | 50 |
| S - 8.2.003 | Biosolids Management Business Plan Update | Study | $ | 180 |
| S - 8.2.013 | Process Master Plan | Study | $ | 300 |
| S - 8.2.015 | Potable Reuse Study | Study | $ | 50 |
| S - 8.2.016 | Phosphorus Removal Study | Study | $ | 50 |
| S - 8.2.018 | Pure Green Demonstration Garden Master Plan | Study | $ | 30 |
| ES - 8.3.001 | E-CAMP Update | Study | $ | 75 |
| ES - 8.4.001 | Extension of Staff Engineering Services | Study | $ | 150 |
| ES - 8.4.002 | Research and Development Services | Study | $ | 50 |
| ES - 8.4.008 | Electronic Operations Manual and Document Management - Phase 4 | Study | $ | 100 |
| ES – 8.4.011 | Service Area Ordinance Alignment | Study | $ | 120 |
| **Total** | | | **$** | **11,240** |

## TABLE 1-3: E-CAMP FY16 Scheduled Project Descriptions

| Project No. | Name | Description |
|---|---|---|
| P-1.1.005 | Grit and Screening Handling Facility Rehab | This project is for the design of the recommended improvements in the 2011 Grit and Screenings Handling Study including replacing bar screens and belt conveyor, expanding existing Screening building, providing new washer compactors, grit removal and pumping improvements, providing new grit washing and dewatering system, and odor control system improvements serving the Screening Building. |
| P-1.2.012 | PSB 1-10 Influent Gate Replacement | This project is to design the replacement all the Primary Settling Basins influent sluice gates that are determined to be corroded and leaking. |
| P-1.3.003 | AB Rehab Projects | This project is for construction of the previously designed Aeration Basin (AB) modifications including improvements to 3WHP water lines, influent channels, slide gate assemblies, aeration basin access, and RAS pumping. |
| P-1.3.005 | AB Diffuser Membrane Replacement | The project includes replacement of all fine bubble dome diffuser membranes in AB Nos. 1-4 and miscellaneous repair work to aeration piping and supports. |
| P-1.3.017 | AB FRP Cover Replacement with Aluminum – Basin 1 | This project is to study replacement covers for the existing fiberglass AB basins currently installed. Intent is to implement the installation of the replacement covers over time as the budget allows. |

| Project No. | Name | Description |
|---|---|---|
| P-3.3.009 | Drying Safety Upgrades | This project is for construction of the Phases 2 and 3 dryer safety improvements identified in the 2013 Drying Safety and Pellet Reheating Project study that are currently under design. Recommendations include relocating bag house and/or implementing mitigation measures. |
| P-4.1.005 | Cogeneration Engine Top-End Overhaul | This project provides the manufacturer recommended top-end overhaul maintenance services to cogeneration engines. |
| P-5.1.001 | ORF I Carbon Media Replacement (Annually) | This project will replace the carbon media in ORF I. There are six media beds in ORF I and they all need to be replaced per the air quality permit. |
| P-5.2.012 | Site Security Facilities | This project is a study for the need for a centralized control console for monitoring and programming card or coded entry to front gate, MCC rooms, and buildings. PA system improvements and integration into the new system, surveillance video, or plant perimeter intrusion system will also be addressed. |
| P-5.2.017 | Instrument Air Piping Rehabilitation | This project is for the design and construction of improvements to the instrument air system. The design will include an evaluation of options such as repair versus replacement of the system. |
| P-5.2.031 | Arc Flash Hazard Assessment | This project involves conducting an arc flash hazard assessment for the existing electrical system including switchgears, distribution switchboards, MCCs, panels, transformers, VFDs and disconnects at the following locations: Centrifuge pit, CPS, EWPCF CEPT (CEP Polymer), Maintenance Building /Administration Building, MCC Dewatering, Cogen Room, and Agua Hedionda. |
| P-5.2.032 | Plant Wide Asset Painting and Protective Coating | This project provides for painting and protective coating to all outside piping and equipment for asset corrosion control. |
| P-5.2.033 | Plant Wide Abandoned Equipment Removal | This project provides for a study to determine the best approach for proper removal of the abandoned equipment at the EWPCF. |
| P-5.3.012 | Chiller for Cogeneration Engine Building | This project is to design and implement the recommendations of the chiller study being conducted in 2015. |
| P-6.1.401 | Electronic Operator Logbook and Pass-Down (OT_OI03) | This project is to install an electronic operator logbook to document actions and allow for a smooth transition of information between operators. |
| P-6.1.407 | Automation Study Implementation | This project is to implement recommendations of the Automation Study initiated in 2015. |

| Project No. | Name | Description |
|---|---|---|
| P-6.2.103 | Data Management Standards (BT_TDG03) | This project establishes standard data definitions throughout EWA. The project establishes formal, documented data quality assurance practices and incorporate data governance and quality assurance best practices into the Technology Master Plan projects. |
| P-6.2.302 | WIMS Enhancements (BT_RC02) | This project is to implement enhancements to the Water Information Management Solution (WIMS) to improve management access to laboratory data. |
| CA - 8.1.006 | FY 2016 Asset Condition Assessments - EWPCF | This project is to provide condition assessment of the EWA assets with a nominal replacement by FY 2020. Assets to be assessed include TWAS Pump 3, collectors at dissolved air flotation thickening (DAFT) Nos. 1 and 2, and construction offices. |
| CA - 8.1.008 | Bridges Condition Assessments | This project provides a condition assessment of the bridges over the flood control channel. The bridges will be inspected visually for corrosion and structural integrity. |
| CA - 8.1.012 | Building Condition Assessments | This project provides a condition assessment of the major buildings including the Operations Building, Warehouse and the Maintenance Building. Building mechanical systems and general condition will be assessed. |
| S - 8.2.003 | Biosolids Management Business Plan Update | This study updates the 2010 Biosolids Management Business Plan to verify assumptions and identify needed program redirection. |
| S - 8.2.013 | Process Master Plan | The process master plan (PMP) is to optimize the operation and maintenance of the EWPCF. Specific issues to be addressed include screening evaluation, re-evaluation of CEPT, primary sludge pumping upgrades evaluation, primary scum pipeline settlement evaluation, secondary treatment process evaluation, sludge process improvements, plant water functional improvements, air quality/Title V evaluation, air permit streamlining opportunities, and onsite energy evaluation. |
| S - 8.2.015 | Potable Reuse Study | This study is to evaluate the most practical approach for implementation of a potable reuse program for EWA as potable reuse regulations develop and opportunities for collaboration with regional stakeholders are better understood. |
| S - 8.2.016 | Phosphorus Removal Study | This study is to evaluate feasibility and cost effectiveness of phosphorus harvesting and recovery. |
| S - 8.2.018 | Pure Green Demonstration Garden Master Plan | This study provides a master planning for construction of a 3 to 5 acre garden demonstrating the efficacy of Pure Green Organic Nitrogen Fertilizer. |
| ES - 8.3.001 | E-CAMP Update | Annual update of the E-CAMP for FY 2016. |

| Project No. | Name | Description |
|---|---|---|
| ES - 8.4.001 | Extension of Staff Engineering Services | The As-Needed Services contract is an annual contract for Engineering Support for needs that develop throughout the fiscal year. |
| ES - 8.4.002 | Research and Development Services | This study includes research and development associated with potential energy or resource recovery related facilities. |
| ES - 8.4.008 | Electronic Operations Manual and Document Management - Phase 4 | The goal of the project is to consolidate previous Operations Manuals, develop additional Operations content as needed, and to format the material into an electronic format. Phase 4 will complete the remaining sections of the Operations Manual and will complete additional related tasks such as development of a specification to include in RFPs and bid documents. |
| ES – 8.4.011 | Service Area Ordinance Alignment | This study will determine the service area ordinance alignment. |

## SECTION 2: INTRODUCTION TO EWA COMPREHENSIVE ASSET MANAGEMENT PLANNING (CAMP)

The Encina Wastewater Authority (EWA) is a public joint powers authority located in the Southern California City of Carlsbad that provides regulatory and wastewater treatment services to approximately 300,000 North San Diego County residents and industrial users. The EWA is owned by six member agencies that include: the City of Carlsbad, City of Vista, City of Encinitas, the Buena Sanitation District, the Leucadia Wastewater District, and the Vallecitos Water District.

### 2.1 Background

The EWA was formed to operate and administer the Encina Water Pollution Control Facility (EWPCF). The EWPCF, an award winning facility, is a secondary activated sludge type treatment facility with the existing design capacity of 40.5 million gallons per day (mgd) liquid and 43.3 mgd solids.

The EWPCF was constructed in 1963 to treat wastewater from the Cities of Carlsbad and Vista. Original construction of the EWPCF consisted of preliminary treatment facilities, anaerobic digesters, sludge drying beds and an ocean outfall. Since its original design and construction, the EWPCF has completed five major expansion phases with the latest major expansion (Phase V) construction completed in 2009. Phase V upgrades included enhanced solids processing as well as significant improvements to the energy management facilities.

As reported in the EWA Fiscal Year 2011 Comprehensive Annual Financial Report, member agency infrastructure investment in the EWPCF has exceeded $229,000,000 since its inception. With this significant level of investment, the EWA is committed to maintaining a comprehensive asset management approach for managing the EWPCF infrastructure.

### 2.2 Purpose

The purpose of this asset management plan is to develop a comprehensive roadmap to address the EWPCF infrastructure challenges. Member agencies have invested significant resources in the EWPCF. With this investment, the EWA places the highest importance on preserving asset reliability while protecting the health and safety of workers and the public. The EWPCF Comprehensive Asset Management Plan (E-CAMP) process maintains a current, organized register of major assets and associated estimated asset service life remaining. 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 assessed service life. We look to best management practice applications that will assist EWA in facing these rewarding challenges. The current E-CAMP addresses the emerging challenges and will continue to renew and extend EWA's commitment in maintaining a reliable and effective infrastructure. With a comprehensive asset management plan we remain steadfast in meeting our commitment to the EWA Mission:

> ***As an environmental leader, EWA provides sustainable and fiscally responsible wastewater services to the communities it serves while maximizing the use of alternative and renewable resources.***

## 2.3 CAMP Process Overview

### 2.3.1 History

In Fiscal Year 2008, EWA transitioned management of its EWPCF infrastructure from the former facility Master Plan Process to the Comprehensive Asset Management Plan (CAMP) program.

### 2.3.2 Capital Projects

The CAMP process results in a list of prioritized recommended improvement projects. Evaluation criteria are used to prioritize projects. The project evaluation criteria established in the Master Plan were brought forward and supplemented in the CAMP process. These criteria take into consideration the service life of each physical asset and place high importance on safety, odor control, regulatory requirements, energy efficiency, plant capacity, cost efficiency and consequence of failure of assets. The evaluation criteria established for the E-CAMP are identified in **Figure 2-1**.

**Figure 2-1: E-CAMP Evaluation Criteria**


Completed E-CAMP projects from 1994 through present are listed in **Appendix A.** A new project numbering system was implemented in the FY 2013 E-CAMP, and a comprehensive list of past, current and future capital projects identified under this system are presented in **Appendix B**.

### 2.3.3 Asset Register

The asset register provides an organized list of major assets, estimated service life of each asset, estimated replacement cost, and scheduled replacement or rehabilitation date of each asset. Major assets are defined as assets with a replacement cost of $50,000 or more. Minor assets, with values less than $50,000 are generally replaced or upgraded through preventative or corrective maintenance activities which the General Services Department tracks using the Computerized Maintenance Management System (CMMS). The Major Asset Register with recent condition assessment information is found in **Appendix E**.

### 2.3.4 Condition Assessment

In FY 2011, EWA initiated a formal process to assess the condition of major assets nearing the end of their service life. The condition assessment documents the current condition of each asset and recommends either extending the estimated service life or defining a project to replace the aging assets.

### 2.3.5 CAMP Methodology

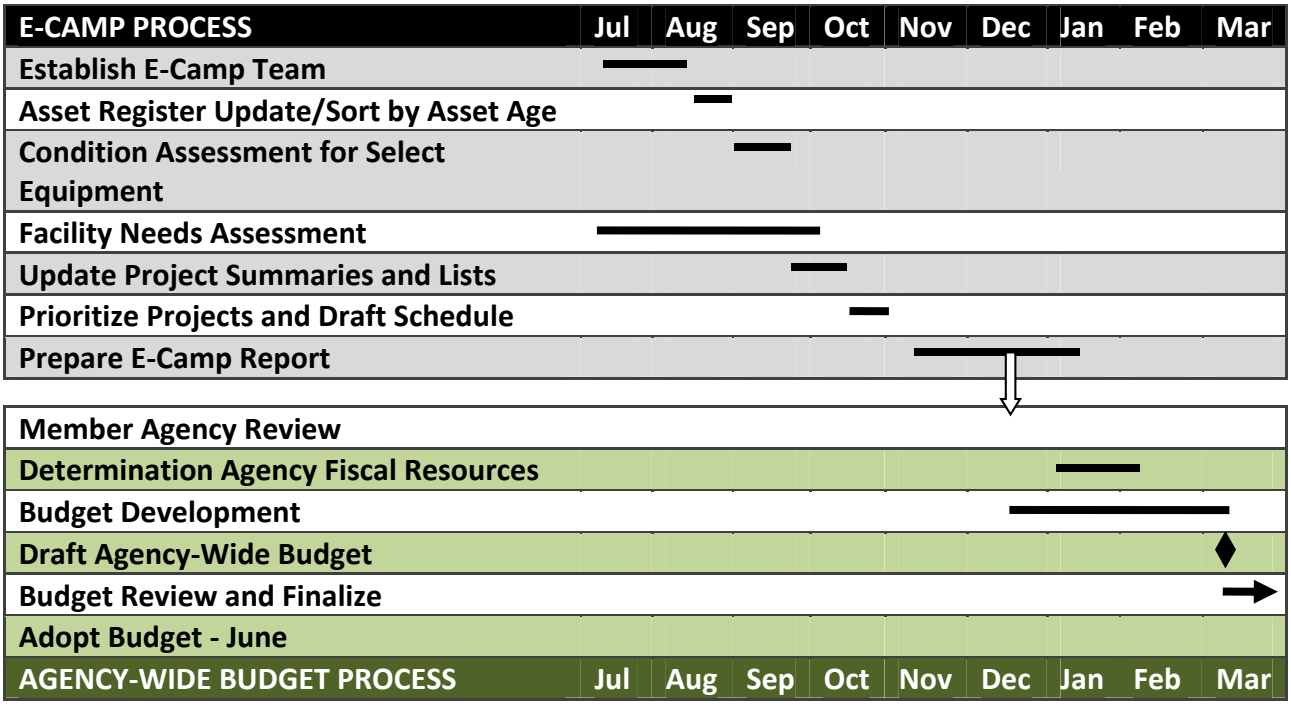
The E-CAMP program methodology is through the Task Elements outlined in **Figure 2-2.** A more detailed discussion of the CAMP methodology is found in **Appendix C**.

**Figure 2-2: E-CAMP Task Elements**


### 2.3.6 Schedule

Each year a series of tasks is completed to update the E-CAMP, with the purpose of providing project definition, cost and prioritization for EWA's overall budget process, as illustrated in **Figure 2-3**.

**Figure 2-3: Annual Update Milestones and Schedule**




### 2.3.7 Project Numbering System

Projects are given unique numbers that relate to the appropriate plant process. Condition Assessments, Studies, Updates, Engineering Services and Other Services are also numbered in accordance with the project numbering system. Conceptual studies for specific projects will be designated with an "S" prefix followed by the same numerical designation as the project.

The project number consists of four segments, for example P-1.3.004:

- The first prefix 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 (specific to the project).
- The second segment is a one-digit number associated with the general process. In the example, the number 1 represents the general process "Liquid Process".

- The third segment is a one digit number associated with the specific unit process or area of the plant. In the example, the number 3 represents the specific process "Secondary Treatment".
- Fourth segment is a three digit sequential number for projects within the specific process.

A summary of the general and specific project numbering system is presented in **Table 2-1**:

**Table 2-1: Project Numbering System**

**P-1: Liquid Process Improvements**
- 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 Improvements**
- 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 Improvements**
- P-5.1: Odor Control
- P-5.2: Plant-Wide Systems
- P-5.3: Buildings
- P-5.4: Miscellaneous

**P-6: Technology Upgrades**
- 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 & 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 for Future**

**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)

## SECTION 3: CONDITION ASSESSMENT SUMMARY

Condition assessments are triggered when an asset nears 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. In this section, assets nearing the replacement year (within 5 years) as listed in the Major Asset Registry in Appendix E are scheduled for condition assessment. During the summer of FY 2015, EWA staff reviewed the asset list and added assets not previously included.

### 3.1 Condition Assessments – FY 2016

CA-8.1.006 FY 2016 Assessments Triggered by Asset Age

This project will provide condition assessment of the EWA assets with nominal replacement date of FY 2020. This project will provide condition assessment of the following assets:

| | |
|---|---|
| P-8004-000 | WAS Pump 1 |
| P-8005-000 | WAS Pump 2 |
| P-8008-000 | WAS Pump 5 |
| P-8023-000 | RAS Pump 1 |
| P-8024-000 | RAS Pump 2 |
| P-8025-000 | RAS Pump 3 |
| P-8026-000 | RAS Pump 4 |
| P-3062-000 | Final Effluent Pump 2 |
| AHU-8054-000 | AHU – Secondary Building |
| AHU-4510-000 | AHU – Warehouse |
| AHU-3720-000 | AHU – Chlorine Bldg, MCC (coordinate with P-5.2.021) |
| AHU-1610-000 | AHU – Fan Room, ORF I, Primary Gallery |
| AHU-6692-000 | AHU – Second Floor Supply Fan (Dewatering) |
| AHU-1601-000 | AHU – Screenings Room |
| AHU-1606-000 | AHU – MCC Room, Screenings (coordinate with P-5.2.021) |
| AHU-4067-000 | AHU – MCC Room, Power Bldg (coordinate with P-5.2.021) |
| FLT-8830-000 | ORF III, Secondary Carbon Filters (East) |
| FLT-8831-000 | ORF III, Secondary Carbon Filters (West) |
| MCC-3500-D00 | MCC-D (Chlorine Bldg) |
| MCC-3500-E00 | MCC-E (Chlorine Bldg) |
| MCC-1500-F00 | MCC-F (Headworks-Screenings Bldg) |
| MCC-1500-G00 | MCC-G (Headworks-Screenings Bldg) |
| MCC-6000-H00 | MCC-H (Sludge Dewatering Bldg) |
| MCC-4000-K00 | MCC-K (Digesters) |
| MCC-4000-M00 | MCC-M (Blowers) |
| MCC-4000-N00 | MCC-N (Blowers) |
| MCC-4000-P00 | MCC-P (Power and Maintenance Bldg) |
| MCC-4000-R00 | MCC-R (Power and Maintenance Bldg) |
| 21” D | 21” Drain Pipe (Pellet Loading to EPS to IJS) |

| | |
|---|---|
| 12” 3WL | 12” No. 3 Water Low Pressure (Refer to Plant Water Study, EPS to Drying Building and ORF I |
| 30” D | 30” Drain Pipe (East of EPS) |
| 16” FA | 16” Foul Air Pipe (Screenings Building, vicinity of Digester Nos. 1 – 3) |
| | Motor – AHU 1271 Supply Fan |
| | Motor – Fume Hood #1 Supply Fan |
| | Motor – Fume Hood #2 Supply Fan |
| | Motor – Fume Hood #3 Supply Fan |
| | Motor – Fume Hood #4 Supply Fan |
| | Motor – Fume Hood #5 Supply Fan |
| | Pipe – Foul Air Collection Piping (Secondary) |
| | Control Panel, HVAC, Ops Bldg |
| | VFD, Final Effluent Pump No. 1 |
| | VFD, Final Effluent Pump No. 2 |
| | Activated Carbon – ORF 2 |
| | Activated Carbon – ORF 3 (East) |
| | Activated Carbon – ORF 3 (West) |

The following assets nearing end of assessed service life will be replaced as part of projects or assessed as part of specific studies:

| | |
|---|---|
| P-7310-000 | TWAS Pump 3 |
| COL-7101-000 | Collector, DAF No. 1 |
| COL-7102-000 | Collector, DAF No. 2 |
| COL-7103-000 | Collector, DAF No. 1 |
| BLDG-4200-000 | Construction offices |
| HU-1506-000 | Hydraulic Unit – Screenings Press |
| SCR-1511-000 | Bar Screen #1, Drive Unit and Level Control Panel |
| SCR-1512-000 | Bar Screen #2, Drive Unit and Level Control Panel |
| SCR-1513-000 | Bar Screen #3, Drive Unit and Level Control Panel |
| SCR-1514-000 | Bar Screen #4, Drive Unit and Level Control Panel |
| GDW-1501-000 | Grit Dewaterer #1 - Screw |
| GDW-1502-000 | Grit Dewaterer #2 - Screw |
| RTO-540-000 | Regenerative Thermal Oxidizer |

CA-8.1.008 Bridges

CA-8.1.008 will assess the bridges over the flood control channel. There is one bridge for vehicular traffic and one bridge for pedestrian traffic that will be assessed. The bridges will be inspected visually for corrosion and structural integrity.

CA-8.1.012 Building Condition Assessment

CA-8.1.012 will assess major buildings including the Operations Building and the Maintenance Building. Building mechanical systems and general condition will be assessed.

## 3.2 Condition Assessments – FY 2017

CA-8.1.009 FY 2017 Assessments Triggered by Asset Age

This project will provide condition assessment of the EWA assets with nominal replacement date of FY 2021:

| | |
|---|---|
| P-3063-000 | Final Effluent Pump 3 |
| P-3064-000 | Final Effluent Pump 4 |
| P-5530-000 | Digester Mixing Pump 5A (North) |
| P-5531-000 | Digester Mixing Pump 5B (South) |
| P-5630-000 | Digester Mixing Pump 6A (North) |
| P-5631-000 | Digester Mixing Pump 6B (South) |
| RTO-5400-000 | Regenerative Thermal Oxidizer |
| | TWAS Pipeline |

The following assets nearing end of assessed service life will be replaced as part of projects or assessed as part of specific studies:

GDW-1501-000 Grit Dewatering Screw 1: to be replaced in P-1.1.005
GDW-1502-000 Grit Dewatering Screw 2: to be replaced in P-1.1.005

## 3.3 Condition Assessments – FY 2018

CA-8.1.010 FY 2018 Assessments Triggered by Asset Age

This project will provide condition assessment of the EWA assets with nominal replacement date of FY 2022.

| | |
|---|---|
| P-8027-000 | RAS Pump 5 |
| P-8028-000 | RAS Pump 6 |
| P-8027-A00 | RAS Pump Spare |
| P-8029-000 | RAS Pump 8 |
| | Odor Reduction Carbon Tower (ORF #3, East) |
| | Odor Reduction Carbon Tower (ORF #3, West) |
| | Primary Sedimentation Basin #1 Cover |
| | Primary Sedimentation Basin #2 Cover |
| | Primary Sedimentation Basin #3 Cover |
| | Primary Sedimentation Basin #4 Cover |
| | Primary Sedimentation Basin #5 Cover |
| | Primary Sedimentation Basin #6 Cover |
| | Security System and Camera |
| | Ocean Outfall Protective Arch |

The following assets will be assessed during external inspections and integrity assessments as required by the California State Lands Commission in the EWA Ocean Outfall Lease.

Pipe – 72" Diffuser Section to End of Outfall
Pipe – 72" Increaser to Diffuser Section

### 3.4 Condition Assessments – FY 2019

CA-8.1.011 FY 2019 Assessments Triggered by Asset Age

This project will provide condition assessment of the EWA assets with nominal replacement date of FY 2023.

Centrifuge Feed Pit Sump Pump Control Panel

The following assets nearing end of assessed service life will be replaced as part of projects or assessed as part of specific studies:

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
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
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

## 3.5 Condition Assessments – FY 2020

CA-8.1.012 FY 2020 Assessments Triggered by Asset Age

This project will provide condition assessment of the EWA assets with nominal replacement date of FY 2024. This project will provide condition assessment of the following assets:

| | | |
|---|---|---|
| 12" D | Pipe-12" Tank Drain, PVC | |
| 24" SE | Pipe-24" Secondary Effluent, DI | |
| 24" SE | Pipe-24" Secondary Effluent, DI | |
| CND-500-000 | Condenser / Saturator | |
| MCC-1500-F00 | MCC-F (Headworks-Screenings Bldg.) | |
| MCC-1500-G00 | MCC-G (Headworks-Screenings Bldg.) | |
| P-3065-000 | Pump-#5 Final Effluent | |
| P-5100-000 | Dig#2 Recirculation Pump | |
| P-7410-000 | Pump-#4 TWAS | |
| PNL-CCP-6100 | PLC Panel Centrifuge #1 (East) | |
| PNL-CCP-6200 | PLC Panel Centrifuge #2 (West) | |
| PNL-CCP-CFP | PLC Controls for Centrifuge Feed Pit | |
| T-600-100 | Nitrogen Storage Tank | |
| T-6910-000 | Ferric Chloride Storage Tank | |
| T-6920-000 | CEPT Polymer Storage Tank | |
| VFD-6100-001 | VFD Main Drive Centrifuge #1 (East) | |
| VFD-6100-002 | VFD Back Drive Centrifuge #1 (East) | |
| VFD-6200-001 | VFD Main Drive Centrifuge #2 (West) | |
| VFD-6200-002 | VFD Back Drive Centrifuge #2 (West) | |
| VS-510-000 | Venturi Scrubber | |
| YS-30-1-1 | Fugitive Dust Rupture Disk Monitor | |
| | Conveyor-Screenings Bldg. | |
| | Covers - A & B Aeration Tank #1 | Project P-1.3.003 |
| | Covers - A & B Aeration Tank #2 | Project P-1.3.003 |
| | Covers - A & B Aeration Tank #3 | Project P-1.3.003 |
| | Covers - A & B Aeration Tank #4 | Project P-1.3.003 |
| | Emergency Standby Generator, Flow Eq | |
| | Emergency Standby Generator, Flow Eq / 1000 Kw | |
| | Generator Control Panel Eng # 1 | |
| | Generator Control Panel Eng # 2 | |
| | Generator Control Panel Eng # 3 | |
| | Generator Control Panel Eng # 4 | |
| | Mixer-#2 Polymer Tank | |
| | Mixer-#3 Polymer Tank | |
| | Mixer-#4 Polymer Tank | |
| | Mixer-#5 Polymer Tank | |
| | Mixer-#6 Polymer Tank | |
| | Mixer-#7 Polymer Tank | |
| | Mixer-#8 Polymer Tank | |
| | Motor-#1 Absorption Chiller | |
| | Motor-#2 Absorption Chiller | |

Polymer Feeder/Blender Pump #1
Polymer Blending Unit / Secondary
Surveillance Video Monitoring System
Tanks - Storage Sodium Hypochlorite
Vibrating Screen

## SECTION 4: STUDIES, UPDATES AND OTHER PROFESSIONAL SERVICES

### 4.1 Studies

Maintaining EWA facilities requires studies to provide planning information. A description of "Conceptual Studies" related to complex 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. Special Studies are studies addressing general EWA or plant-wide issues. "Study Updates" are described in subsection 4.1.3.

#### 4.1.1 Conceptual Studies

Conceptual Studies are designated with an "S" prefix and are numbered corresponding to their associated capital project. Refer to Section 5 for a description of the corresponding project for each conceptual study. For some projects, the scope of work has been defined by staff and is included in the project write-up. For more complex projects with multiple options, a conceptual study is planned. The conceptual study defines options to meet the project needs, includes life-cycle analysis of options, and considers non-monetary factors. A description of each conceptual study that has been identified for completion within the next fiscal year as well as other key studies is presented as follows:

S-1.3.017 AB FRP Cover Replacement with Aluminum

The existing fiberglass reinforced plastic (FRP) covers were installed around 1994. The covers were designed to provide odor containment, but are difficult to remove and pose safety concerns. The study will investigate cost effective alternative covers that meets EWA's safety requirements.

S-3.2.011 Second Waste Gas Flare and Pipeline

The study will assess the demand for a secondary waste gas flare during peak digester gas flow. The waste gas flare system is a backup to the equipment that uses digester gas as a fuel at the EWPCF, including cogen engines and the biosolids drying system. If this equipment is unavailable to use the digester gas, waste gas is conveyed to the flare system. With the addition of return feed from Anaergia's pyrolysis system and the fat, oil, and grease (FOG) receiving program, digester gas production will increase, a second waste gas flare and conveyance pipeline will be needed in the future.

S-3.2.013 Digester Mixing System Replacement

The EWPCF Digester Nos. 4, 5 and 6 are equipped for use as anaerobic digesters. Digester No. 4 was installed with the Phase III plant expansion in 1980, and Digester Nos. 5 and 6 were installed around 1989 with Phase IV. Digester No. 4 uses a gas mix system and Digester Nos. 5 and 6 use a pump mix system.

Newer technology has been developed with the potential for energy savings and more effective mixing of digesters. The digester mix systems are aging. While the mix pumps are maintained and rebuilt, wear in the casings takes place over time and may impact the efficiency. Settlement in the area has been significant around the large mix pumps and is currently being monitored. The compressor on the Digester No. 4 system has recently been replaced.

This study would identify potential new technology alternatives, including the N-Line pump system. Alternatives for rehabilitation or replacement will be identified. Installation requirements including power and structural mounting will be identified. The study should also consider potential options for alternative operation such as reduced schedule or intermittent pump mixing, if feasible. Life cycle analysis and recommendations shall be provided.

S-5.1.005 HW/GRT/PSB Odor Control Improvements

Study S-5.1.005 will evaluate and provide recommendations for modifications and upgrades to the odor control system serving the headworks. The current system, Odor Reduction Facility (ORF) I is a two-stage biological treatment system. The following specific tasks will be addressed:

1. Staff have identified that the current foul air system does not remove foul air from the upstream end of the primary sedimentation basins. Extensive corrosion in the area within the basins substantiates this observation.
2. In the *Grit and Screenings Handling Study* completed by Carollo Engineers in November 2011, need for additional evaluation of the capacity of the headworks odor control system was identified. The S-5.1.005 will evaluate the current capacity requirements as well as requirements needed to meet the modified Screenings Building recommended by the *Grit and Screenings Handling Study*.
3. Odor control requirements and effectiveness of the grit removal system and associated channels will also be assessed and evaluated.
4. The influent junction structure (IJS) rehabilitation has addressed the IJS odor control requirements.
5. Alternative technologies will be identified and three feasible alternatives evaluated using life cycle cost analysis. Each alternative identified will be capable of APCD permitting.
6. For the recommended alternative, provide conceptual design: process flow diagrams, design criteria, siting, foul air collection, utility connections, electrical and instrumentation

S-5.2.012 Site Security Facilities

This study will provide recommendations to the site security configuration and technologies to ensure the safety of the public and EWA staff by restricting access to the EWPCF to authorized personnel.

**Figure P-5.2.012**
Contractor's Entrance to Site

*Description:*
This project would implement the following facilities:

- Centralized control console for monitoring and programming card or coded entry to front gate, MCC rooms, and buildings. Once the system is in place, implementation of door hardware and remote control panels can be added to the system. This console would be configured to monitor remote facilities also.
- Implementation of integration of monitoring and control of the EWPCF vehicle access gates.
- Public Address (PA) System improvements and integration into the new system
- Surveillance video or plant perimeter intrusion system

S-5.2.031 Arc Flash Hazard Assessment

This study will perform the hazard analysis and requirements to protect employees where electric arcing might occur to conform with Occupational Safety and Health Administration (OSHA) and National Fire Protection Association (NFPA) 70E requirements. The study a minimum shall include a short circuit study, protective device time-current coordination study, and flash-hazard analysis. A detailed assessment of the potential energy at each point in the system that would be release in the event of an arcing fault within the equipment.

S-5.2.033 Plant Wide Abandoned Equipment Removal

The EWPCF has abandoned and obsolete equipment/spare parts onsite. This study will determine and document items designated for removal offsite.

S-5.3.003 Construction Office Upgrade

Study S-5.3.003 will identify and evaluate modifications required for potential uses of the original maintenance building, currently used by contractors working on site. Potential other uses for the building include use in conjunction with the Pure Green product produced at the EWPCF with a growing local market. Depending on the occupants and required amenities, a range of improvements may be recommended for this structure. Improvements range from replacement of aging components such as tile, mechanical/electrical system upgrades that may be required, and upgrades of the existing facility if the building is repurposed.

A summary of basic improvements proposed for the building are provided in the table below.

**Figure S-5.3.003**
Electrical Equipment

| Room | Floor Covering | Walls | Ceiling | Window Covering | Lighting | Other |
|---|---|---|---|---|---|---|
| Offices | Replace | Repair & Paint | Replace | Replace | Evaluate/ Replace | |
| Elect Room | Replace | Repair & Paint | Replace | | Evaluate/ Replace | Partition equipment |
| Conf Room | Replace | Repair & Paint | Replace | | Evaluate/ Replace | Repair walls |
| Kitchen | Replace | Repair & Paint | Replace | | Evaluate/ Replace | Remove cabinets |
| Locker Room | Repair | Repair & Paint | Replace | | Evaluate/ Replace | |
| Records Storage | | Repair & Paint | Replace | | Evaluate/ Replace | |
| Corridors | Replace | Repair & Paint | Replace | | Evaluate/ Replace | |
| Building | | | | | | Evaluate HVAC system – test and balance |

S-6.2.102 Technology Master Plan Updates (BT_TDG01) (every 5 yrs)

See P-6.2.102 for additional information.

### 4.1.2 Special Studies

Special studies focus on Organizational or Facility-Wide planning needs. A description of each near term Special Study identified is provided in this sub-section.

S-8.2.005 Wastewater Characterization Study

The purpose of the Wastewater Characterization Study is to provide a comparative analysis of member agency wastewater constituency and strength to support historical cost allocation methodology implemented by the EWA. The Wastewater Characterization Study will establish an effective and accurate methodology in determining future cost allocation for EWA's member agencies.

S-8.2.007 Offsite Wetlands Restoration

A flood control channel conveys stormwater through the EWPCF site and drains to a wetlands site to the west of Encinas Boulevard. This study will evaluate the condition, operations, restoration options and other options for the wetlands. Concerns such as standing water and potential for odors will be considered.

S-8.2.013 Process Master Plan

The process master plan (PMP) is anticipated to be a comprehensive, detailed evaluation of the existing liquid and solids treatment processes, and energy production system to determine the required improvements to ensure future regulatory compliance and to optimize operations and maintenance of the EWPCF. Specific issues to be addressed include screening evaluation (throughout the plant), evaluation of CEPT, primary sludge thickening and pumping, secondary treatment process optimization, sludge process improvements including secondary sludge thickening, plant water functional improvements, and air permitting related to optimizing on-site energy generation and energy independence. Development of hydraulic and process modeling will be required as part of the PMP. Specific issues to be addressed are explained below.

**Screening Evaluation**

The existing grit and screenings 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. These screens are outfitted with ¾ spacing. Debris such as plastics has been observed in the downstream secondary treatment and solids processing products. Screening equipment with smaller openings and alternate configuration would be more effective in preventing solids from moving to downstream processes.

**Figure S-8.2.013a**
Bar Screen

EWA markets a biosolids pellet "Pure Green" which can be used as a soil amendment. The presence of inorganic material in the pellet can negatively impact the perception of this high-quality product. In FY 2012, the *Grit and Screenings Handling Study* included recommendations for alternative screenings removal and handling, grit removal and handling. The study recommendation merits a supplementary study due to parameter changes used in *the Grit and Screenings Handling Study*.

This study would:

- Investigate the need for additional screenings facilities following the bar screens considering existing and future flows completed in FY 2014.
- Evaluate if the use of 3/8 inch bar screen at the headwork is adequate to resolve trash problem within the plant.
- Develop alternatives for screening sludge before and after the digesters.
- Determine whether the plant water systems and strainers should be reconfigured.
- Provide a comparison of alternatives including life cycle costs, advantages and disadvantages.

**Evaluation of CEPT**

The EWPCF implemented Chemically-Enhanced Primary Treatment (CEPT) and has operated the system for approximately 10 years. The system uses chemicals to increase the removal of solids in the primary treatment process, thus reducing the load on the aeration basins. In recent years, the cost of chemicals has increased significantly. The objective of this element of the study is to evaluate the CEPT system and compare current operation to alternate operational modes, including discontinuation of CEPT as well as continued CEPT operation in an "enhanced" optimized mode. Enhanced operational modes could include options to provide better control of chemical feed, aeration air and digester gas.

**Primary Sludge Thickening and Pumping**

The Primary Sedimentation Basins are equipped with ten progressing cavity pumps with 125 gpm capacity each. Six of these pumps were installed during Phase III and four were installed during Phase IV. With the current pump capacity and current thickening occurring in the basins, the plant at times at times experiences difficulty in thickening in primaries which results in excess water being sent to the digesters which can impact dryer operations. In order to reduce solids load on the primary

sedimentation basins, staff has implemented return flow pretreatment, such as diversion of centrate to a DAFT tank for removal of solids prior to return to the process flow. As plant flows increase in the future, constrained primary sludge pumping capacity may further impact operation.
A study as part of the PMP will be completed as the first step of project P 1.2.002 to identify alternatives for modifications to primary sludge thickening, pump capacity and pump configuration. The study will also evaluate the costs and benefits associated with alternative control schemes such as sludge density metering, incorporation of sludge blanket, and flow pacing. This evaluation findings will be closely related to the CEPT evaluation results.

**Secondary Treatment Process Evaluation**

EWPCF's liquid treatment process is a critical element of the wastewater treatment process and essential to complying with EWA's ocean discharge permit. Aging of the liquid treatment process assets is causing the system to be more expensive to operate and be less reliable. The work required to rehabilitate the existing assets is well understood, however, it may make sense to assess other proven and emerging liquid treatment process technologies as an alternative. Energy use at the secondary treatment process accounts for over 50 percent of all the electrical energy used at the EWPCF. Reducing this energy demand is a major opportunity.

This task will involve evaluation of the secondary treatment process to identify opportunities to increase efficiency and optimization. The evaluation will also consider future regulatory impacts and future reuse opportunities. Improvements should be identified to provide for the most efficient operation as wells as flexibility for future process modifications. This evaluation should include the aeration basins, secondary clarifiers as wells as the process air blowers. The followings will be addressed under this evaluation.

*Primary Effluent Equalization*
Evaluate increasing primary effluent storage and equalization capacity to improve process reliability and provide emergency storage in the event of a short term power loss. The EWA currently has the capability to perform some primary effluent equalization, but the equalization volumes and strategies, especially diurnal flow equalization (EQ), have not been extensively studied to provide optimal results. Increasing the primary effluent EQ capacity would help collect all the influent wastewater during a short term power failure. The equalized flow would be pumped to the aeration basins when the power is restored at the treatment plant. Diurnal EQ would also even-out the daily electrical demand and would lead to more stable and consistent operation, allowing EWA to better manage electrical use and energy purchases on the diurnal basis. Reducing influent load fluctuations to the activated sludge process makes controlling oxygen simpler and more reliable. With better dissolved oxygen (DO) control, less energy would be used.

*Solids Contact Stabilization*
Soluble BOD passes through the primary clarifiers and increases the aeration demand in the secondary aeration basins. Evaluate the addition of a solids contact stabilization basin to maximize BOD removal without additional aeration demand. Additional benefits of the solids contact stabilization includes possible reduction in struvite formation in the solids stream, since the soluble BOD is the fuel for biological phosphorus removal.

*Reduced Solids Retention Time (SRT)*

Evaluate and implement strategies to reduce SRT in the secondary treatment process, thus lowering aeration time and associated energy demand and cost.

*Automated Sludge Wasting*

Improve SRT control with real-time total suspended solids (TSS) monitoring of the mixed liquor and return activated sludge (RAS). Benefits include lower energy demands and enhanced biogas production. Evaluate/implement automated sludge wasting strategies, including wasting sludge sources mixed liquor suspended solids (MLSS)/RAS and the use of online TSS probes in aeration basins and RAS lines. This approach provides real time data and more accurately controls the SRT, thereby enhancing process stability, reducing power demand for aeration, and minimizing energy cost. This would also improve biogas production in digesters by minimizing aerobic digestion in the aeration basins due to excess air. Reducing the SRT and fermentation of solids in the primary sedimentation tanks could also help reduce aeration demand in the secondary treatment processes. The primary sludge could be thickened via mechanical cothickening to optimize digestion and biogas production.

*Blower Improvements Assessment*

A significant percentage of the overall energy used at the plant is devoted to blowers used for secondary aeration. Evaluate existing blowers and determine if improvements are needed. Evaluate alternatives for blower replacement to reduce energy consumption, improve turndown capability, and integrate with the automated DO control. Contact San Diego Gas and Electric (SDG&E) to discuss possible rebates for more energy efficient blowers. This approach would reduce overall energy use and optimize the amount of air directed to the secondary aeration system to match biological process needs. The location of the new blowers will also be evaluated. The existing blowers are located far from the aeration tanks. A new blower building in close proximity to the aeration tanks could minimize headloss, energy use, control lag, and losses due to heat. Install new blowers at the most favorable location.

**Sludge Process Improvements**

The followings will be addressed under this evaluation.

*Secondary Sludge Thickening*

The DAFT system is an aging facility. The DAFT 1 and 2 were installed in 1980 under Phase III. DAFT 3 was built in 1989 under Phase IV. The DAFT operates under harsh conditions. Many system components are required to operate the DAFT system, such as air compressors, compressed air storage tanks, large tanks, rotating collectors, tank covers and supports, tank level monitoring, polymer storage and feed, and odor control associated with large air volume. Conveyance of thickened sludge has been problematic. The “dump valve” which serves as a pressure relief valve on the Thickened Waste Activated Sludge discharge piping is older technology, and staff have expressed concern over the functionality of this device. Photos of current condition of the DAFT System are provided in Figure S-8.2.013.

**Figure S-8.2.013b**
Roof supports and hardware in DAFT 3 are corroded

**Figure S-8.2.013c**
Highly Corroded Skimmer Wear surface was rehabilitated by EWA Gen Services

**Figure S-8.3.013d**
Aluminum roof coating is failed in DAFT 1

**Figure S-8.2.013e**
Many mechanical and structural components require ongoing maintenance

**Figure S-8.2.013f**
Operating the DAFT system includes operation of many systems

**Figure S-8.2.013g**
The DAFT system is composed of many components EWA maintains

General Services personnel complete ongoing projects replacing corroded components and recoating surfaces. Equipment components are nearing the end of service life and the cost of maintaining the system is increasing. More modern technologies are available may be better suited for the EWPCF.

Currently the DAFT system treats waste activated sludge, with primary sludge and scum feeding directly to the digester. This study will compare alternative thickening technologies for waste activated sludge and centrate which may reduce the equipment components such as centrifuges, gravity belt thickeners, and rotary drum thickeners. Considerations shall include electrical requirements, polymer use, maintenance requirements, thickening performance, impact on digester capacity, relative life cycle cost, building requirements, and staff requirements for operation and maintenance, and odor issues at Manhole No. 4. Options for thickening system modifications or replacement shall also include the following considerations:

- Repurposing of DAFT tanks: Evaluate converting the existing DAFT tanks to digested sludge storage. This could improve operational flexibility and mitigate risk during events such as power outages.
- Mechanical co-thickening: Replace the existing DAF system with co-thickening options such as rotary drums, rotary screws, or centrifuges to increase solids concentrations and reduce energy requirements.

The study will provide design criteria, control integration concepts, constructability, sequencing, capacity, demolition of existing facilities, and other requirements. The study will present a life cycle cost comparison and non-monetary considerations, and will provide a capital cost estimate for budgeting at least three alternatives.

*Centrate Evaluation*

This task will identify options for conveyance and possibly treatment of centrate. EWA currently conveys centrate to one of the DAFTs to remove solids from centrate prior to return to the primary effluent flow stream. Solids and phosphorus content in the centrate have been problematic. The evaluation should identify the optimum locations for conveyance of the centrate return within the plant. The evaluation should also include or identify any centrate treatment technologies or approaches that should be considered.

*Evaluation of Cell Lysing*

Evaluate cell lysing systems to improve the digestibility of biosolids. Benefits include increasing biogas production and reducing biosolids disposal quantities.

*Dryer Evaluation*

This task will determine when the EWPCF needs the second dryer. The evaluation should identify the optimum location for the new dryer and well as the need and configuration for additional dewatering capacity. The evaluation should also include or identify any new technologies that should be considered. Purpose of this evaluation is to determine changing demands of dryer capacity and cost-savings potential of newly available technology.

**Plant Water Functional Improvements**

The *Plant and Potable Water Systems Study* (*Plant Water Study*) by Dudek dated July 2013 provides a plant-wide system inventory, data and evaluation of the plant and potable water facilities at the EWPCF. Deficiencies were identified and a general approach to address each deficiency was developed. The purpose of this task is to review the overall process, the list of deficiencies and potential projects

identified in the Plant Water Study as well as previously identified E-CAMP projects and additional plant staff input, and to determine alternatives to the current system configuration, and compare these alternatives with the current configuration. The following will be taken into consideration:

- 3W, 3WLC and 3WHP strainer operation and discharge of screenings
- 3WLC intertie to 3WHP system (system used to have this capability, which was eliminated during previous capital project)
- 3WHP Pump Control Improvements (P-5.2.010)
- 3WL Pump No. 3 Installation (P-5.2.007, related to potential deficiency of flow required for ORF systems under some operating conditions, subject to change if ORF system configurations are changed)
- Operating issues identified in Table ES-3, ES-4 and ES-5 of the *Plant Water Study*
- Consideration of plant process drainage and potential reuse of side streams such as heat exchanger drainage.

A 2W system improvements study was suggested as part of the *Plant Water Study* which will be done under this task. The 2W system distributes filtered secondary effluent to the drying process and other ancillary processes such as polymer system makeup water. Filtration is achieved on-site through a sand filter. The sand filter was installed in 1992 and has seen minimal maintenance since. The filter was inspected by a representative of Parkson (the manufacturer of the Dynasand filter) in October 2012 and recommended complete inspection of the filter including draining the unit and inspecting the media and the airlift pump. The representative anticipated that replacement of the media and float switch would be the only rehabilitation necessary to restore the unit performance.

**Air Quality Permitting**

The EWPCF has historically maintained status with the Air Pollution Control District (APCD) as a minor emitter by maintaining an annual carbon monoxide emissions level of less than 100 tons. This status allows permitting and requirements to be monitored primarily through the APCD of the County of San Diego. Facilities that exceed the minor emitter cap are designated as Title V major source permittees. Title V requirements are regulated through the Environmental Protection Agency (EPA) with monitoring and documentation requirements significantly more extensive than for minor emitters.

Maintaining status as a minor emitter requires EWA to significantly limit use of the co-gen facilities or to implement capital improvement projects for gas conditioning and catalyst, thus incurring both significantly more capital and O&M cost. As EWA digester gas flows increase in the future because of increased influent flows, as well as process modifications resulting in increased digester process efficiency, some action will be required.

This task will identify the requirements for Title V status and will provide a life cycle comparison of a minimum of three alternatives:

1) Current Operating Condition: Maintaining minor emitter status with limited co-gen operation
2) Biogas Treatment: Maintaining minor emitter status with implementation of gas conditioning and catalyst. Installing equipment to remove biogas impurities would allow for longer generator run times and reduced generator maintenance, while staying within air quality emissions limits.
3) Title V Permit: Changing status to Title V major emitter.

*Air Permit Streamlining*

This task will also evaluate ways to streamline the existing APCD permits that EWA has been issued. Current configuration of the APCD permits creates confusion in communications with the APCD.

S-8.2.015 Potable Reuse Study

Indirect and direct potable reuse projects (IPR and DPR) are becoming increasingly attractive to provide additional drought proof water supplies 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 upcoming 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 the imported raw water pipelines were found to feasible in the areas east of EWA. Both options would require close collaboration with a wide variety of stakeholders, including San Diego County Water Authority (SDCWA), the majority of regional water districts, the majority of 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 develop and opportunities for collaboration with regional stakeholders are better understood. Evaluate reverse osmosis brine disposal options (i.e. ocean discharge via outfall or another method). Identify IPR and DPR permitting approaches based on understanding of the regulations.

S-8.2.016 Phosphorus Removal Study

Phosphorus is a valuable resource that is present in wastewater. Some agencies harvest phosphorus, but are typically motivated by stringent regulations on phosphorus concentrations in effluent. This study will evaluate feasibility and cost effectiveness of phosphorous harvesting and recovery. Consider full conversion to biological phosphorous removal to maximize recovery. Improvements in primary clarifiers to enhance TSS capture may be necessary to allow for more efficient capture and recovery of phosphorus.

S-8.2.018 Pure Green Demonstration Garden Master Plan

EWA owns a parcel of land south of the existing plant. This land could be used for a variety of uses in the future including flow equalization, IPR/DPR facility, and farming to demonstrate resource recovery and sustainable practices. The Board has approved a master plan for Encina led development, operation, and maintenance of a 3 to 5 acre garden demonstrating the efficacy of Pure Green Organic Nitrogen Fertilizer.

### 4.1.3 Updates

Updates provide current planning information for Authority work that evolves over time.

S-8.2.003 Biosolids Management Business Plan Update

In December of 2007, the EWA received and filed the *EWA Biosolids Management Business Plan*. The EWA Biosolids Management Business Plan provides EWA with a comprehensive document for implementation of best management practices to manage, beneficially use, and dispose of Class A biosolids pellets and Class B biosolids cake. The Biosolids Management Business Plan Update should periodically be updated to verify assumptions and identify needed program redirection.

The Phase V Expansion Construction completed in 2009 provided significant improvements to the EWA cogeneration system. The Energy and Emissions Plan evaluated actions that could move EWPCF toward independence from purchased energy. This study will determine if EWA is structured under the most cost effective SDG&E tariff plan. The recommendations from this study will be evaluated and included in the future E-CAMP projects.

## 4.2 Other Professional Services

Other professional services include Engineering Services, Legal Services and other services such as materials testing, survey and geotechnical services.

### 4.2.1 Engineering Services

Engineering Services projects complete tasks to support the function of EWA, but do not include construction of facilities.

ES-8.3.001 E-CAMP Update

Each year the E-CAMP is updated. EWA managers solicit input from staff to determine needs that have surfaced since the previous update. New projects are defined and all projects are ranked and prioritized. Projects completed during the previous fiscal year are also documented. A five year plan is presented for consideration during the budget process.

ES-8.4.001 Extension of Staff

The As-Needed Services contract is an annual contract for Engineering Support for needs that develop throughout the fiscal year.

ES-8.4.002 R&D Projects Support (Ongoing)

The research and development (R&D) Projects Support study includes research and development associated with potential energy or resource recovery related facilities. Examples would be cell lysis technology, phosphorus recovery, alternative methods of gas utilization, and other emerging technologies.

ES-8.4.008 Electronic Operations Manual and Document Management – Part 4

In FY 2013, EWA initiated Phase 1 of the Electronic Operations Manual and Document Management project. The goal of the project is to consolidate previous Operations Manuals, develop additional Operations content as needed, and to format the material into an electronic format. The project also developed the framework for a system for organization and population of documents into EWAs LaserFiche electronic document storage and retrieval system. Part 4 will complete the remaining sections of the Operations Manual and will complete additional related tasks such as development of a specification to include in RFPs and bid documents such that electronic operations information is provided and formatted to be used to update the Operations Manual.

ES-8.4.010 Electronic Operations Manual and Document Management – Updates

The goal of this project is to update the Operations Manual with the upgrades made to the EWPCF and to format the material into an electronic format. The project will also upload the updated documents into EWAs LaserFiche electronic document storage and retrieval system.

ES-8.4.011 Service Area Ordinance Alignment

Budgetary placeholder for determining the service area ordinance alignment.

ES-8.4.0xx Misc. Professional Studies

Budgetary placeholder for future studies to be determined at a later date.

## SECTION 5: IDENTIFICATION OF E-CAMP PROJECTS

This section provides project background, description, justification and project delivery information for potential projects that have been identified through the E-CAMP process. The purpose of this section is to provide an organized reference for E-CAMP projects both that are recommended for funding in the next five years and for potential future projects. 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 five years.

E-CAMP projects are developed based on a needs assessment, triggered by either asset age or EWA staff observations. 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 the Agency management team 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 at a later time.

Potential projects are given a unique project number. As projects are completed, the project descriptions are removed from this Section and projects are listed by year completed in **Appendix A**. Projects may be removed from consideration for other reasons; for example the project may not meet the $50,000 E-CAMP project threshold and may be addressed by the General Services Group, the project may be combined with a different project, or the project may not meet cost/benefit requirements and therefore be eliminated from consideration. The Comprehensive Project List in **Appendix B** provides a listing of historical, current, future and eliminated projects.

### 5.1 Liquid Process Improvements

This sub-section identifies potential liquid process improvement projects.

#### 5.1.1 Headworks

P-1.1.005 Grit and Screenings Handling Facility Rehab

*Background*

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 FY 2012 the *Grit and Screenings Handling Study* was completed, including 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 recommended additional evaluation of odor control requirements.

**Figure P-1.1.005**
Bar Screen Conveyor

Table 4.3 Proposed Ventilation Rates
Grit and Screenings Handling Study
Encina Wastewater Authority

| Facility | Air Flow Rate (cfm) | | Air Change Rate (Changes/hr) | |
|---|---|---|---|---|
| | Current | Proposed | Current | Proposed |
| Primary Influent Junction Box | 1,200 | 1,200 | 30[1] | 30 |
| Screening Building | 24,200 | 11,100[2] | 33 | 15 |
| Grit and Screenings Handling Building | | | | |
| Grit Handling Room | - | 11,300 | - | 30 |
| Screenings Handling Room | - | 6,700 | - | 30 |
| Bin Room | - | 3,000 | - | 35 |
| Existing Grit Chambers | 5,000 | 5,000 | 27 | 27 |

*Description*

Bar Screens and Grit and Screening Building

- Replace existing bar screens with new climber screens with ¾-inch bar spacing in accordance to 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 shaftless screw conveyor 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 intermediate level of washing.
- Modify the sloped floor in the existing bin area to match screenings building floor to improve access.
- Replace bar screen drainage pump bubbler with ultrasonic level sensor for level monitoring.
- Replace all channel aeration piping and diffusers. Add manifold isolation valves.

Grit Removal and Pumping

- Replace peeling coating in Grit Tank Nos. 1 and 2.
- Replace pipe supports in grit tanks.
- Replace scum gates (stop plates) in the grit tank effluent channel.
- Implement improvements to the grit withdrawal facilities including water fluff piping in hopper, pump suction shortening/straightening, backflush connection, replace standard with long radius elbow, portable pump connection for dewatering grit tanks, discharge pipe resizing, flushing connections.
- Replace grit pumps with higher capacity recessed impeller types, and overhead wiring. Provide spare pump.
- Replace the MCCs serving the headworks and primary clarifier facilities.

Grit Washing and Dewatering

- Provide a system of two tri-cyclone classifiers to replace the existing grit washing and dewatering system.
- Provide a new rotary screen.
- The existing mezzanine level will be demolished 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 additional odor treatment facility would be needed.
- Connect the manhole upstream of the drainage pump station to the ORF.

*Justification*

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 and provide operational flexibility. Odors in the workplace and fugitive odors will be reduced.

*Project Delivery*

Traditional Design – Bid - Construct

Could be combined with P-1.1.006 (Grit Tank Isolation Improvements) or or P-1.2.006 (PSB Rehabilitation)

P-1.1.006 GRS Isolation Improvements with GRS 3 Inlet Gate

*Background*

The current outlet weir on the shared wall between the grit tanks and the grit tank effluent channel is a concrete barrier wall with a fixed height and 24 foot length. When plant flows are high, the water surface elevation in the effluent channel exceeds the barrier wall height and backflow into the out-of-service grit tank, which is a safety concern for workers in the grit tank. Grit Tank No. 3 lacks a motor-operated gate as outfitted in Grit Tank Nos. 1 and 2 to assist with control of influent flows. Operator personnel would have to manually place a stop plate in the grooves shown in Figure P-1.1.006b. The size of the stop plate and handling equipment in direct contact with grit influent is a safety concern. Maintenance personnel isolate the grit tanks at least one time per year for one week duration to complete planned maintenance. Personnel also isolate the tanks approximately weekly to remove rags, pieces of coating worked loose from upstream structures and to clear the hopper and grit pump suction piping.

**Figure P-1.1.006a**
Grit Tanks Effluent Channel

*Description*

- Provide isolation between each grit tank and the grit tank effluent channel.
- Replace existing Grit Tank No. 3 influent stop plate with stop plate with motor-operated gate.

*Justification*

This project is a top priority for safety reasons and would reduce the risk of inundation of staff performing maintenance in off-line grit tanks.

**Figure P-1.1.006b**
Grit Influent Tank No. 3

*Project Delivery*

Traditional Design – Bid - Construct
Could be combined with P-1.1.005 (Grit and Screenings Handling Facility Modifications) or P-1.2.006 (PSB Rehabilitation)

### 5.1.2 Primary Treatment

P-1.2.002 Primary Sludge Pumping Upgrades

*Background*

The Primary Sedimentation Basins are equipped with ten progressing cavity pumps with 125 gpm capacity each. Six of these pumps were installed during Phase III and four were installed during Phase IV. With the current pump capacity and current thickening occurring in the basins, the plant at times experiences an inability to maintain a low sludge blanket in the primary sedimentation basins, with all pumps operating continuously. In order to reduce solids load on the primary sedimentation basins, staff has implemented return flow pretreatment, such as diversion of centrate to a DAFT tank for removal of solids prior to return to the process flow. As plant influent increases in the future, this constrained primary sludge pumping capacity will further impact operation.

**Figure P-1.2.002**
Primary Sludge Pump Gallery

This project will implement improvements, as needed, to provide suitable primary sludge wasting for the EWPCF including sidestreams and ultimate plant flow rates. S-8.2.013 – Process Master Plan (PMP) will identify design flows, long-term plans for CEPT, and side streams routed to the primary treatment area. A study as part of the PMP will be completed as the first step of this project to identify alternatives for modifications to pump capacity and pump configuration. The study will also evaluate the costs and benefits associated with alternative control schemes such as sludge density metering, incorporation of sludge blanket, and flow pacing.

*Description*

- Modify or replace the ten sludge pumps to increase sludge pumping capacity and reliability.
- Modification of the progressing cavity pumps to operate at higher speed or modify the pumps with the installation of different sheaves may provide needed capacity. One pump is obsolete and requires replacement.
- Modify sludge pump control, if recommended.

*Justification*

Project will provide operator flexibility, redundancy, and improved treatment.
Project required to adequately treat future flows.
Replacement of obsolete pump will complete upgrade of primary pump facility to pump model that can be maintained and matches other pumps.

*Project Delivery*

Traditional Design – Bid - Construct

P-1.2.003 PE Second Pipeline

*Background*

One 72-inch pipeline conveys primary effluent from the primary sedimentation basins to the aeration basins. A second pipeline would provide redundancy and may be needed to convey flows under future build-out conditions.

**Figure P-1.2.003**
Primary Effluent Channel

Based on the 2012 Primary Effluent (PE) conveyance system condition assessment, concrete corrosion was found in the crown of the existing PE pipeline. Pipe lining or other repair methods may further reduce the capacity of the existing PE Pipeline. Timing of the second PE pipeline is a factor in the evaluation of alternative methods for rehab of the existing pipeline. A study is scheduled to identify, compare and make recommendations for existing pipeline rehabilitation as well as the timing of the construction of the second PE pipeline.

*Description*

Construct a second primary effluent pipeline

*Justification*

The primary effluent pipeline is a one-of-a-kind facility with a high criticality rating because it is the only pipeline that conveys primary process flows to the aeration basins. A new parallel pipeline would improve the operational reliability at the plant, increase the primary effluent conveyance capacity, and allow for the inspection, maintenance and repair of the existing pipeline.

*Project Delivery*

Traditional Design – Bid - Construct

P-1.2.004 PE Emergency Discharge Pipeline Rehab

*Background*

Prior to the Phase III Plant Expansion, the EWPCF provided primary wastewater treatment and primary effluent was conveyed to the ocean outfall. Secondary treatment was added in 1983 with the Phase III Expansion to the plant. A blend of primary and secondary effluent was discharged until the Phase IV expansion was completed in 1992. Under Phase IV, an isolation gate was installed on the 72-inch primary effluent discharge pipeline to the outfall. It is not known whether the 72-inch primary effluent discharge pipe has been plugged or remains connected to the outfall.

*Description*

- Review record drawings of 72-inch gate at primary effluent junction box, intermediate junction box, and surge tower outlet intertie.
- Determine feasibility of entering original pipeline from PSB to outfall. Pipeline may be under same pressure as outfall.
- Assess condition of gate, pipeline and connection to the outfall.
- Investigate NPDES permit requirements to maintain ability to use the emergency bypass.
- Design modifications to ensure isolation and allow emergency bypass.
- Construct improvements to the pipeline.

**Figure P-1.2.004b**
Primary Effluent – Secondary Bypass Flow Control Gate

*Justification*

Rehabilitation of the primary effluent emergency discharge gate and pipeline will provide a means of discharging primary effluent to the outfall under extreme emergency conditions such as failure of the primary effluent pipeline to the secondary process. A major earthquake or flood could cause this failure. This flexibility could prevent spills of primary effluent from the plant into the creek under extreme emergency conditions, thus reducing health risks, environmental impacts and potential for fines under such conditions.

*Project Delivery*

Traditional Design – Bid - Construct

P-1.2.006 / P-1.2.009 PSB and PE Pipeline Rehab (Phases 1 and 2)

Projects P-1.2.006 and P-1.2.009 will address near term and long term rehabilitation of the Primary Treatment Process and Primary Effluent Conveyance System. Condition assessments were completed in FY 2013 and FY 2014 to document the current condition of these facilities. In addition to the rehabilitation needs of the aging facilities, the capacity requirements for flow projections identified in the *2040 Facility Master Plan* will be taken into consideration, in particular with regards to the need to construct a second Primary Effluent Pipeline. A conceptual study (S-1.2.006/S-1.2.009) is currently evaluating the findings of the condition assessments to recommend a phased approach to realize and extend the full service life as well as modernize the primary treatment process area at the EWPCF.

*Background*
The Primary Sedimentation Basin system has been constructed in phases, as follows:
PSBs 1 and 2: 1966
PSB 3: 1969 (approx.)
PSB 4: 1971
PSBs 5 and 6: 1975 (approx. 1-6 existing on Phase III dwgs, 1980)
PSBs 7 through 10: 1980 (Phase IV expansion)
PSB 1 - 3 Sludge and Scum Collectors, Helical Scum Skimmers: 1984 replaced, 1999 replaced
PSB 4 - 6 Sludge and Scum Collectors, Helical Scum Skimmers: 1984 replaced, 1996 replaced
PSB 7 - 10 Sludge and Scum Collectors, Helical Scum Skimmers: 1992 replaced, 2000 replaced

Photos of corrosion in the primary treatment area are shown in Figure P-1.2.006.

**Figure P-1.2.006a**
PSB – Top of Wall Corrosion

**Figure P-1.2.006b**
PSB Helical Scum Skimmer

**Figure P-1.2.006c**
PSB Effluent Stop Plate

**Figure P-1.2.006d**
PSB Previous Concrete Coated Over

**Figure P-1.2.006e**
Primary Influent Gate Guide Corrosion

**Figure P-1.2.006f**
Primary Influent Channel

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. The final scope of work and budget for this project will be identified in the ongoing study S-1.2.006.

The Primary Effluent Pipeline was constructed around 1979 during the Phase III project implementing secondary treatment at the EWPCF in accordance with the Clean Water Act. The 72-inch pipeline conveys primary effluent to the aeration basin. A second primary effluent pipeline may be needed in the future to provide additional capacity, depending on flow projections and the hydraulic impacts, if any, associated with rehabilitation of the existing Primary Effluent Pipeline.

**Figure P-1.2.009**
Crown of PE Pipeline

In October 2012, EWA conducted a condition assessment of the PE conveyance system including the PE pipeline. The majority of the pipe was in good condition. However, the inspection team observed damage to the concrete due to corrosion in sixteen localized areas in the crown of the pipe. In some areas, there was also damage to the steel reinforcement. The damage was located beginning at joints and extending downstream. The damaged area concrete loss was in most cases one to two inches deep, an average of six to eight inches wide, and between six inches to two

feet long. However in two locations, the damage at the crown of the pipe extended approximately ten to twelve feet.

*Description*

- Design existing system modifications and temporary bypass system for use during pipeline rehabilitation
- Clean and inspect the existing pipeline
- Rehab the existing pipeline and provide protection against future corrosion
- Rehab concrete in 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 and coating, repair cracks, provide additional structural support as needed
- PSB 1-6 Sludge and Scum Collectors – replace equipment
- Minor repairs to Weirs, Launders, and rotating mechanisms on the helical skimmers
- Automation of scum flow control
- Evaluation and repairs, as needed, to the scum conveyance pipeline
- PSBs 1-6 PE Channel – rehabilitate concrete, provide protective coating
- PSB PE EQ Structure and Bypass Structure – rehabilitate concrete and coating. Provide structural reinforcement as needed. Relocation of a new structure may be preferred option, pending results of the study.

The rehabilitation of the PE pipeline will require bypass pumping of the PE effluent from the PSBs to the Aeration Basins. The 2012 condition assessment was completed during an eight hour low flow period at the EWPCF and required 25 mgd of bypass pumping. It is anticipated that bypass pumping will be required for an extended period of approximately two to three weeks. This duration will be verified during the study phase, and will depend on the repair methods selected.

*Project Justification*

Some PSBs have been in operation for nearly 50 years and a range of deficiencies have been noted. The current downstream facilities are designed based on effective primary treatment. Based on asset life and observed conditions, a comprehensive assessment and rehab, as needed is warranted to maintain the reliability of the existing facility. The Primary Effluent Pipeline is a critical, one-of-a-kind facility that must remain in service for EWA to meet the current NPDES permit and prevent spills.

*Project Delivery*

Traditional Design – Bid – Construct

P-1.2.010 PSB Scum Pipeline

*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 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. Refer to Conceptual Study S – 8.2.013 task which addresses the primary scum pipe.

*Description*
Pending results of further study (S-8.2.013), this project may involve excavation of the area with settling, re-compaction of material, and replacement of a section of the pipeline. Alternatives to correction of the settled area and impact on pipelines include rerouting of pipelines.

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

*Project Delivery*
Traditional Design – Bid - Construct

P-1.2.011 Primary Effluent Meter Replacement

*Background*
Primary effluent flows from the effluent channel to the secondary treatment facilities via a 72-inch diameter concrete pipe near the southwest end of Primary Clarifier Tank No. 1. Metering is performed by a propeller style flow meter that provides mismatched flows and its replacement is essential for process control and regulatory compliance. During a condition assessment it was determined that a board installed in the vicinity of the meter was impeding its functionality. As a result, the board and meters were removed. The meters were rebuilt and recalibrated prior to service reimplementation. Currently, the meters are providing accurate flow readings and will be monitored to reassess their service life and criteria for replacement.

P-1.2.012 PSB 1-10 Influent Gate

*Background*

Primary Sedimentation Basins (PSB) Tank Nos. 1 through 5 was installed with Phase III around 1980, and Tank No. 7 through 10 was installed with Phase IV around 1990. From the PSB 1-10 condition assessment conducted in January 2014, it was determined that all the sluice gates guide stems and shafts are corroded and impede the proper functionality of the gate. It was also noted that all 20 gates leak from the inlet valves downstream of the sluice gates. The sluice gate for PSB No. 3-A has failed and has been removed. The gate has been replaced with slop logs and is not in service.

*Description*

- Replace the Influent Gate Nos. 1 to 20

*Justification*

Project P-1.2.012 is needed to maintain the facility in good operating condition.

*Project Delivery*

Traditional Design – Bid – Construct.

**Figure P-1.2.012**
PSB 1-10 Influent Gates

### 5.1.3 Secondary Treatment

P-1.3.003 AB Rehab Projects

*Background*

The secondary process with Aeration Basin Nos. 1 and 2 was installed at the EWPCF as part of the 1980 Phase III Expansion. Aeration Basin Nos. 3 and 4 were added through the 1989 Phase IV expansion. In FY 2012, EWA contracted Carollo to complete design of aeration basin modifications to implement process improvements to 3-water high-pressure (3WHP) water lines, influent channels, slide gate assemblies, aeration basin covers, RAS pumping, and to construct anaerobic selector zones.

**Figure P-1.3.003**
Aeration Basins

*3WHP Water Lines*

The 3WHP water lines and pipe supports in and around Aeration Basin Nos. 3 and 4 are corroded and require replacement. The high-pressure water lines in and around Aeration Basin Nos. 1 and 2 will not be replaced, as these lines have previously been replaced with polyvinyl chloride (PVC) pipe. The 3WHP piping/valving to the utility water supply stations at all four basins is corroded and requires replacement. The remaining high-pressure service air piping feeding the utility water supply stations is not used; therefore, it will be demolished and not replaced.

*Influent Channels Modifications*

Structural rehabilitation of the channels is required due to hydrogen sulfide corrosion of the concrete and steel elements. In addition, the portion of each influent channel downstream of the main inlet gates is not needed for step feed or contact stabilization modes of operation for the foreseeable future; that portion of the channel will therefore be isolated and removed from service to reduce further corrosion.

*Slide Gate Assemblies*

The existing influent gates to each basin are corroded, difficult to operate, and need to be replaced. The step feed and contact stabilization gates are not needed for the foreseeable future, so they can be replaced with plates to cover the openings. The effluent gates are in acceptable condition, so they will not be replaced at this time.

*Aeration Basin Covers Access*

The existing fiberglass reinforced plastic (FRP) covers are difficult to remove and there are several related safety concerns associated with basin access. New safe access locations are needed.

*RAS Pumping*

RAS is pumped from the Secondary Clarifiers to the Aeration Basins through dedicated RAS pumps. If a pump requires repair, the corresponding clarifier is required to be taken out of service. This limits operational flexibility. To address this issue, a standby RAS pump is required. Although load calculations indicate that the MCCs are sufficient to power the new RAS pump, there are some physical constraints that must be addressed.

*Anaerobic Selector*

As part of the *Secondary Aeration Basin Rehabilitation Study* completed in 2011, addition of anaerobic selector zones was recommended. The purpose of the anaerobic zones is to improve sludge settleability and thereby maximize secondary treatment capacity. 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. This project will provide baffles, anaerobic mixers and other modifications needed to implement a true anaerobic selector. These zones "selectively" grow microorganisms which have better settleability. 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.

Implementation of the Anaerobic Selector work will be accomplished in three projects. P-1.3.003 will modify the access covers to provide access points to the mixers and do piping modifications; P-1.3.005 will replace the existing diffusers; and P-1.3.018 will install baffle walls, mixers, and additional diffusers to satisfy the increased oxygen demand.

*Description*

*3WHP Water Pipe*

- Replace 3WHP water lines with PVC type with stainless steel pipe supports.
- Replace water supply stations to a location near new access hatches.
- The new utility water supply stations will utilize new stainless steel pipe, valves, and appurtenances for maximum corrosion resistance.

*Influent Channels Modifications*

- Install new concrete barrier walls inside both influent and RAS channels just beyond the main inlet gate.
- Expand the walkway around the new concrete barrier wall to provide egress in case a gate is ever installed on the new barrier wall.
- At both influent channels upstream from the new barrier wall, apply repair mortar and polyurethane protective coating.
- At both influent channels beyond the new barrier wall, apply only repair mortar.
- Repair the expansion joint filler and sealant at both channels as required.
- Repair all leaks into the influent channels downstream of the new barrier wall as required.
- Provide a new sump and sump pump at the south end of each influent channel for drainage.
- Replace the existing carbon steel rebates at Influent Channel Nos. 1 and 2 with new aluminum rebates (the existing aluminum rebates at Influent Channel Nos. 3 and 4 are in good condition and will not be replaced).
- Remove the existing channel air piping and pipe supports from both channels.
- Relocate the discharge of the Carlsbad Water Reclamation Plant (CWRP) reject pipelines from the influent channels to the basins.
- Replace the existing diffuser grid air valves with above-cover air valves and meters.
- Replace the existing slide gates between Influent Channel Nos. 1 and 2 and the effluent channel with a concrete wall.

*Slide Gate Assemblies*

- The four influent gates will be replaced with stainless steel downward-opening slide gates with provisions for actuation using a portable operator.
- Intermediate step-feed gates will be demolished and covered with stainless steel plates.
- Contact stabilization gates will be closed off with stainless steel plates. Gates may be added in the future as the need arises.

*Aeration Basin Caver Access*

- Provide access point platforms with up to 12-foot wide by 15-foot long aluminum checker plate covering with removable handrail and access gates.
- Provide a 5-foot by 6-foot hatch at each access point.
- Lightweight aluminum covers will be used to cover the hatch.
- Provide seven access points per pass for each basin, 56 total.
- Provide davit posts for tie-off points. Multiple tie-off davit post mounting locations are provided. The davit posts are portable and attach to permanently installed mounting plates.
- A davit sleeve for the plant's entry/retrieval and fall arrest system will be provided.
- A ladder guide system will be provided.

*RAS Pumping*

- Provide standby RAS pump with valving configured to backup any of the existing RAS pumps.
- Provide a new suction header for the new RAS pump.
- The existing "Dynamatic" VFDs (for RAS pumps 5, 6, and 7 and WAS Pump 4), MCC-B1, and MCC-C1 will be demolished, and new starters/VFDs for loads previously fed from demolished equipment will be provided in new MCC sections.

*Anaerobic Selector- partial*

- Demolish FRP covers over the mixers that would be installed as part of P-1.3.009 and install aluminum plate, roof hatch, and handrail provide access points to mixers.
- Provide the required piping modifications.

Justification

The additional RAS pump will increase available equipment capacity. The project will reduce operation and maintenance costs associated removing the associated clarifier from service and expediting repairs. Cover replacement and reconfiguration improves worker safety around and inside the basins. The structural rehabilitation will extend the lifetime of the concrete structure and replacement of corroded influent slide gates will improve operational functionality and reliability of the gates.

*Project Delivery*

Traditional Design – Bid – Construct

P-1.3.005 AB Diffuser Membrane Replacement

*Background*

Aeration Basin Nos. 1 and 2 were constructed as part of Phase III Expansion in 1984. In 2001, EWA replaced the original 9-inch ceramic diffusers (6,516 diffusers per basin) with Envirex membrane type dome diffusers for Aeration Basin Nos. 1, 2 and 4. Aeration Basin No. 3 was converted to membrane type in 2006. Approximately 5,400 new diffusers were provided during the 2006 retrofit.

**Figure P-1.3.005**
Aeration Basin Diffusers

EWA operates the Basins in a quasi-anaerobic mode by turning off the aeration air in the first zone of the aeration basins. Project P-1.3.018 (AB Anaerobic Selector Zones) will reconfigure the basins with baffle walls and an anaerobic mixer to provide a true anaerobic selector. This will impact the number of diffusers with the removal of the first grid of diffusers and addition of diffusers to the second grid to satisfy increased oxygen demand. Project P-1.3.018 will only add additional diffusers to offset those removed from the anaerobic zones; the existing diffuser membranes will be replaced under Project P-1.3.005.

Per original manufacturer's recommendations, membrane service life is six to eight years for optimal performance, but is variable based on the depth of the basin and other site specific characteristics. It is unclear if the manufacturer's recommendations are based on the breakdown of diffuser materials over time, or the wear of the diffusers assuming they are operating full time during the service life. As membranes remain in service, the openings in the membrane diffuser heads may become worn and oxygen transfer efficiency may be reduced, thus increasing air flow requirements. Lower air flow requirements generally result in lower power consumption, based on the type of blower and the ability to adjust blower output.

Beginning in 2005, Envirex changed the membrane formulation to the "Diamond" membrane with longer life, lower headloss and higher oxygen transfer efficiency for 10 to 30 percent energy savings potential, per the manufacturer. The recommended standard replacement period of these membranes is seven to ten years. Sanitaire offers a service of factory testing for the assessment of wear. In 2014, Sanitaire assessed several diffusers removed from AB 3 with the following results:

| | DWP inches of water at | | | Hardness Durometer |
|---|---|---|---|---|
| Diffuser | 1.0 scfm | 2.0 scfm | 3.0 scfm | Shore A |
| Pass A diffuser #1 | 10.3 | 14.2 | 19.7 | 79 |
| Pass A diffuser #2 | 10.2 | 16.8 | 22.3 | 80 |
| Pass B diffuser #1 | 18.2 | 20.3 | 25.0 | 70 |
| Pass B diffuser #2 | 19.0 | 21.2 | 26.1 | 71 |

Note from manufacturer regarding testing:

- "The diffusers in pass A are older. They have a permanent crown deformation.
- The diffuser in pass A has a lot of mineral scale on surface however the distribution pattern is good and it appears there is little scaling in the perforations.

- The diffusers in Pass A are very hard. We consider replacement of the Sanitaire diffuser at about 70. Again I do not know the baseline of these diffusers but I will assume it is less than 70 as the diffuser in pass B measure at 70.
- The diffusers in pass B have a heavy organic fouling and is the probably reason for the increased DWP."

The table below presents a summary of operational time vs. optimal time recommended by the membrane manufacturer, as of year 2014.

| Aeration Basin | Replace Year | Years Installed | Percent Time Oper-ating | Yrs Oper-ating | Expect. Opt Life (1) | Comments |
|---|---|---|---|---|---|---|
| No. 1 - 6,500 diffusers | 2001 | 13 | 66% | 8.6 | 7 | Have been in service longer than optimal life recommended |
| No. 2 - 6,500 diffusers | 2001 | 13 | 66% | 8.6 | 7 | Have been in service longer than optimal life recommended |
| No. 3 - 5,400 diffusers | 2006 | 8 | 66% | 5.3 | 7 | Have been in service less than optimal life recommended |
| No. 4 - used as equaliz. | 2001 | 13 | 0 | - | 7 | Have been in service less than optimal life recommended |
| (1) The Expected Optimum Life is based on manufacturer recommendations, 6-8 yrs prior to "Diamond" type, 8-10 for Diamond type. Ave of time range used | | | | | | |

*Description*
Study S.1.3.016 is currently underway evaluating cost-benefit analysis of replacing AB diffuser membranes. Scope of this project will be revised based on the study findings and recommendations. However, for planning purposes the following scope items are considered for this project.

- Replace all fine bubble dome diffuser membranes in Aeration Basin Nos. 1 through 4. For planning purposes, 5,400 diffusers per basin are budgeted for replacement of membranes.
- Complete miscellaneous repairs to aeration piping and supports, as needed, in Aeration Basin Nos. 1 through 4.

*Justification*
Replacement of the air diffusers membranes is based on service life recommended to provide energy efficient operation. New membranes will provide increased oxygen transfer at lower blower operating costs, as long as the blower power consumption can be reduced with more efficient diffuser operation.

*Project Delivery*
Traditional Design – Bid – Construct

P-1.3.007 SCs 5 and 6 Mech Rehab

*Background*

Secondary Clarifier Nos. 5 and 6 were installed in 1992. The condition of the clarifier components was assessed during FY 2011 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. Clarifier Nos. 1 through 4 equipment replacement was completed during FY 2011 – FY 2012, and similar equipment replacement is anticipated for Secondary Clarifier Nos. 5 and 6.

**Figure P-1.3.007**
Secondary Clarifier Nos. 5 and 6
Corrosion

*Description*

Project work will include the following:

- Demolish and remove existing clarifier mechanism and appurtenances
- Install new clarifier mechanism including removal and disposal of 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
- Remove and replace the feed well
- Apply three-coat epoxy coating system to all steel portions of the clarifier
- Protect and reuse the bridge and ancillary equipment
- Clean and repair the concrete walls
- Repair, patch with steel plate, or replace portions of launder trough and support system as needed.
- Abrasive blast clean launder trough and supports in place; Abrasive blast clean steel portions of the bridge. Apply epoxy coating system to all steel on the launders, supports, and bridge.
- Replace existing rectangular FRP weirs
- Remove and replace the drain gates for all clarifiers
- Remove and replace the influent gate
- Remove and replace the density baffles

*Justification*

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 water quality.

*Project Delivery*

Traditional Design – Bid – Construct

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 as shown in Figure P-1.3.008. The basin currently does not have a RAS pump or a clarifier mechanism. The basin is currently being used for flow equalization. With completion of the new Flow Equalization Facilities this basin 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 P-1.3.008**
Secondary Clarifier No. 7 Tank

P-1.3.010 WAS Pipeline Replacement

*Background*

The exposed 8-inch 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).


**Figure P-1.3.010**
WAS Pipeline

*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 a WAS pipeline replacement of the piping across the bridge, and from the bridge south to the WAS pumps. However, the modification or replacement of the DAFT system may impact the alignment of the WAS pipeline. New sludge thickening equipment options are available that would require a smaller footprint, and the WAS pipeline alignment may change.

*Justification*

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*

Traditional Design – Bid – Construct

P-1.3.013 SC Concrete Cracking Prevention

*Background*

EWA's secondary clarifiers are routinely emptied for maintenance. Cracks in the tank floors along with groundwater infiltration have been observed. The cracks interfere with the operation of the sludge scraper, which can get stuck on the uneven surface. The tanks have groundwater pop-off valves installed in the floor of the tank to relieve groundwater pressure and prevent damage to the tanks from uplift forces. During recent rehabilitation projects, debris has fallen into the pop-off valves, preventing them from operating. A potential cause of cracking is thermal stress on the concrete. When the tanks are empty, the cold groundwater on outer (buried) face and the hot sun heating up the interior face can cause a temperature gradient in the concrete. The temperature difference can cause differential expansion within the tank resulting in cracking.

**Figure P-1.3.013**
Secondary Clarifier Cracking

EWA currently has two dewatering pump stations installed near Clarifier No. 5 and No. 6. The dewatering pump stations are used to prevent groundwater from entering the clarifiers. Discharge from dewatering pump stations is currently conveyed to the mixed liquor channel for secondary clarification.

*Description*

A condition assessment and structural evaluation of the tanks have currently being done to identify the cause of the cracks in the tank. A project conceptual study will provide the basis for an improvement project to fix the existing cracks and minimize the potential for future cracks. The existing groundwater pumping operation is also being evaluated, including 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 will be developed after the evaluation is completed.

*Justification*

Further evaluation of the secondary clarifier cracking will assist EWA in identifying the most appropriate approach for repair/rehabilitation.

*Project Delivery*

Condition assessment and evaluation of the secondary clarifiers to further define project scope for a potential repair or improvement project.

P-1.3.014 SCs 1 – 8 Influent and Effluent Gate Rehab/Replacement

*Background*

Secondary Clarifier Nos. 1, 2, 3 and 4, were built in 1984 and were rehabilitated during FY 2011 – FY 2012. The rehabilitation did not address the condition of the influent or the effluent gates. During the SE Conveyance System condition assessment, the influent and effluent gates were observed to leak and were unable to completely isolate the basins.

*Description*

Project work will include the following:

- Assess the influent gates
- Remove and replace influent and effluent gates with motor operators.

**Figure P-1.3.014**
Secondary Clarifier Effluent Gates

*Justification*

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.

Motor operators make time spent opening and closing the gates more efficient. They also provide less risk of injury as seating position is approached, than do portable, pneumatic operators. Motor operators should be considered for this project.

*Project Delivery*

Traditional Design – Bid – Construct

P-1.3.015 AB Flow Equalization Feed and Return Pipeline Rehab

*Background*
Primary Effluent is conveyed through the Primary Effluent Equalization Structure (PE EQ Structure) just upstream of the aeration basins. This structure is equipped with an aeration basin 36-inch diameter feed, 20-inch diameter return pipeline and flow control system which uses AB 4 as needed to equalize diurnal flows. The pipeline is ductile iron material. During the October 2012 Primary Effluent Conveyance System Condition Assessment, discoloration and potential defects were observed in two locations. The specific nature of the inconsistency could not be determined. Based on the deterioration of other buried ferrous piping at the EWPCF as a result of corrosive soils, rehabilitation or spot repairs of these pipelines may be required.

*Description*
Repair or rehabilitate the AB Flow Equalization Feed and Return Pipelines.

*Justification*
The PE flow equalization system improves the operation of the secondary treatment process. Peak flows are diverted during the day, and flow is returned back to the process during low flow times. This flow equalization allows a more uniform flow for treatment at the EWPCF and the Carlsbad Water Reclamation Facility, and also provides adequate plant water for use in the cogen system and other plant demands during low flow periods.

*Project Delivery*
Traditional Design – Bid – Construct. Could be combined with P-1.3.003.

P-1.3.017 AB FRP Cover Replacement with Aluminum

*Background*
The existing FRP covers were installed around 1994. The covers were designed to provide odor containment, but are difficult to remove and pose safety concerns. The basin covers will be reconfigured with aluminum plates to provide ease of safe basin access. Additional modifications will be incorporated into the project based on a condition assessment and process evaluation.

*Description*
- Remove and demolish existing FRP covers.
- Install basin aluminum covers and support beams

*Justification*
Cover replacement improves worker safety around and inside the basins.

*Project Delivery*
Traditional Design – Bid – Construct

P-1.3.018 AB Anaerobic Selector Zones

*Background*
As part of the *Secondary Aeration Basin Rehabilitation Study* completed in 2011, addition of anaerobic selector zones was recommended. 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. This project will provide baffles, anaerobic mixers and other modifications needed to implement a true anaerobic selector. Anaerobic selectors will improve sludge settleability and maximize secondary clarifier capacity. These zones "selectively" grow microorganisms which have better settleability. 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.

Implementation of the Anaerobic Selector work will be accomplished in three projects. P-1.3.003 will modify the access covers to provide access points to the mixers and do piping modifications; P-1.3.005 will replace the existing diffusers; and P-1.3.018 will install baffle walls, mixers, and additional diffusers to satisfy the increased oxygen demand.

*Description*
Project work will include the following:
- Install two anaerobic zones in each basin, requiring two baffle walls per basin.
- Install additional diffusers to satisfy the increased oxygen demand in the basin.
- Install one mixer per zone.

*Justification*
The addition of anaerobic selectors will improve sludge settleability and therefor maximize the existing secondary treatment capacity.

*Project Delivery*
Traditional Design – Bid – Construct

### 5.1.4 Effluent

P-1.4.001 EPS Rehabilitation

*Background*
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.

**Figure P-1.4.001**
Final Effluent Pumps

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. The pumps should be monitored for excessive wear, and this project re-prioritized if the pump condition deteriorates.

P-1.4.002 EPS MCC and Conductors Replacement

*Background*
The existing Motor Control Centers (MCCs) and conductors for the effluent pump station and the chlorine contact basins 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 replacement of the MCCs will provide a more reliable operation of the effluent pump station. 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. This project may be coordinated with P-5.2.021 (Installation of Climate Control on MCCs).

**Figure P-1.4.002**
Effluent Pump Station MCC Room

P-1.4.003 Secondary Effluent Gates at Chlorine Contact Chamber

*Background*

The existing secondary effluent gates at the Chlorine Contact Chamber are operated by attaching a motorized/pneumatic hand tool to an operating nut. Operation is required to change operational modes and also for periodic maintenance of the gates. Installation of permanent motor operators would facilitate this operation. Motor operators can be programmed to slow as the gate reaches the full open or full closed position. Under some conditions, improper operation with hand tools may result in damage or injury if the gate reaches full open or full closed with the hand tool running at full speed.

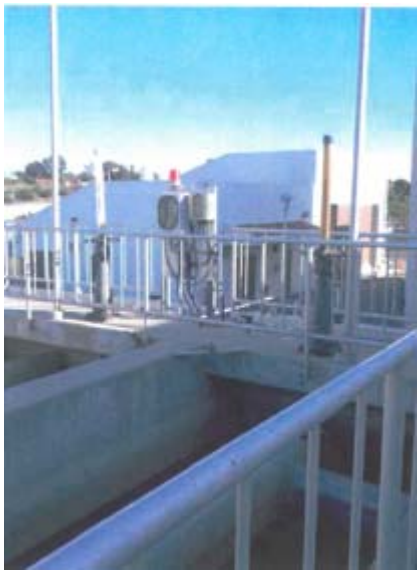


**Figure P-1.4.003**
SE Gates at Chlorine Contact Chamber

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 FY 2012 land outfall inspection, the lining in the EPS discharge piping was observed to be failing. Additionally, the abandoned Primary Effluent (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*

Rehabilitate the EPS discharge pipeline lining with a liner or other method. Recoat the abandoned PE pipeline in the surge tower. As an alternative, this pipeline may be removed and the openings blocked. This work will require outage planning.

Justification

The pipe lining provides protection to the pipe system. 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

Specify – Bid – Construct. Combine with Land Outfall internal inspection.

## 5.2 Outfall

### 5.2.1 Outfall

P-2.1.002 Ocean Outfall Maintenance and Inspection - External

*Background*

Regularly scheduled ocean outfall inspection is required to monitor the condition of the outfall. Scheduled outfall inspections are every two years for external inspection. This project implements the recommendations for minor repair from the inspection reports. Major ballast repair will be completed by Project P-2.1.004 (Ocean Outfall Ballast Restoration – External)

**Figure P-2.1.002**
View towards Ocean Outfall

*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

Implementation:

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

*Justification*

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.

*Project Delivery*

Procurement

P-2.1.004 Ocean Outfall Ballast Restoration

*Background*
Ballast surrounds the outfall to provide protection of the piping which is located on the ocean floor. Over time, ballast material can move and require replenishment and repair. Project P-2.1.002, Ocean Outfall Maintenance and Inspection – External, will document the extent of restoration required.

**Figure P-2.1.004**
View towards Ocean Outfall

*Description*
Restore ocean outfall ballast if material is lost over time.

*Justification*
This project will provide ocean outfall maintenance 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.

*Project Delivery*
Traditional Design – Bid – Construct

P-2.1.005 Ocean Outfall Bathymetric Survey – External

*Background*
This project would complete a Bathymetric Survey of the exterior of the Ocean Outfall, providing an exact location of the outfall and documentation of the pipeline and ballast material as well as 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 other analysis.

*Description*
Conduct a Bathymetric survey of the ocean outfall

*Justification*
The survey will precisely locate the ocean outfall, provide a baseline of the facility and surrounding area, and indicate overall condition. The baseline survey may be used to compare future surveys with the baseline condition, for example following a seismic event.

*Project Delivery*
RFP - Contract

P-2.1.006 Ocean Outfall – Integrity Assessment per SLC Lease

*Background*
This project would complete an integrity assessment of the lease facilities (Ocean Outfall) by a California Registered Civil/Structural Engineer, every six (6) years and when warranted by extraordinary circumstances such as an accident or a significant seismic event.


**Figure P-2.1.006**
Outfall near Shore

*Description*
Perform core sampling of the land outfall
Sample analysis for structural integrity assessment
Confined space entry is required

*Justification*
To comply with the California State Lands Commission (SLC) General Lease No. PRC 3097.9 for the EWA Ocean Outfall, an integrity assessment was the proposed alternative to the required internal inspection that is not feasible for this outfall due to diver risk and lack of capable ROV technology that can navigate the vertical transition without risk of damage to the outfall. 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.

*Project Delivery*
RFP – Contract

**This page intentionally left blank**

## 5.3 Solids Process Improvements

### 5.3.1 Biosolids Thickening

P-3.1.001 DAFTs 1-3 Scum Collector Replacement

*Background*

The DAFT scum collectors are internal components of the DAFT tanks. Currently the plant operates two of the DAFT tanks in original configuration while the third DAFT tank is being used as holding tank for centrate. In January 2011, the condition assessment of the DAFT scum collectors identified that the three scum collectors were replaced with stainless steel type in 1995 and the scum collectors were found in fair condition and fully functional. The service life was extended five years allowing time for monitoring of condition as well as evaluation of the process. The Process Master Plan S-8.2.013 scope includes evaluation of the DAFT and alternative technologies. Recommendations of the master plan will define the scope of this project.

**Figure P-3.1.001**
DAFT Collector and Launder

*Description*

- In-kind replacement of the DAFT scum collector, drive, beach and skimmer arms.

*Justification*

DAFT collector is aging and replacement should be implemented when equipment cannot be maintained cost effectively through replacement parts.

*Project Delivery*

Traditional Design – Bid – Construct; Coordinate with P-3.1.002 which may replace the DAFT system. If the system is replaced, this project will be eliminated.

P-3.1.002 Sludge Process Improvements (DAFT or Alt Technology, Efficiency)

*Background*

Three DAF units provide thickening of Waste Activated Sludge, with provision and space to add a fourth unit. The original two DAFs were installed in 1982 during the Phase III expansion and the third DAF was installed in 1984 during the Phase IV expansion. One DAF is currently used to remove solids from centrate before it is returned to the plant. Alternative mechanical thickening equipment is available and could be implemented to provide backup, replacement or additional capacity, if needed in the future.

The Process Master Plan S-8.2.013 scope includes evaluation of the DAFT and alternative technologies. Recommendations of the master plan will define the scope of this project.

*Description*

This project will implement the recommendations of Study S-8.2.013. Refer to subsection 4.1.1 of this E-CAMP for more description of the proposed study. This project will include installation of new equipment and demolition of old facilities.

*Justification*

DAFT system replacement or expansion with alternative newer technology may be justified by lower operations and maintenance costs. DAFT collector is aging and replacement should be implemented when equipment cannot be maintained cost effectively through replacement parts.

*Project Delivery*

Traditional Design – Bid – Construct

P-3.1.003 TWAS Pipeline Replacement

*Background*

The DAFT is capable of producing thicker solids than the thickened waste activated sludge (TWAS) pumping system can convey. This project would modify the discharge of the TWAS piping to reduce hydraulic losses and allow a higher flowrate of higher concentration solids to be conveyed to the digesters. The preliminary concept includes pipe replacement from the TWAS pumps at the DAFT complex to Digester Nos. 4, 5 and 6. The existing line size is 8-inch and the replacement line size needs verification but may be 10-inch. TWAS piping from the DAFTs to the pipeline adjacent to the digesters was replaced in Phase V, Biosolids Facilities (refer to sheet Y13B). The Process Master Plan S-8.2.013 scope includes evaluation of the DAFT and alternative technologies. Recommendations of the master plan will impact the scope of this project.

**Figure P-3.1.003**
TWAS Pump and Discharge Piping

*Description*

- Replace approximately 600 feet of existing piping with larger diameter of pipe, per hydraulic calculations.
- Eliminate bends, use long radius elbows, and reduce minor losses in pipe system.

*Justification*

Increased flow and increased solids concentration of thickened sludge conveyed to the digesters results in increased digester capacity, thicker digested sludge and reduced centrate volumes.

*Project Delivery*

Traditional Design – Bid – Construct; Coordinate with Project P-3.1.002

P-3.1.004 DAFT Polymer System Replacement

*Background*

The existing batch type polymer system is aging and components, such as the existing progressing cavity pump model, are outdated and difficult to maintain. Newer polymer blender technology alternatives offer advantages of ease of operation and maintenance. Newer model pumps are equipped with mechanical seals that do not require seal water. Seal water has the disadvantage of early activation of the polymer in the neat polymer piping system.

Coordinate with P-3.1.002 which may replace the DAFT system. If the system is replaced, this project will be eliminated or modified to the needs of a new thickening process.


**Figure P-3.1.004**
DAF Polymer System

### 5.3.2 Biosolids Digestion

P-3.2.004 Biosolids Screening Facility

*Background*
In 2010, a study 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 currently is 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 Nos. 2 and 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 headworks finer screens not practical. S-8.2.012 – Process Master Plan will re-evaluate the screenings handling in the *Grit and Screenings Handling Study* based on new products available in the market. Scope of this project will be re-defined after completion of S-8.2.018.

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

*Project Delivery*
Design – Build - Construct

P-3.2.006 Cell Lysis Facilities

*Background*
The incomplete breakdown of WAS in the digester limits gas production and reduces biosolids dewaterability. Cell lysis would increase gas production and improve dewaterability. Lysis technology is under development and may be ready for testing in the next few years.

P-3.2.007 Digesters Nos. 1 and 3 Retrofit for Sludge/Gas Storage

*Background*
Study S-3.2.007 is a proposed future conceptual study to evaluate the gas or liquid sludge storage capacity that may be obtained by using Digester Nos. 1 and 3. The study would identify the scope of improvements needed for these structures to be used for either purpose. A condition assessment would also be conducted.

This project would implement the recommendations of the conceptual study.

**Figure P-3.2.007**
Digester No. 1

P-3.2.009 Digester No. 4, 5, and 6 – Interior Coating, Structural Reinforcement

*Background*

Rehabilitation of the gas mixing system and cleaning of Digester No. 4 was performed in 2012. Coating of the digester cover interior and interior process piping was noted as a need during the recent cleaning. Digesters No. 5 and 6 were last cleaned in 2012. Coating of the digester cover interior and interior process piping was noted as a need during the recent cleaning. In order to support alternative mixing equipment that is under consideration, additional structural supports will be incorporated into the cover prior to coating.

*Description*:

- After draining, 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.
- Install additional supports for potential installation of alternative mixing equipment.
- Apply prime coat to all steel surfaces.
- Apply coating to digester cover interior and interior process piping.
- Repair a soft spot on the roof of Digester No. 6.

*Justification*

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.

*Project Delivery*

Design – Build – Construct

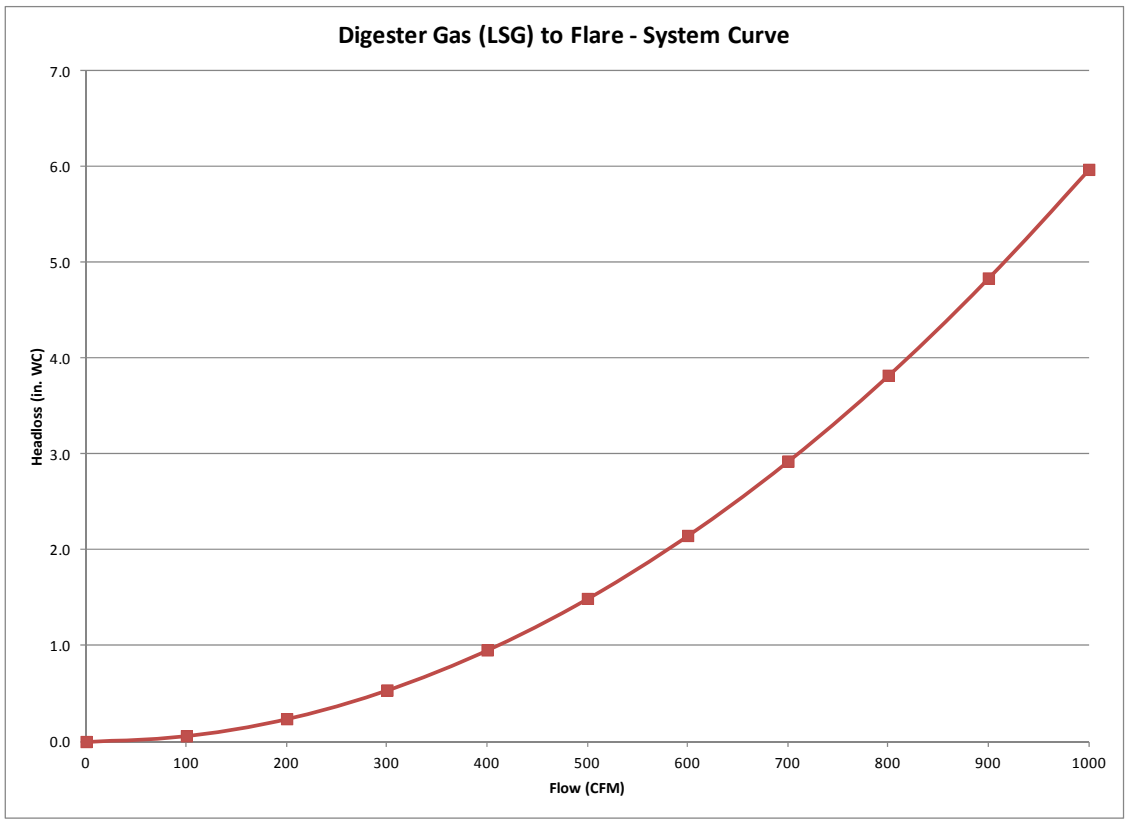
## P-3.2.011 Second Waste Gas Flare and Pipeline

*Background*

The waste gas flare system is a backup to the equipment that uses digester gas as a fuel at the EWPCF, including cogen engines and the biosolids drying system. If this equipment is unavailable to use the digester gas, waste gas is conveyed to the flare system.

EWA is in the process of implementing a biofuel receiving facility project which will increase the gas production at the EWPCF. A second waste gas flare and pipeline may be needed in the future if the current pipeline and flare capacity is not sufficient to flare the waste gas design flow as increased by future influent flow and additional gas production resulting from the biofuel and other potential projects. The waste gas design flow will be determined through testing of the biofuel receiving facility design and with consideration of plant flow projections updated by the 2040 *Master Plan*.

The following is a plot of the system curve of the waste gas pipeline. The plotted values should be field verified before they are used for design purposes.



P-3.2.013 Digester Mixing System Replacement

*Background*

The sludge mixing system for Digester Nos. 5 and 6 have been in service for nearly 25 years. There are four centrifugal pumps, each with a 50 HP motor. Digester No. 4 is mixed using a gas compressor based gas mixing system. Newer technologies such as the linear motion mixers may be cost effective replacements based on life cycle cost as compared to these large pump mix units. Additionally, the current pumps are supported at grade in the region of the plant that has experienced settlement. EWA is monitoring settlement in the region. Alternate pumps may be supported off the digester structure, thus minimizing the potential for impact on the mixing systems if the ground continues to settle.

**Figure P-3.2.013**
Digester 6 Pump

*Description*

- Evaluate options for alternative digester mix systems including life cycle analysis.
- Replace the four pump mix units (two per digester) at Digester Nos. 5 and 6, with alternative mix technology.
- Replace the gas mix system at Digester No. 4 if cost effective.

*Justification*

A more energy efficient digester mix system would reduce operating cost. A mixer mounted from the digester would be a preferred support system than the existing pumps on grade, given the ground settlement that is occurring in the digester area.

*Project Delivery*

Design – Bid – Construction
Coordinate with P-3.2.009 Digester Nos. 4, 5 and 6 Covers - Interior Coating, Structural Reinforcement (to support mixer)

### 5.3.3 Biosolids Dewatering and Drying

P-3.3.001 MCC and Conductors Replacement – DW and Power Bldg

*Background*
The existing MCCs and conductors for the dewatering and 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. This project will also include the removal of the wiring and exposed conduit of the abandoned equipment.

**Figure P-3.3.001**
Power Building MCC

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, and 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 Dryer Addition and Centrifuges Replacement

*Background*
The drying facility was implemented with provisions for a second dryer, which will be needed when plant flows increase in the future. Based on current flow projections, the second dryer will be needed in 2016. The 2040 *Master Plan* update revised flow projections and conclude that the second dryer will not be needed until after 2018. When the second dryer is installed, replacement of the centrifuges with higher capacity units will be required. Currently, three centrifuges operate to feed the dryer. When the second dryer is installed, three larger centrifuges, each capable of feeding one dryer, will be required.

P-3.3.007 Centrifuges Major Maintenance

*Background*

Planned maintenance activities of the centrifuges, will allow EWA to realize the full service life of the equipment. Manufacturer recommendations for planned maintenance include full bearing overhaul every 8,000 hours of operation and rotating assembly refurbishment as needed, generally every 16,000 hours of operation. As equipment ages, EWA may elect to maintain additional spare parts such as a feed tube ($9,000) and a gearbox ($71,000).

*Description*

Full bearing overhaul (every 8,000 hours or approximately annually, estimated $8,000 parts)
Rotating assembly refurbishment (scheduling based on annual inspection, approximately every 16,000 hours or every two years, estimated $40,000). Includes tile replacement, feed zone repair as needed, conveyor flight hard surfacing as needed, dimensions check, rebalance, gearbox tune-up.

*Justification*

Completion of planned maintenance allows EWA to realize the longer service life, more reliable operation and better return on investment in assets.

*Project Delivery*

In-House, parts purchased from manufacturer, rotating assembly refurbishment by manufacturer.

P-3.3.008 Dryer Major Maintenance

*Background*
Planned maintenance activities of the dryer are completed to maintain reliable operation and realize service life of the equipment. The manufacturer, Andritz Separation Inc., recommends the replacement of the dryer drum duct approximately every seven to ten years, and the replacement of the dryer drum support rollers approximately every ten years. Other manufacturer recommendations and repair parts include the following:

- Stators
- Elevator Gear Box
- Centrifuge Repair Parts
- Rupture Disc
- Shaker Motor
- Plow Heads
- Cake Pump Rebuild Spares
- Mist Eliminator Panels
- Bag House Filter Socks
- Slide Gate Repair Parts
- Recirculation Pump Feed Pit Spares
- Misc. IE belts, hoses, gauges
- Compressor and Air Dryer (redundancy)

*Description*
Complete maintenance activities per manufacturer recommendations

*Justification*
Completion of planned maintenance allows EWA to realize the longer service life, more reliable operation and better return on investment in assets.

*Project Delivery*
In-House procurement of services

P-3.3.009 Drying Safety Upgrades

*Background*

Safety and regulatory concerns have come under consideration as a result of further review of NFPA 654, the standard for prevention of fire and dust explosions from the manufacturing, processing and handling of combustible particulate solids. In the Drying Building, further consideration is warranted on the bag house located inside the building. Consideration would include feasibility of relocating the bag house outdoors, advantages that may be gained through relocation, consequences that may be experienced (such as delay in travel time to bag house) and other means of hazard mitigation.

**Figure P-3.3.009a**
Drying Building Bag House
(blue structure)

NFPA 654 requires that bag houses such as the one operated by EWA and located in the Drying Building, be located outside of a building. However, there are modifications that could be made to the bag house to mitigate explosion hazard, including:

- Explosion suppression systems which discharge a suppressant in milliseconds within the vessel, when triggered by a spark or pressure
- Isolation devices on all ducts at the bag house to prevent propogation of flame and pressure to upstream equipment when triggered by a spark or pressure.

In addition to evaluation of bag house location options, other potential improvements have been identified:

- Rotation of dust collector so deflagration panel does not face exit
- Installation of deflagration vent combination flame arrestor unit instead of current style
- Installation of angled deflector plates to deflect flame front (industry experts have found that this is not the most reliable option because the flame can engulf the deflector and continue to move in the same direction)

The dryer uses a recycle bin to store seed pellets during the drying process. The facility stores final product pellets in storage silos, each with a capacity of 4,500 cubic feet. Storage of pellets for more than a day has resulted in hot spots in the storage vessels. Hot spots can lead to smoldering of product and possible thermal runaway. This is problematic as the dryer system uses a two-day outage for weekly maintenance. Additionally, the silos were sized to provide up to two weeks of storage of pellets for flexibility in the disposal of the product.

Currently, EWA is operating the system to minimize the potential for development of hot spots and thermal runaway in the system. During the weekly outage, the recycle bin is emptied to the minimum level, as required to restart the dryer system. Finished pellets are loaded into trucks and hauled off site daily keeping the silo storage volume at a minimum. In at least one instance, hotspots were detected in the recycle bin.

EWA emptied the recycle bin quickly to dissipate the heat, which resulted in pellets on the floor of the drying building and flow of washdown and pellets into the drain system which returns flow to the plant. In order to restart the dryer, EWA staff manually transferred pellets to the bucket elevator for return to the bin.

In FY 2011, EWA initiated a project with the goal of equipping the system to empty the recycle bin upon system shutdown, and to refill the recycle bin with pellets from the silos prior to restarting the system. The project scope also planned to install two additional temperature ropes per silo to provide additional temperature monitoring.


**Figure P-3.3.009b**
Pellet Storage and Hauling

The conceptual design scope development is ongoing with alternatives under consideration. Inability to store pellets in the silo because of risk of thermal events prevents the transfer of pellets from the silo to the recycle bin as being a viable alternative. Additional research and other avenues of controlling the heat are under consideration. Additional goals have been identified in providing a means of recycle bin drainage during washdown.

*Description*

- Complete study/evaluation of safety concerns and compliance with NFPA 65.
- As recommended by study, relocate bag house and/or implement mitigation measures
- Rotate dust collector.
- Install deflagration vent combination flame arrestor unit.
- Reroute recycle bin nitrogen purge vent to discharge outside.
- Implement recommendations of the pellet storage system improvements to reduce incidence and risk of thermal events resulting from pellet storage
- Recommendations may include equipment to recirculate the pellets within the silo, additional temperature monitoring for early detection of heat buildup, and provisions to facilitate the washdown of the recycle bin.

*Justification*

The project is needed to comply with anticipated regulatory changes and to protect personnel and equipment from explosion potential.

*Project Delivery*

Traditional Design – Bid - Construct

P-3.3.017 Dewatering Polymer Storage Tank Replacement

*Background*

The dewatering polymer storage tank with a capacity of 7,000 gallons was installed as part of the Phase V expansion. A number of factors have resulted in constraint in receiving a full delivery of polymer. These factors include:

- High demand for polymer corresponds to limited number of days of storage provided
- Polymer supplier's location results in significant travel time and corresponding lead time in polymer ordering
- Elevation of pumps and configuration of tank bottom do not allow bottom volume of tank to be used as operational storage
- Weekend and holiday schedules may require additional lead time in ordering of polymer.
- Polymer delivery occurs within a delivery window. EWA must plan for the outside end of the delivery time, but the delivery may arrive sooner

**Figure P-3.3.017**
Dewatering Polymer Storage Tank

Based on these factors, there are occasions when there is not sufficient volume in the polymer storage tank to receive a full delivery of polymer. The delivery company charges EWA for excess polymer that must be transported back to the source or to an alternate location if available.

*Description*

Several options have been identified to provide greater flexibility for the polymer storage management. Given the significant cost of polymer, life cycle costs should be considered in the determination of system improvements recommended, if any.

Options for system improvements include:

1) Conversion of polymer type for the DAF process to the same type as the centrifuge operation, resulting in overall higher volume of type polymer currently used for the centrifuges.
2) Replacement of existing polymer tank with new, larger tank. Consideration must be given to containment area and other appurtenant equipment.
3) Addition of another polymer storage tank
4) Conversion of other existing tanks, currently not being used, for polymer storage. A polymer transfer system would likely also be required with this option.

Implement most cost effective option based on additional analysis. For budgeting purposes, it is assumed that an additional polymer storage tank will be installed.

*Justification*

Project will improve operational efficiency by allowing for larger volumes of polymer to be delivered while maintaining operation. This reduces the risk of disrupting operation by running out of polymer, and avoids wasting excess polymer.

P-3.3.018 Centrate Pipeline Replacement

Centrate and DAFT drainage are conveyed through Manhole No. 4. Valving on the system can be configured to convey flow to the primary effluent pipeline or the primary influent gallery. EWA conducted CCTV of the 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. This project will address the deficiencies of the system. Deficiencies include repairs to centrate and primary scum line between Sedimentation Tank Nos. 1 and 7 will provide more operational flexibility of centrate discharge.

P-3.3.019 Centrifuge Drive Replacement

*Background*
EWA operates three centrifuges to dewater stabilized sludge prior to drying. The centrifuge drives have required more maintenance than anticipated, and also has resulted in extended outage time. The General Services Department has identified alternate centrifuge drives to reduce outage time and provide advantageous life cycle costs.

*Description*
Replace Centrifuge Drives with new from alternative manufacturer.

*Justification*
This project will realize cost savings through reduced maintenance. The project also will result in a more reliable centrifuge operation, which is required for drying system operation.

*Project Delivery*
Traditional Design – Bid – Construct
Coordinate with the condition assessments of Centrifuge Nos. 1 and 2, Maindrive and Backdrive, condition assessment scheduled as CA-8.1.004 in FY 2015.

P-3.3.022 Secondary Controls Load Out Facilities Ground Floor

The pellet load out facility is controlled from the upper level where the conveyor is located. This configuration was designed based on the filling of trailer-trucks whereby the fill process is best observed from above. However, with the success of the Pure Green pellet market based on filling of smaller super-sacks, the ideal location of the fill controls would be from the lower level where the sacks are located. This project would provide a remote control panel at the ground floor to facilitate the filling of pellet super-sacks.

## 5.4 Energy Management

### 5.4.1 Energy Management

P-4.1.003 Cogen Engine Catalyst

*Background*
The operating hours of Internal Combustion (IC) cogeneration engines at EWA are currently limited by the amount of carbon monoxide (CO) emitted during operation. The Energy & Emissions Plan identified the installation of engine exhaust catalysts to reduce the engine carbon monoxide emissions rate and remove the operating hours constraint.

*Description*
The project includes installation of the Cogen Engine Catalyst system for four engines.

*Justification*
This project implements the engine catalyst system installation in accordance with the *Energy & Emissions Strategic Plan* recommendations. The engine catalyst systems proposed will also allow EWPCF to meet regulatory requirements for unlimited use of either biogas or natural gas for operation of the IC engines. This allows EWPCF to maximize site generated electricity which moves EWPCF further toward energy independence in accordance with a *2013 Tactical Plan* goal.

*Project Implementation*
Design-Build

P-4.1.005 Cogen Engine Top-End Overhaul

*Background*
Four engine-generator sets were installed as part of 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.

**Figure P-4.1.005**
Cogeneration Engine Nos. 1 and 2

Based on the existing air permit it is estimated that the total engine run hours for the four engines will be approximately 16,650 hours per year. To spread out the expense of the engine maintenance it is anticipated that two of the four engines will be primarily operated each year. This allows for the scheduling of engine overhauls of the four engines as shown in Table 4.1.005. Shading indicates the engine is due for overhaul in the corresponding year.

*Table 4.1.005 Engine-Generator Operating Scenarios and Overhaul Schedule*

| FY Year | Operating Hours for Previous Period / Total Operating Hours | | | |
|---|---|---|---|---|
| | Engine No. 1 | Engine No. 2 | Engine No. 3 | Engine No. 4 |
| | Run Time/Time Till Full Overhaul (Total Run time) Any Scheduled Maintenance | | | |
| 2014 Run Hour Status | 24,189 | 24,316 | 19,523 | 19,449 |
| 2015 | 325/24,514 | 325/24,641 | 8,000/27,523 In-Frame | 8,000/27,449 In-Frame |
| 2016 | 8,000/32,514 Top-End | 8,000/32,641 Top-End | 325/27,848 | 325/27,774 |
| 2017 | 325/32,839 | 325/32,966 | 8,000/35,848 Top-End | 8,000/35,774 Top-End |
| 2018 | 8,000/40,000 (40,839) Full | 8,000/40,000 (40,966) Full | 325/36,173 | 325/36,099 |
| 2019 | 325/325 (41,164) | 325/325 (41,291) | 8,000/40,000 (44,173) Full | 8,000/40,000 (44,099) Full |
| 2020 | 8,000/8,325 (49,164) Top-End | 8,000/8,325 (49,291)Top-End | 325/325 44,498 | 325/325 44,424 |
| 2021 | 325/8,650 (49,489) | 325/8,650 (49,616) | 8,000/8,325 (52,498) Top-End | 8,000/8,325 (52,424) Top-End |
| 2022 | 8,000/16,650 (57,489) Top-End | 8,000/16,650 (57,616) Top-End | 325/8,650 (52,749) | 325/8,650 (52,749) |
| 2023 | 325/16,975 (57,814) | 325/16,975 (57,941) | 8,000/16,650 (60,823) Top-End | 8,000/16,650 (60,749) Top-End |
| 2024 | 8,000/24,975 (65,814) In-Frame | 8,000/24,975 (65,941) In-Frame | 325/16,975 (61,148) | 325/16,975 (61,074) |
| 2025 | 325/25,300 (66,139) | 325/25,300 (66,266) | 8,000/24,975 (69,148) In-Frame | 8,000/24,975 (69,074) In-Frame |
| 2026 | 8,000/33,300 (74,139) Top-End | 8,000/33,300 (74,266) Top-End | 325/25,300 (69,473) | 325/25,300 (69,399) |
| Co-Gen Engine Run hour status was recorded from 2013 Flow Data | | | | |

Total Operating Hours Per Year:

| | | | |
|---|---|---|---|
| On-Peak: | | | |
| Summer | = 3 engines x 7 hours/day x 109 days = | 2,289 | Hours |
| Winter | = 3 engines x 3 hours/day x 152 days = | 1,368 | Hours |
| Semi-Peak: | | | |
| Summer | = 2 engines x 9 hours/day x 109 days = | 1,962 | Hours |
| Winter | = 2 engines x 13 hours/day x 152 days = | 3,952 | Hours |
| Off-Peak: | | | |
| Summer | = 1 engines x 8 hours/day x 109 days = | 872 | Hours |
| Winter | = 1 engines x 8 hours/day x 152 days = | 1,216 | Hours |
| Weekends | = 2 engines x 24 hours/day x 104 days = | 4,992 | Hours |
| | Total Operating Hours Per Year = | 16,651 | Hours |

*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 engine with new oil
- remanufacturing of 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, 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*

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*

Receive bids for service contract.

P-4.1.006 Cogen Engine In-Frame Overhaul

*Background*

Four engine-generator sets were installed as part of 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.

**Figure P-4.1.006**
Cogeneration Engine Nos. 1 and 2

Based on the existing air permit it is estimated that the total engine run hours for the four engines will be approximately 16,650 hours per year. To spread out the expense of the engine maintenance it is anticipated that two of the four engines will be primarily operated each year. This allows for the scheduling of engine overhauls of the four engines are shown in Table 4.1.006. Shading indicates the engine is due for overhaul in the corresponding year.

*Table 4.1.006 Engine-Generator Operating Scenarios and Overhaul Schedule*

| FY Year | Operating Hours for Previous Period / Total Operating Hours | | | |
|---|---|---|---|---|
| | Engine No. 1 | Engine No. 2 | Engine No. 3 | Engine No. 4 |
| | Run Time/Time Till Full Overhaul (Total Run time) Any Scheduled Maintenance | | | |
| 2014 Run Hour Status | 24,189 | 24,316 | 19,523 | 19,449 |
| 2015 | 325/24,514 | 325/24,641 | 8,000/27,523 In-Frame | 8,000/27,449 In-Frame |
| 2016 | 8,000/32,514 Top-End | 8,000/32,641 Top-End | 325/27,848 | 325/27,774 |
| 2017 | 325/32,839 | 325/32,966 | 8,000/35,848 Top-End | 8,000/35,774 Top-End |
| 2018 | 8,000/40,000 (40,839) Full | 8,000/40,000 (40,966) Full | 325/36,173 | 325/36,099 |
| 2019 | 325/325 (41,164) | 325/325 (41,291) | 8,000/40,000 (44,173) Full | 8,000/40,000 (44,099) Full |
| 2020 | 8,000/8,325 (49,164) Top-End | 8,000/8,325 (49,291)Top-End | 325/325 44,498 | 325/325 44,424 |
| 2021 | 325/8,650 (49,489) | 325/8,650 (49,616) | 8,000/8,325 (52,498) Top-End | 8,000/8,325 (52,424) Top-End |
| 2022 | 8,000/16,650 (57,489) Top-End | 8,000/16,650 (57,616) Top-End | 325/8,650 (52,749) | 325/8,650 (52,749) |
| 2023 | 325/16,975 (57,814) | 325/16,975 (57,941) | 8,000/16,650 (60,823) Top-End | 8,000/16,650 (60,749) Top-End |
| 2024 | 8,000/24,975 (65,814) In-Frame | 8,000/24,975 (65,941) In-Frame | 325/16,975 (61,148) | 325/16,975 (61,074) |
| 2025 | 325/25,300 (66,139) | 325/25,300 (66,266) | 8,000/24,975 (69,148) In-Frame | 8,000/24,975 (69,074) In-Frame |
| 2026 | 8,000/33,300 (74,139) Top-End | 8,000/33,300 (74,266) Top-End | 325/25,300 (69,473) | 325/25,300 (69,399) |
| Co-Gen Engine Run hour status was recorded from 2013 Flow Data | | | | |

Total Operating Hours Per Year:

| | | | |
|---|---|---|---|
| On-Peak: | | | |
| Summer | = 3 engines x 7 hours/day x 109 days = | 2,289 | Hours |
| Winter | = 3 engines x 3 hours/day x 152 days = | 1,368 | Hours |
| Semi-Peak: | | | |
| Summer | = 2 engines x 9 hours/day x 109 days = | 1,962 | Hours |
| Winter | = 2 engines x 13 hours/day x 152 days = | 3,952 | Hours |
| Off-Peak: | | | |
| Summer | = 1 engines x 8 hours/day x 109 days = | 872 | Hours |
| Winter | = 1 engines x 8 hours/day x 152 days = | 1,216 | Hours |
| Weekends | = 2 engines x 24 hours/day x 104 days = | 4,992 | Hours |
| | Total Operating Hours Per Year = | 16,651 | Hours |

*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*

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*

Receive bids for service contract.

P-4.1.007 Cogen Engine Full Overhaul

*Background*

Four engine-generator sets were installed as part of 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.

**Figure P-4.1.007**
Cogeneration Engine Nos. 1 and 2

Based on the existing air permit it is estimated that the total engine run hours for the four engines will be approximately 16,650 hours per year. To spread out the expense of the engine maintenance it is anticipated that two of the four engines will be primarily operated each year. This allows for the scheduling of engine overhauls of the four engines are shown in Table 4.1.007. Shading indicates the engine is due for overhaul in the corresponding year.

*Table 4.1.007 Engine-Generator Operating Scenarios and Overhaul Schedule*

| FY Year | Operating Hours for Previous Period / Total Operating Hours | | | |
|---|---|---|---|---|
| | Engine No. 1 | Engine No. 2 | Engine No. 3 | Engine No. 4 |
| | Run Time/Time Till Full Overhaul (Total Run time) Any Scheduled Maintenance | | | |
| 2014 Run Hour Status | 24,189 | 24,316 | 19,523 | 19,449 |
| 2015 | 325/24,514 | 325/24,641 | 8,000/27,523 In-Frame | 8,000/27,449 In-Frame |
| 2016 | 8,000/32,514 Top-End | 8,000/32,641 Top-End | 325/27,848 | 325/27,774 |
| 2017 | 325/32,839 | 325/32,966 | 8,000/35,848 Top-End | 8,000/35,774 Top-End |
| 2018 | 8,000/40,000 (40,839) Full | 8,000/40,000 (40,966) Full | 325/36,173 | 325/36,099 |
| 2019 | 325/325 (41,164) | 325/325 (41,291) | 8,000/40,000 (44,173) Full | 8,000/40,000 (44,099) Full |
| 2020 | 8,000/8,325 (49,164) Top-End | 8,000/8,325 (49,291)Top-End | 325/325 44,498 | 325/325 44,424 |
| 2021 | 325/8,650 (49,489) | 325/8,650 (49,616) | 8,000/8,325 (52,498) Top-End | 8,000/8,325 (52,424) Top-End |
| 2022 | 8,000/16,650 (57,489) Top-End | 8,000/16,650 (57,616) Top-End | 325/8,650 (52,749) | 325/8,650 (52,749) |
| 2023 | 325/16,975 (57,814) | 325/16,975 (57,941) | 8,000/16,650 (60,823) Top-End | 8,000/16,650 (60,749) Top-End |
| 2024 | 8,000/24,975 (65,814) In-Frame | 8,000/24,975 (65,941) In-Frame | 325/16,975 (61,148) | 325/16,975 (61,074) |
| 2025 | 325/25,300 (66,139) | 325/25,300 (66,266) | 8,000/24,975 (69,148) In-Frame | 8,000/24,975 (69,074) In-Frame |
| 2026 | 8,000/33,300 (74,139) Top-End | 8,000/33,300 (74,266) Top-End | 325/25,300 (69,473) | 325/25,300 (69,399) |
| Co-Gen Engine Run hour status was recorded from 2013 Flow Data | | | | |

Total Operating Hours Per Year:

| | | | |
|---|---|---|---|
| On-Peak: | | | |
| Summer | = 3 engines x 7 hours/day x 109 days = | 2,289 | Hours |
| Winter | = 3 engines x 3 hours/day x 152 days = | 1,368 | Hours |
| Semi-Peak: | | | |
| Summer | = 2 engines x 9 hours/day x 109 days = | 1,962 | Hours |
| Winter | = 2 engines x 13 hours/day x 152 days = | 3,952 | Hours |
| Off-Peak: | | | |
| Summer | = 1 engines x 8 hours/day x 109 days = | 872 | Hours |
| Winter | = 1 engines x 8 hours/day x 152 days = | 1,216 | Hours |
| Weekends | = 2 engines x 24 hours/day x 104 days = | 4,992 | Hours |
| | Total Operating Hours Per Year = | 16,651 | Hours |

*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 transporting of crankshaft to be cut and polished.

*Justification*
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*
Receive bids for service contract.

## P-4.1.008 Cogeneration Engine 5 Installation

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

**Figure P-4.1.008**
Future Co-Gen Engine 5 location

P-4.1.010 Cogeneration 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. Increase in capacity of the five engine-generators may be a cost-effective alternative to adding a sixth engine-generator, which would require a building expansion.

**Figure P-4.1.009**
Potential Location Identified for Future Co-Gen Engine

P-4.1.011 ORC Generator

*Background*
An Organic Rankine Cycle (ORC) power generating system works in a similar way to a water Rankine cycle (tradition steam power plant). The Rankine cycle is a thermodynamic cycle which converts heat into work. The heat cycle is external and the working fluid, in this case refrigerant, is a closed loop. The work is extracted and converted to electricity using a turbine generator. This project would implement an ORC system to generate electricity.

P-4.1.012 Heat Loop Bypass Installation

*Background*

**Figure P-4.1.012**
Plated Heat Exchangers (in blue)

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 would provide heat loop bypass piping to maintain the cogen facility in operation in the event of a heat exchanger outage. Bypass piping would be fabricated and stored on site, such that in the event of a heat exchanger outage, the piping could be installed to bypass the system heat exchanger. 3WCL water would absorb the heat from the cogen engines and then be discharged to drainage. This system would be temporary and repair of the system heat exchangers would be a high priority because the digester sludge heating also relies on the system heat exchangers. An extended outage would cause a digester upset and deterioration or failure of the digestion process. An alternative temporary piping configuration may be conceivable to use the cogen waste heat to directly heat the digester sludge.

*Description*

- Modify existing piping with fittings to allow disconnection of heat exchanger and disposal of 3WCL water from cogen heat exchangers to drainage
- Provide temporary piping to connect to 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*

This project would provide heat loop bypass piping to maintain the cogen facility in operation 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 would 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 reseeding 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 backup system.

*Project Delivery*

Traditional Design – Bid - Construct

P-4.1.014 VFDs on Misc Equipment

*Background*

The *Energy & Emissions Strategic Plan* includes recommendations to improve the efficiency of the existing electricity usage within the EWPCF. This project installs Variable Frequency Drive (VFD) units in select locations. VFDs can be used to reduce motor speed where process demands vary, which reduces power consumption. Areas with this opportunity include various Heating, Ventilating, Air Conditioning (HVAC) equipment, the digester mixing pumps, and the plant water pumping systems.

*Description*

- Design and install VFD controls for selected HVAC equipment.
  - Fan 1602 Exhaust Fan, 100 hp
  - Fan 6660 OCF Fan 1, 60 hp
  - Fan 4019 Blower Room Fan, 30 hp
  - Fan 8830 Foul Air Fan, 60 hp
  - Fan 6610 BFP Room AHU, 20 hp
  - Fan 4022 Engine Room Fan, 15 hp
  - Fan 4023 Solids Digestion Engine Room Fan, 15 hp
  - Fan 1601 Supply Fan, 7.5 hp
  - Fan 4081 Blower Room Fan, 10 hp
  - Fan 6691 Supply Fan, 5 hp
  - Fan 8055 Gallery Fan, 5 hp
  - Fan 4067 Air Handler, 3 hp
  - Fan 8054 Air Handler, 3 hp
- Design and install VFD controls for Digester Mixing Pumps.
  - 5530, 5531, 5630, 5631 Digester Mix Pumps, 50 hp each
- Design and install VFD controls for Plant Water Pumping Systems.
  - 3031, 3032, 3033 Plant Water (3WHP) Pumps, 50 hp each
  - 3051, 3052 Plant Water (3WL) 60 and 75 hp
  - 3021, 3022, 3023 Plant Water (3W) 25 hp each
  - 20 Plant Water (2W) 25 hp
  - 3041, 3042 Plant Water (3WCL) 15 hp each

*Justification*

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

*Project Delivery*

Traditional Design – Bid – Construct

P-4.1.015 Gas Conditioning Facilities

*Background*

The operation of Internal Combustion (IC) Cogeneration engines at EWA are currently limited by the amount of carbon monoxide (CO) emitted during operation. The *Energy & Emissions Strategic Plan* identified the installation of engine exhaust catalysts to reduce engine carbon monoxide emissions. Pretreatment of biogas is required to avoid poisoning of exhaust catalysts. In order to use biogas with a catalyst; moisture, siloxanes, $H_2S$ and other contaminants must be removed from the gas stream using a gas treatment system. $H_2S$ is removed using an iron sponge or similar equipment, moisture is removed using a refrigerated dryer, and siloxane is removed using an activated carbon filter.

*Description*

Construct an integrated gas conditioning system to remove the moisture, siloxanes, hydrogen sulfide, and other contaminants from the biogas stream

*Justification*

This project implements the recommendations of the *Energy & Emissions Strategic Plan*. Biogas treatment allows the use of catalysts on engine exhaust which reduces CO emissions. Reducing CO emissions removes the constraints on engine run time which allows increased site generated electricity at lower cost than purchased electricity. The proposed biogas treatment systems are required in order to use biogas as a fuel in the IC engines with the catalyst systems. Without the gas treatment the biogas would poison the catalyst.

*Project Delivery*

Traditional Design – Bid - Construct

**This page intentionally left blank**

## 5.5 General Improvements

### 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 ORF I requires replacement of activated carbon based on sulfur content of carbon sampled. Historically, the carbon has required replacement every two years. Since the PSBs 1-6 cover replacement, carbon sampling has resulted in higher levels of sulfur that is anticipated in resulting in semiannual carbon replacement. The ORF I unit was recently removed from service for media replacement, at which time the unit was assessed to be in good working condition.

**Figure P-5.1.001**
Existing Headworks Facility

*Description*

- Design and construct odor control improvements resulting from P-5.1.004, Odor Monitoring Facilities.
- Perform a condition assessment on the liquid scrubbers to determine their condition. The last condition assessment performed for this process is unknown.

*Justification*

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

*Project Delivery*

Traditional Design – Bid - Construct

P-5.1.004 Odor Monitoring Facilities

*Background*

This project will use technology such as ODO Watch (Cruder Technology) to develop data around odors. Portable monitors would be installed around the plant to establish an odor baseline and identify areas where odor levels are above the baseline. This survey will measure and record the odor at various times during days and nights, weekdays and weekend days, and different seasons. The survey will also address and document odor sources outside the fence line within half a mile from the EWPCF.


**Figure P-5.1.004**
EWPCF Aerial View

Based on the results of the plant-wide monitoring, project priorities would be updated for odor control projects throughout the plant (P-5.1.005 – Primary Clarifier Odor Control Improvements; P-5.1.006 - Influent Junction Structure Odor Control Improvements; P-5.1.007 – Dryer Building Odor Control Improvements)

*Description*

- Develop a plan for odor monitoring identifying methods, equipment, personnel, location and frequency requirements
- Install equipment required to complete the monitoring
- Conduct field monitoring
- Analyze data to determine baseline olfactory characteristics within the plant boundary and within one-half mile of the plant boundary
- Provide report with baseline characteristics and recommendations on locations and level of odor remediation needed

*Justification*

A byproduct of wastewater treatment is odor production. EWA is responsible for controlling odors so as not to negatively impact public health and in order to maintain a positive working environment.

*Project Delivery*

Traditional Design-Bid-Construct

P-5.1.005 HW/GRT/PSB Odor Control Eval

*Background*

ORF I provides odor control for the headworks, aerated grit tanks and the primary clarifier influent and effluent channels. The original design capacity of ORF I is 40,000 cubic feet per minute (CFM). A preliminary capacity evaluation of ORF I was performed as part of the grit and screenings handling study to determine if additional odor control capacity was needed for the grit and screenings handling expansion. With some reconfiguration of the odor control strategy, it was determined that an additional 7,900 CFM of odor control capacity would be needed. The grit and screening handling improvement project (P-1.1.005) included costs for a standalone, package odor control unit to provide the required additional odor control capacity. However, the odor control evaluation performed was preliminary and it was recommended that a more detailed odor control study be performed. In addition, there may be a need to provide odor control for the main tank headspace in the primary clarifiers (~7,800 cubic feet per tank). If the primary clarifiers were scrubbed at the same rate as the primary influent and effluent channels (10 air changes per hour), the required odor control capacity would be 13,000 CFM for all 10 primary clarifiers (1,300 CFM per clarifier).

*Description*

- Verify required foul air exhaust rates for existing and new facilities, including the main primary clarifier headspace.
- Determine capacity of existing odor reduction facility and evaluate whether the capacity of the existing odor reduction facility can be increased to match required exhaust rates.
- Evaluate alternatives for providing odor treatment capacity, including packaged biological scrubbers.
- Determine which sources of foul air should be treated by the existing odor reduction facility versus a new odor reduction facility. For example, evaluate treating foul air from the primary clarifiers with a new odor control facility to free up capacity at the existing screening building ORF I.
- Develop conceptual design of the proposed odor reduction facilities, including process flow diagrams, design criteria, siting, layout, four air collection and routing, utility connections, electrical, and instrumentation.

*Justification*

Additional evaluation is needed to identify the necessary odor control upgrades required. The effectiveness of the current odor control arrangement for the primary clarifiers also warrants further consideration.

*Project Delivery*

Traditional Design – Bid – Construct

P-5.1.007 Drying Building Odor Control Improvements

Based on the results of the plant-wide odor monitoring study, P-5.1.004, odor control improvements will be implemented in areas identified with odors significantly above the odor baseline.

### 5.5.2 Plant-Wide Systems

P-5.2.006 Plant Water Functional Improvements

*Background*

The *Plant and Potable Water Systems Study (Plant Water Study)* by Dudek dated July 2013 provides a plant-wide system inventory, data and evaluation of the plant and potable water facilities at the EWPCF. Deficiencies were identified and a general approach to address each deficiency was developed. However, the overall plant water production and distribution system including the 3W, 3WLC, 3WHP and 3WL pumps was identified to have the potential for some reconfiguration to provide a more efficient and reliable process.

**Figure S-5.2.006**
Plant Water System Overview

The plant water system supply and demand has evolved over the phased development of the EWPCF. The results of Study S-8.2.003 – Process Master Plan will be implemented through this project P-5.2.006. The following will be taken into consideration:

- 3W, 3WLC and 3WHP strainer operation and discharge of screenings
- 3WLC intertie to 3WHP system (system used to have this capability, which was eliminated during previous capital project)
- 3WL Pump No. 3 Installation related to potential deficiency of flow required for ORF systems under some operating conditions. When DAF water usage is high, there is a concern that the ORF units will not receive the flow required for treatment and to meet regulatory requirements. This improvement item is subject to change if ORF system configurations are changed.
- Operating issues identified in Table ES-3, ES-4 and ES-5 of the Plant Water Study
- Consideration of plant process drainage and potential reuse of side streams such as heat exchanger drainage.

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.

**Figure P-5.2.012**
Contractor's Entrance to Site

*Description:*
This project would implement the following facilities:

- Centralized control console for monitoring and programming card or coded entry to front gate, MCC rooms, and buildings. Once the system is in place, implementation of door hardware and remote control panels can be added to the system. This console would be configured to monitor remote facilities also.
- Implementation of integration of monitoring and control of the EWPCF vehicle access gates.
- Public Address (PA) System improvements and integration into the new system
- Surveillance video or plant perimeter intrusion system
- Specific hardware and configuration pending the results of a study phase.

Justification
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*
Traditional Design-Bid-Construct

P-5.2.014 Perimeter Fence Replacement

This project will replace the perimeter chain-link fence located on the north, east, and south side of the EWPCF. The existing fence has sections without barbed wire on top, and sections that are in poor condition.

Perimeter Chain Link Fence

P-5.2.015 Northwest Storm Water Drain Sump to South DAF Pit

A catch basin located between the south gate and the vehicular crossing of the flood control channel, captures stormwater flowing south from the Operations Building vicinity, east from the plant entrance, and west from the vehicular crossing. During dry weather and during the first hour of a rain event, flow from the catch basin is diverted to the TWAS pit where sump pumps return flows to the treatment process. After the first hour, flows may be diverted to the flood control channel.

During very heavy storms, the sump pumps in the TWAS pit may not keep up with the inflow from this catch basin, creating the potential for flooding in the TWAS pit. Additionally, the piping and fittings in this catch basin may not be of adequate size to capture and convey all the flow during the first hour of the storm to the TWAS pit.

The study phase of this project would determine appropriate storm design criteria, determine the runoff flow generated in the drainage area, and calculate the size of piping and catch basin required. The study would determine if the flow rate generated by the design storm exceeds the firm capacity of the sump pumps in the TWAS pit. Recommendations for upgrades to the system would be implemented during the construction phase of the project.

**Figure P-5.2.015**
Stormdrain near DAF Pit

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 system within the plant site, there is concern regarding the condition of the instrument air piping system. Some of the needs of the system needs may also have changed over the years as upgrades have been implemented. For example ultrasonic level sensors have 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 vs. replacement of the system.


**Figure P-5.2.017**
Service Air/Washdown Station

*Description*

A conceptual study was completed in 2014 to

- document current instrument air requirements
- determine condition of existing system
- identify replacement piping configuration, pipe materials, capacity requirements, and
- develop costs for proposed upgrades

*Project*

- Implement recommendations of the conceptual study.

*Justification*

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 increase time required by staff or prevent the ability to maintain treatment facilities.

*Project Delivery*

Traditional Design-Bid-Construct

P-5.2.019 Plant Landscaping

*Background*

Landscape irrigation systems are aging and require regular maintenance. Additionally, construction activity and site modifications have left some areas of the EWPCF landscape that requires improvement. This project would replace existing irrigation systems that are reaching the end of their service life, and would provide additional or improved landscaping at the plant, especially areas that are visible to the public.

P-5.2.021 Climate Control at MCCs

*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 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 P-5.2.021**
SEEPS MCC Facility

*Description*

Identify needs of the following MCC building and facility locations, including cooling system and heaters and provide climate control as needed.

- Cogen/Power MCC Room
- Primary/Screenings MCC Room
- Secondary Process MCC Room
- Dewatering Process MCC Room
- Secondary Effluent Pump Station (SEPS) MCC Room
- Effluent Pump Station/Chlorination MCC Room
- Drying Building process control lab

- Provide Climate Control, as needed

*Justification*

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 potential for intruders to enter and cause harm to themselves, equipment or the treatment process.

*Project Delivery*

Traditional Design – Bid – Construct.

P-5.2.026 Plant Waste Stream Rerouting

*Background*
The treatment plant at EWA generates several waste or recycle streams, which are currently routed back through the treatment process. The recycling of these waste streams is common practice at most wastewater treatment facilities; however, some of the process waste streams can cause treatment difficulties when they are recycled. In particular, the centrate and odor reduction facility drainage are high-strength waste streams. Previously EWA has tried routing centrate to the primary influent, which caused difficulties due to the additional solids loading to the primary sedimentation basins. Routing the centrate to the primary effluent channel was also investigated; however doing so caused problems with the secondary treatment process. An evaluation of treatment plant waste streams should be performed.

*Description*
The evaluation would consist of the following:
- Summarize and characterize the major plant recycle streams including flows and loads
- Evaluate current routing and routing alternatives
- Evaluate potential treatment options for recycle streams

*Justification*
The optimization of waste stream routing and treatment (if necessary) will help to minimize the current process impacts from the waste streams and may improve overall treatment process performance.

*Project Delivery*
Traditional Design – Bid – Construct

P-5.2.027 Plant-Wide Seal Coating

*Background*
A large portion of the EWA treatment plant site 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*
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*
Traditional Design – Bid – Construct

P-5.2.028 Flooding Mitigation

*Background*

In 2013, RMC performed a flooding study to identify risks associated with various flooding scenarios at the EWPCF and provided recommendations for mitigation measures. Areas identified as potential for inundation are the equipment galleries, access hatches and ventilation fans, doors with floor clearance, and flood control channels with reduced capacity due to vegetation growth as shown in P-5.2.028a and P-5.2.028b.

**Figure P-5.2.028a**
Flood Channel within the Plant

*Description*

- Removable bulk heads
- Higher concrete walls around access hatches and ventilation fans
- Remove vegetation overgrowth in the flood channel
- Watertight seals to doors
- Additional recommendations pending final study

*Justification*

The EWPCF is a vital infrastructure that treats 40.5 MGD liquid and 43.3 MGD solids from a 125 square mile service area. This project is essential to mitigating the risk of catastrophic plant failure.

**Figure P-5.2.028b**
Middle Primary Pump Gallery Entrance

*Project Delivery*

Traditional Design – Bid – Construct

P-5.2.031 Arc Flash Hazard Assessment

*Background*
This project involves conducting an arc flash hazard assessment for the existing electrical system including switchgears, distribution switchboards, MCCs, panels, transformers, VFDs and disconnects at the following locations:

- Centrifuge pit
- CPS
- EWPCF CEPT (CEPT Polymer)
- Maintenance Building/Administration Building
- MCC Dewatering
- Cogen Room
- Aqua Hedionda

Arc Flash Study will be based on the current coordination study to be provided by EWA. The project will then implement the study recommendations.

*Description*
The followings will be covered in the arc flash hazard assessment study scope:

- Open switchgear as required to confirm existing devices and conditions
- Review existing switchboard for switch and device replacement
- Update single line diagrams in CAD and input to SKM systems software for device Arc Flash availability
- Provide Arc Flash labels one per panel or switchgear section
- Provide one set of Arc Flash Labels
- Provide overall system review and recommendations for setting, testing, and replacements if required.

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.

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 will be performed to inventory all obsolete and abandoned equipment that will be removed.

### 5.5.3 Buildings

P-5.3.001 Ops Bldg Locker Replacement

*Background*
The Operations Facility locker rooms for men and women were constructed as part of "Operations and Maintenance Facilities" contract dated January 2005. The lockers installed do not accommodate the standard hanger that is used for employee uniforms. A technical memorandum dated January 4th, 2011 identified the criteria for the new lockers, the considerations for the layout modifications, and the cost options. This project will replace the lockers with new lockers sized to hold the standard hanger.

**Figure P-5.3.001**
Locker with Standard Hanger

P-5.3.002 Operations Building Air Intake Relocation

*Background*
The Operations Building air handling units draw air from the east side of the building in the vicinity of the primary treatment process. The air taken in from this area can be characterized as having unpleasant odors which are transferred to the working environment of staff and visitors inside the building. This environment has the potential to raise worker health concerns and can create a negative working environment as well as a negative impression to visitors. The moisture in the air also damages the filters.

**Figure P-5.3.002**
Ops Bldg Intake Filters Damaged by Moisture

*Description*
- Design, fabricate and install an aesthetically pleasing air intake to the two separate air handling units in the Operations Building. One intake serves the first floor and the other serves the second floor.
- Provide intake ducts that originate in the location of the existing louvers, extend up the outside of the building, and cross the roof to pick up fresh air from the west on top of the roof.
- The unit would be custom designed, single or dual heavy gauge construction, and include protection from entry of birds, insects and water
- Provide moisture removal for the intake air

*Justification*
This project would create a more positive working environment for staff and visitors, and would reduce the potential for health concerns associated with breathing foul air.

*Project Delivery*
Design – Bid - Construct

P-5.3.004 Ops Bldg Chiller Replacement

Project P-5.3.004 will supplement the Operations Building chiller with a new absorption chiller and hot water loop utilizing heat waste from the IC engines hot water recovery system. This project will require both the chiller and piping from the Cogen facility to the Operations Building.

P-5.3.010 Dryer Lab Enclosure

This satellite laboratory provides testing services to the biosolids dewatering and drying process. The laboratory is stationed in a wide open area on the second floor. An enclosure is recommended to provide proper ventilation for the exhaust from the moisture analyzers and the 105°F oven; as well as, separation from the ambient environment to obtain accurate moisture and solids content results.

**Figure P-5.3.010**
Dryer Laboratory

P-5.3.012 Chiller for Cogen Enginer Building

The Cogen Engine Building is served by a chiller which does not function properly due to few issues. 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 just to get the unit operational. One idea is to use engine generator room as energy sink to provide artificial load to the chiller. Another consideration is that the chiller is near its useful life. Although, its manufacturer indicated it can still be used, its condition needs to be re-evaluated.

A study scheduled in FY 2015 will to check condition of the chiller and do an HVAC evaluation to determine if it can be used to serve the engine room and the maintenance room with some improvements. The study will determine the required improvements to make the existing chiller operational. This project will implement the recommendations of the study.

### 5.5.4 Miscellaneous

P-5.4.004 Vallecitos Sample Vault Installation

Vallecitos Water District, one of the EWA's member agency, is located east of the EWPCF and treats wastewater to produce secondary effluent. The treated secondary effluent is conveyed to EWPCF, eventually entering the outfall pipeline. Secondary effluent from the Vallecitos wastewater treatment plant travels through a 24-inch pipe, enters the east side of the Encina property 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 then turns into a 30-inch line and travels to a surge tower. The surge tower collects the secondary effluent from Vallecitos and from the EWPCF and discharges into an 84-inch ocean outfall pipeline. The existing sampling station is located along the 84-inch ocean outfall pipeline.

Currently there is no water quality testing on the secondary effluent from Vallecitos. In order for EWA to have a better understanding of all its water quality constituents that are discharged, testing of the secondary effluent from Vallecitos will be necessary. This project will provide the second sampling station along the 24-inch Vallecitos line.

## 5.6 Technology

### 5.6.1 Operations Technology

Project and Solution Governance:

- An Authority-wide SCADA Steering Committee will govern and manage the Enterprise SCADA Project.

Project Pre-Requisites, Dependencies and Constraints:

- *Pre-Requisites:* Completion of a detailed Program Implementation Plan to manage the overall program.

#### 5.6.1.1 Special Studies

No Projects for this Section

#### 5.6.1.2 Enterprise SCADA

Project and Solution Governance:

- An Authority-wide SCADA Steering Committee will govern and manage the Enterprise SCADA Project.

Project Pre-Requisites, Dependencies and Constraints:

- *Pre-Requisites:* Completing the Optimization Feasibility study would provide additional justification for the increased level of automation.

- *Dependencies:* The SCADA Standards must be completed and the new plant Ethernet network construction before starting the Enterprise SCADA project.

P-6.1.201 SCADA Network and Computer Room Upgrades (OT_ES01)

*Background*

This project includes the design and implementation of an Ethernet network to replace the existing Rockwell ControlNet plant LAN. This network shall be designed to incorporate a redundant control room at an external facility. In addition, the existing control room shall be modified to accommodate new SCADA hardware and a new modern and ergonomic control room shall be designed and constructed. A backup control room will also be designed and build as part of this task.

*Description*

- Provide an Ethernet/TCP-IP network design to replace the outdated ControlNet LAN.
- Provide a migration plan for replacing the existing ControlNet LAN.
- Provide a strategy and design for converging other networks into the SCADA LAN.
- Provide a logical and cyber network design, configuration and testing
- Provide a Server Room design to accommodate new SCADA servers and workstations.
- Provide an Uninterruptable Power Supply design to support both existing and new network cores.
- Provide the design for a redundant Control Room.
- Provide the design for a new Control Room at EWA that is state-of-the-art and ergonomic.
- Provide a Request for Bid and Construction and Engineering Management services during the network construction.

*Justification*
The Control Room is the heart of where operational decisions are made and is vital for EWA's continued operational success. With a new network and automation, the entire wastewater system will be controlled from the Control Room. The existing Control Room should be upgraded to improve functional integration, ergonomics, and use of space.

As a result of the general lack of support for the technology, it is difficult to get support for ControlNet and the existing ControlNet is expensive to maintain and expand, creates maintenance issues for the System's Group, is outdated, and limited in performance, and has exhibited some reliability problems.

*Project Delivery*
Design - Bid – Build

P-6.1.204 Co-Gen Facility and Biosolids SCADA Integration (OT_ES04)

*Background*
These facilities are highly automated and the control system infrastructure has 70% of its lifecycle remaining. This task will not re-program the PLC/PAC processors but will re-configure the HMI to comply with the EWA's SCADA standards and integrate the process into the centralized ODMS (Task 3).

*Description*
Provide an upgraded Supervisory Level for these processes including an updated HMI and Historian. Follow the same procedure as defined in Task 4.

*Justification*
PLC and HMI implementation is not uniform across the enterprise. The SCADA standards that are developed as part of the SCADA standards project are intended to define the standards for all EWA's future SCADA projects.

*Project Delivery*
Design - Bid – Build

#### 5.6.1.3 Information Driven

The EWA relies on historical operations data captured from SCADA for reporting (regulatory and production), analysis, operations decision support, optimization, and planning. Production data is currently captured manually by transferring data from SCADA to Excel or from reads-and-rounds. In addition, to providing operations data to Operators for near real-time tactical decisions the automated capture of data from SCADA will significantly improve the quality of data transferred to Hach WIMS to support business decisions. The EWA will save significant time by automating reports by eliminating a large portion of the data transfer done during reads-and-rounds.

Project and Solution Governance:

- An Authority-wide SCADA Steering Committee will govern and manage the Data Management and Integration Project.

Project Prerequisites, Dependencies and Constraints:

- *Prerequisites:* None
- *Dependencies:* This project should be aligned with an overall EWA strategy for data integration including standards for middleware and business intelligence.

P-6.1.301 Implement ODMS Layer 1 (SCADA Historian) (OT_ID01)

*Background*

Design, configure, and test level 1 (Production Database level) of the EWA's ODMS to capture, consolidate, and manage production data from SCADA and manual data sources. Operations staff will be able access to production data through a user-friendly, Business Intelligence suite of tools that supports data mining, reporting, and analytics. This project will enable the consolidation of the existing three (3) SCADA historical databases into a single, high availability database that provides an enterprise view of production data.

*Description*

- The database design portion of this task analyzes and defines the database architecture, hardware and software requirements, and metadata ("data about data"). The following is a summary of the design report content: database architecture, data sources (manual-entry, SCADA, etc.), data flow, data capture requirements, database back-up and restore, data security, alarm-event capture and presentation, and trending requirements. For budgetary purposes, It is anticipated that the architecture will include a one DMZ Historian (to support data access by all stakeholders), two Facility Historians (in a redundant configuration), and one Web Portal. The final architecture will be determined during the design phase.
- Provide a redundant historian production database, a replicated DMZ historian, and Web Portal. Configure and test SCADA data capture, back-up and recovery, and servers as documented in the ODMS Design.
- Provide manual data entry forms to enable manually collected data to be directly entered into the database. These forms will be designed to do a first order of data validation and support mobile computing.
- Provide the configuration and test of six single-page reports. Configure the Web Portal to auto-generate, distribute and post the reports. Create ad-hoc query templates for common queries.

- Provide Historian database administrator and end-users staff training. A two day database administrator course is recommended and a one day end-user course. Three sessions of end-user training will be provided.

*Justification*

An ODMS (Operations Data Management System) captures data from real-time, operational systems, which are widely distributed; there are numerous opportunities for data quality problems including: network communication failure, servers and PLCs that are offline, instruments that are out-of-calibration or being calibrated, transposition errors from manual data entry. The EWA requires strategies for identifying suspect data and rules for correcting that data to maintain the value of its ODMS.

Responsibility for the management of the ODMS must be clearly defined to ensure the integrity and continuous operation of the system, including the addition of new users, user-rights, back-up and restore, system enhancements, etc.

*Project Delivery*

Design – Bid - Implement

P-6.1.302 SCADA Integration with WIMS and Dashboards (OT_ID03)

*Background*

Provide EWA staff access to real-time operations data from the WIMS system to support effective business decisions. The design portion of this task, defines the data required and the method of data transfer between databases. The implementation develops the data link between the ODMS and WIMS, and constructs the dashboards.

*Description*

EWA is currently in the process of implementing a Hach WIMS system. This software integrates data from disparate sources into a centralized database for streamlined reporting, trending, and dashboards. One of the key data sources is operational data from SCADA and manual entry. The Enterprise SCADA Project designs and implements an ODMS Layer 1 (Production Database). The ODMS will collect and house the operational data collected from SCADA and manually entered data. Ultimately, the goal is to transfer some of this data into the WIMS database for access by users on the Enterprise network. From the operational data, new dashboards would be created providing a graphical representation of key data. The following will be accomplished as part of this task:

- Complete a *Needs Assessment* to determine the business data required by Operations and operations data required by enterprise stakeholders. The *Needs Assessment* would define metadata including data type, source, destination, etc.
- Design and build the data link between the Level 1 ODMS and the WIMS system. The design will include the data model, data flow, security, and application requirements.
- Develop EWA Management dashboards (5) utilizing integrated data available in WIMS.
- Update ODMS standards and management practices to incorporate the SCADA integration with WIMS.
- Provide DBA and end-user training

*Justification*

The integration of SCADA, as the primary source of operations data, with the utility's WIMs provides Operations with all of the information they require to support effective decision making. The SCADA data would be in addition to data from other sources that include laboratory, financial, and maintenance data. Moreover, there are numerous stakeholders across the EWA that require access to operations data to support capacity planning, asset management, predictive maintenance, invoicing, and customer service.

- Providing operations data across the enterprise would eliminate the significant effort of capturing data during reads-and-rounds. Data that is currently being captured manually can be gathered from SCADA and used for reporting and in dashboards.
- To support effective business decisions, Staff need real-time access to data from numerous corporate data sources. Empowering EWA staff with data requires data access tools that are user-friendly, graphical, and do not require specialized programming knowledge. With dashboards EWA management can view the overall status and production of EWA Operations with ability to drill down and analyze detailed data when necessary.
- SCADA data enables management to monitor the unit cost of operation in near real-time. Cost of operation information supports budgeting decisions and operational strategies that can lower cost.

*Project Delivery*

Design – Bid - Implement

#### 5.6.1.4 Operations Improvement

Project and Solution Governance:

- An Authority-wide SCADA Steering Committee will govern and manage the Operations Enhancement and Optimization Project.

Project Pre-Requisites, Dependencies and Constraints:

- *Pre-Requisites:* None
- *Dependencies:* The *Optimization Feasibility Study* will identify (and justify) the need for addition instrumentation and control devices. Completing this task with the *Automation Study* will identify all the desired automation upgrades before the Enterprise SCADA system is designed and constructed.

P-6.1.401 Electronic Operator Logbook and Pass-Down (OT_OI03)

*Background*

Integrate an electronic logbook with SCADA to enable Operators to log events and actions associated with operating events as well as using the electronic log for pass-down instructions and supervisory direction. Operator logs would be stored in a searchable database for future recall.

*Description*

- Facilitate workshops with Operations and the Systems Group to define the requirements for the operator logbook.
- Investigate appropriate technologies that meet the defined requirements.
- Prepare a draft and final Preliminary Design report with budgets.
- Implement the electronic operator logbook.

*Justification*

During the interviews it was expressed that there is a lot of issues during a typical operator's shift that do not get transferred during turn-over. Items such as acknowledging certain alarms and taking equipment out of service are not necessarily passed down to the next shift. The electronic operator logbook will allow operations to document actions and allow for a smooth transition of information between operators.

*Project Delivery*

Bid - Implement

P-6.1.402 Optimization Implementation (OT_OI01)

*Background*
Design and implement the best valued optimization strategies identified and scoped in the previous Optimization Feasibility Study. The budget included for this design and implementation task is a placeholder since the actual cost cannot be determined until the study is completed. Best-valued technology refers to a value-based selection process that considers functionality, product maturity, support, and cost.

*Description*
The scope of this project will be determined during the Special Study - Optimization Feasibility Study,

*Justification*
Refer to the Optimization Feasibility Study above for justification.

*Project Delivery*
Pending Special Study

P-6.1.407 Automation Study Implementation

*Background*
This project will implement recommendations of the Automation Study.

### 5.6.1.5 SCADA Asset Management

Project and Solution Governance:

- An Authority-wide SCADA Steering Committee will govern and manage the SCADA Management Project.

*Pre-Requisites:* None

*Dependencies:*

- Alarm remediation is dependent on the completion of the alarming standards developed as part of the SCADA Standards.
- Software Standards should be developed in sequence with the SCADA Pilot Project.

No Projects for this Section

### 5.6.2 Business Technology

#### 5.6.2.1 Technology & Data Governance

Project and Solution Governance:
*BT_TDG01 – IT Governance; BT_TDG02 – Technology Master Plan Updates; BT_TDG03 – Data Management Standards*

- The EWA's IT Team, in conjunction with the Executive Team, will lead this project and involve specific managers and staff as these three Tasks are initiated and executed.

Project Pre-Requisites, Dependencies and Constraints:
*BT_TDG01 – IT Governance; BT_TDG02 – Technology Master Plan Updates; BT_TDG03 – Data Management Standards*

- All defined projects in the Technology Master Plan are dependent on this project for their full success. All three of the major Tasks within this Project can be initiated immediately.

P-6.2.102 Technology Master Plan Updates (BT_TDG01) (every 5 yrs)

*Background*
The IT Projects Review Process – established in the prior Task (IT Governance) – may identify needed changes to the Technology Master Plan. Reviews of progress on existing Technology Master Plan Projects may also drive needed revisions to the Technology Master Plan. This Task addresses these requirements and the need to periodically update the Technology Master Plan to better meet business/operations demands. The Plan recommends that the Technology Master Plan be updated just prior to the next major investment cycle; that is, in FY2018 (the last year of this investment planning cycle), EWA should update the Technology Master Plan to cover the timeframe from FY2019 through FY2023.

*Description*

- Complete annual management reviews of progress on the Technology Master Plan and consider any needed refinements to the Plan which may emerge from the IT Projects Review Process:
  - Changes to originally planned projects that are underway, including changes in scope (expansions or reductions), timeline, and resource assignments;
  - Deletions of originally planned projects due to changes in business needs or funding constraints;
  - Consolidations of originally planned projects into a single (or fewer) projects, due to changes in business needs and required scope of implementations; and
  - Additions of entirely new projects – not originally identified, but which are required in order to address new or changed business needs.
- Complete a major update to the Technology Master Plan in FY2018 in advance of the next investment planning cycle (FY2019 – FY2023)

*Justification*
Program Value – Supports ongoing alignment and integration of technology projects and technology project implementation activities; provides the process for consolidating management

*Project Delivery:* Bid – Develop

P-6.2.103 Data Management Standards (BT_TDG03)

*Background*

The Data Management Standards Task is focused on establishing standard data definitions throughout EWA and identifying the key staff who will need to ensure compliance with data entry and data reporting standards. The intent of a sound EWA Data Governance program is to provide the following:

- Enable better decision-making, using more accurate and reliable data.
- Reduce operational friction, by ensuring that all staff are using the right data and interpreting reports consistently.
- Protect the needs of data stakeholders, with management and compliance reports that are accurate and consistent.
- Train management and staff to adopt common approaches to data issues.
- Build standard, repeatable data quality assurance processes.
- Reduce costs and increase effectiveness through coordination of data management efforts.

*Description*

- Establish formal, documented data quality assurance practices – enabling more efficient data integration as well as more accurate and timely management trending, analysis, and reporting.
- Incorporate data governance and quality assurance best practices into the Technology Master Plan projects.

*Justification*

Organizational/Business Value – Provides support for reliable and consistent management reporting; standardized "meanings" for all data elements ensures that the same values will be reported in response to Board and upper management requests for information; reduces staff labor required to reconcile different data definitions and resulting report variances.

- Program Value – Improves the specification of interfaces among integrated solutions being implemented via the Technology Master Plan; avoids duplication of effort in regard to database designs and implementations, conflicting integration strategies, as well as ineffective outputs to managers (reports, analyses, trends, etc.).
- Project Value – Provides the underlying foundation for effective and efficient data integration and interfaces among EWA business applications; it isn't feasible to technically integrate systems and databases without first having agreed-upon data standards.

*Project Delivery*

Bid – Develop and Implement

#### 5.6.2.2 Business Management Enhancements

Project Pre-Requisites, Dependencies and Constraints:

*BT_BME01 – Financial Enhancements; BT_BME03 – HR Implementation*

• *Prerequisites:* The IT Governance Policies Task (within the Technology and Data Governance Project) will provide the project implementation standards and help establish foundation for identifying business improvement targets.

• *Dependencies:* The software applications that are to be integrated with MUNIS – such as MUNIS Payroll, Management Dashboards, CMMS and CPM – need to be fully implemented before the integration can be successfully started and completed.

*BT_BME08 – Management Reporting Enhancements*

• *Prerequisites:* The IT Governance Policies Task (within the Technology and Data Governance Project) – as well as business process improvement initiatives associated with each of the business application enhancement projects – will provide the requirements for management reporting. The benefits realization of a utility-wide Management Trending, Analysis and Reporting solution is strongly dependent upon the establishment of an integrated framework for IT Governance, Program Management, and Project Management as well as the definition and improvement of business processes, key performance indicators, workflows and business rules.

• *Dependencies:* The software applications that are to be integrated with the solution need to be implemented in advance of or in parallel with this Task. The Technology Master Plan recommends that all transaction processing applications – that is, applications that process transactions (payroll, inventory, procurement, etc.) – be implemented in advance of any efforts to implement management reporting dashboards.

P-6.2.202 Management Reporting Enhancements (BT_BME08)

*Background*
This Task puts in place the technical foundation for implementing Management Trending, Analysis and Reporting applications throughout EWA. The Task also implements management dashboards and other self-service applications to better support decision making within EWA.

This Task focuses on delivering the right information in the right format and timing to best support management decision making. Management Trending, Analysis and Reporting applications have been shown to reduce latency in decision cycles and provide broader, shared access for collaborative decision making. Timely access to information about employees, financials/costs, suppliers, assets, inventory levels and maintenance schedules, and other operational business data can result in better and faster decisions at all levels of the organization. Management Trending, Analysis and Reporting applications have become mainstream, mission-critical business tools – enabling utilities to more quickly adapt to changing business/operations requirements.

A key strategy associated with this Task will be to enable more effective utilization of Excel spreadsheets within EWA. Currently, Excel is oftentimes used as a stand-alone data source for management analysis and reporting. This is not a good use of Excel and does not provide the required data integrity and protection required for sustained management decision support. This Task will enable managers to continue to use Excel as a tool for analysis without also having to depend on Excel as a data source. This will be accomplished by linking Excel spreadsheets to databases that will feed accurate, reliable data consistently (i.e., database-enabled Excel spreadsheets). This will help to ensure that there is one version of the "truth" when managers view their spreadsheets or reports.

*Implementation*
- Implement the core Management Trending, Analysis and Reporting applications that will be used to address the following needs identified during assessment interviews:
  - Finance – financial dashboards, Database-enabled Excel worksheets, automated report delivery, and ad hoc reporting;
  - Human Resources – HR/Employee Dashboard(s);
  - Maintenance/Operations – trending, analysis and reporting of maintenance and operations data;
  - Environmental and Regulatory Compliance – environmental compliance dashboards, Management Database-enabled Excel worksheets, ad hoc reporting, automated alerts and notifications;
  - Capital Improvements Projects Team – capital projects dashboards, Database-enabled Excel worksheets, ad hoc reporting, automated alerts and notifications;
  - (NOTE: In addition to the reporting needs being addressed directly by the project, the implementation of an Operations Data Management System, or ODMS, will address the more intensive operations analytical and reporting requirements of Operations as well as Environmental and Regulatory Compliance).
- Develop a phased-roll out of Management Trending, Analysis and Reporting applications that address identified business requirements.
- Formulate and execute a project plan for the Management Trending, Analysis and Reporting includes procurement of system elements, installation of technical elements, training of EWA managers and key staff, and deployment of applications.

- Implement the Microsoft SQL Server Reporting Services (SSRS) and Analytical Services (SSAS) capabilities that EWA already owns so as to support the phased roll-out of the Management Trending, Analysis and Reporting applications.
- Standardize all analytical reporting, which will reduce application support requirements.

*Integration*

- Establish automated data uploads from MUNIS business applications to management dashboards and online reports, streamlining the entire management decision making process by delivering information updated in near-realtime.

*Justification*

Organizational/Business Value – The Management Trending, Analysis and Reporting System will immediately improve EWA's ability to share the results of information trending and analysis. It will deliver a more flexible set of software tools than are available with EWA's business applications alone. And, it will streamline many of the management reporting processes throughout EWA beyond what is available with EWA's business applications. This project implements the foundational Management Dashboards technologies for addressing the needs of all Authority managers. The project provides the capability for EWA managers to view the same source of data, thereby reducing data duplication and reconciliation.

Program Value – The Management Trending, Analysis and Reporting System will enable improvements to the other Technology Master Plan projects as well as to EWA's strategic business initiatives. The positive impact of this business intelligence capability will be significant in terms of delivering the right information to managers at key decision points in business processes for financial, HR, work/maintenance, environmental compliance, and operations management. This business intelligence capability extends the value of each of the major business and operations systems that EWA will have already invested in – including MUNIS, LIMS, WIMS, and others. The EWA's business and operations performance improvement initiatives will be strongly supported by this new business intelligence capability and allow Authority executives more flexibility in viewing trends in both the short-term and long-term planning timeframes.

*Project Delivery*

An Authority-wide steering committee will govern the Management Trending, Analysis and Reporting System. The IT Team will manage all technical aspects of the Management Dashboards System as well as the implementation, integration, and deployment of Management Dashboards applications.

### 5.6.2.3 Regulatory Compliance

Project Pre-Requisites, Dependencies and Constraints:
*BT_RC01 – LIMS Enhancements; BT_RC02 – WIMS Enhancements; BT_RC03 – Regulatory SOP*

Enhancements

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide guidelines and standards for governance and project implementation.
- *Dependencies:* The systems that LIMS needs to be integrated with – Linko Compliance Management, the Operations Data Management System (ODMS) and Management Dashboards – need to be implemented in advance of or in parallel with this project.

P-6.2.302 WIMS Enhancements (BT_RC02) (annual x5)

*Background*
This Task implements enhancements to EWA's existing Water Information Management Solution (WIMS, provided by Hach Solutions) so as to improve management access to laboratory data.

The Hach Water Information Management Solution (Hach WIMS) software combines data from laboratory and operational sources to provide managers with a more complete picture of wastewater processes – enabling better operational decisions. This water data management software takes in uploaded data from LIMS (Laboratory Information Management System) and ODMS (Operations Data Management System), streamlines reporting, provides user-defined alerts, and enables access to charting, graphing and mapping tools. WIMS is essential for managing and reporting data to the EPA, State, and other regulatory agencies. Some of the key capabilities of this solution include:

- *Central, Secure Database.* Process data is automatically (or manually) stored into a central, secure database for easy monitoring, analysis, reporting and predictive modeling. The data is readily accessible via a secured web interface, while securing audit trails and historical records are safe and continuously available for easy viewing.
- *Built-in Equations Manage Complex Calculations.* WIMS has built-in industry-specific formulas and verification protocols so as to enable complex calculations quickly and accurately. Such built-in equations help provide consistent results based on EPA requirements.
- *Troubleshooting Tools for Data Verification.* Intelligent alerts and modeling tools help resolve, predict and prevent wastewater system disruptions. WIMS data management software will flag problems, automatically verify and compare data, develop "what if" scenarios, and perform search queries.
- *Regulatory and Internal Report Templates Save Time.* Pre-programmed EPA and State report templates create business and regulatory reports instantly. The water data management software enables automatically scheduled reports on-screen, printed, or delivered via
- *Customizable Dashboards and Features.* Personalized dashboards allows managers to monitor key data and immediately shows the required information. This allows quick access to reports, graphs, and entry forms and provides shortcuts to other parts of the software.

*Description*

*Implementation*

- Re-evaluate EWA's business needs for WIMS and formulate a list of desired enhancements that are needed to fulfill those business needs; evaluate needs for additional reports and build out the data structures to generate those reports.
- If needed, conduct a WIMS software upgrade to provide the enhancements required to address the business needs for more rapid lab information management.
- Assess the needs and design the approach to improving the data uploads into WIMS from LIMS, ODMS, and any other desired data sources.
- Assess the needs for uploading data from WIMS to the Management Trending, Analysis and Reporting applications to support management dashboards.

*Integration*

- Establish enhanced interfaces for LIMS with the following:
  - Labworks Laboratory Information Management System.
  - Linko Compliance Management Software.
  - Operations Data Management System (which is one of the systems implemented via the Operations Technology Projects).
  - Management Trending, Analysis and Reporting applications – including Dashboards.

*Justification*

Organizational/Business Value – This Task builds upon the existing investment in the WIMS solution by building out the database tables and views that enable new or updated regulatory reporting. This will allow EWA to avoid future costs, as it ensures EWA will remain effective in its submittal of regulatory compliance reports.

*Project Delivery*

All three Tasks within the Regulatory Compliance Project should be guided by Environmental Services; governed jointly by Environmental Services and Operational Services; and technically supported by General Services (Information Systems).

### 5.6.2.4 Asset Management

Project Pre-Requisites, Dependencies and Constraints:

*BT_AM01 – CMMS Enhancements*

- *Pre-Requisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards. The benefits realization from implementing an Authority-wide CMMS solution is strongly dependent upon the establishment of sound project management approach and a commitment to business process change.
- *Dependencies:* The software applications that are to be integrated with the solution – including MUNIS Financials/HR, CPM, and ODMS – need to be implemented in advance of or in parallel with this project.

BT_AM02 – Maintenance SOPs

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide guidelines and standards for governance and project implementation.
- *Dependencies:* The two systems that need to be integrated – Laserfiche and Sharepoint Portal – need to be implemented before starting the integration.

BT_AM03 – GIS Implementation and Integration

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

BT_AM04 – Capital Asset Planning

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* The software applications that are to be integrated with the solution – MUNIS Finance, MUNIS CMMS and MUNIS Fixed Assets – need to be implemented in advance of this project.

BT_AM05 – Mobile Electronic Forms

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide guidelines and standards for governance and project implementation.
- *Dependencies:* Any of the EWA information systems that need to be integrated with the electronic form system need to be implemented in advance of or in parallel with this project.

P-6.2.401 CMMS Enhancements (BT_AM01)

*Background*

This Task implements an expanded CMMS capability through more enhanced software functionality as well as integration of CMMS with EWA's Financial and HR Applications, SCADA, GIS, and other systems. Further, this Task – in conjunction with the other Tasks in the Asset Management Project – establishes the foundation for improved asset management, tracking of cost of service elements, and workforce mobility.

*Implementation*

- Implement foundational technology (server hardware and software, network connectivity, cyber-security, and data storage and back-up) for the new MUNIS CMMS.

- Install the new MUNIS CMMS software on server.
- Configure the new MUNIS CMMS software per the business requirements.
- Test and confirm the MUNIS CMMS configuration fit to business requirements.
- Plan and execute a deployment plan to Authority end-users.
- Design, develop, and publish management reports – including maintenance performance metrics, trending of time spent on various activities (or at specific remote facilities), and trending of problems by asset type.

*Integration*

Establish interfaces for the new software with the following through this project:

- MUNIS CMMS-MUNIS Financials/HR interface: MUNIS Financials/HR provides purchase order status (associated with work orders in MUNIS CMMS), materials/inventory costs, and standard labor rates (to enable calculation of work order labor costs in MUNIS CMMS). Purchase requisitions initiated in MUNIS CMMS will trigger purchase orders in MUNIS Financials/HR. And, MUNIS CMMS provides inventory levels and type queries for maintenance personnel.
- MUNIS CMMS-SCADA Historian Interface: This enables the triggering of Preventive and Predictive Maintenance work orders based on the uploading of equipment runtime data from the SCADA Historian to the MUNIS CMMS (an even more functional interface is to be implemented via another project, the Operations Data Management Project).
- MUNIS CMMS-GIS Interface: This interface will enable mobile, geospatial views of work orders, work sites, crew locations, etc. It will also enable geospatial analyses of asset condition status. GIS is an enabling technology that provides spatial context for many business processes. CMMS directly supports business processes relating to tracking and managing work and maintenance activities performed on the organization's assets. Since many wastewater utility assets can be maintained in GIS, there are many benefits that can be realized by integrating these two technologies:
  - Integrated through a common mapping application interface provides personnel such as dispatchers an efficient and effective means to respond to work requests and create work orders.
  - Providing a single common spatial asset database that can be leveraged by many business systems throughout EWA.
  - Providing real-time access to geospatial information about current work activities in order to plan and allocate appropriate resources within both Maintenance and Operations.
  - Providing a more efficient means for GIS data maintenance and editing, while reducing the backlog for entering facilities information.

*Justification*

Organizational Value – This Task addresses the organizational requirements for enhanced CMMS capabilities and accessibility, mobile access to CMMS, Asset/Maintenance dashboard, and ease of use.

Solution Value – The enhancement of MUNIS CMMS maintains EWA's upgrade path for its existing MUNIS CMMS software, including access to ongoing vendor support.

*Project Delivery*

General Services (IT and Maintenance) will lead this Task; governance will include other groups as well, especially Operational Services. The IT Team will manage all aspects of the implementation, integration, and deployment of the MUNIS CMMS software.

### 5.6.2.5 Capital Program Management

No Projects for this Section

### 5.6.2.6 Document/Records Management

Project Pre-Requisites, Dependencies and Constraints:

BT_DM01 – Collaborative / Content Portal

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

*BT_DM02 – Public Website Enhancements*

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

BT_DM03 – EDMS Update and Enhancements

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

P-6.2.601 Public Website Enhancements (BT_DM02)

*Background*

The objective of this Task is to enhance the EWA public website – providing improved search capabilities; publishing more information for communities and partner agencies; providing online forms for employee applications, permitting, etc.

*Description*

*Implementation*

Evaluate the existing EWA public website, identify improvement opportunities, review and prioritize the improvements with management, and execute the enhancements.

*Integration*

Integrate with the electronic form system to enable outside parties to electronically complete forms for submission to EWA for various purposes.

*Justification*

Organizational/Business Value – Ensures the continuation of an effective public presence by EWA.

*Project Delivery*

This Task is to be led by General Services (Information Systems) and governed by representatives from all groups within the EWA.

#### 5.6.2.7 Information Technology Infrastructure

Project Pre-Requisites, Dependencies and Constraints:

*BT_ITI01 – Mobile Computing Deployments*

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

BT_ITI02 – Telecommunications Upgrades

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

*BT_ITI03 – Business Continuity Readiness*

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

*BT_ITI04 – Cyber-Security Assessments / Improvements / Updates*

- *Prerequisites:* The IT Governance Task (within the Technology and Data Governance Project) will provide the project implementation standards and help in establishing desired management improvement targets.
- *Dependencies:* None.

P-6.2.703 Business Continuity Readiness (BT_ITI03)

*Background*

This Task completes the development of a business continuity plan for EWA, including the identification of a set of actions to ensure organizational readiness for disaster recovery and returning the business to normal operations. It is expected that this Task will dovetail with an operations continuity plan for EWA (defined in the Operations Technology Projects of this Technology Master Plan).

The objectives of a good business continuity plan include:

- Guaranteeing the safety and well-being of EWA employees, customers, and business partners;
- Coordinating the activities of recovery personnel, thereby avoiding confusion and duplication of effort;
- Recovering critical business functions rapidly and with minimal operations impact;
- Limiting any disaster-related damages;
- Mitigating any financial losses or legal liabilities; and
- Minimizing the direct and indirect costs or losses associated with recovery operations.

*Description*

*Implementation*

- Develop a EWA-wide plan for business continuity and disaster recovery, including a documented set of procedures which specify actions, roles and responsibilities, lines of communication, and required technologies.
- Develop disaster scenarios for training and practicing the business continuity and disaster recovery procedures.
- Establish a schedule for testing and validating the business continuity and disaster recovery procedures.
- Complete evaluation and selection of the technical capabilities required for disaster recovery.
- Formulate action plan for implementing the technical capabilities required for disaster recovery – including back-up data center, back-up work center, and back-up telecommunications.

*Justification*

Organizational/Business Value – Delivers the action plan for getting EWA ready for disaster recovery and return to normal levels of business operations.

*Project Delivery*

IT should lead this, with governance by the entire EWA management team.

P-6.2.704 Telecommunications Upgrades (BT_ITI02)

*Background*
This Task replaces EWA's telephone equipment; the existing technology is obsolete and no longer supported.

*Description*
*Implementation*
Develop functional and technical specifications for new telecommunications equipment and software;

Evaluate alternative telecommunications solution options; select telecommunications solution that best addresses the business needs with solid long-term viability.

*Justification*
Organizational/Business Value – Sustains effective telecommunications services for EWA.

Project Delivery
IT Group leads; governance by General Services.

## SECTION 6: PROJECT PRIORITY RANKING

Proposed E-CAMP projects are first screened based on Safety, Assessed Condition or Regulatory Compliance. Projects required to maintain a safe working environment, to prevent eminent equipment failure in the next two years, and to maintain regulatory compliance are designated "Top Priority" (TP). Certain major assets, such as engine generators, undergo regularly scheduled contracted major maintenance to preserve asset functionality. These projects are designated "Preventative Maintenance" (PM). TP and PM projects are recommended for near-term funding. Remaining projects are prioritized as described in this section.

The project prioritization process utilizes the established evaluation categories and assigns a weighted value between 1 and 6 with 1 being the lowest importance and 6 being the highest importance. Each project is rated utilizing the seven evaluation categories with priority value assignment ranging from 0 to 3 with 1 representing low relevance, 2 representing medium relevance and 3 representing high relevance. If a specific evaluation category bears no relevance to the project, the project is assigned a rating of 0.

The resulting priority score for each project is determined as the product of the category weight value and the priority value assigned. The composite score for each project is the sum of its priority scores in each evaluation category. Recommendation of project implementation is based on each project's composite score. The priority project rating can vary from year to year based on specific circumstances at the EWPCF in that particular year.

Figure 6-1 presents the Priority Ranking System used, and Table 6-1 provides the scoring of the FY 2016 potential projects.

**Figure 6-1: Priority Project Ranking System**

| EVALUATION CATEGORY | CATEGORY WEIGHT (1 = Lowest Priority) |
|---|---|
| Safety | Top Priority |
| Assessed Asset Service Life reached within 2 years | Top Priority |
| Regulatory Compliance | Top Priority |
| Consequence of Failure | 6 |
| Odor Control | 5 |
| Energy Efficiency | 4 |
| Cost Efficiency | 3 |
| Assessed Asset Service Life | 2 |
| Organizational Efficiency | 1 |

**This page intentionally left blank**

ENCINA WASTEWATER AUTHORITY

Table 6-1, FY 2016 ACTIVE PROJECTS SORTED BY PRIORITY

| Ref | Project No. | Capital Project | FY Planned Constr Start | Prel. Total Score | Sfty TP Yes/ No | AUL TP Yes/ No | Reg TP Yes/ No | 6 cnsq fail | 5 Odor Cntrl | 4 Engy Eff | 3 Cost Eff | 2 A Use Life | 1 Org Eff |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 6 | 5 | 4 | 3 | 2 | 1 |
| 6 | P - 1.1.006 | GRS Isolation Improvements w/GRS 3 Inf Gate | 2018 | TP[2] | yes | | | - | - | - | - | - | - |
| 24 | P - 1.2.012 | PSB 1-10 Influent Gate Replacement | 2017 | TP[2] | | yes | | - | - | - | - | - | - |
| 32 | P - 1.3.007 | SCs 5 and 6 Mech Rehab | 2018 | TP[2] | | yes | | - | - | - | - | - | - |
| 42 | P - 1.3.017 | AB FRP Cover Replacement | 2017+[4] | TP[2] | yes | | | - | - | - | - | - | - |
| 50 | P - 2.1.002 | Ocean Outfall Maintenance and Inspection - External (2 yrs) | 2017+[4] | TP[2] | | | yes | - | - | - | - | - | - |
| 53 | P - 2.1.005 | Ocean Outfall Bathymetric Survey - External (5 yrs) | 2020 | TP[2] | | | yes | - | - | - | - | - | - |
| 54 | P - 2.1.006 | Ocean Outfall - Integrity Assessment per SLC Lease (5 yrs) | 2020 | TP[2] | | | yes | - | - | - | - | - | - |
| 81 | P - 3.3.009 | Drying Safety Upgrades | 2016 | TP[2] | yes | | | - | - | - | - | - | - |
| 118 | P - 5.1.001 | ORF I Carbon Replacement (annually) | 2016+ [4] | TP[2] | | | Yes | - | - | - | - | - | - |
| 140 | P - 5.2.012 | Site Security Facilities | 2017 | TP[2] | yes | | | - | - | - | - | - | - |
| 160 | P - 5.2.031 | Arc Flash Hazard Assessment | NA [1] | TP[2] | yes | | | - | - | - | - | - | - |
| 172 | P - 5.3.010 | Dryer Lab Enclosure | 2019 | TP[2] | yes | | | - | - | - | - | - | - |
| 5 | P - 1.1.005 | Grit and Screenings Handling Facility Rehab | 2017 | 44 | | | | 1 | 2 | 3 | 3 | 2 | 3 |
| 18 | P - 1.2.006 | PSB Phase 1 and PE Pipeline (Phase 1) | 2020 | 43 | | | | 3 | 2 | 0 | 2 | 3 | 3 |
| 30 | P - 1.3.005 | AB Diffuser Membrane Replacement | 2016 | 40 | | | | 2 | 0 | 3 | 3 | 2 | 3 |
| 67 | P - 3.2.009 | Digester 4, 5 and 6 Covers - Interior Coating, Struct Reinf | 2019 | 39 | | | | 3 | 1 | 1 | 1 | 3 | 3 |
| 122 | P - 5.1.005 | HW/GRT/PSB Odor Control Improvements | 2019 | 39 | | | | 2 | 3 | 0 | 1 | 3 | 3 |
| 99 | P - 4.1.003 | Cogen Engine Catalyst | 2020 | 38 | | | | 0 | 2 | 3 | 3 | 2 | 3 |
| 111 | P - 4.1.015 | Gas Conditioning Facilities | 2020 | 38 | | | | 0 | 2 | 3 | 3 | 2 | 3 |
| 146 | P - 5.2.017 | Instrument Air Piping Repairs | 2016 | 37 | | | | 3 | 0 | 1 | 2 | 3 | 3 |
| 71 | P - 3.2.013 | Digester Mixing System Replacement | 2019 | 36 | | | | 2 | 0 | 3 | 2 | 2 | 2 |

ENCINA WASTEWATER AUTHORITY

Table 6-1, FY 2016 ACTIVE PROJECTS SORTED BY PRIORITY

| Ref | Project No. | Capital Project | FY Planned Constr Start | Prel. Total Score | Sfty TP Yes/ No | AUL TP Yes/ No | Reg TP Yes/ No | 6 cnsq fail | 5 Odor Cntrl | 4 Engy Eff | 3 Cost Eff | 2 A Use Life | 1 Org Eff |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | P - 1.2.010 | PSB Scum Pipeline | ≥2021 | 33 | | | | 3 | 0 | 0 | 2 | 3 | 3 |
| 43 | P - 1.3.018 | AB Anaerobic Selector Zones | 2020 | 33 | | | | 2 | 0 | 2 | 2 | 2 | 3 |
| 28 | P - 1.3.003 | AB Rehab Projects | 2016 | 31 | | | | 2 | 0 | 3 | 1 | 1 | 2 |
| 134 | P - 5.2.006 | Plant Water Functional Improvements | 2018 | 29 | | | | 2 | 0 | 1 | 2 | 2 | 3 |
| 150 | P - 5.2.021 | Climate Control at MCCs | 2017 | 28 | | | | 1 | 0 | 3 | 2 | 1 | 2 |
| 47 | P - 1.4.004 | EPS Pipe Lining and Abandoned Pipe Coating Repair | ≥2021 | 27 | | | | 2 | 0 | 0 | 2 | 3 | 3 |
| 163 | P - 5.3.001 | Ops Bldg Locker Replacement | ≥2021 | 26 | | | | 1 | 1 | 1 | 2 | 1 | 3 |
| 91 | P - 3.3.019 | Centrifuge Drive Replacement | ≥2021 | 25 | | | | 2 | 0 | 0 | 2 | 2 | 3 |
| 56 | P - 3.1.002 | Sludge Process Improvements (DAFT or Alt Tech, Efficiency) | 2019 | 24 | | | | 0 | 1 | 2 | 2 | 1 | 3 |
| 174 | P - 5.3.012 | Chiller for Cogen Engine Building | 2016 | 24 | | | | 0 | 0 | 3 | 3 | 0 | 3 |
| 164 | P - 5.3.002 | Ops Bldg Air Intake Relocation | ≥2021 | 23 | | | | 1 | 2 | 0 | 0 | 2 | 3 |
| 57 | P - 3.1.003 | TWAS Pipeline Replacement | ≥2021 | 22 | | | | 1 | 0 | 2 | 1 | 1 | 3 |
| 69 | P - 3.2.011 | Second Waste Gas Flare and Pipeline | 2020 | 22 | | | | 1 | 1 | 1 | 1 | 1 | 2 |
| 90 | P - 3.3.018 | Centrate Pipeline Replacement (w/P-1.2.010) | ≥2021 | 22 | | | | 2 | 0 | 0 | 1 | 2 | 3 |
| 121 | P - 5.1.004 | Odor Monitoring Facilities | ≥2021 | 22 | | | | 1 | 2 | 0 | 1 | 1 | 1 |
| 39 | P - 1.3.014 | SCs 1 - 8 Infl and Effl Gate Rehab/Replacement | ≥2021 | 21 | | | | 2 | 0 | 0 | 1 | 2 | 2 |
| 94 | P - 3.3.022 | Loadout Facility Secondary Control | ≥2021 | 21 | | | | 1 | 0 | 1 | 2 | 1 | 3 |
| 35 | P - 1.3.010 | WAS Pipeline Replacement | 2020 | 20 | | | | 2 | 0 | 0 | 1 | 2 | 1 |
| 62 | P - 3.2.004 | Biosolids Screening Facility | 2020 | 20 | | | | 0 | 0 | 2 | 3 | 0 | 3 |
| 21 | P - 1.2.009 | PSB Struct and Mech Rehab (PSB Ph 2) | ≥2021 | 19 | | | | 1 | 0 | 1 | 1 | 2 | 2 |
| 156 | P - 5.2.027 | Plant-Wide Seal Coating | ≥2021 | 19 | | | | 1 | 0 | 1 | 1 | 2 | 2 |
| 38 | P - 1.3.013 | SC Concrete Cracking Prevention | ≥2021 | 18 | | | | 2 | 0 | 0 | 1 | 1 | 1 |

ENCINA WASTEWATER AUTHORITY

Table 6-1, FY 2016 ACTIVE PROJECTS SORTED BY PRIORITY

| Ref | Project No. | Capital Project | FY Planned Constr Start | Prel. Total Score | Sfty TP Yes/ No | AUL TP Yes/ No | Reg TP Yes/ No | 6 cnsq fail | 5 Odor Cntrl | 4 Engy Eff | 3 Cost Eff | 2 A Use Life | 1 Org Eff |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 162 | P - 5.2.033 | Plant Wide Abandoned Equipment Removal | 2018 | 18 | | | | 0 | 0 | 0 | 3 | 3 | 3 |
| 14 | P - 1.2.002 | Primary Sludge Pumping Upgrades | ≥2021 | 17 | | | | 1 | 0 | 1 | 1 | 1 | 2 |
| 52 | P - 2.1.004 | Ocean Outfall Ballast Restoration | ≥2021 | 17 | | | | 2 | 0 | 0 | 1 | 1 | 0 |
| 40 | P - 1.3.015 | AB Flow Eq Feed and Return Pipeline Rehab | ≥2021 | 16 | | | | 1 | 0 | 0 | 2 | 1 | 2 |
| 65 | P - 3.2.007 | Digesters 1 and 3 Retrofit for Sludge/Gas storage | ≥2021 | 16 | | | | 0 | 0 | 2 | 2 | 0 | 2 |
| 104 | P - 4.1.008 | Cogen Engine 5 Installation | ≥2021 | 16 | | | | 0 | 0 | 2 | 2 | 0 | 2 |
| 124 | P - 5.1.007 | Drying Bldg Odor Control Improvements | ≥2021 | 16 | | | | 1 | 2 | 0 | 0 | 0 | 0 |
| 142 | P - 5.2.014 | Perimeter Fence Replacement | ≥2021 | 16 | | | | 1 | 0 | 0 | 1 | 2 | 3 |
| 166 | P - 5.3.004 | Ops Bldg Chiller Replacement | ≥2021 | 16 | | | | 1 | 0 | 0 | 2 | 1 | 2 |
| 108 | P - 4.1.012 | Heat Loop Bypass Installation | ≥2021 | 15 | | | | 0 | 1 | 1 | 1 | 0 | 3 |
| 110 | P - 4.1.014 | Retrofit HVAC Fans and Air Handlers with VFDs | ≥2021 | 15 | | | | 0 | 0 | 1 | 2 | 1 | 3 |
| 58 | P - 3.1.004 | DAF Polymer System Replacement | ≥2021 | 14 | | | | 1 | 0 | 0 | 1 | 1 | 3 |
| 80 | P - 3.3.008 | Dryer Major Maint | ≥2021 | 14 | | | | 2 | 0 | 0 | 0 | 1 | 0 |
| 55 | P - 3.1.001 | DAFTs 1 - 3 Scum Collector Replacement | ≥2021 | 13 | | | | 1 | 0 | 0 | 1 | 1 | 2 |
| 78 | P - 3.3.006 | Second Dryer Addition | 2020 | 13 | | | | 1 | 0 | 0 | 1 | 1 | 2 |
| 23 | P - 1.2.011 | PE Meter Replacement | ≥2021 | 12 | | | | 1 | 0 | 0 | 1 | 1 | 1 |
| 45 | P - 1.4.002 | EPS MCC and Conductors Replacement | ≥2021 | 12 | | | | 1 | 0 | 1 | 0 | 1 | 0 |
| 64 | P - 3.2.006 | Cell Lysis Facilities | ≥2021 | 12 | | | | 0 | 0 | 1 | 2 | 0 | 2 |
| 44 | P - 1.4.001 | EPS Rehab | ≥2021 | 11 | | | | 1 | 0 | 0 | 1 | 1 | 0 |
| 148 | P - 5.2.019 | Plant Landscaping | 2020 | 11 | | | | 0 | 1 | 0 | 1 | 1 | 1 |
| 155 | P - 5.2.026 | Plant Waste Stream Rerouting | 2020 | 11 | | | | 0 | 0 | 1 | 1 | 1 | 2 |
| 157 | P - 5.2.028 | Flooding Mitigation | ≥2021 | 10 | | | | 1 | 0 | 0 | 1 | 0 | 1 |

ENCINA WASTEWATER AUTHORITY

Table 6-1, FY 2016 ACTIVE PROJECTS SORTED BY PRIORITY

| Ref | Project No. | Capital Project | FY Planned Constr Start | Prel. Total Score | Sfty TP Yes/ No | AUL TP Yes/ No | Reg TP Yes/ No | 6 cnsq fail | 5 Odor Cntrl | 4 Engy Eff | 3 Cost Eff | 2 A Use Life | 1 Org Eff |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 89 | P - 3.3.017 | DW Polymer Storage Tank Replacement | ≥2021 | 9 | | | | 0 | 0 | 1 | 1 | 0 | 2 |
| 15 | P - 1.2.003 | PE Second Pipeline | ≥2021 | 8 | | | | 1 | 0 | 0 | 0 | 1 | 0 |
| 79 | P - 3.3.007 | Centrifuges Major Maint | ≥2021 | 8 | | | | 1 | 0 | 0 | 0 | 1 | 0 |
| 16 | P - 1.2.004 | PE Emergency Discharge Pipeline Rehab | ≥2021 | 6 | | | | 1 | 0 | 0 | 0 | 0 | 0 |
| 178 | P - 5.4.004 | Vallecitos Sample Vault Installation | ≥2021 | 5 | | | | 0 | 0 | 0 | 1 | 0 | 2 |
| 46 | P - 1.4.003 | SE Gate Motor Operator Installation | ≥2021 | 4 | | | | 0 | 0 | 0 | 1 | 0 | 1 |
| 73 | P - 3.3.001 | MCC and Conductors Replacement - DW and Power Bldg | ≥2021 | 4 | | | | 0 | 0 | 0 | 0 | 2 | 0 |
| 76 | P - 3.3.004 | Pellet Bagging Facilities | ≥2021 | 4 | | | | 0 | 0 | 0 | 1 | 0 | 1 |
| 107 | P - 4.1.011 | ORC Generator | ≥2021 | 4 | | | | 0 | 0 | 1 | 0 | 0 | 0 |
| 165 | P - 5.3.003 | Construction Office Upgrade | ≥2021 | 3 | | | | 0 | 0 | 0 | 0 | 0 | 3 |
| 33 | P - 1.3.008 | SC 7 - Conversion from EQ to Clarifier | ≥2021 | 1 | | | | 0 | 0 | 0 | 0 | 0 | 1 |
| 106 | P - 4.1.010 | Cogen Engine 6 Installation | ≥2021 | 1 | | | | 0 | 0 | 0 | 0 | 0 | 1 |
| 143 | P - 5.2.015 | Northwest Storm Water Drain Sump to South DAF Pit Rehabilitation | ≥2021 | 1 | | | | 0 | 0 | 0 | 0 | 0 | 1 |
| 101 | P - 4.1.005 | Cogen Engine Top-End Overhaul (2016, 2017, 2 eng/yr) | 2016+ (4) | PM(3) | | | | - | - | - | - | - | - |
| 102 | P - 4.1.006 | Cogen Engine In-Frame Overhaul (2024, 2025, 2 eng/yr) | 2024+ (4) | PM(3) | | | | - | - | - | - | - | - |
| 103 | P - 4.1.007 | Cogen Engine Full Overhaul (2018, 2019, 2 eng/yr) | 2018+ (4) | PM(3) | | | | - | - | - | - | - | - |
| 161 | P - 5.2.032 | Plant Wide Asset Painting and Protective Coating (Annually) | 2016+ (4) | PM(3) | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| 182 | P - 6.1.201 | SCADA Network and Computer Room Upgrades (OT_ES01) | 2017 | TMP(5) | | | | - | - | - | - | - | - |
| 185 | P - 6.1.204 | Co-Gen Facility and Biosoilds SCADA Integration (OT_ES04) | 2019 | TMP(5) | | | | - | - | - | - | - | - |
| 187 | P - 6.1.301 | Implement ODMS Layer 1 (SCADA Historian) (OT_ID01) | 2017 | TMP(5) | | | | - | - | - | - | - | - |
| 188 | P - 6.1.302 | SCADA Integration with WIMS and Dashboards (OT_ID03) | 2019 | TMP(5) | | | | - | - | - | - | - | - |

ENCINA WASTEWATER AUTHORITY

Table 6-1, FY 2016 ACTIVE PROJECTS SORTED BY PRIORITY

| Ref | Project No. | Capital Project | FY Planned Constr Start | Prel. Total Score | Sfty TP Yes/ No | AUL TP Yes/ No | Reg TP Yes/ No | 6 cnsq fail | 5 Odor Cntrl | 4 Engy Eff | 3 Cost Eff | 2 A Use Life | 1 Org Eff |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 194 | P - 6.1.401 | Electronic Operator Logbook and Pass-Down (OT_OI03) | 2016 | TMP[5] | | | | - | - | - | - | - | - |
| 195 | P - 6.1.402 | Optimization Implementation (OT_OI01) | ≥2021 | TMP[5] | | | | - | - | - | - | - | - |
| 200 | P - 6.1.407 | Automation Study Implementation | 2016+ | TMP[5] | | | | - | - | - | - | - | - |
| 215 | P - 6.2.102 | Technology Master Plan Updates (BT_TDG02) (every 5 yrs) | NA [1] | TMP[5] | | | | - | - | - | - | - | - |
| 216 | P - 6.2.103 | Data Management Standards (BT_TDG03) | 2016 | TMP[5] | | | | - | - | - | - | - | - |
| 218 | P - 6.2.202 | Management Reporting Enhancements (BT_BME08)(5yrs) | 2017+ [4] | TMP[5] | | | | - | - | - | - | - | - |
| 226 | P - 6.2.302 | WIMS Enhancements (BT_RC02) (annual x5) | 2016+ | TMP[5] | | | | - | - | - | - | - | - |
| 228 | P - 6.2.401 | CMMS Enhancements (BT_AM01) (annual) | NA [1] | TMP[5] | | | | - | - | - | - | - | - |
| 234 | P - 6.2.601 | Public Website Enhancements (BT_DM02) | ≥2021 | TMP[5] | | | | - | - | - | - | - | - |
| 239 | P - 6.2.703 | Business Continuity Readiness (BT_ITI03) | 2018 | TMP[5] | | | | - | - | - | - | - | - |
| 240 | P - 6.2.704 | Telecommunications Upgrades (BT_ITI02) | ≥2021 | TMP[5] | | | | - | - | - | - | - | - |
| | | | | | | | | | | | | | |

(1) NA = Not applicable
(2) TP = Top Priority
(3) PM = Preventative Maintenance
(4) + = Reoccuring Project
(5) TMP = Technology Master Plan

**This page intentionally left blank**

## SECTION 7: RECOMMENDED PROJECT IMPLEMENTATION SCHEDULE & COST SUMMARY

The Recommended Project Implementation Schedule and Cost Summary for FY 2016 through FY 2020 is presented on the following pages. This schedule is based on project priority ranking. These tables present each phase of projects scheduled for funding, as well as condition assessments, special studies, and engineering services.

**This page intentionally left blank**

## Table 7-1: FY 2016 EWA Capital Improvement Program

### FY 2016 E-CAMP Multi-Year Projects

| FY 2016 | | Condition Assessments Proposed Budget | Studies and Services Proposed Budget | Design Proposed Budget | Construction Proposed Budget | Construction Engineering Proposed Budget | Construction Management Proposed Budget | Total by Project Element | Total Project Budget |
|---|---|---|---|---|---|---|---|---|---|
| **Liquid Process Improvements (1.X)** | | | | | | | | | **$ 6,482,000** |
| P - 1.1.005 | Grit and Screenings Handling Facility Rehab | $ - | $ - | $ 800,000 | $ - | $ - | $ - | $ 800,000 | |
| P - 1.2.012 | PSB 1-10 Influent Gate Replacement | $ - | $ - | $ 88,000 | $ - | $ - | $ - | $ 88,000 | |
| P - 1.3.003 | AB Rehab Projects | $ - | $ - | $ - | $ 4,621,000 | $ 240,000 | $ 305,000 | $ 5,166,000 | |
| P - 1.3.005 | AB Diffuser Membrane Replacement | $ - | $ - | $ - | $ 390,000 | $ - | $ - | $ 390,000 | |
| P - 1.3.017 | AB FRP Cover Replacement with Aluminum - Basin 1 | $ - | $ 38,000 | $ - | $ - | $ - | $ - | $ 38,000 | |
| **Outfall (2.X)** | | | | | | | | | **$ -** |
| **Solids Process Improvements (3.X)** | | | | | | | | | **$ 1,839,000** |
| P - 3.3.009 | Drying Safety Upgrades | $ - | $ - | $ - | $ 1,644,000 | $ 86,000 | $ 109,000 | $ 1,839,000 | |
| **Energy Management (4.X)** | | | | | | | | | **$ 275,000** |
| P - 4.1.005 | Cogeneration Engine Top-End Overhaul (2016, 2017, 2 eng/yr) | $ - | $ - | $ - | $ 275,000 | $ - | $ - | $ 275,000 | |
| **General Improvements (5.X)** | | | | | | | | | **$ 816,000** |
| P - 5.1.001 | ORF I Carbon Media Replacement (annually) | $ - | $ - | $ - | $ 100,000 | $ - | $ - | $ 100,000 | |
| P - 5.2.012 | Site Security Facilities | $ - | $ 27,000 | $ - | $ - | $ - | $ - | $ 27,000 | |
| P - 5.2.017 | Instrument Air Piping Rehab | $ - | $ - | $ 42,000 | $ 241,000 | $ 13,000 | $ 16,000 | $ 312,000 | |
| P - 5.2.031 | Arc Flash Hazard Assessment | $ - | $ 75,000 | $ - | $ - | $ - | $ - | $ 75,000 | |
| P - 5.2.032 | Plant Wide Asset Painting and Protective Coating | $ - | $ - | $ 12,000 | $ 128,000 | $ - | $ 9,000 | $ 149,000 | |
| P - 5.2.033 | Plant Wide Abandoned Equipment Removal | $ - | $ 22,000 | $ - | $ - | $ - | $ - | $ 22,000 | |
| P - 5.3.012 | Chiller for Cogen Engine Building | $ - | $ - | $ 18,000 | $ 100,000 | $ 6,000 | $ 7,000 | $ 131,000 | |
| **Technology Master Plan Projects (6.X)** | | | | | | | | | **$ 613,000** |
| P - 6.1.401 | Electronic Operator Logbook and Pass-Down (OT_OI03) | $ - | $ - | $ - | $ 117,000 | $ 7,000 | $ - | $ 124,000 | |
| P - 6.1.407 | Automation Study Implementation | $ - | $ - | $ 26,000 | $ 287,000 | $ 15,000 | $ 19,000 | $ 347,000 | |
| P - 6.2.103 | Data Management Standards (BT_TDG03) | $ - | $ - | $ - | $ 80,000 | $ - | $ - | $ 80,000 | |
| P - 6.2.302 | WIMS Enhancements (BT_RC02) (annual x5) | $ - | $ - | $ - | $ 62,000 | $ - | $ - | $ 62,000 | |
| **Professional Services (not associated with specific projects) (8.X)** | | | | | | | | | **$ 1,215,000** |
| CA - 8.1.006 | FY 2016 Asset Condition Assessments - EWPCF | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ 50,000 | |
| CA - 8.1.008 | Bridges | $ 10,000 | $ - | $ - | $ - | $ - | $ - | $ 10,000 | |
| CA - 8.1.012 | Building Condition Assessments | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ 50,000 | |
| S - 8.2.003 | Biosolids Management Business Plan Update | $ - | $ 180,000 | $ - | $ - | $ - | $ - | $ 180,000 | |
| S - 8.2.013 | Process Master Plan (Solids, Air, Title V, CEPT, Efficiency) | $ - | $ 300,000 | $ - | $ - | $ - | $ - | $ 300,000 | |
| S - 8.2.015 | Potable Reuse Study | $ - | $ 50,000 | $ - | $ - | $ - | $ - | $ 50,000 | |
| S - 8.2.016 | Phosphorus Removal Study | $ - | $ 50,000 | $ - | $ - | $ - | $ - | $ 50,000 | |
| S - 8.2.018 | Pure Green Demonstration Garden Master Plan | $ - | $ 30,000 | $ - | $ - | $ - | $ - | $ 30,000 | |
| ES - 8.3.001 | E-CAMP Update | $ - | $ 75,000 | $ - | $ - | $ - | $ - | $ 75,000 | |
| ES - 8.4.001 | Extension of Staff Engineering Services (Annual) | $ - | $ 150,000 | $ - | $ - | $ - | $ - | $ 150,000 | |
| ES - 8.4.002 | Research and Development Services | $ - | $ - | $ 50,000 | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.008 | Electronic Operations Manual and Document Mgmt - Phase 4 | $ - | $ 100,000 | $ - | $ - | $ - | $ - | $ 100,000 | |
| ES - 8.4.011 | Service Area Ordinance Alignment | $ - | $ 120,000 | $ - | $ - | $ - | $ - | $ 120,000 | |
| **Remote Facility Major Plant Rehabilitation: General Improvements (refer to the R-CAMP)** | | | | | | | | | **$ -** |
| | **Sub-Totals FY 2016 Multi-Year Projects** | **$ 110,000** | **$ 1,217,000** | **$ 1,036,000** | **$ 8,045,000** | **$ 367,000** | **$ 465,000** | **$ 11,240,000** | **$ 11,240,000** |

## Table 7-2: FY 2017 EWA Capital Improvement Program

### FY 2016 E-CAMP Multi-Year Projects

| FY 2017 | | Condition Assessments Proposed Budget | Studies and Services Proposed Budget | Design Proposed Budget | Construction Proposed Budget | Construction Engineering Proposed Budget | Construction Management Proposed Budget | Total by Project Element | Total Project Budget |
|---|---|---|---|---|---|---|---|---|---|
| **Liquid Process Improvements (1.X)** | | | | | | | | | **$ 5,750,000** |
| P - 1.1.005 | Grit and Screenings Handling Facility Rehab - Year 1 of 2 | $ - | $ - | $ - | $ 2,954,940 | $ 153,000 | $ 195,160 | $ 3,304,000 | |
| P - 1.2.012 | PSB 1-10 Influent Gate Replacement | $ - | $ - | $ - | $ 950,000 | $ 50,000 | $ 63,000 | $ 1,063,000 | |
| P - 1.3.017 | AB FRP Cover Replacement with Aluminum - Basin No. 1 | $ - | $ - | $ 57,000 | $ 1,253,000 | $ 32,000 | $ 41,000 | $ 1,383,000 | |
| **Outfall (2.X)** | | | | | | | | | **$ 76,000** |
| P - 2.1.002 | Ocean Outfall Maint and Inspection - External (Every 2 yrs) | $ - | $ - | $ - | $ 76,000 | $ - | $ - | $ 76,000 | |
| **Solids Process Improvements (3.X)** | | | | | | | | | **$ -** |
| **Energy Management (4.X)** | | | | | | | | | **$ 275,000** |
| P - 4.1.005 | Cogeneration Engine Top-End Overhaul (2016, 2017, 2 eng/yr) | $ - | $ - | $ - | $ 275,000 | $ - | $ - | $ 275,000 | |
| **General Improvements (5.X)** | | | | | | | | | **$ 869,000** |
| P - 5.1.001 | ORF I Carbon Media Replacement (annually) | $ - | $ - | $ - | $ 100,000 | $ - | $ - | $ 100,000 | |
| P - 5.2.012 | Site Security Facilities | $ - | $ - | $ 39,000 | $ 225,000 | $ 12,000 | $ 15,000 | $ 291,000 | |
| P - 5.2.021 | Climate Control at MCCs (4 MCCs) | $ - | $ - | $ 44,000 | $ 254,000 | $ 14,000 | $ 17,000 | $ 329,000 | |
| P - 5.2.032 | Plant Wide Asset Painting and Protective Coating | $ - | $ - | $ 12,000 | $ 128,000 | $ - | $ 9,000 | $ 149,000 | |
| **Technology Master Plan Projects (6.X)** | | | | | | | | | **$ 4,206,000** |
| P - 6.1.201 | SCADA Network and Computer Room Upgrades (OT_ES01) | $ - | $ - | $ 493,000 | $ 2,845,000 | $ 149,000 | $ - | $ 3,487,000 | |
| P - 6.1.407 | Automation Study Implementation | $ - | $ - | $ 46,000 | $ 500,000 | $ 26,000 | $ 33,000 | $ 605,000 | |
| P - 6.2.202 | Management Reporting Enhancements (BT_BME08)(5yrs) | $ - | $ - | $ - | $ 52,000 | $ - | $ - | $ 52,000 | |
| P - 6.2.302 | WIMS Enhancements (BT_RC02) (annual x5) | $ - | $ - | $ - | $ 62,000 | $ - | $ - | $ 62,000 | |
| **Professional Services (not associated with specific projects) (8.X)** | | | | | | | | | **$ 650,000** |
| CA - 8.1.009 | FY 2017 Asset Condition Assessments - EWPCF | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.3.001 | E-CAMP Update | $ - | $ 100,000 | $ - | $ - | $ - | $ - | $ 100,000 | |
| ES - 8.4.001 | Extension of Staff Engineering Services (Annual) | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| ES - 8.4.002 | Research and Development Services | $ - | $ - | $ 50,000 | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.008 | Electronic Operations Manual and Document Mgmt - Updates | $ - | $ 50,000 | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.0xx | Misc. Professional Studies | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| **Remote Facility Major Plant Rehabilitation: General Improvements (refer to the R-CAMP)** | | | | | | | | | **$ -** |
| | **Sub-Totals FY 2017 Multi-Year Projects** | **$ 50,000** | **$ 50,000** | **$ 741,000** | **$ 9,674,940** | **$ 436,000** | **$ 373,160** | **$ 11,826,000** | **$ 11,826,000** |

## Table 7-3: FY 2018 EWA Capital Improvement Program

### FY 2016 E-CAMP Multi-Year Projects

| FY 2018 | | Condition Assessments Proposed Budget | Studies and Services Proposed Budget | Design Proposed Budget | Construction Proposed Budget | Construction Engineering Proposed Budget | Construction Management Proposed Budget | Total by Project Element | Total Project Budget |
|---|---|---|---|---|---|---|---|---|---|
| **Liquid Process Improvements (1.X)** | | | | | | | | | **$ 11,176,000** |
| P - 1.1.005 | Grit and Screenings Handling Facility Rehab - Year 2 of 2 | $ - | $ - | $ - | $ 5,736,060 | $ 297,000 | $ 378,840 | $ 6,412,000 | |
| P - 1.1.006 | GRS Isolation Improvements w/GRS 3 Inf Gate | $ - | $ - | $ - | $ 873,000 | $ 46,000 | $ 58,000 | $ 977,000 | |
| P - 1.3.007 | SCs 5 and 6 Mech Rehab | $ - | $ - | $ 186,000 | $ 2,021,000 | $ 105,000 | $ 134,000 | $ 2,446,000 | |
| P - 1.3.017 | AB FRP Cover Replacement with Aluminum - Basin No. 2 | $ - | $ - | $ 15,000 | $ 1,253,000 | $ 32,000 | $ 41,000 | $ 1,341,000 | |
| **Outfall (2.X)** | | | | | | | | | **$ -** |
| **Solids Process Improvements (3.X)** | | | | | | | | | **$ 484,000** |
| P - 3.2.009 | Digester 4, 5 and 6 Covers - Interior Coating, Struct Reinf. | $ - | $ - | $ 323,000 | $ - | $ - | $ - | $ 323,000 | |
| P - 3.2.013 | Digester Mixing System Replacement | $ - | $ - | $ 161,000 | $ - | $ - | $ - | $ 161,000 | |
| **Energy Management (4.X)** | | | | | | | | | **$ 924,000** |
| P - 4.1.007 | Cogen Engine Full Overhaul (2018, 2019, 2 eng/yr) | $ - | $ - | $ - | $ 924,000 | $ - | $ - | $ 924,000 | |
| **General Improvements (5.X)** | | | | | | | | | **$ 1,193,000** |
| P - 5.1.001 | ORF I Carbon Media Replacement (annually) | $ - | $ - | $ - | $ 100,000 | $ - | $ - | $ 100,000 | |
| P - 5.2.006 | Plant Water Functional Improvements | $ - | $ - | $ 42,000 | $ 450,000 | $ 24,000 | $ 30,000 | $ 546,000 | |
| P - 5.2.032 | Plant Wide Asset Painting and Protective Coating | $ - | $ - | $ 12,000 | $ 128,000 | $ - | $ 9,000 | $ 149,000 | |
| P - 5.2.033 | Plant Wide Abandoned Equipment Removal | $ - | $ - | $ 34,000 | $ 364,000 | $ - | $ - | $ 398,000 | |
| **Technology Master Plan Projects (6.X)** | | | | | | | | | **$ 1,102,000** |
| P - 6.1.204 | Co-Gen Facility and Biosoilds SCADA Integration (OT_ES04) | $ - | $ - | $ 75,000 | $ - | $ - | $ - | $ 75,000 | |
| P - 6.1.301 | Implement ODMS Layer 1 (SCADA Historian) (OT_ID01) | $ - | $ - | $ - | $ 205,000 | $ - | $ - | $ 205,000 | |
| P - 6.1.407 | Automation Study Implementation | $ - | $ - | $ 46,000 | $ 500,000 | $ 26,000 | $ 33,000 | $ 605,000 | |
| P - 6.2.202 | Management Reporting Enhancements (BT_BME08)(5yrs) | $ - | $ - | $ - | $ 52,000 | $ - | $ - | $ 52,000 | |
| P - 6.2.302 | WIMS Enhancements (BT_RC02) (annual x5) | $ - | $ - | $ - | $ 62,000 | $ - | $ - | $ 62,000 | |
| P - 6.2.703 | Business Continuity Readiness (BT_ITI03) | $ - | $ - | $ 103,000 | $ - | $ - | $ - | $ 103,000 | |
| **Professional Services (not associated with specific projects) (8.X)** | | | | | | | | | **$ 650,000** |
| CA - 8.1.010 | FY 2018 Asset Condition Assessments - EWPCF | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.3.001 | E-CAMP Update | $ - | $ 100,000 | $ - | $ - | $ - | $ - | $ 100,000 | |
| ES - 8.4.001 | Extension of Staff Engineering Services (Annual) | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| ES - 8.4.002 | Research and Development Services | $ - | $ - | $ 50,000 | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.008 | Electronic Operations Manual and Document Mgmt - Updates | $ - | $ 50,000 | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.0xx | Misc. Professional Studies | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| **Remote Facility Major Plant Rehabilitation: General Improvements (refer to the R-CAMP)** | | | | | | | | | **$ -** |
| | **Sub-Totals FY 2018 Multi-Year Projects** | **$ 50,000** | **$ 50,000** | **$ 1,047,000** | **$ 12,668,060** | **$ 530,000** | **$ 683,840** | **$ 15,529,000** | **$ 15,529,000** |

## Table 7-4: FY 2019 EWA Capital Improvement Program

### FY 2016 E-CAMP Multi-Year Projects

| FY 2019 | | Condition Assessments Proposed Budget | Studies and Services Proposed Budget | Design Proposed Budget | Construction Proposed Budget | Construction Engineering Proposed Budget | Construction Management Proposed Budget | Total by Project Element | Total Project Budget |
|---|---|---|---|---|---|---|---|---|---|
| **Liquid Process Improvements (1.X)** | | | | | | | | | **$ 1,341,000** |
| P - 1.3.017 | AB FRP Cover Replacement with Aluminum - Basin No. 3 | $ - | $ - | $ 15,000 | $ 1,253,000 | $ 32,000 | $ 41,000 | $ 1,341,000 | |
| **Outfall (2.X)** | | | | | | | | | **$ 76,000** |
| P - 2.1.002 | Ocean Outfall Maint and Inspection - External (Every 2 yrs) | $ - | $ - | $ - | $ 76,000 | $ - | $ - | $ 76,000 | |
| **Solids Process Improvements (3.X)** | | | | | | | | | **$ 9,066,000** |
| P - 3.1.002 | Sludge Process Improvements (DAF or Alt Tech, Efficiency) | $ - | $ 77,000 | $ 251,000 | $ 2,561,000 | $ 133,000 | $ 170,000 | $ 3,192,000 | |
| P - 3.2.009 | Digester 4, 5 and 6 Covers - Interior Coating, Struct Reinf. | $ - | $ - | $ - | $ 3,509,000 | $ 182,000 | $ 232,000 | $ 3,923,000 | |
| P - 3.2.013 | Digester Mixing System Replacement | $ - | $ - | $ - | $ 1,744,000 | $ 91,000 | $ 116,000 | $ 1,951,000 | |
| **Energy Management (4.X)** | | | | | | | | | **$ 924,000** |
| P - 4.1.007 | Cogen Engine Full Overhaul (2018, 2019, 2 eng/yr) | $ - | $ - | $ - | $ 924,000 | $ - | $ - | $ 924,000 | |
| **General Improvements (5.X)** | | | | | | | | | **$ 1,293,000** |
| P - 5.1.001 | ORF I Carbon Media Replacement (annually) | $ - | $ - | $ - | $ 100,000 | $ - | $ - | $ 100,000 | |
| P - 5.1.005 | HW/GRT/PSB Odor Control Improvements | $ - | $ - | $ 60,000 | $ 651,000 | $ 34,000 | $ 43,000 | $ 788,000 | |
| P - 5.2.032 | Plant Wide Asset Painting and Protective Coating | $ - | $ - | $ 12,000 | $ 128,000 | $ - | $ 9,000 | $ 149,000 | |
| P - 5.3.010 | Dryer Lab Enclosure | $ - | $ - | $ 34,000 | $ 197,000 | $ 11,000 | $ 14,000 | $ 256,000 | |
| **Technology Master Plan Projects (6.X)** | | | | | | | | | **$ 1,998,000** |
| P - 6.1.204 | Co-Gen Facility and Biosoilds SCADA Integration (OT_ES04) | $ - | $ - | $ - | $ 716,000 | $ 38,000 | $ - | $ 754,000 | |
| P - 6.1.302 | SCADA Integration with WIMS and Dashboards (OT_ID03) | $ - | $ - | $ - | $ 286,000 | $ 15,000 | $ - | $ 301,000 | |
| P - 6.1.407 | Automation Study Implementation | $ - | $ - | $ 46,000 | $ 500,000 | $ 26,000 | $ 33,000 | $ 605,000 | |
| P - 6.2.102 | Technology Master Plan Updates (BT_TDG02) (every 5 yrs) | $ - | $ 224,000 | $ - | $ - | $ - | $ - | $ 224,000 | |
| P - 6.2.202 | Management Reporting Enhancements (BT_BME08)(5yrs) | $ - | $ - | $ - | $ 52,000 | $ - | $ - | $ 52,000 | |
| P - 6.2.302 | WIMS Enhancements (BT_RC02) (annual x5) | $ - | $ - | $ - | $ 62,000 | $ - | $ - | $ 62,000 | |
| **Professional Services (not associated with specific projects) (8.X)** | | | | | | | | | **$ 650,000** |
| CA - 8.1.011 | FY 2019 Asset Condition Assessments - EWPCF | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.3.001 | E-CAMP Update | $ - | $ 100,000 | $ - | $ - | $ - | $ - | $ 100,000 | |
| ES - 8.4.001 | Extension of Staff Engineering Services (Annual) | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| ES - 8.4.002 | Research and Development Services | $ - | $ - | $ 50,000 | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.008 | Electronic Operations Manual and Document Mgmt - Updates | $ - | $ 50,000 | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.0xx | Misc. Professional Studies | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| **Remote Facility Major Plant Rehabilitation: General Improvements (refer to the R-CAMP)** | | | | | | | | | **$ -** |
| **Sub-Totals FY 2019 Multi-Year Projects** | | **$ 50,000** | **$ 851,000** | **$ 468,000** | **$ 12,759,000** | **$ 562,000** | **$ 658,000** | **$ 15,348,000** | **$ 15,348,000** |

## Table 7-5 FY 2020 EWA Capital Improvement Program

### FY 2016 E-CAMP Multi-Year Projects

| FY 2020 | | Condition Assessments Proposed Budget | Studies and Services Proposed Budget | Design Proposed Budget | Construction Proposed Budget | Construction Engineering Proposed Budget | Construction Management Proposed Budget | Total by Project Element | Total Project Budget |
|---|---|---|---|---|---|---|---|---|---|
| **Liquid Process Improvements (1.X)** | | | | | | | | | **$ 7,342,000** |
| P - 1.2.006 | PSB Phase I and PE Pipeline Rehab (Phase 1) | $ - | $ - | $ 310,000 | $ 3,359,000 | $ 174,000 | $ 222,000 | $ 4,065,000 | |
| P - 1.3.010 | WAS Pipeline Replacement | $ - | $ - | $ 55,000 | $ 318,000 | $ 17,000 | $ 21,000 | $ 411,000 | |
| P - 1.3.017 | AB FRP Cover Replacement with Aluminum - Basin 4 | $ - | $ - | $ 15,000 | $ 1,253,000 | $ 32,000 | $ 41,000 | $ 1,341,000 | |
| P - 1.3.018 | AB Anaerobic Selector Zones | $ - | $ - | $ 116,000 | $ 1,259,000 | $ 66,000 | $ 84,000 | $ 1,525,000 | |
| **Outfall (2.X)** | | | | | | | | | **$ 217,000** |
| P - 2.1.005 | Ocean Outfall Bathymetric Survey - External (Every 5 Years) | $ - | $ - | $ - | $ 88,000 | $ 5,000 | $ 6,000 | $ 99,000 | |
| P - 2.1.006 | Ocean Outfall - Integrity Assessment per SLC Lease (Every 5 Years) | $ - | $ - | $ 17,000 | $ 96,000 | $ 5,000 | $ - | $ 118,000 | |
| **Solids Process Improvements (3.X)** | | | | | | | | | **$ 14,559,000** |
| P - 3.2.004 | Biosolids Screening Facility | $ - | $ - | $ 100,000 | $ 1,078,000 | $ 56,000 | $ 72,000 | $ 1,306,000 | |
| P - 3.2.011 | Second Waste Gas Flare and Pipeline | $ - | $ 34,000 | $ 102,000 | $ 1,105,000 | $ 58,000 | $ 73,000 | $ 1,372,000 | |
| P - 3.3.006 | Second Dryer Addition | $ - | $ 288,000 | $ 882,000 | $ 9,582,000 | $ 496,000 | $ 633,000 | $ 11,881,000 | |
| **Energy Management (4.X)** | | | | | | | | | **$ 5,319,000** |
| P - 4.1.003 | Cogen Engine Catalyst | $ - | $ - | $ 35,000 | $ 198,000 | $ 11,000 | $ 13,000 | $ 257,000 | |
| P - 4.1.005 | Cogeneration Engine Top-End Overhaul (2020, 2021, 2 eng/yr) | $ - | $ - | $ - | $ 275,000 | $ - | $ - | $ 275,000 | |
| P - 4.1.015 | Gas Conditioning Facilities | $ - | $ - | $ 364,000 | $ 3,956,000 | $ 205,000 | $ 262,000 | $ 4,787,000 | |
| **General Improvements (5.X)** | | | | | | | | | **$ 840,000** |
| P - 5.1.001 | ORF I Carbon Media Replacement (annually) | $ - | $ - | $ - | $ 100,000 | $ - | $ - | $ 100,000 | |
| P - 5.2.019 | Plant Landscaping | $ - | $ - | $ 38,000 | $ 220,000 | $ 12,000 | $ 15,000 | $ 285,000 | |
| P - 5.2.026 | Plant Waste Stream Rerouting | $ - | $ 20,000 | $ 38,000 | $ 216,000 | $ 12,000 | $ 20,000 | $ 306,000 | |
| P - 5.2.032 | Plant Wide Asset Painting and Protective Coating | $ - | $ - | $ 12,000 | $ 128,000 | $ - | $ 9,000 | $ 149,000 | |
| **Technology Master Plan Projects (6.X)** | | | | | | | | | **$ 719,000** |
| P - 6.1.407 | Automation Study Implementation | $ - | $ - | $ 46,000 | $ 500,000 | $ 26,000 | $ 33,000 | $ 605,000 | |
| P - 6.2.202 | Management Reporting Enhancements (BT_BME08)(5yrs) | $ - | $ - | $ - | $ 52,000 | $ - | $ - | $ 52,000 | |
| P - 6.2.302 | WIMS Enhancements (BT_RC02) (annual x5) | $ - | $ - | $ - | $ 62,000 | $ - | $ - | $ 62,000 | |
| **Professional Services (not associated with specific projects) (8.X)** | | | | | | | | | **$ 650,000** |
| CA - 8.1.012 | FY 2020 Asset Condition Assessments - EWPCF | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.3.001 | E-CAMP Update | $ - | $ 100,000 | $ - | $ - | $ - | $ - | $ 100,000 | |
| ES - 8.4.001 | Extension of Staff Engineering Services (Annual) | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| ES - 8.4.002 | Research and Development Services | $ - | $ - | $ 50,000 | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.008 | Electronic Operations Manual and Document Mgmt - Updates | $ - | $ 50,000 | $ - | $ - | $ - | $ - | $ 50,000 | |
| ES - 8.4.0xx | Misc. Professional Studies | $ - | $ 200,000 | $ - | $ - | $ - | $ - | $ 200,000 | |
| **Remote Facility Major Plant Rehabilitation: General Improvements (refer to the R-CAMP)** | | | | | | | | | **$ -** |
| | **Sub-Totals projects deferred to FY 2020 or beyond** | **$ 50,000** | **$ 892,000** | **$ 2,180,000** | **$ 23,845,000** | **$ 1,175,000** | **$ 1,504,000** | **$ 29,646,000** | **$ 29,646,000** |

**This page intentionally left blank**

**APPENDIX A**

**HISTORICAL PROJECT LIST**

**This page intentionally left blank**

**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
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
5. P - 3.3.009 Drying Safety Upgrades (Phases 2 and 3; Year 1 of 2)
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
9. P - 4.1.019 Chilled Water and Hot Water Systems
10. P - 4.1.021 Cogen NG Line Meter
11. P - 5.1.002 ORF I Carbon Replacement (annually)
12. P - 5.1.008 ORF III Chem Feed System Improvements
13. P - 5.1.010 ORF I, ORF II, ORF III Process Improvements
14. P - 5.3.006 Secondary Scum Pit Roof Removal
15. P - 6.1.101 Process Control Narrative/Automation Study
16. P - 6.1.501 SCADA Design Guidlelines
17. P - 6.1.502 SCADA Software Standards
18. P - 6.1.508 SCADA Governance
19. P - 6.2.101 IT Goverance Policies
20. P - 6.2.301 LIMS Enhancements
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 (PVSI1)
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)

This page intentionally left blank

**APPENDIX B**

**PROJECT LIST**

**This page left intentionally blank**

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| | | | | |
| **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 | Grit and Screenings Handling Facility Rehab | pre-2014 | pending |
| 6 | P - 1.1.006 | GRS Isolation Improvements w/GRS 3 Inf Gate | pre-2014 | pending |
| *7* | *P - 1.1.007* | *Vactor Receiving Station* | *pre-2014* | *2014* |
| ~~*8*~~ | ~~*P - 1.1.008*~~ | ~~*GRS Rehab*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| *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*~~ | ~~*pending*~~ |
| ~~*12*~~ | ~~*P - 1.1.012*~~ | ~~*Off-Site Fermentation and Odor Control*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **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 | pending |
| 16 | P - 1.2.004 | PE Emergency Discharge Pipeline Rehab | pre-2014 | pending |
| ~~*17*~~ | ~~*P - 1.2.005*~~ | ~~*PSB Helical Scum Skimmer Replace - (w/P-1.2.006)*~~ | ~~*pre-2014*~~ | ~~*combined*~~ |
| 18 | P - 1.2.006 | PSB Phase 1 and PE Pipeline (Phase 1) | pre-2014 | pending |
| ~~*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-1.2.006 )*~~ | ~~*pre-2014*~~ | ~~*combined*~~ |
| 21 | P - 1.2.009 | PSB Struct and Mech Rehab (PSB Ph 2) | pre-2014 | pending |
| 22 | P - 1.2.010 | PSB Scum Pipeline | 2014 | pending |
| 23 | P - 1.2.011 | PE Meter Replacement | 2015 | pending |
| 24 | P - 1.2.012 | PSB 1-10 Influent Gate Replacement | 2016 | pending |
| | | | | |
| **1.3 Secondary Treatment** | | | | |
| 25 | P - 1.3.001 | *Blower Electrical Improvements* | *pre-2014* | *2013* |
| ~~*26*~~ | ~~*P - 1.3.002*~~ | ~~*Annunciator Panels Replace - Second Process (w/P-1.3.004)*~~ | ~~*pre-2014*~~ | ~~*combined*~~ |
| ~~*27*~~ | ~~*P - 1.3.003*~~ | ~~*AB Selector Implementation and Cover Replacement*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 28 | P - 1.3.003 | AB Rehab Projects | 2016 | pending |
| ~~*29*~~ | ~~*P - 1.3.004*~~ | ~~*AB Mech Rehab and RAS Pump Addition*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 30 | P - 1.3.005 | AB Diffuser Membrane Replacement | pre-2014 | pending |
| ~~*31*~~ | ~~*P - 1.3.006*~~ | ~~*Secondary Polymer System Replacement (no longer used)*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 32 | P - 1.3.007 | SCs 5 and 6 Mech Rehab | pre-2014 | pending |

| Ref | Project No. | Capital Project<br>(Red, Projects Identified in FY 2016 E-Camp)<br>*(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| 33 | P - 1.3.008 | SC 7 - Conversion from EQ to Clarifier | pre-2014 | pending |
| ~~*34*~~ | ~~*P - 1.3.009*~~ | ~~*Sec Splitter Box Gate Motor Operators Install - eliminated*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| 35 | P - 1.3.010 | WAS Pipeline Replacement | pre-2014 | pending |
| ~~*36*~~ | ~~*P - 1.3.011*~~ | ~~*AB No. 3 Diffusers Membr Repl -(duplicate, see P-1.3.005)*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| *37* | P - 1.3.012 | *AB DO Probe Replacement* | *2014* | *pending* |
| 38 | P - 1.3.013 | SC Concrete Cracking Prevention | 2014 | pending |
| 39 | P - 1.3.014 | SCs 1 - 8 Infl and Effl Gate Rehab/Replacement | 2014 | pending |
| 40 | P - 1.3.015 | AB Flow Eq Feed and Return Pipeline Rehab | 2014 | pending |
| *41* | P - 1.3.016 | *AB Efficiency Optimization* | *2015* | *2015* |
| 42 | P - 1.3.017 | AB FRP Cover Replacement | 2016 | pending |
| 43 | P - 1.3.018 | AB Anaerobic Selector Zones | 2016 | pending |
| | | | | |
| **1.4 Effluent** | | | | |
| 44 | P - 1.4.001 | EPS Rehab | pre-2014 | pending |
| 45 | P - 1.4.002 | EPS MCC and Conductors Replacement | pre-2014 | pending |
| 46 | P - 1.4.003 | SE Gate Motor Operator Installation | pre-2014 | pending |
| 47 | P - 1.4.004 | EPS Pipe Lining and Abandoned Pipe Coating Repair | 2014 | pending |
| ~~*48*~~ | ~~*P - 1.4.005*~~ | ~~*PD Blower Addition, Aeration/Agitation*~~ | ~~*2014*~~ | ~~*pending*~~ |
| | | | | |
| **2.0 Outfall** | | | | |
| **2.1 Outfall** | | | | |
| *49* | *P - 2.1.001* | *Land Outfall Inspection and Cleaning - Internal - Complete* | *pre-2014* | *2013* |
| 50 | P - 2.1.002 | Ocean Outfall Maintenance and Inspection - External (2 yrs) | pre-2014 | 2015 |
| ~~*51*~~ | ~~*P - 2.1.003*~~ | ~~*Outfall ARV Vault Replacement - (w/P-1.1.001)*~~ | ~~*pre-2014*~~ | ~~*2014*~~ |
| 52 | P - 2.1.004 | Ocean Outfall Ballast Restoration | pre-2014 | pending |
| 53 | P - 2.1.005 | Ocean Outfall Bathymetric Survey - External (5 yrs) | 2014 | pending |
| 54 | P - 2.1.006 | Ocean Outfall - Integrity Assessment per SLC Lease (5 yrs) | 2015 | pending |
| | | | | |
| **3.0 Solids Processing Improvements** | | | | |
| **3.1 Biosolids Thickening** | | | | |
| 55 | P - 3.1.001 | DAFTs 1 - 3 Scum Collector Replacement | pre-2014 | pending |
| 56 | P - 3.1.002 | Sludge Process Improvements (DAFT or Alt Tech, Efficiency) | pre-2014 | pending |
| 57 | P - 3.1.003 | TWAS Pipeline Replacement | pre-2014 | pending |
| 58 | P - 3.1.004 | DAF Polymer System Replacement | pre-2014 | pending |
| | | | | |
| **3.2 Biosolids Digestion** | | | | |
| *59* | *P - 3.2.001* | *Biofuel Receiving Facilities (Addl budget)* | *pre-2014* | *2014* |
| *60* | *P - 3.2.002* | *Digesters 5 and 6 Cleaning* | *pre-2014* | *2013* |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| ~~*61*~~ | ~~*P - 3.2.003*~~ | ~~*Digesters 5 and 6 Pump/Piping Foundation Stabilization*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 62 | P - 3.2.004 | Biosolids Screening Facility | pre-2014 | pending |
| ~~*63*~~ | ~~*P - 3.2.005*~~ | ~~*Digesters 5 and 6 Mixing Pumps Replacement*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 64 | P - 3.2.006 | Cell Lysis Facilities | pre-2014 | pending |
| 65 | P - 3.2.007 | Digesters 1 and 3 Retrofit for Sludge/Gas storage | pre-2014 | pending |
| ~~*66*~~ | ~~*P - 3.2.008*~~ | ~~*Waste Gas Flare Operation Mods*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 67 | P - 3.2.009 | Digester 4, 5 and 6 Covers - Interior Coating, Struct Reinf | 2014 | pending |
| ~~*68*~~ | ~~*P - 3.2.010*~~ | ~~*Digesters 5 and 6 Covers - Interior Coating (comb w/3.2.009)*~~ | ~~*2014*~~ | ~~*combined*~~ |
| 69 | P - 3.2.011 | Second Waste Gas Flare and Pipeline | pre-2014 | pending |
| ~~*70*~~ | ~~*P - 3.2.012*~~ | ~~*Digester 4 - Dewatering*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 71 | P - 3.2.013 | Digester Mixing System Replacement | 2015 | pending |
| *72* | *P - 3.2.014* | *Digester Gas Pipeline Replacement* | *2015* | *pending* |
| | | | | |
| **3.3 Biosolids Dewatering and Drying** | | | | |
| 73 | P - 3.3.001 | MCC and Conductors Replacement - DW and Power Bldg | pre-2014 | pending |
| ~~*74*~~ | ~~*P - 3.3.002*~~ | ~~*Pellet Storage Facility Improvements (w/P-3.3.009)*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| ~~*75*~~ | ~~*P - 3.3.003*~~ | ~~*Struvite Control Facilities (eliminate, Ostara)*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 76 | P - 3.3.004 | Pellet Bagging Facilities | pre-2014 | pending |
| ~~*77*~~ | ~~*P - 3.3.005*~~ | ~~*Cake Pump Mods - eliminated*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 78 | P - 3.3.006 | Second Dryer Addition | pre-2014 | pending |
| 79 | P - 3.3.007 | Centrifuges Major Maint | pre-2014 | pending |
| 80 | P - 3.3.008 | Dryer Major Maint | pre-2014 | pending |
| 81 | P - 3.3.009 | Drying Safety Upgrades | pre-2014 | 2014 |
| ~~*82*~~ | ~~*P - 3.3.010*~~ | ~~*Drying Building Coded Locks (PAR)*~~ | ~~*pre-2014*~~ | ~~*2014 ?GS?*~~ |
| ~~*83*~~ | ~~*P - 3.3.011*~~ | ~~*Recycle Bin Purge Vent Relocation - (w/P-3.3.009)*~~ | ~~*pre-2014*~~ | ~~*combined*~~ |
| *84* | *P - 3.3.012* | *RTO Media Replacement* | *pre-2014* | *2014* |
| ~~*85*~~ | ~~*P - 3.3.013*~~ | ~~*RTO Process Upgrades*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| *86* | *P - 3.3.014* | *RTO Flush Drain Relocation* | *pre-2014* | *2014* |
| *87* | *P - 3.3.015* | *RTO Equipment Corrosion Control* | *pre-2014* | *2014* |
| ~~*88*~~ | ~~*P - 3.3.016*~~ | ~~*Cake Conveyance Equipment Improvements*~~ | ~~*pre-2014*~~ | ~~*combined*~~ |
| 89 | P - 3.3.017 | DW Polymer Storage Tank Replacement | pre-2014 | pending |
| *90* | *P - 3.3.018* | *Centrate Pipeline Replacement (w/P-1.2.010)* | *2014* | *≥2021* |
| 91 | P - 3.3.019 | Centrifuge Drive Replacement | 2014 | pending |
| ~~*92*~~ | ~~*P - 3.3.020*~~ | ~~*Dryer Drum Repair*~~ | ~~*2014*~~ | ~~*2014*~~ |
| ~~*93*~~ | ~~*P - 3.3.021*~~ | ~~*Pyrolysis Facilities*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 94 | P - 3.3.022 | Loadout Facility Secondary Control | 2015 | pending |
| ~~*95*~~ | ~~*P - 3.3.023*~~ | ~~*Centrate Line TSS Probes - PAR*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*96*~~ | ~~*P - 3.3.024*~~ | ~~*Centrifuge Remote Control Addition (combined with 3.3.006)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| **4.0 Energy Management** | | | | |
| **4.1 Energy Management** | | | | |
| ~~97~~ | ~~P - 4.1.001~~ | ~~Cogen Communications Redundancy (incorp w/Tech MP)~~ | ~~pre-2014~~ | ~~combined~~ |
| *98* | *P - 4.1.002* | *Cogen UPS Upgrade - completed in house.* | *pre-2014* | *2012* |
| 99 | P - 4.1.003 | Cogen Engine Catalyst | pre-2014 | pending |
| *100* | *P - 4.1.004* | *NG Dilution Equipment Servicing* | *pre-2014* | *2014* |
| 101 | P - 4.1.005 | Cogen Engine Top-End Overhaul (2016, 2017, 2 eng/yr) | pre-2014 | pending |
| 102 | P - 4.1.006 | Cogen Engine In-Frame Overhaul (2024, 2025, 2 eng/yr) | pre-2014 | pending |
| 103 | P - 4.1.007 | Cogen Engine Full Overhaul (2018, 2019, 2 eng/yr) | pre-2014 | pending |
| 104 | P - 4.1.008 | Cogen Engine 5 Installation | pre-2014 | pending |
| ~~105~~ | ~~P - 4.1.009~~ | ~~Cogen Top-End OH 1 and 2 - (w/P-4.1.005)~~ | ~~pre-2014~~ | ~~combined~~ |
| 106 | P - 4.1.010 | Cogen Engine 6 Installation | pre-2014 | pending |
| 107 | P - 4.1.011 | ORC Generator | pre-2014 | pending |
| 108 | P - 4.1.012 | Heat Loop Bypass Installation | pre-2014 | pending |
| *109* | *P - 4.1.013* | *Cogen Bldg Floor Repair (PAR)* | *pre-2014* | *2014 GS* |
| 110 | P - 4.1.014 | Retrofit HVAC Fans and Air Handlers with VFDs | 2015 | pending |
| 111 | P - 4.1.015 | Gas Conditioning Facilities | pre-2014 | pending |
| ~~112~~ | ~~P - 4.1.016~~ | ~~Blower Replacement with High Efficiency Type~~ | ~~pre-2014~~ | ~~pending~~ |
| ~~113~~ | ~~P - 4.1.017~~ | ~~Annunciator Panels Replacement - Power Bldg (by GS)~~ | ~~pre-2014~~ | ~~PAR~~ |
| *114* | *P - 4.1.018* | *Lighting and Controls Improvements* | *2014* | *pending* |
| *115* | *P - 4.1.019* | *Chilled Water and Hot Water Systems* | *2014* | *pending* |
| ~~116~~ | ~~P - 4.1.020~~ | ~~Energy Independence Upgrades~~ | ~~2014~~ | ~~pending~~ |
| *117* | *P - 4.1.021* | *Cogen NG Line Meter* | *2015* | *pending* |
| | | | | |
| **5.0 General Improvements** | | | | |
| **5.1 Odor Control** | | | | |
| 118 | P - 5.1.001 | ORF I Carbon Replacement (annually) | pre-2014 | pending |
| ~~119~~ | ~~P - 5.1.002~~ | ~~ORF I Carbon Replacement (annually)~~ | ~~pre-2014~~ | ~~pending~~ |
| ~~120~~ | ~~P - 5.1.003~~ | ~~ORF III Carbon Replacement~~ | ~~pre-2014~~ | ~~pending~~ |
| 121 | P - 5.1.004 | Odor Monitoring Facilities | pre-2014 | pending |
| 122 | P - 5.1.005 | HW/GRT/PSB Odor Control Improvements | pre-2014 | pending |
| *123* | *P - 5.1.006* | *IJS Odor Control Improvements - complete* | *pre-2014* | *pending* |
| 124 | P - 5.1.007 | Drying Bldg Odor Control Improvements | pre-2014 | pending |
| 125 | P - 5.1.008 | ORF III Chem Feed System Improvements | pre-2014 | pending |
| ~~126~~ | ~~P - 5.1.009~~ | ~~ORF III Recirc Pump Facility Repairs - (w/P-5.1.008)~~ | ~~2013~~ | ~~eliminated~~ |
| *127* | *P - 5.1.010* | *ORF I, ORF II, and ORF III Process Improvements* | *2015* | *pending* |
| ~~128~~ | ~~P - 5.1.011~~ | ~~MH No. 4 Odor Control~~ | ~~pre-2014~~ | ~~pending~~ |
| | | | | |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| **5.2 Plant-Wide Systems** | | | | |
| *129* | *P - 5.2.001* | *Natural Gas Pipeline Replacement* | *pre-2014* | *2014* |
| ~~*130*~~ | ~~*P - 5.2.002*~~ | ~~*High Risk and Critical Asset Rehabilitation (w/misc projects)*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| ~~*131*~~ | ~~*P - 5.2.003*~~ | ~~*High Risk & Critical Asset Rehab- (w/P-5.2.002)*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| *132* | *P - 5.2.004* | *3WLC Strainer Replacement* | *pre-2014* | *2014* |
| ~~*133*~~ | ~~*P - 5.2.005*~~ | ~~*3WHP Strainer Replacement (See P-5.2.006)*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 134 | P - 5.2.006 | Plant Water Functional Improvements | pre-2014 | pending |
| ~~*135*~~ | ~~*P - 5.2.007*~~ | ~~*3WL Pump No. 3 Installation (See P-5.2.006)*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| ~~*136*~~ | ~~*P - 5.2.008*~~ | ~~*Underground Piping Rehabilitation - comb w/misc projects*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| ~~*137*~~ | ~~*P - 5.2.009*~~ | ~~*Structure Settlement Stabilization (see 3.2.003)*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| ~~*138*~~ | ~~*P - 5.2.010*~~ | ~~*3WHP Pump Control Improvements*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| ~~*139*~~ | ~~*P - 5.2.011*~~ | ~~*1W System Rehab*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 140 | P - 5.2.012 | Site Security Facilities | pre-2014 | pending |
| ~~*141*~~ | ~~*P - 5.2.013*~~ | ~~*Crane Truck Replacement - elim., veh replace PAR*~~ | ~~*pre-2014*~~ | ~~*PAR*~~ |
| 142 | P - 5.2.014 | Perimeter Fence Replacement | pre-2014 | pending |
| 143 | P - 5.2.015 | Northwest Storm Water Drain Sump to South DAF Pit Rehabilitation | pre-2014 | pending |
| ~~*144*~~ | ~~*P - 5.2.016*~~ | ~~*2W System Upgrades*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| ~~*145*~~ | ~~*P - 5.2.017*~~ | ~~*Service Air and Instrument Air Piping Repairs*~~ | ~~*pre-2014*~~ | ~~*pending*~~ |
| 146 | P - 5.2.017 | Instrument Air Piping Repairs | pre-2014 | pending |
| ~~*147*~~ | ~~*P - 5.2.018*~~ | ~~*UG piping to new pipe galleries - eliminated, not practical*~~ | ~~*pre-2014*~~ | ~~*PAR*~~ |
| 148 | P - 5.2.019 | Plant Landscaping | 2014 | pending |
| ~~*149*~~ | ~~*P - 5.2.020*~~ | ~~*Facility Vehicle Replacement - eliminated, veh replace PAR*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| 150 | P - 5.2.021 | Climate Control at MCCs | pre-2014 | pending |
| ~~*151*~~ | ~~*P - 5.2.022*~~ | ~~*Coded Entry at MCCs - (w/P-5.2.012)*~~ | *pre-2014* | pending |
| *152* | *P - 5.2.023* | *South Parcel Fence* | *pre-2014* | *2013* |
| ~~*153*~~ | ~~*P - 5.2.024*~~ | ~~*Exterior Asset Corrosion Control - PAR*~~ | ~~*2014*~~ | ~~*PAR*~~ |
| ~~154~~ | ~~P - 5.2.025~~ | ~~Technology Master Plan Recommendations Implementation~~ | ~~2014~~ | ~~*pending*~~ |
| 155 | P - 5.2.026 | Plant Waste Stream Rerouting | 2015 | pending |
| 156 | P - 5.2.027 | Plant-Wide Seal Coating | ≥2021 | pending |
| 157 | P - 5.2.028 | Flooding Mitigation | 2015 | pending |
| ~~158~~ | ~~P - 5.2.029~~ | ~~3WL - Flow Control Valves on ORFs I & II Spray Water Lines~~ | ~~2015~~ | ~~*pending*~~ |
| ~~159~~ | ~~P - 5.2.030~~ | ~~3WHP - Install Solenoid Valves and Local Controllers~~ | ~~2015~~ | ~~*pending*~~ |
| 160 | P - 5.2.031 | Arc Flash Hazard Assessment | 2016 | pending |
| 161 | P - 5.2.032 | Plant Wide Asset Painting and Protective Coating (Annually) | 2016+ | pending |
| 162 | P - 5.2.033 | Plant Wide Abandoned Equipment Removal | 2016 | pending |
| | | | | |
| **5.3 Buildings** | | | | |
| 163 | P - 5.3.001 | Ops Bldg Locker Replacement | pre-2014 | pending |
| 164 | P - 5.3.002 | Ops Bldg Air Intake Relocation | pre-2014 | pending |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| 165 | P - 5.3.003 | Construction Office Upgrade | pre-2014 | pending |
| 166 | P - 5.3.004 | Ops Bldg Chiller Replacement | pre-2014 | pending |
| ~~*167*~~ | ~~*P - 5.3.005*~~ | ~~*Chlorine Storage Facility Floor Repairs - (PAR)*~~ | ~~*pre-2014*~~ | ~~*PAR*~~ |
| 168 | P - 5.3.006 | Secondary Scum Pit Roof Removal | pre-2014 | pending |
| ~~*169*~~ | ~~*P - 5.3.007*~~ | ~~*RAS Channel Vapor Barrier (w/P-1.3.004)*~~ | ~~*pre-2014*~~ | ~~*combined*~~ |
| *170* | *P - 5.3.008* | *Roof Access Safety Facilities* | *pre-2014* | *2014* |
| *171* | *P - 5.3.009* | *DW Bldg Roof Repair (PAR)* | *pre-2014* | *2014 - GS* |
| 172 | P - 5.3.010 | Dryer Lab Enclosure | 2015 | pending |
| ~~*173*~~ | ~~*P - 5.3.011*~~ | ~~*Pure Green Storage Facility*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 174 | P - 5.3.012 | Chiller for Cogen Engine Building | 2016 | pending |
| | | | | |
| **5.4 Miscellaneous** | | | | |
| ~~*175*~~ | ~~*P - 5.4.001*~~ | ~~*Treatment Plant Model - eliminated, <$50k*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| ~~*176*~~ | ~~*P - 5.4.002*~~ | ~~*Lateral File Cabinets in Vault - eliminated, not E-CAMP project*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| ~~*177*~~ | ~~*P - 5.4.003*~~ | ~~*Document Management - moved to ES project*~~ | ~~*pre-2014*~~ | ~~*eliminated*~~ |
| 178 | P - 5.4.004 | Vallecitos Sample Vault Installation | pre-2014 | pending |
| | | | | |
| **6.0 Technology** | | | | |
| **6.1 Operations Technology** | | | | |
| **6.1.1 Special Studies** | | | | |
| 179 | P - 6.1.101 | Process Control Narrative and Automation Study (OT_SS01) | 2015 | pending |
| ~~*180*~~ | ~~*P - 6.1.102*~~ | ~~*Optimization Feasibility Study (OT_SS02)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*181*~~ | ~~*P - 6.1.103*~~ | ~~*SCADA Knowledge Management Plan (OT_SS03)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.1.2 Enterprise SCADA** | | | | |
| 182 | P - 6.1.201 | SCADA Network and Computer Room Upgrades (OT_ES01) | 2015 | pending |
| ~~*183*~~ | ~~*P - 6.1.202*~~ | ~~*SCADA Pilot Project (OT_ES02)*~~ | ~~*2016*~~ | ~~*pending*~~ |
| ~~*184*~~ | ~~*P - 6.1.203*~~ | ~~*SCADA Upgrade Plant and Remote Fac (OT_ES03)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 185 | P - 6.1.204 | Co-Gen Facility and Biosoilds SCADA Integration (OT_ES04) | 2015 | pending |
| ~~*186*~~ | ~~*P - 9.6.121*~~ | ~~*SCADA Upgrade for CWRF Facility (OT_ES05) (R-CAMP)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.1.3 Information Driven** | | | | |
| 187 | P - 6.1.301 | Implement ODMS Layer 1 (SCADA Historian) (OT_ID01) | 2015 | pending |
| 188 | P - 6.1.302 | SCADA Integration with WIMS and Dashboards (OT_ID03) | 2015 | pending |
| ~~*189*~~ | ~~*P - 6.1.303*~~ | ~~*ODMS Management and Data Validation (OT_ID02)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*190*~~ | ~~*P - 6.1.304*~~ | ~~*Automated Data Validation (OT_ID04)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*191*~~ | ~~*P - 6.1.305*~~ | ~~*Tablet Access to Electronic Documentation (OT_ID05)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*192*~~ | ~~*P - 6.1.306*~~ | ~~*Inventory, Collate and Load Documentation (OT_ID06)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*193*~~ | ~~*P - 6.1.307*~~ | ~~*EWA Staff Wiki (OT_ID07)*~~ | ~~*2015*~~ | ~~*pending*~~ |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| | | | | |
| **6.1.4 Operations Improvement** | | | | |
| 194 | P - 6.1.401 | Electronic Operator Logbook and Pass-Down (OT_OI03) | 2016 | pending |
| 195 | P - 6.1.402 | Optimization Implementation (OT_OI01) | 2015 | pending |
| ~~*196*~~ | ~~*P - 6.1.403*~~ | ~~*O&M Performance Management (OT_OI02)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*197*~~ | ~~*P - 6.1.404*~~ | ~~*Automated Workflow Management (OT_OI04)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*198*~~ | ~~*P - 6.1.405*~~ | ~~*Electronic O&M/Context Sensitive Help (OT_OI05)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*199*~~ | ~~*P - 6.1.406*~~ | ~~*Equipment Condition Based Monitoring (OT_OI06)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 200 | P - 6.1.407 | Automation Study Implementation | 2016 | pending |
| | | | | |
| | | | | |
| **6.1.5 SCADA Asset Management** | | | | |
| 201 | P - 6.1.501 | SCADA Design Guidelines (OT_AM01) | 2015 | pending |
| 202 | P - 6.1.502 | SCADA Software Standards (OT_AM02) | 2015 | pending |
| ~~*203*~~ | ~~*P - 6.1.503*~~ | ~~*HMI and PLC Procurement Agreements (OT_AM05)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*204*~~ | ~~*P - 6.1.504*~~ | ~~*Alarm Remediation (Biannial) (OT_AM10)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*205*~~ | ~~*P - 6.1.505*~~ | ~~*SCADA Cyber Security VA (Biannial) (OT_AM12)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*206*~~ | ~~*P - 6.1.506*~~ | ~~*SCADA Project Development Methodologies (OT_AM03)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*207*~~ | ~~*P - 6.1.507*~~ | ~~*Standard Division 17 Specifications (OT_AM04)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 208 | P - 6.1.508 | SCADA Governance (OT_AM06) | 2015 | pending |
| ~~*209*~~ | ~~*P - 6.1.509*~~ | ~~*Organization and Support Plan (OT_AM07)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*210*~~ | ~~*P - 6.1.510*~~ | ~~*SCADA Disaster Recovery/Business Continuity (OT_AM08)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*211*~~ | ~~*P - 6.1.511*~~ | ~~*SCADA Software Change Management (OT_AM09)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*212*~~ | ~~*P - 6.1.512*~~ | ~~*SCADA Lifecycle Management (OT_AM11)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*213*~~ | ~~*P - 6.1.513*~~ | ~~*Critical Instrument Calibration Procedure (OT_AM13)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.2 Business Technology** | | | | |
| **6.2.1 Technology & Data Governance** | | | | |
| 214 | P - 6.2.101 | IT Governance Policies (BT_TDG01) | 2015 | pending |
| 215 | P - 6.2.102 | Technology Master Plan Updates (BT_TDG02) (every 5 yrs) | 2015 | pending |
| 216 | P - 6.2.103 | Data Management Standards (BT_TDG03) | 2015 | pending |
| | | | | |
| **6.2.2 Business Management Enhancements** | | | | |
| ~~*217*~~ | ~~*P - 6.2.201*~~ | ~~*HR Implementation (BT_BME03)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 218 | P - 6.2.202 | Management Reporting Enhancements (BT_BME08)(5yrs) | 2015 | pending |
| ~~*219*~~ | ~~*P - 6.2.203*~~ | ~~*Financial Enhancements (BT_BME01)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*220*~~ | ~~*P - 6.2.204*~~ | ~~*Payroll Enhancements (BT_BME02)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*221*~~ | ~~*P - 6.2.205*~~ | ~~*Project Accounting Enhancements (BT_BME04)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*222*~~ | ~~*P - 6.2.206*~~ | ~~*Procurement Enhancements (BT_BME05)*~~ | ~~*2015*~~ | ~~*pending*~~ |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| ~~223~~ | ~~P - 6.2.207~~ | ~~*Inventory Enhancements (BT_BME06)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~224~~ | ~~P - 6.2.208~~ | ~~*Fixed Assets Enhancements (BT_BME07)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.2.3 Regulatory Compliance** | | | | |
| 225 | P - 6.2.301 | LIMS Enhancements (BT_RC01) (annual x5) | 2015 | pending |
| 226 | P - 6.2.302 | WIMS Enhancements (BT_RC02) (annual x5) | 2015 | pending |
| ~~227~~ | ~~P - 6.2.303~~ | ~~*Regulatory SOP Enhancements (BT_RC03)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.2.4 Asset Management** | | | | |
| 228 | P - 6.2.401 | CMMS Enhancements (BT_AM01) (annual) | 2015 | pending |
| ~~229~~ | ~~P - 6.2.402~~ | ~~*Maintenance SOPs (BT_AM02)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~230~~ | ~~P - 6.2.403~~ | ~~*GIS Implementation & Integration (BT_AM03)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~231~~ | ~~P - 6.2.404~~ | ~~*Capital Asset Planning (BT_AM04)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~232~~ | ~~P - 6.2.405~~ | ~~*Mobile Electronic Forms (BT_AM05)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.2.5 Capital Program Management** | | | | |
| ~~233~~ | ~~P - 6.2.501~~ | ~~*Capital Program Management (BT_CPM01)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.2.6 Document/Records Management** | | | | |
| 234 | P - 6.2.601 | Public Website Enhancements (BT_DM02) | 2015 | pending |
| ~~235~~ | ~~P - 6.2.602~~ | ~~*Collaboration/Content Portal (BT_DM01)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~236~~ | ~~P - 6.2.603~~ | ~~*EDMS Update & Enhancements (BT_DM03)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| | | | | |
| **6.2.7 Information Technology Infrastructure** | | | | |
| ~~237~~ | ~~P - 6.2.701~~ | ~~*Mobile Computing Deployments (BT_ITI01) (annual x3)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~238~~ | ~~P - 6.2.702~~ | ~~*Cyber-Security Assess/Improve/Updates (BT_ITI04) (annual x4)*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 239 | P - 6.2.703 | Business Continuity Readiness (BT_ITI03) | 2015 | pending |
| 240 | P - 6.2.704 | Telecommunications Upgrades (BT_ITI02) | 2015 | pending |
| | | | | |
| **7.0 Reserved for Future** | | | | |
| **8.0 Professional Services** | | | | |
| **8.1 Condition Assessments** | | | | |
| *241* | *CA-8.1.001* | *FY 2013 Asset Condition Assessments* | *2014* | *2013* |
| *242* | *CA-8.1.002* | *Fire Main Supply* | *2014* | *2014* |
| *243* | *CA-8.1.003* | *FY 2014 Assessments Triggered by Asset Age* | *2014* | *2014* |
| 244 | CA-8.1.004 | FY 2015 Assessments Triggered by Asset Age | 2014 | pending |
| 245 | CA-8.1.005 | Underground Structures (Elect MHs) | 2014 | pending |
| 246 | CA-8.1.006 | FY 2016 Assessments Triggered by Asset Age | 2014 | pending |
| ~~247~~ | ~~CA-8.1.007~~ | ~~*Underground Structures - Part 2 - eliminated*~~ | ~~*2014*~~ | ~~*pending*~~ |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~ )* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| 248 | CA-8.1.008 | Bridges | 2014 | pending |
| 249 | CA-8.1.009 | FY 2017 Assessments Triggered by Asset Age | 2014 | pending |
| 250 | CA-8.1.010 | FY 2018 Assessments Triggered by Asset Age | 2014 | pending |
| 251 | CA-8.1.011 | FY 2019 Assessments Triggered by Asset Age | 2015 | pending |
| 252 | CA-8.1.012 | Building Condition Assessment | 2015 | pending |
| 253 | CA-8.1.013 | FY 2020 Assessments Triggered by Asset Age | 2015 | pending |
| | | | | |
| **8.2 Studies and Updates** | | | | |
| *254* | *S-8.2.001* | *EWPCF 2040 Facility Master Plan Study* | *2014* | *2014* |
| *255* | *S-8.2.002* | *Plant and Non-Potable Water Study* | *2014* | *2013* |
| 256 | S-8.2.003 | Biosolids Management Business Plan Update | 2014 | pending |
| *257* | *S-8.2.004* | *Comprehensive Energy Rates Study (see P-4.1.020)* | *2014* | *pending* |
| 258 | S-8.2.005 | Wastewater Characterization Study | 2014 | pending |
| ~~*259*~~ | ~~*S-8.2.006*~~ | ~~*Exterior Asset Corrosion Control (PAR)*~~ | ~~*2014*~~ | ~~*pending*~~ |
| 260 | S-8.2.007 | Offsite Wetlands Restoration | 2014 | pending |
| ~~*261*~~ | ~~*S-8.2.008*~~ | ~~*R&D Projects Support (moved to ES-8.4.002)*~~ | ~~*2014*~~ | ~~*NA*~~ (1) |
| ~~*262*~~ | ~~*S-8.2.009*~~ | ~~*Agency Merger Studies - not part of capital program*~~ | ~~*2014*~~ | ~~*NA*~~ (1) |
| *263* | *S-8.2.010* | *Plant Flooding Study* | *2014* | ~~*NA*~~ (1) |
| ~~*264*~~ | ~~*S-8.2.011*~~ | ~~*Technology Assessment Group Project Feasibility Study*~~ | ~~*2015*~~ | ~~*pending*~~ |
| ~~*265*~~ | ~~*S-8.2.012*~~ | ~~*Sludge / Biosolids Screening Facility*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 266 | S-8.2.013 | Process Master Plan (Solids, Air, Title V, CEPT, efficiency) | 2015 | pending |
| ~~*267*~~ | ~~*S-8.2.014*~~ | ~~*CEPT Evaluation*~~ | ~~*2015*~~ | ~~*pending*~~ |
| 268 | S-8.2.015 | Potable Reuse Study | 2015 | pending |
| 269 | S-8.2.016 | Phosphorus Removal Study | 2016 | pending |
| 270 | S-8.2.017 | Secondary Treatment Replacement Alternatives Study | 2016 | pending |
| 271 | S-8.2.018 | Pure Green Demonstration Garden Master Plan | 2016 | pending |
| | | | | |
| **8.3 E-CAMP Updates** | | | | |
| 272 | ES-8.3.001 | E-CAMP Updates (Annual) | 2013 | 2012 |
| | | | | |
| **ES-8.4 Engineering Services** | | | | |
| 273 | ES-8.4.001 | Extension of Staff Engineering Services (Annual) | 2014 | 2006 |
| 274 | ES-8.4.002 | R&D Projects Support | 2014 | 2012 |
| *275* | *ES-8.4.003* | *Map Underground Piping ≤ 12-inch* | *2014* | *2013* |
| ~~*276*~~ | ~~*ES-8.4.004*~~ | ~~*Map Underground Piping > 12-inch*~~ | ~~*2014*~~ | ~~*pending*~~ |
| *277* | *ES-8.4.005* | *Electronic O&M and Document Management - Phase 1* | *2014* | *2013* |
| *278* | *ES-8.4.006* | *Electronic O&M and Document Management - Phase 2* | *2014* | *2014* |

| Ref | Project No. | Capital Project (Red, Projects Identified in FY 2016 E-Camp) *(Blue, Italics Text Indicates Project Funded/ Completed by FY Construction Listed or ~~Eliminated~~)* | E-CAMP Rev Year Project Added | Actual Const FY Start |
|---|---|---|---|---|
| 279 | ES-8.4.007 | Electronic O&M and Document Management - Phase 3 | 2014 | pending |
| 280 | ES-8.4.008 | Electronic O&M and Document Management - Phase 4 | 2015 | pending |
| 281 | ES-8.4.009 | Pyrolosis Pilot Study Support | 2015 | NA (1) |
| 282 | ES-8.4.010 | Electronic O&M and Document Management - Updates | 2016 | NA (1) |
| 283 | ES-8.4.0xx | Misc. Professional Studies | 2016 | NA (1) |
| | | | | |
| **OS-8.5 Other Services** | | | | |
| ~~*283*~~ | ~~*OS-8.5.001*~~ | ~~*Legal and Misc Services (Annual)*~~ | ~~*2014*~~ | ~~*NA*~~ (1) |
| *284* | *OS-8.5.002* | *Settlement Study* | *2015* | *2014* |
| ~~*285*~~ | ~~*OS-8.5.003*~~ | ~~*Printing, Shipping, and Advertising*~~ | ~~*2015*~~ | ~~*2015*~~ |
| ~~*286*~~ | ~~*OS-8.5.004*~~ | ~~*Capital Improvement Management Assessment*~~ | ~~*2015*~~ | ~~*2015*~~ |
| | | | | |
| **9.0 Remote Major Rehab Improvements - Refer to R-CAMP** | | | | |

(1) NA = Not applicable
(2) TP = Top Priority
(3) PM = Preventative Maintenance
(4) + = Reoccuring Project
(5) TMP = Technology Master Plan
(6) PAR = Planned Asset Replacement

**APPENDIX C**

**EWA COMPREHENSIVE ASSET MANAGEMENT PLAN METHODOLOGY**

**This page left intentionally blank**

## Appendix C: EWA Comprehensive Asset Management Plan Methodology

### C.1 Background

The Encina Water Pollution Control Facility (EWPCF) has a successful history of asset management through its Master Plan of Rehabilitation and Major Improvement Projects (Master Plan). Originally developed in 1993, the Master Plan became the vehicle to communicate to the EWA Board of Directors the future EWPCF infrastructure improvements and the anticipated resources required for implementation. The Master Plan for the EWPCF utilized a comprehensive ranking system that included seven evaluation categories to determine infrastructure rehabilitation and replacement needs. Those evaluation categories were:

1. Replacement Required
2. Maintain Plant Rated Capacity
3. Cost Efficiency
4. Improve Safety and Working Environment
5. Improve Odor Control
6. Compliance with Regulatory Requirements
7. Improve Energy Efficiency

Each evaluation category was appropriately weighted to an established level of importance ranging from 1 to 10 with 1 being the lowest importance and 10 being the highest importance. Previous Master Plan projects are listed in **Appendix A**.

### C.2 Introduction to the EWPCF Comprehensive Master Plan (E-CAMP) Process

This appendix outlines the EWA's approach and basic framework behind the EWPCF Comprehensive Asset Management Plan (E-CAMP) process. The CAMP process was developed from the previous Master Plan process, incorporating project needs identification based on asset-based inventory and ongoing condition assessment triggered by approaching of the end of useful life.

EWA developed an initial major asset registry which was used as a basis for the CAMP process. The CAMP process consists of seven unique task elements that provide staff and consultant with a logical framework of progression from beginning to its ultimate conclusion with final publishing and distribution of the E-CAMP update each year.

The E-CAMP is updated prior to establishing the budget for the upcoming fiscal year. While the E-CAMP is independent of the budgeting process, it is used as a reference in developing one, five and twenty year budgets. The annual update is utilized in planning capital rehabilitation projects with the consideration of anticipated changes in regulatory compliance, cost-saving opportunities, available funding and ongoing O&M requirements of the EWPCF.

The implementation schedule is prepared after considering the project priority ranking and other factors, such as regulatory compliance deadlines and economy of scale. Typical scheduling of project phases include:

- Condition Assessment
- Feasibility Study
- Design
- Bid and Construction

Typically the condition assessment for major assets is completed at least five years prior to reaching the estimated end of the estimated useful life of major assets. A feasibility study or in-kind replacement is scheduled when the asset is confirmed to be nearing the end of its assessed useful life. The study and design phases will consider conventional and alternative delivery methods including design-build (DB), design-build-operate (DBO), design-build-own-operate (DBOO), etc. Construction is typically scheduled for the year after the design phase.

At the beginning of each fiscal year, the E-CAMP projects selected for funding are initiated. If the cost of implementing an approved project during a fiscal year exceeds the budgeted amount, or if the project is not started in its respective fiscal year, the project can then be re-evaluated for priority ranking and implementation in the following fiscal year.

The E-CAMP contains condition assessments, studies, and other capital plan updates. It is primarily focused on rehabilitation and improvements needed for the existing facilities. Projects that are considered in the E-CAMP are those needed to maintain the existing facilities, reduce operating costs, meet regulatory requirements, improve odor control, improve plant safety or improve energy efficiency. The cost of each project included in the E-CAMP is estimated to exceed $50,000. However, EWA staff may select lower cost projects to be included in the E-CAMP if those projects are considered high priority.

Professional services including condition assessments, studies, and other capital plan updates included in the E-CAMP are included based upon the probability that the outcome of each assessment, study, and update will most likely exceed the $50,000 threshold for E-CAMP project inclusion.

Remote facility capital asset related projects are identified under the Remote Comprehensive Asset Management Plan (R-CAMP) and are not evaluated in the E-CAMP. However, the remote facility projects recommended in the most recent R-CAMP are included in Section 7 of the E-CAMP.

Implementation of the E-CAMP is through the following seven Task Elements:

- Task Element 1 – Conduct Condition Assessments
- Task Element 2 – Update Asset Lists
- Task Element 3 – Conduct Needs Assessments
- Task Element 4 – Update Capital Projects Lists
- Task Element 5 – Determine Priority Projects
- Task Element 6 – Estimate Project Costs
- Task Element 7 – Recommend Project Implementation Schedule

The EWA budgeting process includes several designations to group capital projects. These are referenced in E-CAMP project summary tables and are described as follows:

- Capital Improvement Projects (CIP): Improvement projects that increase or maintain system capacity. The EWA budgeting process defines Capital Improvement Projects as those valued greater than $20,000. Projects valued between $20,000 and $50,000 will generally not be included in the E-CAMP.
- Planned Asset Replacement (PAR): Asset replacement projects extend the useful life of facilities. The EWA budgeting process defines PAR projects as those valued greater than $20,000. Projects valued between $20,000 and $50,000 will generally not be included in the E-CAMP.
- Capital Acquisition (CA): New assets or facility repair projects valued greater than $2,000 but less than $20,000.
- Major Assets (MjA): Assets valued greater than $50K

- Minor Assets (MnA): Assets valued less than $50K
- Information Systems (IS)
- Improved Technology (IMPR)

The E-CAMP contains detailed supporting documents that provide an organized listing of major assets, estimated useful life of each asset, and scheduled replacement or rehabilitation of each asset. Through the E-CAMP, EWA staff project future expenditures for capital improvement projects, in both the short and long term, and communicates proposed improvements to the EWA Board of Directors. Discussion of each Task Element occurs in the subsequent paragraphs.

### C.3 Major Asset Register

The cornerstone of the EWA's E-CAMP is an accurate inventory of the EWPCF assets placed in its appropriate asset classification. The EWPCF Infrastructure was placed in service over various major expansion phases of construction that began in 1963. Major asset inventory and historical asset auditing is a continuing process for EWA staff. Assets inventoried in FY 2009 and FY 2010 included above ground and below ground piping 12-inches and larger. Assets inventoried in FY 2011 include the new operations and maintenance facilities, biosolids facilities and energy management facilities. In FY 2012, below ground piping less than 12-inches in diameter were added to the major asset register. Encina has provided the updated registry list annually for the FY2013-2015 E-CAMP preparation.

Major assets currently inventoried for the EWPCF can be found in the **Appendix E.** The EWPCF major asset register will be reviewed annually to account for in-house and contracted rehabilitation projects.

Information that is provided in the asset register includes:

- Asset ID
- Asset Description
- Asset Classification
- Asset Location
- Asset Installation Date
- Last Rehabilitation Date of Asset
- Estimated Asset Useful Life
- Estimated Asset Replacement Date
- Estimated Replacement Cost

#### C.3.1 Asset Classification

Asset classification within the E-CAMP effectively organizes EWPCF assets according to functionality. The E-CAMP includes six unique asset classifications that are categorized in **Figure C-1**.

**Figure C-1: Asset Classifications**

| STRUCTURE | MECHANICAL | ELECTRICAL & INSTRUMENTATION | PIPING | FLEET | MISCELLANEOUS |
|---|---|---|---|---|---|
| - Buildings<br>- Pavement<br>- Tanks<br>- Storm Drains<br>- Vaults<br>- Etc. | - Barscreens<br>- Air Handling Units<br>- Slide Gates<br>- Collectors<br>- Conveyors<br>- Etc. | - Motor Control<br>- Switchgear<br>- SCADA<br>- Control Panels<br>- Electrical Panels<br>- Etc. | - Above Ground<br>- Below Ground<br>- 4" and Larger<br>- Critical Piping<br>- Fire Sprinkler<br>- Etc. | - Utility Tractors<br>- Utility Forklifts<br>- Utility Vehicles<br>- Etc. | - Waste Gas Flares<br>- Truck Scales<br>- Carbon Beds<br>- Fencing<br>- Guard Rails<br>- Etc. |

### C.3.2 Asset Useful Life Expectancy

Asset useful life expectancy is an estimation of how long an asset is expected to function in its environment. Initially, the useful life was estimated. Assets utilized in the wastewater treatment process are generally recognized as "severe-duty" assets routinely exposed to a wide variety of harmful elements. Asset useful life estimates for the EWPCF were determined through in-house staff consultation, benchmarking other wastewater treatment facilities and conducting online research.

Once asset useful life estimations were determined they were placed in the E-CAMP Major Asset Register and are used as a basis for rehabilitation or replacement budgeting. As assets near the end of their estimated useful life, a condition assessment is completed to determine the "assessed" useful life. Based on the assessed useful life, either replacement of the asset is scheduled or deferred until later in the assessed service life.

**Table C-1** lists general asset useful life estimates utilized for the EWPCF.

**Table C-1: General Asset Useful Life Estimates**

| Asset | Useful Life (years) |
|---|---|
| Actuator | 15 |
| Air Conditioner | 15 |
| Air Drier | 10 |
| Air Handling Units | 20 |
| Air Compressor | 10 |
| Air Dryer | 25 |
| Aluminum Covers, for process areas | 20 |
| Analyzer (Meter), Dissolved Oxygen | 10 |
| Analyzer, $CO_2$ and CO | 10 |
| Backflow Preventer | 15 |
| Bar Screens | 20 |
| Battery Bank | 7 |
| Belt Filter Presses | 20 |
| Bin, Wet Cake and Recycle Material | 25 |
| Blower, RTO Exhaust | 25 |
| Blower, Furnace Combustion | 25 |
| Blowers – Aeration Air (engine driven) | 20 |
| Blowers – Aeration Air (electric) | 30 |
| Blowers – Agitation Air | 30 |
| Blower - Digester Mix Gas | 20 |
| Bookcase, File Drawer, Cabinet, Desk, Hutch | 10 |
| Boiler | 15 |
| Building, Structure | 50 |
| Burner, RTO | 30 |

| Asset | Useful Life (years) |
|---|---|
| Burner – Waste Gas | 30 |
| Catalyst, Oxidation | 10 |
| Centrifuge | 25 |
| Chiller (Power Bldg) | 20 |
| Chute | 25 |
| Collector – DAF Tank | 15 |
| Collector – Secondary Clarifier | 20 |
| Communication Radio | 7 |
| Condenser/Saturator | 10 |
| Conveyor – Screw | 25 |
| Conveyor – Belt | 20 |
| CPU | 7 |
| Crane | 25 |
| Crusher, Pellet Roller | 25 |
| Digester Gas Boiler | 15 |
| Door, Roll up | 25 |
| Defribrillator | 10 |
| Drill | 7 |
| Drum Dryer | 30 |
| Drying oven, paint shop | 12 |
| Dust Collector | 20 |
| Electric Conduit, Wiring, and Fixtures | 25 |
| Electric Cart | 7 |
| Electric Switch Gear | 20 |

| Asset | Useful Life (years) |
|---|---|
| Electric Transformer | 20 |
| Elevator, Bucket | 25 |
| Elevator | 25 |
| Engine – Cogen | 20 |
| Engine Related Equipment | 20 |
| Ethernet Switch | 7 |
| Explosion Vent | 20 |
| Fan | 25 |
| Filter – 3WHP/2W Sandfilter | 25 |
| Filter – Carbon | 20 |
| Fire Hydrant | 10 |
| Flame Arrester | 15 |
| FRP Weirs | 15 |
| FRP Tanks | 15 |
| Fugitive Dust Rupture Disk Monitor | 15 |
| Furnace | 30 |
| Furnace Flame Detector | 30 |
| Gates - slide gate | 30 |
| Gates - sluice gate, stainless steel | 30 |
| Gates - sluice gate, cast iron | 20 |
| General Distribution Panel (Power Bldg) | 20 |
| Grinder – Sludge | 15 |
| Grit Dewatering Screw | 20 |
| Hand-hole | 25 |
| Heat Exchanger, shell and tube steel | 30 |
| Heat Exchanger, Plate & Frame | 30 |
| Heat Recovery Silancer | 20 |
| Hydraulic Unit – Screenings Press | 10 |
| Instrumentation Analyzers, turbidmeters, level sensors | 5 |
| Instrumentation Controls | 15 |
| Laboratory Equipment, Furnace | 12 |

| Asset | Useful Life (years) |
|---|---|
| Laboratory Equipment, Hood, Fume | 20 |
| Laboratory Equipment, Kiln | 15 |
| Laboratory Equipment, Miscellaneous Mixers, Stirrers, Burners | 7 |
| Laboratory Equipment, Bottle Washer | 10 |
| Laptop | 7 |
| Leak Detector | 10 |
| Level Sensor | 7 |
| Lighting, Yard | 15 |
| Heater, Pellet Oil Tank | 10 |
| Main Switchgear | 30 |
| Mixer, Static Polymer | 10 |
| Meter, chemical flow | 7 |
| Mixer, Dryer | 25 |
| Meter, Magnetic Flow | 15 |
| Meter, portable | 10 |
| Monitor | 7 |
| Motor Control Centers | 40 |
| Panel | 15 |
| Pellet Cooler | 25 |
| Piping - Ductile Iron, exposed | 30 |
| Piping - Ductile Iron, underground | 40 |
| Piping - PVC, exposed | 15 |
| Piping - PVC, underground | 35 |
| Piping - RCP, underground, sewers | 50 |
| Piping - RCP, underground, storm drains & outfalls | 50 |
| Piping - Stainless Steel | 30 |
| Piping - Steel, underground | 30 |
| Plumbing – General | 20 |
| Plumbing - Laboratory Piping | 20 |
| Pneumatic Transport System | 25 |
| Polycyclone Screw Feed | 25 |

| Asset | Useful Life (years) |
|---|---|
| Polycyclone Separator | 25 |
| Preseparator | 25 |
| Product Diverter | 25 |
| Printer | 7 |
| Pulsatin Dampener | 8 |
| Pump – WAS, Oil, 3WHP, Primary Sludge, Drain, Grit | 10 |
| Pump – Scum, Chemical | 8 |
| Pump – TWAS, 3W, Sump, Storm Water, Sludge Circulating, Cake | 15 |
| Pump – RAS, PE, SE, 2W, Digester Mixing, Vertical Turbine | 20 |
| Receiver | 20 |
| Recycle Bin Activator/ Vibrator | 25 |
| Refrigerator | 10 |
| Regenerative Thermal Oxidizer | 3 |
| Regulator, Air or Pressure | 10 |
| Rotary Screen | 20 |
| Scale | 25 |
| Server | 7 |
| Skimmer | 15 |
| Spout, Dustless Load | 15 |
| Stormwater Brow Ditch | 50 |
| Strainer, Basket | 10 |
| Strainer, Automatic | 15 |
| Structures – Concrete | 50 |
| Tank – Concrete | 50 |
| Tank – Expansion | 20 |
| Tank – Filtration | 15 |
| Tank – Nitrogen | 15 |
| Tank – Oil | 20 |
| Tank – Pneumatic Air | 15 |
| Tank – Polymer Mixing | 15 |

| Asset | Useful Life (years) |
|---|---|
| Tank – Silo | 40 |
| Tank – Water Air Break | 20 |
| Tank – Ferric Chloride Storage | 15 |
| Tank – Raw Polymer Storage | 15 |
| Tape Drive | 7 |
| Thermocouple | 10 |
| Transmitters/Switches - Pressure, Temperature, Level, Flow, Vibration | 7 |
| Transformer | 40 |
| UPS | 10 |
| Valves - Air Release Valves | 10 |
| Valves - Butterfly Valves | 20 |
| Valve - Ball (chemical) | 15 |
| Valve - Check Valve | 15 |
| Valve - Double Blocking Main Gas | 20 |
| Valve - Hopper Outlet | 25 |
| Valve - Light Duty | 25 |
| Valve - Plug (Air or Digester Gas) | 20 |
| Valve - Plug (Solids or Liquid) | 15 |
| Valve - Pressure Relief | 10 |
| Valve, Purge | 10 |
| Valves - Raw wastewater | 15 |
| Valve, Rotary | 15 |
| Valves – Sludge | 15 |
| Valve - Solenoid | 10 |
| Vehicle | 7 |
| Variable Frequency Drive (VFD) | 10 |
| Venturi Scrubber | 10 |
| Saw | 10 |
| Shaker Screen | 25 |
| Wet Bin Live Bottom Screw | 25 |

## C.4 CAMP Task Elements

### C.4.1 Task Element 1 – Conduct Condition Assessments

Infrastructure planning and condition assessment provides a solid foundation for future decision making. It is critical that the EWA has a clear understanding of the condition of its infrastructure and how it is performing. Management decisions leading to the replacement and rehabilitation of the EWPCF assets revolve around these two aspects. Not knowing the current condition or performance level of an asset may lead to the premature failure of the asset, leaving the EWA with only one option: to replace the asset – usually the most expensive option in the asset management life-cycle chain.

The unforeseen failure of an asset can have significant consequences that constitute a business risk or potential loss to the EWA. By conducting regular condition assessments, and by monitoring asset performance, rehabilitation strategies can be updated and refined, and ultimate replacement schedules can be determined more accurately. Condition assessment allows the EWA to better understand the remaining useful life of the EWPCF assets. This fundamental understanding drives future expenditure patterns.

In FY 2011, EWA initiated a formal condition assessment process for the EWPCF major assets. The condition assessment documents the current condition of each asset and recommends one of the following:

1) For assets in with remaining useful life, recommend extending the estimated useful life and redesignating to an assessed useful life.

2) Assets with end of useful life projected in the near term, recommend a needs assessment to define a project.

### C.4.2 Task Element 2 – Update Major Asset Register

The Major Asset Register is updated with assessed useful life information determined during the condition assessment conducted as Task Element 1. Additional updates to the Asset Register may include addition or replacement of assets during the previous year capital project work.

### C.4.3 Task Element 3 – Conduct Needs Assessments

Needs assessments are identified both from the condition assessments and from EWA staff observation. When an asset condition assessment determines that an asset is within five years of its assessed useful life, that asset may be recommended for in-kind replacement or for a more detailed study to determine if alternative technologies are more suitable for upgrade. Staff observations are investigated and recommendations summarized in new project definitions.

### C.4.4 Task Element 4 – Update Capital Projects List

A comprehensive list of capital projects is maintained and updated with new projects during each CAMP cycle. The projects are numbered by process area.

### C.4.5 Task Element 5 – Priority Project Assignment

Proposed E-CAMP projects are first screened based on Safety, Assessed Condition or Regulatory Compliance. Projects required to maintain a safe working environment, to prevent eminent equipment failure in the next two years, and to maintain regulatory compliance are designated "Top Priority" and are recommended for funding. Remaining projects are prioritized as described in this section.

The project prioritization process utilizes the established evaluation categories and assigns a weighted value between 1 and 6 with 1 being the lowest importance and 6 being the highest importance. Each project is rated utilizing the seven evaluation categories with priority value assignment ranging from 0 to 3 with 1 representing low relevance, 2 representing medium relevance and 3 representing high relevance. If a specific evaluation category bears no relevance to the project, the project is assigned a rating of 0.

The resulting priority score for each category is determined as the product of the category weight value and the priority value assigned. The composite score for each project is the sum of its priority scores in each evaluation category. Recommendation of project implementation is based on each project's composite score. The priority project rating can vary from year to year based on specific circumstances at the EWPCF in that particular year.

**Figure C-2: Priority Project Ranking Methodology**

| EVALUATION CATEGORY | CATEGORY WEIGHT (1 = Lowest Priority) |
|---|---|
| Safety | Top Priority |
| Assessed Asset Useful Life reached within 2 years | Top Priority |
| Regulatory Compliance | Top Priority |
| Consequence of Failure | 6 |
| Odor Control | 5 |
| Energy Efficiency | 4 |
| Cost Efficiency | 3 |
| Assessed Asset Useful Life | 2 |
| Organizational Efficiency | 1 |

**Evaluation Category Discussion**

The following paragraphs describe each prioritization category and the scoring process. First, projects are screened for applicability of the first three categories. If a project receives a "yes" score for these categories, it is classified as a "top priority" project and is recommended for funding in the near term. If a project receives a "no" score for these categories, it is then scored for the following categories.

### C.4.5.1 Safety

The safety category is used to assess improvements needed to maintain a safe working environment for facility personnel. If a project will significantly reduce the risk of an accident occurring or will significantly improve the working environment then it would screen as a safety project.

### C.4.5.2 Assessed Useful Life

The asset useful life evaluation category addresses the need to replace an existing asset that is within two years of the end of its assessed useful life.

### C.4.5.3 Regulatory Compliance

The regulatory compliance evaluation category is used to assess the relative impact of a project and its ability to comply with current or anticipated regulatory requirements such as:

- Effluent discharge criteria
- Air pollution control rules and regulations
- Regulation for storage and handling of hazardous material
- Storm water regulations
- OSHA and other safety regulations

A project would be identified as a top priority project based on regulatory compliance if there is a high level of risk of non-compliance with established regulatory criteria.

### C.4.5.4 Consequence of Failure

The consequence of failure category is used to determine the criticality of an asset. Some assets are more critical than other assets in maintaining the plant capacity, having higher risk of a failure or an accident occurring, or having higher impacts on the ability to comply with regulatory requirements. These critical assets should be managed and/or maintained to a greater degree than less critical assets because of the probability of a failure occurring and the resulting consequences of that failure.

### C.4.5.5 Odor Control

The odor control evaluation category is used to assess whether a project has a significant effect on improving odor control at the EWPCF. In order for an odor source to be rated, it must be noticeable to odor receptors beyond the EWPCF plant boundary.

#### C.4.5.6 Energy Efficiency

The energy efficiency evaluation category is used to assess the energy effectiveness of each project. Energy effectiveness can be realized through a reduction of energy usage and costs resulting from the implementation of a project. If a project significantly reduces the EWPCF energy requirements or increases the capability to meet on-site energy demands it would receive a higher rating.

#### C.4.5.7 Cost Efficiency

The cost efficiency evaluation category is used to assess the cost effectiveness of each project. Cost effectiveness can be realized through a reduction of operational costs resulting from the implementation of a project. In addition, if a project has a relatively short payback period then it would be designated as cost effective and receive a higher rating.

#### C.4.5.8 Assessed Useful Life

The assessed useful life category is used to assess projects related to aging assets. If an asset is within five years of assessed useful life, it will score higher in this category.

#### C.4.5.9 Organizational Efficiency

The organizational efficiency evaluation category is used to assess the improvement in safety and working environment for the EWPCF plant personnel if the project is implemented. If a project will improve organizational efficiency by creating a more positive working environment, it receives a high rating.

## C.5 Cost Control Considerations

For implementation of each E-CAMP project, the following issues should be considered to control project costs:

1. Where practical, projects should be combined into a single construction contract. This would reduce the volume of contract documents, contract management costs, construction inspection costs, EWA staff time and the general contractor's overhead and supervision costs.

2. Pre-purchase major assets to eliminate Contractor mark-up.

3. Bid projects at the beginning of the fiscal year if bidding climate is favorable.

4. Design and bid similar projects together. This will allow EWA to obtain a favorable bid for multiple units of each asset. O&M costs would be reduced due to simplified training of personnel and a smaller amount of parts inventory.

**APPENDIX D**

**PROJECT COST TABLES**

**This page left intentionally blank**

ENCINA WASTEWATER AUTHORITY

Appendix D - Cost Tables: Table of Contents

ENCINA WASTEWATER AUTHORITY

Appendix D - Cost Tables: Table of Contents

(1) NA = Not applicable
(2) SNR = No study required.
(3) CANR = Condition Assessment Not Required
(4) + = Reoccuring Project

**This page intentionally left blank**

## Appendix D: Project Cost Tables

The E-CAMP Project Cost Table for FY2016 through 2020 contains project construction, study and condition assessment cost estimates. This allows EWA to plan and accurately budget ongoing as well as future assessment and replacement of assets to realize full use of service and to replace assets prior to the end of assessed service life.

The baseline percentages for anticipated construction years extending past a few years are as follows:

| Description | Percentage |
|---|---|
| Contractor Overhead & Profit: | 27% |
| Shipping Rate | 40 % of total is shipped at 15% |
| Sales Tax | 50% of total is taxed at 7.75% |
| Project Contingency | 40% |

Values should be annually reviewed or altered at the engineer/estimator's discretion with more precise percentages as more pertinent information is known and the construction year approaches.

There is Project Phase Cost associated with the Total Main Project Cost that is factored into the Total Project Cost. The baseline percentages for these are as follows:

| Project Phase | Rate* | Contingency |
|---|---|---|
| Condition Assessment | 1.5% | 20% |
| Conceptual Study | 2.5% | 20% |
| Design | 8.0% | 15% |
| Engineer During Construction | 4.5% | 15% |
| Construction Management | 5.5% | 20% |

*Percent of Total Main Project Cost

Rate and Contingency are subject to modification pending upon relevant information and project difficulty. Project Contingency is subject to adjustment based on accuracy of cost estimate. 10% contingency is incorporated in addition to engineering estimates obtained by other consultant firms. Previous condition assessment, conceptual study, and/or acceptable design from projects in the same process may minimize the project phases cost.

Modifications or changes to the baseline percentages should be noted in the last box in the project cost table for further reference.

**This page intentionally left blank**

## Project 1.1.005

**Grit and Screenings Handling Facility Rehab**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Screening (existing headworks) | | | | | | | |
| Demolition | 1 | LS | $ 93,471 | $ 94,000 | | $ - | $ 94,000 |
| Influent Channel Repair | 1 | LS | $ 41,600 | $ 42,000 | | $ - | $ 42,000 |
| Screens (Four climber sceens) | 1 | LS | $ 1,102,400 | $ 1,103,000 | | $ - | $ 1,103,000 |
| Ventilation and Ducting | 1 | LS | $ 124,800 | $ 125,000 | | $ - | $ 125,000 |
| Cutthroat Flume Modifications | 1 | LS | $ 28,704 | $ 29,000 | | $ - | $ 29,000 |
| Electrical | 1 | LS | $ 232,023 | $ 233,000 | | $ - | $ 233,000 |
| Instrumentation | 1 | LS | $ 46,405 | $ 47,000 | | $ - | $ 47,000 |
| Grit and Screenings Building | 1 | LS | | | | $ - | |
| Demolition | 1 | LS | $ 28,042 | $ 29,000 | | $ - | $ 29,000 |
| Site Work | 1 | LS | $ 21,708 | $ 22,000 | | $ - | $ 22,000 |
| Concrete | 1 | LS | $ 122,554 | $ 123,000 | | $ - | $ 123,000 |
| Building (Masonry/Roof/Handrails) | 1 | LS | $ 155,766 | $ 156,000 | | $ - | $ 156,000 |
| Washer/Compactor (2 units) | 1 | LS | $ 256,256 | $ 257,000 | | $ - | $ 257,000 |
| Classifier (2 units) | 1 | LS | $ 503,360 | $ 504,000 | | $ - | $ 504,000 |
| Roto Strainer (1 unit) | 1 | LS | $ 95,680 | $ 96,000 | | $ - | $ 96,000 |
| Odor Control (1 unit) | 1 | LS | $ 267,800 | $ 268,000 | | $ - | $ 268,000 |
| Screenings Conveyor | 1 | LS | $ 234,416 | $ 235,000 | | $ - | $ 235,000 |
| Mechanical Piping | 1 | LS | $ 236,600 | $ 237,000 | | $ - | $ 237,000 |
| Electrical | 1 | LS | $ 299,259 | $ 300,000 | | $ - | $ 300,000 |
| Instrumentation | 1 | LS | $ 59,852 | $ 60,000 | | $ - | $ 60,000 |
| Grit Removal | | | | | | | |
| Demolition | 1 | LS | $ 15,095 | $ 16,000 | | $ - | $ 16,000 |
| Concrete | 1 | LS | $ 461 | $ 500 | | $ - | $ 500 |
| Grit Pumps (6 units) | 1 | LS | $ 166,620 | $ 167,000 | | $ - | $ 167,000 |
| Mechanical Piping | 1 | LS | $ 159,959 | $ 160,000 | | $ - | $ 160,000 |
| Electrical | 1 | LS | $ 66,792 | $ 67,000 | | $ - | $ 67,000 |
| Instrumentation | 1 | LS | $ 13,358 | $ 14,000 | | $ - | $ 14,000 |

| | | | |
|---|---|---|---|
| **Subtotal** | | | **$ 4,385,000** |
| Contractor Overhead & Profit @ | 15% | | $ 822,000 |
| Escalation to Midpoint | 12% | | $ 731,000 |
| Sales Tax | 7.75% | | $ 212,000 |
| Contingency @ | 25% | | $ 1,096,000 |
| **Total Main Project Cost from Previous Reports** | | | **$ 7,246,000** |
| Project Contingency @ | 10% | | $ 724,600 |
| **Total Main Project Cost (Year of Estimate or Estimate Update)** | | | **$ 7,970,600** |
| **Total Project Cost (Present Value in 2015 Dollars)** | LA CCI Nov-2011 | 10088 | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.090 |
| **Total Main Project Cost (CAMP Report Year)** | | | **$ 8,691,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.1.005 CA | Condition Assessment | 1.5% | $ 130,365 | 20% | $ 26,073 | $ 157,000 | Completed |
| 1.1.005 CS | Conceptual Study | 2.5% | $ 217,275 | 20% | $ 43,455 | $ 261,000 | Completed |
| 1.1.005 DS | Design | 8.0% | $ 695,280 | 15% | $ 104,292 | $ 800,000 | $ 800,000 |
| 1.1.005 EDC | Engr During Construction | 4.5% | $ 391,095 | 15% | $ 58,664 | $ 450,000 | $ 450,000 |
| 1.1.005 CM | Construction Mgt | 5.5% | $ 478,005 | 20% | $ 95,601 | $ 574,000 | $ 574,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 10,515,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Carollo Tech Memo No. 6 Grit and Screening Handling Study, November 2011.

## Project 1.1.006

**GRS Isolation Improvements w/GRS 3 Inf Gate**

| Main Project Type | |
|---|---|
| New Facility | X |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2018 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Install adjustable weir gate (estimated 24' x 12" gate) | 3 | EA | $ 45,000 | $ 135,000 | 25% | $ 33,750 | $ 168,750 |
| Grit Chamber No. 3 Influent - Motorized Sluice Gate | 1 | LS | $ 58,280 | $ 59,000 | | $ - | $ 59,000 |
| Motor Operators (2 motor operators per eff weir gate) | 6 | EA | $ 25,000 | $ 150,000 | 25% | $ 37,500 | $ 187,500 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 416,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 113,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 25,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 17,000 |
| Project Contingency @ | | 40% | | $ 229,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 800,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2011 | 10088 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.090 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 873,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.1.006 CA | Condition Assessment | 1.5% | $ 13,095 | 20% | $ 2,619 | $ 16,000 | not reqd |
| 1.1.006 CS | Conceptual Study | 2.5% | $ 21,825 | 20% | $ 4,365 | $ 27,000 | Completed FY2015 |
| 1.1.006 DS | Design | 8.0% | $ 69,840 | 15% | $ 10,476 | $ 81,000 | Completed FY2015 |
| 1.1.006 EDC | Engr During Construction | 4.5% | $ 39,285 | 15% | $ 5,893 | $ 46,000 | $ 46,000 |
| 1.1.006 CM | Construction Mgt | 5.5% | $ 48,015 | 20% | $ 9,603 | $ 58,000 | $ 58,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 977,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Estimated weir gate cost from OCSD Peak Flow Mngt project escalated to 2011 cost.
4. Maybe more cost effective to install isolation gates at the end of each grit effluent channel.

## Project 1.2.006

**PSB Phase I and PE Pipeline Rehab (Phase 1)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Bypass Pumping | 1 | LS | $ 300,000 | $ 300,000 | | $ - | $ 300,000 |
| PE Pipeline Cleaning | 60 | LF | $ 1,000 | $ 60,000 | 25% | $ 15,000 | $ 75,000 |
| Pipe Repairs, mechanical, crown of pipe | 20 | EA | $ 5,000 | $ 100,000 | 50% | $ 50,000 | $ 150,000 |
| PSB 1-6 effluent channel gates, conc repair | 24 | EA | $ 3,500 | $ 84,000 | 50% | $ 42,000 | $ 126,000 |
| PSB 1-6 effl channel conc repair, coating (120'L x 3'W x 6'D) | 1476 | SF | $ 75 | $ 110,700 | 50% | $ 55,350 | $ 166,050 |
| PSB PE EQ Structure Coating (240' L x 4.5' W x 6' D) | 2934 | SF | $ 75 | $ 220,050 | | $ - | $ 221,000 |
| PSB PE EQ Bypass Structure Coating (5' L x 4' W x 6' D) | 108 | SF | $ 75 | $ 8,100 | | $ - | $ 9,000 |
| PSB effluent launder supports | 4 | EA | $ 7,000 | $ 28,000 | 50% | $ 14,000 | $ 42,000 |
| PSB equipment (shaft) priority repairs | 1 | EA | $ 10,000 | $ 10,000 | 50% | $ 5,000 | $ 15,000 |
| PSB 1-10 (20 influent gates, 18-inch dia, ss) | 20 | EA | $ 10,000 | $ 200,000 | 25% | $ 50,000 | $ 250,000 |
| PSB infl channel conc repair, coating (220' L x 3' W x 8' D) | 2676 | SF | $ 75 | $ 200,700 | 25% | $ 50,175 | $ 251,000 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 1,606,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 434,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 97,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 63,000 |
| Project Contingency @ | | 40% | | $ 880,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 3,080,000** |
| **ENR CCI Corresponding to Year of Estimate** | | LA CCI Nov-2011 | 10088 | |
| **ENR CCI Corresponding to CAMP Report Year** | | LA CCI Jan-2015 | 10999 | 1.090 |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 3,359,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.2.006 CA | Condition Assessment | 1.5% | $ 50,385 | 20% | $ 10,077 | $ 61,000 | completed |
| 1.2.006 CS | Conceptual Study | 2.5% | $ 83,975 | 20% | $ 16,795 | $ 101,000 | $ 101,000 |
| 1.2.006 DS | Design | 8.0% | $ 268,720 | 15% | $ 40,308 | $ 310,000 | $ 310,000 |
| 1.2.006 EDC | Engr During Construction | 4.5% | $ 151,155 | 15% | $ 22,673 | $ 174,000 | $ 174,000 |
| 1.2.006 CM | Construction Mgt | 5.5% | $ 184,745 | 20% | $ 36,949 | $ 222,000 | $ 222,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 4,166,000** |

**Notes:**

Total Project Cost (Present Value in 2015 Dollars)

2. Percent of Total Main Project Cost

3. Cost estimated. A more detailed cost will be available after the study phase.

## Project 1.2.012

**PSB 1 - 10 - Inf Gate Replacement**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Oct-12 |
| Estimate Update | Feb-15 |
| Const Year | 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Mobilization/Demobilization | 1 | LS | $ 20,000 | $ 20,000 | 25% | $ 5,000 | $ 25,000 |
| Bypass/Outage | 1 | LS | $ 75,000 | $ 75,000 | 25% | $ 18,750 | $ 94,000 |
| Dewater | 1 | LS | $ 50,000 | $ 50,000 | 50% | $ 25,000 | $ 75,000 |
| (2'-8" x 7'-3" Slide Gates, new stainless steel plate, reuse extg frame, stem and operator) | 20 | EA | $ 10,000 | $ 200,000 | 50% | $ 100,000 | $ 300,000 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 494,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 134,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 30,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 20,000 |
| Project Contingency @ | | 40% | | $ 272,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 950,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Jan-2015 | 10999 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 950,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.2.012 CA | Condition Assessment | 1.5% | $ 14,250 | 20% | $ 2,850 | $ 18,000 | complete |
| 1.2.012 CS | Conceptual Study | 2.5% | $ 23,750 | 20% | $ 4,750 | $ 29,000 | Not Required |
| 1.2.012 DS | Design | 8.0% | $ 76,000 | 15% | $ 11,400 | $ 88,000 | $ 88,000 |
| 1.2.012 EDC | Engr During Construction | 4.5% | $ 42,750 | 15% | $ 6,413 | $ 50,000 | $ 50,000 |
| 1.2.012 CM | Construction Mgt | 5.5% | $ 52,250 | 20% | $ 10,450 | $ 63,000 | $ 63,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 1,151,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Estimate do not include physical repair of the Primary Sed. Basins
4. Slide gate cost from IEUA, RP-1 Gate Replacement Project, Waterman quotes escalated to 2015 dollars.

## Project 1.3.003

**AB Rehab Project**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | May-11 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements (3)** | | | | | | | |
| General and Site Work | 1 | LS | $ 21,000 | $ 21,000 | 0% | $ - | $ 21,000 |
| 3WHP Water Pipe | 1 | LS | $ 91,656 | $ 91,656 | 0% | $ - | $ 92,000 |
| Influent Channel | 1 | LS | $ 765,934 | $ 766,000 | 0% | $ - | $ 766,000 |
| Slide Gates | 1 | LS | $ 328,248 | $ 328,248 | 0% | $ - | $ 329,000 |
| Basin Covers and Access | 1 | LS | $ 818,613 | $ 818,613 | 0% | $ - | $ 819,000 |
| RAS Pumping | 1 | LS | $ 222,703 | $ 223,000 | 0% | $ - | $ 223,000 |
| EIC | 1 | LS | $ 375,850 | $ 376,000 | 0% | $ - | $ 376,000 |
| Anaerobic Selector- partial | 1 | LS | $ 256,510 | $ 257,000 | 0% | $ - | $ 257,000 |

| | | |
|---|---|---|
| **Subtotal** | | **$ 2,883,000** |
| Contractor Overhead & Profit @ | 15% | $ 497,000 |
| Escalation to Mid Point | 3% | $ 114,000 |
| Sales Tax - included | 7.75% | included above |
| Contingency @ | 15% | $ 433,000 |
| **Total Main Project Cost from Previous Reports** | | **$ 3,927,000** |
| Project Contingency @ | 10% | $ 392,700 |
| **Total Main Project Cost (Year of Estimate or Estimate Update)** | | **$ 4,319,700** |

| | | | |
|---|---|---|---|
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Mar 2012 | 10284 | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.070 |
| **Total Main Project Cost (CAMP Report Year)** | | | **$ 4,621,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.3.003 CA | Condition Assessment | 1.5% | $ 69,315 | 20% | $ 13,863 | $ 84,000 | Completed |
| 1.3.003 CS | Conceptual Study | 2.5% | $ 115,525 | 20% | $ 23,105 | $ 139,000 | Completed |
| 1.3.003 DS | Design | 8.0% | $ 369,680 | 15% | $ 55,452 | $ 426,000 | Completed |
| 1.3.003 EDC | Engr During Construction | 4.5% | $ 207,945 | 15% | $ 31,192 | $ 240,000 | $ 240,000 |
| 1.3.003 CM | Construction Mgt | 5.5% | $ 254,155 | 20% | $ 50,831 | $ 305,000 | $ 305,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 5,166,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Secondary Aeration Basin Rehabilitation Tech Memo No. 8, May 2011, Carollo and Updated cost estimate dated 3/12/2012

## Project 1.3.005

**AB Diffuser Membrane Replacement**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | X |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Repair Diffuser Piping | 1 | LS | $ 20,000 | $ 20,000 | 0% | $ - | $ 20,000 |
| Replace Diffusers, AB 1 | 5400 | EA | $ 5 | $ 27,000 | 50% | $ 13,500 | $ 41,000 |
| Replace Diffusers, AB 2 | 5400 | EA | $ 5 | $ 27,000 | 50% | $ 13,500 | $ 41,000 |
| Replace Diffusers, AB 3 | 5400 | EA | $ 5 | $ 27,000 | 50% | $ 13,500 | $ 41,000 |
| Replace Diffusers, AB 4 | 5400 | EA | $ 5 | $ 27,000 | 50% | $ 13,500 | $ 41,000 |
| Dispose of old diffusers and construction debris | 1 | LS | $ 10,000 | $ 10,000 | 50% | $ 5,000 | $ 15,000 |
| Mob / Demb | 1 | LS | $ 5,000 | $ 5,000 | 50% | $ 2,500 | $ 8,000 |
| **Subtotal** | | | | | | | **$ 207,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ 56,000 |
| 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)** | | | | | | | **$ 357,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2011 | 10077 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.092 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 390,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.3.005 CA | Condition Assessment | 1.5% | $ 5,850 | 20% | $ 1,170 | $ 8,000 | Completed |
| 1.3.005 CS | Conceptual Study | 2.5% | $ 9,750 | 20% | $ 1,950 | $ 12,000 | Completed |
| 1.3.005 DS | Design | 8.0% | $ 31,200 | 15% | $ 4,680 | $ 36,000 | not reqd |
| 1.3.005 EDC | Engr During Construction | 4.5% | $ 17,550 | 15% | $ 2,633 | $ 21,000 | not reqd |
| 1.3.005 CM | Construction Mgt | 5.5% | $ 21,450 | 20% | $ 4,290 | $ 26,000 | not reqd |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 390,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Secondary Aeration Basin Rehabilitation Tech Memo No. 8, May 2011, Carollo and Updated cost estimate dated 3/12/2012
4. Diamond diffusers based on Siemens quote dated 11/15/2011 . Used a lower contingency since received a vendor quote.

## Project 1.3.007

**SCs 5 and 6 Rehabilitation**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Sep-11 |
| Estimate Update | Feb-15 |
| Const Year | 2018 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Bonds and Insurance | 1 | LS | $ 12,300 | $ 13,000 | | | $ 13,000 |
| Mobilization | 1 | LS | $ 10,997 | $ 11,000 | | | $ 11,000 |
| Fab and Deliver Clarifier Mechanisms | 2 | EA | $ 195,954 | $ 392,000 | | | $ 392,000 |
| Demo Existing Clarifier Equipment | 2 | EA | $ 17,529 | $ 36,000 | | | $ 36,000 |
| Install New Clarifiers - Includes Sandblast/Painting of New Equipment | 2 | EA | $ 195,954 | $ 392,000 | | | $ 392,000 |
| Repair Concrete Cracks | 2 | EA | $ 3,550 | $ 8,000 | | | $ 8,000 |
| Repair Concrete Holes | 2 | EA | $ 2,825 | $ 6,000 | | | $ 6,000 |
| Replace Launders/Trough | 2 | EA | $ 20,790 | $ 42,000 | | | $ 42,000 |
| Replace Launder Supports | 2 | EA | $ 6,951 | $ 14,000 | | | $ 14,000 |
| Abbrassive Blast/Coat Extg Knee Brackets, Troughts, Bridges | 2 | EA | $ 60,138 | $ 121,000 | | | $ 121,000 |
| Replace Weirs | 2 | EA | $ 12,084 | $ 25,000 | | | $ 25,000 |
| Replace Drain Gates | 2 | EA | $ 6,460 | $ 13,000 | | | $ 13,000 |
| Replace Influent Gates | 2 | EA | $ 5,000 | $ 10,000 | 50% | $ 5,000 | $ 15,000 |
| Rehab Effluent Gates | 2 | EA | $ 3,000 | $ 6,000 | | | $ 6,000 |
| Electrical | 1 | LS | $ 34,050 | $ 35,000 | | | $ 35,000 |
| Demobilize | 1 | LS | $ 19,616 | $ 20,000 | | | $ 20,000 |
| Cost Estimate Based on Filanc Pay Request, Clarifier Nos. 1-4 | | | | | | | |
| **Subtotal** | | | | | | | **$ 1,149,000** |
| Contractor Overhead & Profit @ | 15% | | | | | | $ 173,000 |
| Shipping Rate 40% of total is shipped @ | 15% | | | | | | Included |
| Sales Tax 50% of total is taxed @ | 7.75% | | | | | | Included |
| Project Contingency @ | 40% | | | | | | $ 529,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 1,851,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2011 | | 10077 | | | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | | 10999 | | | 1.092 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 2,021,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.3.007 CA | Condition Assessment | 1.5% | $ 30,315 | 20% | $ 6,063 | $ 37,000 | Completed |
| 1.3.007 CS | Conceptual Study | 2.5% | $ 50,525 | 20% | $ 10,105 | $ 61,000 | Not Applicable |
| 1.3.007 DS | Design | 8.0% | $ 161,680 | 15% | $ 24,252 | $ 186,000 | $ 186,000 |
| 1.3.007 EDC | Engr During Construction | 4.5% | $ 90,945 | 15% | $ 13,642 | $ 105,000 | $ 105,000 |
| 1.3.007 CM | Construction Mgt | 5.5% | $ 111,155 | 20% | $ 22,231 | $ 134,000 | $ 134,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 2,446,000** |

**Total Project Cost (Present Value in 2015 Dollars)**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimated based on Filanc Pay Request for Clarifier 1-4 Rehab Project dated September 2011.

## 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 | Jan-15 |
| Initial Estimate | Nov-12 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **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 | Incl. | $ - | $ 50,000 |
| Temporary bypass piping | 1 | LS | $ 40,000 | $ 40,000 | | $ - | $ 40,000 |
| New WAS pipe (8" DI Pipe) | 250 | LF | $ 160 | $ 40,000 | | $ - | $ 40,000 |
| Paving/restoration | 750 | SF | $ 5 | $ 3,750 | Incl. | $ - | $ 3,750 |
| Existing piping and pavement demolition | 1 | LS | $ 20,000 | $ 20,000 | | $ - | $ 20,000 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 154,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 42,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 10,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 6,000 |
| Project Contingency @ | | 40% | | $ 85,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 297,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Jul-2012 | 10296 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.068 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 318,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.3.010 CA | Condition Assessment | 1.5% | $ 4,770 | 20% | $ 954 | $ 6,000 | Completed |
| 1.3.010 CS | Conceptual Study | 2.5% | $ 7,950 | 20% | $ 1,590 | $ 10,000 | not reqd |
| 1.3.010 DS | Design | 15.0% | $ 47,700 | 15% | $ 7,155 | $ 55,000 | $ 55,000 |
| 1.3.010 EDC | Engr During Construction | 4.5% | $ 14,310 | 15% | $ 2,147 | $ 17,000 | $ 17,000 |
| 1.3.010 CM | Construction Mgt | 5.5% | $ 17,490 | 20% | $ 3,498 | $ 21,000 | $ 21,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 411,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimates from RS Means 2012 and Novato Sanitary District Wastewater Facility Upgrade Cost Estimates
4. Length of pipe is estimated per Phase IV, SPM2, Sheet 139, WAS pipe exits from pump room at CL EL 118. TOC EL 124.

## Project 1.3.017

**AB FRP Cover Replacement with Aluminum**

| Main Project Type | | Key Dates | |
|---|---|---|---|
| New Facility | | CAMP Report | Jan-15 |
| Facility Rehabilitation | X | Initial Estimate | May-11 |
| Major Maintenance | | Estimate Update | Feb-15 |
| Asset Replacement | | Const Year | 2016+ |
| Special Study | | | |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Remove and Demolish Existing Covers | 1 | LS | $ 50,000 | $ 50,000 | 0% | | $ 50,000 |
| Install Basin Aluminum Covers (5) (6) | 18120 | SF | $ 30 | $ 544,000 | 0% | $ - | $ 544,000 |
| dimesion of the basin= 70 ft x 300 ft | | | | | | | |
| unit price including installation = $30/SF | | | | | | | |
| access cover size =15 ft x 12 ft | | | | | | | |
| 16 access covers per basin | | | | | | | |
| Support Beams | 1 | LS | $ 50,000 | $ 50,000 | 0% | | $ 50,000 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 644,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 174,000 |
| Shipping Rate - included | 40% of total is shipped @ | 15% | | $ 39,000 |
| Sales Tax - included | 50% of total is taxed @ | 7.75% | | $ 25,000 |
| Project Contingency @ | | 40% | | $ 353,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 1,235,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Jan-2015 | 10999 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 1,235,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.3.017 CA | Condition Assessment | 1.5% | $ 18,525 | 20% | $ 3,705 | $ 23,000 | Completed |
| 1.3.017 CS | Conceptual Study (6) | 2.5% | $ 30,875 | 20% | $ 6,175 | $ 38,000 | $ 38,000 |
| 1.3.017 DS | Design (3) | 4.0% | $ 49,400 | 15% | $ 7,410 | $ 57,000 | $ 57,000 |
| 1.3.017 DS | Design (6) | 1.0% | $ 12,350 | 15% | $ 1,853 | $ 15,000 | $ 15,000 |
| 1.3.017 EDC | Engr During Construction (3) | 2.3% | $ 27,788 | 15% | $ 4,168 | $ 32,000 | $ 32,000 |
| 1.3.017 CM | Construction Mgt (3) | 2.8% | $ 33,963 | 20% | $ 6,623 | $ 41,000 | $ 41,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 1,418,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Design completed in 2012, addl budget allocated for minor revisions and bid process. Used 50% of template percentage because this project is primarily material based.
4. 2012 Major Plant Rehabilitation Project, Bid Schedule PCL dated 2014
5. Budget Price from Coombs-Hopkins, Jan 2015
6. Estimate suggested by EWA/RMC Staff. Repackaging the design package based on the previous design.

## Project 1.3.018

**AB Anaerobic Selector Zones**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| 1. Basin Selector Zones -partial | 1 | LS | $ 784,755 | $ 784,755 | 0% | $ - | $ 785,000 |
| **Subtotal** | | | | | | | **$ 785,000** |
| Contractor Overhead & Profit @ | 15% | | | | | | $ 136,000 |
| Escalation to Mid Point | 3% | | | | | | $ 31,000 |
| Sales Tax - included | 7.75% | | | | | | included above |
| Contingency @ | 15% | | | | | | $ 118,000 |
| **Total Main Project Cost from Previous Reports** | | | | | | | **$ 1,070,000** |
| Project Contingency @ | 10% | | | | | | $ 107,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 1,177,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Mar 2012 | | 10284 | | | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | | 10999 | | 1.070 | | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 1,259,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 1.3.018 CA | Condition Assessment | 1.5% | $ 18,885 | 20% | $ 3,777 | $ 23,000 | Completed |
| 1.3.018 CS | Conceptual Study | 2.5% | $ 31,475 | 20% | $ 6,295 | $ 38,000 | Completed |
| 1.3.018 DS | Design | 8.0% | $ 100,720 | 15% | $ 15,108 | $ 116,000 | $ 116,000 |
| 1.3.018 EDC | Engr During Construction | 4.5% | $ 56,655 | 15% | $ 8,498 | $ 66,000 | $ 66,000 |
| 1.3.018 CM | Construction Mgt | 5.5% | $ 69,245 | 20% | $ 13,849 | $ 84,000 | $ 84,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 1,525,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Secondary Aeration Basin Rehabilitation Tech Memo No. 8, May 2011, Carollo and Updated cost estimate dated 3/12/2012

## Project 2.1.002

**Sea Outfall Inspection and Maintenance - External**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | X |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2017, 2019 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Underwater inspection and minor maintenance | 1 | LS | $ 43,000 | $ 43,000 | 0% | $ - | $ 43,000 |
| **Subtotal** | | | | | | | **$ 43,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ 12,000 |
| Shipping Rate | 0% | of total is shipped @ | 15% | | | | Included |
| Sales Tax | 0% | of total is taxed @ | 7.75% | | | | Included |
| Project Contingency @ | | | 25% | | | | $ 14,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 69,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2011 | 10088 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.090 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 76,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 2.1.002 CA | Condition Assessment [4] | 1.5% | $ 1,140 | 20% | $ 228 | $ 2,000 | Included |
| 2.1.002 CS | Conceptual Study | 2.5% | $ 1,900 | 20% | $ 380 | $ 3,000 | Included |
| 2.1.002 DS | Design | 8.0% | $ 6,080 | 15% | $ 912 | $ 7,000 | Not Applicable |
| 2.1.002 EDC | Engr During Construction | 4.5% | $ 3,420 | 15% | $ 513 | $ 4,000 | Not Applicable |
| 2.1.002 CM | Construction Mgt | 5.5% | $ 4,180 | 20% | $ 836 | $ 6,000 | Not Applicable |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 76,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
4. Cost based on last project cost provided by D. Larson December 2011. Contingency decreased based on proposal fee.

## Project 2.1.005

**Sea Outfall Bathymetric Survey - External**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | x |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-14 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Bathymetric Survey | 1 | LS | $ 54,174 | $ 54,174 | 0% | $ - | $ 54,174 |
| Cost from proposal from SCRIPPs<br>Proposal dated October 27, 2014 | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Subtotal** | | | | | **$ 55,000** |
| Contractor Overhead & Profit @ | | 27% | | | $ 15,000 |
| Shipping Rate | 0% of total is shipped @ | 15% | | | not reqd |
| Sales Tax | 0% of total is taxed @ | 7.75% | | | not reqd |
| 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 Jan-2015 | 10999 | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | **$ 88,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 2.1.005 CA | Condition Assessment | 1.5% | $ 1,320 | 20% | $ 264 | $ 1,600 | not reqd |
| 2.1.005 CS | Conceptual Study | 2.5% | $ 2,200 | 20% | $ 440 | $ 3,000 | included |
| 2.1.005 DS | Design | 8.0% | $ 7,040 | 15% | $ 1,056 | $ 9,000 | not reqd |
| 2.1.005 EDC | Engr During Construction | 4.5% | $ 3,960 | 15% | $ 594.00 | $ 5,000 | $ 5,000 |
| 2.1.005 CM | Construction Mgt | 5.5% | $ 4,840 | 20% | $ 968 | $ 6,000 | $ 6,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 99,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Used lower contingency since cost estimate is based on actual construction bids received from a contractor.

## Project 2.1.006

**Ocean Outfall - Integrity Assessment per SLC Lease**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | x |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Mob/Demob | 1 | LS | $ 10,000 | $ 10,000 | 0% | $ - | $ 10,000 |
| Confined Space Entry Crew into Land Outfall | 1 | Day | $ 30,000 | $ 30,000 | 0% | $ - | $ 30,000 |
| Core Sampling | 2 | LS | $ 2,500 | $ 5,000 | 0% | $ - | $ 5,000 |
| CCTV | 1 | LS | $ 5,000 | $ 5,000 | 0% | $ - | $ 5,000 |
| Assessment | 1 | LS | $ 7,450 | $ 7,450 | 0% | $ - | $ 7,450 |

Note: EWA may want to CCTV the old PE discharge line in conjuction with this project. Cost Approx. $5000
Egr during construction includes confined space entry, structural egr observations and report, core testing and report

| | | | | | |
|---|---|---|---|---|---|
| **Subtotal** | | | | | **$ 58,000** |
| Contractor Overhead & Profit @ | | | 27% | | $ 16,000 |
| Shipping Rate | 0% | of total is shipped @ | 15% | | $ - |
| Sales Tax | 0% | of total is taxed @ | 7.75% | | $ - |
| Project Contingency @ | | | 25% (6) | | $ 19,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | **$ 93,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2013 | 10740 | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | 1.024 |
| **Total Main Project Cost (CAMP Report Year)** | | | | | **$ 96,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 2.1.006 CA | Condition Assessment | 1.5% | $ 1,440 | 20% | $ 288 | $ 1,800 | not reqd |
| 2.1.006 CS | Conceptual Study | 2.5% | $ 2,400 | 20% | $ 480 | $ 3,000 | not reqd |
| 2.1.006 DS | Design (7) | 15.0% | $ 14,400 | 15% | $ 2,160 | $ 17,000 | $ 17,000 |
| 2.1.006 EDC | Engr During Constr, Testing, SLC | 4.5% | $ 4,320 | 15% | $ 648 | $ 5,000 | $ 5,000 |
| 2.1.006 CM | Construction Mgt | 5.5% | $ 5,280 | 20% | $ 1,056 | $ 7,000 | not reqd |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 118,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Confined space entry crew based on date rate from EWA Ocean Outfall Internal Inspection 2012
4. Concrete coring test quote from UTS, LLC 2013 for sample preparation and compressive strength test.
5. Assumed 40 hours to analyze and generate a integrity assessment report.
6. Used lower contingency since cost estimate is based on actual construction bids received from a contractor.

## Project 3.1.002

**Sludge Process Improvements (DAFT or Alt Tech, efficiency)**

| Main Project Type | |
|---|---|
| New Facility | X |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-12 |
| Estimate Update | Feb-15 |
| Const Year | 2019 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Scope of replacement system to be determined after Study. | 1 | LS | $ 2,500,000 | $ 2,500,000 | 0% | $ - | $ 2,500,000 |
| **Subtotal** | | | | | | | **$ 2,500,000** |
| Contractor Overhead & Profit @ | | | 0% | (Included) | | | $ - |
| Shipping Rate | 0% | of total is shipped @ | 15% | (Included) | | | $ - |
| Sales Tax | 0% | of total is taxed @ | 7.75% | (Included) | | | $ - |
| Project Contingency @ | | | 0% | (Included) | | | $ - |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 2,500,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2013 | 10740 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 2,561,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 3.1.002 CA | Condition Assessment | 1.5% | $ 38,415 | 20% | $ 7,683 | $ 47,000 | not reqd |
| 3.1.002 CS | Conceptual Study | 2.5% | $ 64,025 | 20% | $ 12,805 | $ 77,000 | $ 77,000 |
| 3.1.002 DS | Design[4] | 8.0% | $ 204,880 | 23% | $ 46,098 | $ 251,000 | $ 251,000 |
| 3.1.002 EDC | Engr During Construction[4] | 4.5% | $ 115,245 | 15% | $ 17,287 | $ 133,000 | $ 133,000 |
| 3.1.002 CM | Construction Mgt | 5.5% | $ 140,855 | 20% | $ 28,171 | $ 170,000 | $ 170,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 3,192,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate will be further defined after the scope of work is identified.

## Project 3.2.004

**Sludge Screening Facility**

| Main Project Type | |
|---|---|
| New Facility | X |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Apr-10 |
| Estimate Update | Nov-14 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Tempoary Utilities | 1 | LS | $ 16,000 | $ 16,000 | 0% | $ - | $ 16,000 |
| Sludge Screening Platform | 1 | LS | $ 70,660 | $ 70,660 | 0% | $ - | $ 71,000 |
| Strainpress | 1 | LS | $ 350,000 | $ 350,000 | 0% | $ - | $ 350,000 |
| Sludge Feed Pump | 1 | LS | $ 94,990 | $ 94,990 | 0% | $ - | $ 95,000 |
| Grinder | 1 | LS | $ 39,200 | $ 39,200 | 0% | $ - | $ 39,000 |
| Odor Control | 1 | LS | $ 8,638 | $ 8,638 | 0% | $ - | $ 9,000 |
| Mechanical Piping and Valves | 1 | LS | $ 35,925 | $ 35,925 | 0% | $ - | $ 36,000 |
| Instrumentation | 1 | LS | $ 3,000 | $ 3,000 | 0% | $ - | $ 3,000 |
| Electrical | 1 | LS | $ 22,500 | $ 22,500 | 0% | $ - | $ 23,000 |
| Debris Collection Room | 1 | LS | $ 36,850 | $ 36,850 | 0% | $ - | $ 37,000 |

Cost estimate elements based on April 26, 2010 Black & Veatch Screening Facility Basis of Design Report

| | | | |
|---|---|---|---|
| **Subtotal** | | | **$ 679,000** |
| Mid-Point of Costruction | 3% | | $ 21,000 |
| Contingency @ | 25% | | $ 170,000 |
| **Total Main Project Cost from Previous Reports** | | | **$ 870,000** |
| Project Contingency @ | 10% | | $ 87,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | **$ 957,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Apr-2010 | 9772 | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.126 |
| **Total Main Project Cost (CAMP Report Year)** | | | **$ 1,078,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 3.2.004 CA | Condition Assessment | 1.5% | $ 16,170 | 20% | $ 3,234 | $ 20,000 | Complete |
| 3.2.004 CS | Conceptual Study | 2.5% | $ 26,950 | 20% | $ 5,390 | $ 33,000 | Complete |
| 3.2.004 DS | Design | 8.0% | $ 86,240 | 15% | $ 12,936 | $ 100,000 | $ 100,000 |
| 3.2.004 EDC | Engr During Construction | 4.5% | $ 48,510 | 15% | $ 7,277 | $ 56,000 | $ 56,000 |
| 3.2.004 CM | Construction Mgt | 5.5% | $ 59,290 | 20% | $ 11,858 | $ 72,000 | $ 72,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 1,306,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate based on April 26, 2010 Black & Veatch Screening Facility Basis of Design Report

## Project 3.2.009

**Digester No. 4, 5 and 6 Covers - Interior Coating**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Oct-12 |
| Estimate Update | Feb-15 |
| Const Year | 2019 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| **Interior Coating and Structural Reinforcement [3]** | | | | | | | |
| Draining Digesters | 3 | LS | $ 140,300 | $ 420,900 | 0% | $ - | $ 420,900 |
| Scaffolding | 3 | LS | $ 19,000 | $ 57,000 | 0% | $ - | $ 57,000 |
| Sandblasting | 3 | LS | $ 91,375 | $ 274,125 | 0% | $ - | $ 274,125 |
| Coating | 3 | LS | $ 292,400 | $ 877,200 | 0% | $ - | $ 877,200 |
| Steel Stiffeners | 3 | LS | $ 62,830 | $ 188,490 | 0% | $ - | $ 188,490 |
| Soft Spot Repairs (Digester 6 Only) | 1 | LS | $ 50,000 | $ 50,000 | 0% | $ - | $ 50,000 |
| **Subtotal** | | | | | | | **$ 1,868,000** |
| Contractor Overhead & Profit @ | 10% | | | | | | $ 186,800 |
| General Requirements | 15% | | | | | | $ 308,000 |
| Sales Tax | 7.75% | | | | | | included |
| Contingency @ | 35% | | | | | | $ 827,000 |
| **Total Main Project Cost from Previous Reports** | | | | | | | **$ 3,189,800** |
| Project Contingency @ | 10% | | | | | | $ 318,980 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 3,509,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Jan-2015 | | 10999 | | | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | | 10999 | | 1.000 | | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 3,509,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 3.2.009 CA | Condition Assessment | 1.5% | $ 52,635 | 20% | $ 10,527 | $ 64,000 | complete |
| 3.2.009 CS | Conceptual Study | 2.5% | $ 87,725 | 20% | $ 17,545 | $ 106,000 | Not Required |
| 3.2.009 DS | Design | 8.0% | $ 280,720 | 15% | $ 42,108 | $ 323,000 | $ 323,000 |
| 3.2.009 EDC | Engr During Construction | 4.5% | $ 157,905 | 15% | $ 23,686 | $ 182,000 | $ 182,000 |
| 3.2.009 CM | Construction Mgt | 5.5% | $ 192,995 | 20% | $ 38,599 | $ 232,000 | $ 232,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 4,246,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Estimates based on Probable Construction Cost for Digester Cleaning - B&V December 19, 2014

## Project 3.2.011

**Second Waste Gas Flare and Pipeline**

| Main Project Type | |
|---|---|
| New Facility | X |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-14 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Furnish Contract Bonds, Project Insurance & Permits | 1 | LS | $ 8,000 | $ 8,000 | 0% | $ - | $ 8,000 |
| Mobilization/Demobilization including Closeout/Cleanup | 1 | LS | $ 13,000 | $ 13,000 | 0% | $ - | $ 13,000 |
| Excavation Safety Measures | 1 | LS | $ 500 | $ 500 | 0% | $ - | $ 500 |
| Demolition | 1 | LS | $ 15,000 | $ 15,000 | 0% | $ - | $ 15,000 |
| One New Flare, Digester Gas Handling Equipment, Appurt | 1 | LS | $ 285,343 | $ 285,343 | 0% | $ - | $ 285,343 |
| Installation of New Flare, Digester Equipment, Appurt | 1 | LS | $ 86,157 | $ 86,157 | 0% | $ - | $ 86,157 |
| Electrical and Installation | 1 | LS | $ 17,000 | $ 17,000 | 0% | $ - | $ 17,000 |
| Coordination of Flare Permit Process and Source Tests | 1 | LS | $ 2,000 | $ 2,000 | 0% | $ - | $ 2,000 |
| Piping from Digester 3 to New Flare | 500 | LF | $ 200.00 | $ 100,000 | 0% | $ - | $ 100,000 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 527,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 143,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 32,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 21,000 |
| Project Contingency @ | | 40% | | $ 290,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 1,013,000** |
| **ENR CCI Corresponding to Year of Estimate** | | LA CCI Nov-2011 | 10088 | |
| **ENR CCI Corresponding to CAMP Report Year** | | LA CCI Jan-2015 | 10999 | 1.090 |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 1,105,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 3.2.011 CA | Condition Assessment | 1.5% | $ 16,575 | 20% | $ 3,315 | $ 19,900 | Not Req'd |
| 3.2.011 CS | Conceptual Study | 2.5% | $ 27,625 | 20% | $ 5,525 | $ 34,000 | $ 34,000 |
| 3.2.011 DS | Design | 8.0% | $ 88,400 | 15% | $ 13,260 | $ 102,000 | $ 102,000 |
| 3.2.011 EDC | Engr During Construction | 4.5% | $ 49,725 | 15% | $ 7,459 | $ 58,000 | $ 58,000 |
| 3.2.011 CM | Construction Mgt | 5.5% | $ 60,775 | 20% | $ 12,155 | $ 73,000 | $ 73,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 1,372,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate based on November 25, 2011 SS Mechanical Corp. Purchase Order #20110073

## Project 3.2.013

**Digester Mixing System Replacement**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-14 |
| Initial Estimate | Feb-15 |
| Estimate Update | Feb-15 |
| Const Year | 2019 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Draining Digesters | - | | $ - | $ - | 0% | $ - | $ - |
| Demolition of Existing Mixing System | 1 | LS | $ 74,904.00 | $ 74,904 | 0% | $ - | $ 74,904 |
| Cut 24" Diameter Hole in Digester Cover | 3 | LS | $ 1,125.00 | $ 3,375 | 0% | $ - | $ 3,375 |
| Equipment Cost (Linear Motion Mixer) | 3 | LS | $ 283,140.00 | $ 849,420 | 0% | $ - | $ 849,420 |
| **Subtotal** | | | | | | | **$ 928,000** |
| Contractor Overhead & Profit @ | 10% | | | | | | $ 93,000 |
| General Requirements | 15% | | | | | | $ 153,000 |
| Sales Tax | 7.75% | | | | | | included |
| Project Contingency @ | 35% | | | | | | $ 411,000 |
| **Total Main Project Cost from Previous Reports** | | | | | | | **$ 1,585,000** |
| Project Contingency @ | 10% | | | | | | $ 158,500 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 1,744,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Jan-2015 | | | 10999 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | | | 10999 | | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 1,744,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 3.2.013 CA | Condition Assessment | 1.5% | $ 26,160 | 20% | -- | | not required |
| 3.2.013 CS | Conceptual Study | 2.5% | $ 43,600 | 20% | $ 8,720 | $ 53,000 | completed |
| 3.2.013 DS | Design | 8.0% | $ 139,520 | 15% | $ 20,928 | $ 161,000 | $ 161,000 |
| 3.2.013 EDC | Engr During Construction | 4.5% | $ 78,480 | 15% | $ 11,772 | $ 91,000 | $ 91,000 |
| 3.2.013 CM | Construction Mgt | 5.5% | $ 95,920 | 20% | $ 19,184 | $ 116,000 | $ 116,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 2,112,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Estimates based on Probable Construction Cost for Digester Cleaning - B&V December 19, 2014. This cost estimate assumes the project will be constructed simultaneously with P 3.2.009-Digester 4, 5, and 6 Covers.

## Project 3.3.006

**Second Dryer Addition**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-14 |
| Initial Estimate | Feb-15 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Second Heat Dryer | 1 | LS | $ 5,000,000 | $ 5,000,000 | 0% | $ - | $ 5,000,000 |
| **Subtotal** | | | | | | | **$ 5,000,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ 1,350,000 |
| Shipping Rate | 40% | of total is shipped @ | 15% | | | | $ 300,000 |
| Sales Tax | 50% | of total is taxed @ | 7.75% | | | | $ 194,000 |
| Project Contingency @ | | | 40% | | | | $ 2,738,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 9,582,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Jan-2015 | 10999 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 9,582,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 3.3.006 CA | Condition Assessment | 1.5% | $ 143,730 | 20% | $ 28,746 | $ 172,500 | Not Applicable |
| 3.3.006 CS | Conceptual Study | 2.5% | $ 239,550 | 20% | $ 47,910 | $ 288,000 | $ 288,000 |
| 3.3.006 DS | Design | 8.0% | $ 766,560 | 15% | $ 114,984 | $ 882,000 | $ 882,000 |
| 3.3.006 EDC | Engr During Construction | 4.5% | $ 431,190 | 15% | $ 64,679 | $ 496,000 | $ 496,000 |
| 3.3.006 CM | Construction Mgt | 5.5% | $ 527,010 | 20% | $ 105,402 | $ 633,000 | $ 633,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 11,881,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. A more detailed cost estimate will be available when the project is within three years from construction

## Project 3.3.009

**Drying Safety Upgrades - Phase 2 and 3**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Replacement of Extg Outdoor Explosion Vent | 1 | LS | $ 100,000 | $ 100,000 | 0% | $ - | $ 100,000 |
| Indoor Bag House Deflagration Isolation | 1 | LS | $ 100,000 | $ 100,000 | 0% | $ - | $ 100,000 |
| Screw Conveyor and Bucket Elevator Deflagration Isolation | 1 | LS | $ 60,000 | $ 60,000 | 0% | $ - | $ 60,000 |
| Bucket Elevator Deflagration Isolation | 1 | LS | $ 130,000 | $ 130,000 | 0% | $ - | $ 130,000 |
| Nitrogen Injection at Bottom of Storage Silos | 1 | LS | $ 7,000 | $ 7,000 | 0% | $ - | $ 7,000 |
| Recycle Bin Emptying Improvements | 1 | LS | $ 105,000 | $ 105,000 | 0% | $ - | $ 105,000 |
| Dehumidification of Silo Ventilation Air Supply | 1 | LS | $ 140,000 | $ 140,000 | 0% | $ - | $ 140,000 |
| CO Monitoring of Rcyc Bin, Dryer Gas Loop, Bucket Elev. | 1 | LS | $ 300,000 | $ 300,000 | 0% | $ - | $ 300,000 |
| Screw Conveyor Slide Gate Replacement | 1 | LS | $ 17,000 | $ 17,000 | 0% | $ - | $ 17,000 |
| Phase 3 | 1 | LS | $ 500,000 | $ 500,000 | 0% | $ - | $ 500,000 |
| Costs taken from "Drying Safety and Pellet Reheating Project", Final Report, Nov 2013, Author: Black and Veatch | | | | | | | |
| **Subtotal** | | | | | | | **$ 1,459,000** |
| Contingency @ | 40% | | | | | | included |
| **Total Main Project Cost from Previous Reports** | | | | | | | **$ 1,459,000** |
| Project Contingency @ | 10% | | | | | | $ 145,900 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 1,605,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2013 | | | 10740 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | | | 10999 | | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 1,644,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 3.3.009 CA | Condition Assessment | 1.5% | $ 24,660 | 20% | $ 4,932 | $ 30,000 | Not Applicable |
| 3.3.009 CS | Conceptual Study | 2.5% | $ 41,100 | 20% | $ 8,220 | $ 50,000 | Completed |
| 3.3.009 DS | Design | 8.0% | $ 131,520 | 15% | $ 19,728 | $ 152,000 | Completed |
| 3.3.009 EDC | Engr During Construction | 4.5% | $ 73,980 | 15% | $ 11,097 | $ 86,000 | $ 86,000 |
| 3.3.009 CM | Construction Mgt | 5.5% | $ 90,420 | 20% | $ 18,084 | $ 109,000 | $ 109,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 1,839,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Costs taken from "Drying Safety and Pellet Reheating Project", Final Report, Nov 2013, Author: Black and Veatch

## Project 4.1.003

**Cogen Engine Catalyst**

| Main Project Type | |
|---|---|
| New Facility | X |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Dec-10 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Gas conditioning facilities on engine exhaust [3] (Project is in Phase 2 of Energy Projects) | 1 | LS | $ 121,000 | $ 121,000 | 0% | $ - | $ 130,000 |
| **Subtotal** | | | | | | | **$ 130,000** |
| Contractor Overhead & Profit @ | 12% | | | | | | included |
| Shipping Rate | 15% | | | | | | included |
| Sales Tax | 7.75% | | | | | | included |
| Project Contingency | 25% | Based on Kenny Jenks study (3) | | | | | $ 33,000 |
| **Total Main Project Cost from Previous Reports** | | | | | | | **$ 163,000** |
| Project Contingency @ | 10% | | | | | | $ 16,300 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 180,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Dec-2011 | | 10008 | | | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | | 10999 | | 1.099 | | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 198,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 4.1.003 CA | Condition Assessment | 1.5% | $ 2,970 | 20% | $ 594 | $ 4,000 | Not Applicable |
| 4.1.003 CS | Conceptual Study | 2.5% | $ 4,950 | 20% | $ 990 | $ 6,000 | Complete |
| 4.1.003 DS | Design-Build | 15.0% | $ 29,700 | 15% | $ 4,455 | $ 35,000 | $ 35,000 |
| 4.1.003 EDC | Engr During Construction | 4.5% | $ 8,910 | 15% | $ 1,337 | $ 11,000 | $ 11,000 |
| 4.1.003 CM | Construction Mgt | 5.5% | $ 10,890 | 15% | $ 1,634 | $ 13,000 | $ 13,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 257,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Costs based on draft tech memo, October 2012, provided via email by Kennedy Jenks

## Project 4.1.005

**Cogeneration Engine Top-End Overhaul**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | X |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-12 |
| Initial Estimate | Nov-08 |
| Estimate Update | Feb-15 |
| Const Year | 2016, 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Top-end Overhaul for two engines (reqd after 8,000 service hours for each engine) | 2 | EA | $ 42,100 | $ 84,200 | 79% | $ 66,097 | $ 151,000 |
| Spare heat shield (in case replacement is needed) | 1 | EA | $ 10,000 | $ 10,000 | 0% | $ - | $ 10,000 |
| Auxiliary Equipment | 1 | LS | $ 36,000 | $ 36,000 | 0% | $ - | $ 36,000 |
| **Subtotal** | | | | | | | **$ 197,000** |
| Contractor Overhead & Profit @ | | | 0% | | | | Included |
| Shipping Rate | 0% | of total is shipped @ | 15% | | | | Included |
| Sales Tax | 0% | of total is taxed @ | 7.75% | | | | Included |
| Project Contingency @ | | | 25% | | | | $ 50,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 247,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2008 | 9876 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.114 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 275,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 4.1.005 CA | Condition Assessment | 1.5% | $ 4,125 | 20% | $ 825 | $ 5,000 | Complete |
| 4.1.005 CS | Conceptual Study | 2.5% | $ 6,875 | 20% | $ 1,375 | $ 9,000 | Not Applicable |
| 4.1.005 DS | Design | 8.0% | $ 22,000 | 15% | $ 3,300 | $ 26,000 | Not Applicable |
| 4.1.005 EDC | Engr During Construction | 4.5% | $ 12,375 | 15% | $ 1,856 | $ 15,000 | Not Applicable |
| 4.1.005 CM | Construction Mgt | 5.5% | $ 15,125 | 20% | $ 3,025 | $ 19,000 | Not Applicable |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 275,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Quote was provided by Hawthorne Power Systems in Nov 25, 2008. Refer to Table 7-2. Contingency reduced resulting from this quote
4. Engine overhaul top-end shall be performed on 2 of 4 engines after every 8,000 service hours. At 24,000 hrs an in-frame overhaul is reqd for each engine. The in-frame overhaul includes a top-end overhaul so separate top-end is not reqd on those years. At 40,000 hrs, major overhaul reqd
5. In 2013 and 2017, Engine Nos. 3 and 4 are due for Top End overhaul service. In 2016, Engine Nos. 1 and 2 are due for Top End overhaul maintenance service.

## Project 4.1.007

**Co-gen Engine Full Overhaul**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | X |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-14 |
| Initial Estimate | Apr-14 |
| Estimate Update | Feb-15 |
| Const Year | 2018 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| In-frame Overhaul for two engines (reqd after 24,000 service hours for each engine) | 2 | EA | $ 173,000 | $ 346,000 | 20.7% | $ 71,622 | $ 418,000 |
| 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 | 2 | EA | $ 30,000 | $ 60,000 | 25.0% | $ 15,000 | $ 75,000 |
| Based on observations during in-frame overhauls, the crankshafts will be evaluated. Replacement is not anticipated but may be required. | | | | | | | |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 493,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 134,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 30,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 20,000 |
| Project Contingency @ | | 25% | | $ 170,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 847,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2011 | 10088 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.090 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 924,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 4.1.007 CA | Condition Assessment | 1.5% | $ 13,860 | 20% | $ 2,772 | $ 16,700 | not reqd |
| 4.1.007 CS | Conceptual Study | 2.5% | $ 23,100 | 20% | $ 4,620 | $ 28,000 | not reqd |
| 4.1.007 DS | Design | 8.0% | $ 73,920 | 15% | $ 11,088 | $ 86,000 | not reqd |
| 4.1.007 EDC | Engr During Construction | 4.5% | $ 41,580 | 15% | $ 6,237 | $ 48,000 | not reqd |
| 4.1.007 CM | Construction Mgt | 5.5% | $ 50,820 | 20% | $ 10,164 | $ 61,000 | not reqd |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 924,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Quote was provided by Hawthorne Power Systems in Nov 25, 2008. Refer to Table 7-2. Contingency reduced resulting from this quote
4. Engine overhaul in-frame shall be performed on engines after 24,000 service hours. Operation scheduled such that 2 engines per year are overhauled
5. In-frame overhaul includes top-end overhaul work.

## Project 4.1.015

**Gas Conditioning Facilities**

| Main Project Type | |
|---|---|
| New Facility | X |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-12 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Site Work | 1 | LS | $ 14,400 | $ 14,400 | 0% | $ - | $ 14,400 |
| Concrete | 1 | LS | $ 115,100 | $ 115,100 | 0% | $ - | $ 115,100 |
| Metals | 1 | LS | $ 3,000 | $ 3,000 | 0% | $ - | $ 3,000 |
| Finishes | 1 | LS | $ 12,500 | $ 12,500 | 0% | $ - | $ 12,500 |
| Equipment | 1 | LS | $ 1,496,800 | $ 1,496,800 | 0% | $ - | $ 1,496,800 |
| Mechanical | 1 | LS | $ 50,900 | $ 50,900 | 0% | $ - | $ 50,900 |
| Electrical | 1 | LS | $ 168,100 | $ 168,100 | 0% | $ - | $ 168,100 |
| Instrumentation | 1 | LS | $ 168,100 | $ 168,100 | 0% | $ - | $ 168,100 |

| | | | |
|---|---|---|---|
| **Subtotal** | | | **$ 2,029,000** |
| Contractor Overhead & Profit @ | 15% | | $ 296,000 |
| General Requirements | 10% | | $ 203,000 |
| Contractor MU on Subs | 12% | | $ 44,000 |
| Sales Tax | 7.75% | | $ 114,000 |
| Project Contingency @ | 25% | | $ 672,000 |
| **Total Main Project Cost from Previous Reports** | | | **$ 3,358,000** |
| Project Contingency @ | 10% | | $ 335,800 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | **$ 3,694,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Oct-2012 | 10273 | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Nov-2014 | 10999 | 1.071 |
| **Total Main Project Cost (CAMP Report Year)** | | | **$ 3,956,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 4.1.015 CA | Condition Assessment | 1.5% | $ 59,340 | 20% | $ 11,868 | $ 72,000 | Not Applicable |
| 4.1.015 CS | Conceptual Study | 2.5% | $ 98,900 | 20% | $ 19,780 | $ 119,000 | Completed |
| 4.1.015 DS | Design-Build | 8.0% | $ 316,480 | 15% | $ 47,472 | $ 364,000 | $ 364,000 |
| 4.1.015 EDC | Engr During Construction | 4.5% | $ 178,020 | 15% | $ 26,703 | $ 205,000 | $ 205,000 |
| 4.1.015 CM | Construction Mgt | 5.5% | $ 217,580 | 20% | $ 43,516 | $ 262,000 | $ 262,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 4,787,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Costs based on draft tech memo, October 2012, provided via email by Kennedy Jenks

## Project 5.1.001

**ORF I Carbon Replacement**

| Main Project Type | | Key Dates | |
|---|---|---|---|
| New Facility | | CAMP Report | Jan-15 |
| Facility Rehabilitation | | Initial Estimate | Aug-08 |
| Major Maintenance | | Estimate Update | Feb-15 |
| Asset Replacement | X | Const Year | 2016+ |
| Special Study | | | |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Carbon Replacement, market price | 1 | LS | $62,000 | $ 62,000 | 0% | $ - | $ 62,000 |

FY 2013 bid range was $53k, $63k, $82k, $107k. Contractor for low bid subsequently notified EWA that he did not include $5k cost in original bid.
The low bid Contractor honored his bid but the anticipated future cost for this work should include an additional $5k plus addl cost associated with inflation.

| | | | | | |
|---|---|---|---|---|---|
| **Subtotal** | | | | | **$ 62,000** |
| Contractor Overhead & Profit @ | | | 27% | | Included |
| Shipping Rate | 0% | of total is shipped @ | 15% | | Included |
| Sales Tax | 0% | of total is taxed @ | 7.75% | | Included |
| Project Contingency @ | | | 40% | | $ 25,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | **$ 87,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Apr-2013 | 10289 | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | 1.069 |
| **Total Main Project Cost (CAMP Report Year)** | | | | | **$ 94,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.1.002 CA | Condition Assessment | 1.5% | $ 1,410 | 20% | $ 282 | $ 2,000 | Not Applicable |
| 5.1.002 CS | Conceptual Study | 2.5% | $ 2,350 | 20% | $ 470 | $ 3,000 | Not Applicable |
| 5.1.002 DS | Design | 8.0% | $ 7,520 | 15% | $ 1,128 | $ 9,000 | Not Applicable |
| 5.1.002 EDC | Engr During Construction | 4.5% | $ 4,230 | 15% | $ 635 | $ 5,000 | $ 5,000 |
| 5.1.002 CM | Construction Mgt | 5.0% | $ 4,700 | 20% | $ 940 | $ 6,000 | Not Applicable |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 99,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Quote (unit cost) provided by Carbon Activated Corporation for ORF I project in April 2013. Applied unit cost to vol ORF 1
4. Analysis of Peroxide useage vs carbon regen

## Project 5.1.005

**HW/GRT/PSB Odor Control**

| Main Project Type | | Key Dates | |
|---|---|---|---|
| New Facility | | CAMP Report | Jan-15 |
| Facility Rehabilitation | X | Initial Estimate | Oct-12 |
| Major Maintenance | | Estimate Update | Feb-15 |
| Asset Replacement | | Const Year | 2019 |
| Special Study | | | |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Scope of work for the improvement to be determined. | | | | | | | |
| Potential scope of work includes the following: | | | | | | | |
| Odor ducts and connections | 1 | LS | $ 30,000 | $ 30,000 | 0% | $ - | $ 30,000 |
| New Odor Control Unit | 1 | LS | $ 300,000 | $ 300,000 | 0% | $ - | $ 300,000 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 330,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 90,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 20,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 13,000 |
| Project Contingency @ | | 40% | | $ 182,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 635,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2013 | 10740 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 651,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.1.005 CA | Condition Assessment | 1.5% | $ 9,765 | 20% | $ 1,953 | $ 12,000 | Not Applicable |
| 5.1.005 CS | Conceptual Study (incl other OC) | LS | $ 40,000 | 20% | $ - | $ 40,000 | Incl w/design |
| 5.1.005 DS | Design | 8.0% | $ 52,080 | 15% | $ 7,812 | $ 60,000 | $ 60,000 |
| 5.1.005 EDC | Engr During Construction | 4.5% | $ 29,295 | 15% | $ 4,394 | $ 34,000 | $ 34,000 |
| 5.1.005 CM | Construction Mgt | 5.5% | $ 35,805 | 20% | $ 7,161 | $ 43,000 | $ 43,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 788,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Estimated cost. A more detailed cost estimate will available after condition assessment or conceptual study.

## Project 5.2.006

**Plant Water Functional Improvements**

| Main Project Type | | Key Dates | |
|---|---|---|---|
| New Facility | | CAMP Report | Jan-14 |
| Facility Rehabilitation | x | Initial Estimate | Dec-12 |
| Major Maintenance | | Estimate Update | Feb-15 |
| Asset Replacement | | Const Year | 2018 |
| Special Study | | | |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Piping and Valves | 1 | LS | $ 300,000 | $ 300,000 | 0% | $ - | $ 300,000 |
| **Subtotal** | | | | | | | **$ 300,000** |
| Contractor Overhead & Profit included | | | 0% | | | | included |
| Shipping Rate Included | 50% | of total is shipped @ | 0% | | | | included |
| Sales Tax Included | 50% | of total is taxed @ | 0.0% | | | | included |
| Project Contingency Included | | | 40% | | | | $ 120,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 420,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Mar-2012 | 10283 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.070 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 450,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.006 CA | Condition Assessment | 1.5% | $ 6,750 | 20% | $ 1,350 | $ 8,100 | not reqd |
| 5.2.006 CS | Conceptual Study | 2.5% | $ 11,250 | 20% | $ 2,250 | $ 14,000 | complete |
| 5.2.006 DS | Design w/Tech Memo | 8.0% | $ 36,000 | 15% | $ 5,400 | $ 42,000 | $ 42,000 |
| 5.2.006 EDC | Engr During Construction | 4.5% | $ 20,250 | 15% | $ 3,038 | $ 24,000 | $ 24,000 |
| 5.2.006 CM | Construction Mgt | 5.5% | $ 24,750 | 20% | $ 4,950 | $ 30,000 | $ 30,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 546,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost

## 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 | Jan-15 |
| Initial Estimate | Nov-12 |
| Estimate Update | Feb-15 |
| Const Year | 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Centralized control and monitoring console | 1 | LS | $ 30,000 | $ 30,000 | 0% | $ - | $ 30,000 |
| (Serves EWPCF and Remote Facilities) | | | | | | | |
| Surveillance video monitoring system and installation | | | | | | | |
| Video camara | 10 | EA | $ 500 | $ 5,000 | 50% | $ 2,500 | $ 8,000 |
| Receivers | 10 | EA | $ 500 | $ 5,000 | 50% | $ 2,500 | $ 8,000 |
| Software and recording | 1 | LS | $ 50,000 | $ 50,000 | 0% | $ - | $ 50,000 |
| PA System Modification | 1 | LS | $ 10,000 | $ 10,000 | 0% | $ - | $ 10,000 |
| Gates retrofit and connect to system | 2 | EA | $ 20,000 | $ 40,000 | 0% | $ - | $ 40,000 |
| **Subtotal** | | | | | | | **$ 116,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ 32,000 |
| Shipping Rate | 40% | of total is shipped @ | 15% | | | | $ 7,000 |
| Sales Tax | 50% | of total is taxed @ | 7.75% | | | | $ 5,000 |
| Project Contingency @ | | | 40% | | | | $ 65,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 225,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Jan-2015 | 10999 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 225,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.012 CA | Condition Assessment | 1.5% | $ 3,375 | 20% | $ 675 | $ 5,000 | not reqd |
| 5.2.012 CS | Conceptual Study (5) | 10.0% | $ 22,500 | 20% | $ 4,500 | $ 27,000 | $ 27,000 |
| 5.2.012 DS | Design (5) | 15.0% | $ 33,750 | 15% | $ 5,063 | $ 39,000 | $ 39,000 |
| 5.2.012 EDC | Engr During Construction | 4.5% | $ 10,125 | 15% | $ 1,519 | $ 12,000 | $ 12,000 |
| 5.2.012 CM | Construction Mgt | 5.5% | $ 12,375 | 20% | $ 2,475 | $ 15,000 | $ 15,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 318,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate based on information from "http://www.fixr.com/costs/install-video-surveillance-cameras".
4. Scope will be further defined after study of the project needs is complete.
5. Higher percentage was used due to small capital cost of the project.

## 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 | Jan-15 |
| Initial Estimate | Nov-11 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Air Compressor | 1 | LS | $ 20,000 | $ 20,000 | 60% | $ 12,000 | $ 32,000 |
| 1-inch galv steel instrumentation air aboveground piping | 1000 | 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 @ | 15% | | $ 10,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 7,000 |
| Project Contingency @ | | 40% | | $ 69,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 241,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Jan-2015 | 10999 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 241,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.017 CA | Condition Assessment | 1.5% | $ 3,615 | 20% | $ 723 | $ 5,000 | complete |
| 5.2.017 CS | Conceptual Study | 2.5% | $ 6,025 | 20% | $ 1,205 | $ 8,000 | not reqd |
| 5.2.017 DS | Design (4) | 15.0% | $ 36,150 | 15% | $ 5,423 | $ 42,000 | $ 42,000 |
| 5.2.017 EDC | Engr During Construction | 4.5% | $ 10,845 | 15% | $ 1,627 | $ 13,000 | $ 13,000 |
| 5.2.017 CM | Construction Mgt | 5.5% | $ 13,255 | 20% | $ 2,651 | $ 16,000 | $ 16,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 312,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimated per Service and Instrument Air Condition Assessment Recommendations, 2014.
4. Higher percentage was used due to small capital cost of the project.

## Project 5.2.019

**Plant Landscaping**

| Main Project Type | | Key Dates | |
|---|---|---|---|
| New Facility | | CAMP Report | Jan-14 |
| Facility Rehabilitation | x | Initial Estimate | Dec-12 |
| Major Maintenance | | Estimate Update | Feb-15 |
| Asset Replacement | | Const Year | 2020 |
| Special Study | | | |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **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 | $ 5,400 | 0% | $ - | $ 6,000 |
| New Landscaping | 75,000 | SF | $ 1.00 | $ 75,000 | 0% | $ - | $ 75,000 |
| **Subtotal** | | | | | | | **$ 105,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ 29,000 |
| Shipping Rate | 40% | of total is shipped @ | 15% | | | | $ 7,000 |
| Sales Tax | 50% | of total is taxed @ | 7.75% | | | | $ 5,000 |
| Project Contingency @ | | | 40% | | | | $ 59,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 205,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Mar-2012 | 10283 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.070 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 220,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.019 CA | Condition Assessment | 1.5% | $ 3,300 | 20% | $ 660 | $ 4,000 | Not Applicable |
| 5.2.019 CS | Conceptual Study | 2.5% | $ 5,500 | 20% | $ 1,100 | $ 7,000 | Not Applicable |
| 5.2.019 DS | Design (3) | 15.0% | $ 33,000 | 15% | $ 4,950 | $ 38,000 | $ 38,000 |
| 5.2.019 EDC | Engr During Construction | 4.5% | $ 9,900 | 15% | $ 1,485 | $ 12,000 | $ 12,000 |
| 5.2.019 CM | Construction Mgt | 5.5% | $ 12,100 | 20% | $ 2,420 | $ 15,000 | $ 15,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 285,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Higher percentage was used due to small capital cost of the project.

## Project 5.2.021

**Climate Control at MCCs**

| Main Project Type | |
|---|---|
| New Facility | X |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-14 |
| Initial Estimate | |
| Estimate Update | Feb-15 |
| Const Year | 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Replace HVAC system at 4 MCCs | 4 | LS | $ 50,000 | $ 200,000 | 0% | $ - | $ 200,000 |
| MCCs included in the cost estimate: | | | | | | | |
| Dewatering/Drying MCC | | | | | | | |
| EPS/Chlorination MCC | | | | | | | |
| Secondary Process MCC | | | | | | | |
| Flow EQ MCC | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Subtotal** | | | | | **$ 200,000** |
| Contractor Overhead & Profit @ | | 27% | | | $ 54,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | | incuded |
| Sales Tax | 50% of total is taxed @ | 7.75% | | | included |
| Project Contingency @ | | 40% | | | included |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | **$ 254,000** |
| **ENR CCI Corresponding to Year of Estimate** | | LA CCI Jan-2015 | 10999 | | |
| **ENR CCI Corresponding to CAMP Report Year** | | LA CCI Jan-2015 | 10999 | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | **$ 254,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.021 CA | Condition Assessment | 1.5% | $ 3,810 | 20% | $ 762 | $ 4,600 | nor required |
| 5.2.021 CS | Conceptual Study | 2.5% | $ 6,350 | 20% | $ 1,270 | $ 8,000 | nor required |
| 5.2.021 DS | Design (3) | 15.0% | $ 38,100 | 15% | $ 5,715 | $ 44,000 | $ 44,000 |
| 5.2.021 EDC | Engr During Construction | 4.5% | $ 11,430 | 15% | $ 1,715 | $ 14,000 | $ 14,000 |
| 5.2.021 CM | Construction Mgt | 5.5% | $ 13,970 | 20% | $ 2,794 | $ 17,000 | $ 17,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 329,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Higher percentage was used due to small capital cost of the project.

## Project 5.2.026

**Plant Waste Stream Routing**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | X |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-12 |
| Estimate Update | Feb-15 |
| Const Year | 2020 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Piping and Valves | 1 | LS | $ 150,000 | $ 150,000 | 0% | $ - | $ 150,000 |
| Cost estimate to be revised when study complete | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Subtotal** | | | | | **$ 150,000** |
| Contractor Overhead & Profit @ | | 0% | (Included) | | $ - |
| Shipping Rate | 0% of total is shipped @ | 15% | (Included) | | $ - |
| Sales Tax | 0% of total is taxed @ | 7.75% | (Included) | | $ - |
| Project Contingency @ | | 40% | (Included) | | $ 60,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | **$ 210,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2013 | | 10740 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | | 10999 | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | **$ 216,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.026 CA | Condition Assessment | 0.0% | $ - | 20% | $ - | $ - | not reqd |
| 5.2.026 CS | Conceptual Study | 7.5% | $ 16,200 | 20% | $ 3,240 | $ 20,000 | $ 20,000 |
| 5.2.026 DS | Design (4) | 15.0% | $ 32,400 | 15% | $ 4,860 | $ 38,000 | $ 38,000 |
| 5.2.026 EDC | Engr During Construction | 4.5% | $ 9,720 | 15% | $ 1,458 | $ 12,000 | $ 12,000 |
| 5.2.026 CM | Construction Mgt (4) | 7.5% | $ 16,200 | 20% | $ 3,240 | $ 20,000 | $ 20,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 306,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate will be further defined after the scope of work is identified.
4. Higher percentage was used due to small capital cost of the project.

## Project 5.2.031

**Arc Flash Hazard Asessment**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | |
| Major Maintenance | |
| Asset Replacement | X |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Feb-15 |
| Estimate Update | Feb-15 |
| Const Year | Jul-05 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Inplementing Recommendationd from Asc Flash Study | 1 | LS | | $ - | 0% | $ - | $ - |
| **Subtotal** | | | | | | | **$ -** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ - |
| 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 Nov-2014 | 10760 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.022 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ -** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.031 CA | Condition Assessment | 1.5% | $ - | 20% | $ - | $ - | $ 75,000 |
| 5.2.031 CS | Conceptual Study | 2.5% | $ - | 20% | $ - | $ - | NA |
| 5.2.031 DS | Design | 8.0% | $ - | 15% | $ - | $ - | NA |
| 5.2.031 EDC | Engr During Construction | 4.5% | $ - | 15% | $ - | $ - | NA |
| 5.2.031 CM | Construction Mgt | 5.0% | $ - | 20% | $ - | $ - | NA |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 75,000** |

**Notes:**

1. Arc Flash Study is cost is based on the proposal received from Nazzareno Electric Co. Inc in December 2014. Budgetary price reported here includes 20% of contingency on the proposed budget for the study.

## 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 | Jan-15 |
| Initial Estimate | |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Asset Painting and Protective Coating | 1 | LS | | $ 70,000 | 0% | $ - | $ 70,000 |
| **Subtotal** | | | | | | | **$ 70,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ 19,000 |
| Shipping Rate | 0% | of total is shipped @ | 15% | | | | included |
| Sales Tax | 0% | of total is taxed @ | 7.75% | | | | included |
| Project Contingency @ | | | 40% | | | | $ 36,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 125,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2014 | 10760 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.022 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 128,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.032 CA | Condition Assessment | 1.5% | $ 1,920 | 20% | $ 384 | $ 3,000 | NA |
| 5.2.032 CS | Conceptual Study | 2.5% | $ 3,200 | 20% | $ 640 | $ 4,000 | NA |
| 5.2.032 DS | Design | 8.0% | $ 10,240 | 15% | $ 1,536 | $ 12,000 | $ 12,000 |
| 5.2.032 EDC | Engr During Construction | 4.5% | $ 5,760 | 15% | $ 864 | $ 7,000 | NA |
| 5.2.032 CM | Construction Mgt | 5.5% | $ 7,040 | 20% | $ 1,408 | $ 9,000 | $ 9,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 149,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Budget to be reanalized when bid data becomes available.

## 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 | Jan-15 |
| Initial Estimate | |
| Estimate Update | Feb-15 |
| Const Year | 2018 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Equipment Abandonment | 1 | LS | $ 200,000 | $ 200,000 | 0% | $ - | $ 200,000 |
| **Subtotal** | | | | | | | **$ 200,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | $ 54,000 |
| Shipping Rate | 0% | of total is shipped @ | 15% | | | | included |
| Sales Tax | 0% | of total is taxed @ | 7.75% | | | | included |
| Project Contingency @ | | | 40% | | | | $ 102,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 356,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2014 | 10760 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.022 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 364,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.2.033 CA | Condition Assessment | 1.5% | $ 5,460 | 20% | $ 1,092 | $ 7,000 | Not Applicable |
| 5.2.033 CS | Conceptual Study (4) | 5.0% | $ 18,200 | 20% | $ 3,640 | $ 22,000 | $ 22,000 |
| 5.2.033 DS | Design | 8.0% | $ 29,120 | 15% | $ 4,368 | $ 34,000 | $ 34,000 |
| 5.2.033 EDC | Engr During Construction | 4.5% | $ 16,380 | 15% | $ 2,457 | $ 19,000 | Not Applicable |
| 5.2.033 CM | Construction Mgt | 5.5% | $ 20,020 | 20% | $ 4,004 | $ 25,000 | Not Applicable |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 420,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Budget to be reanalized when bid data becomes available.
4. Estimate Value Recommended by EWA/RMC Staff

## Project 5.3.010

**Dryer Lab Enclosure**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-14 |
| Initial Estimate | Dec-13 |
| Estimate Update | Feb-15 |
| Const Year | 2019 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Laboratory Enclosure | 1 | LS | $ 150,000 | $ 150,000 | 0% | $ - | $ 100,000 |
| Includes structure, ventilation, doors, lighting | | | | | | | |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 100,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 27,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 6,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 4,000 |
| Project Contingency @ | | 40% | | $ 55,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 192,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2013 | 10740 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 197,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.3.010 CA | Condition Assessment | 1.5% | $ 2,955 | 20% | $ 591 | $ 4,000 | Not Applicable |
| 5.3.010 CS | Conceptual Study | 2.5% | $ 4,925 | 20% | $ 985 | $ 6,000 | Not Applicable |
| 5.3.010 DS | Design (3) | 15.0% | $ 29,550 | 15% | $ 4,433 | $ 34,000 | $ 34,000 |
| 5.3.010 EDC | Engr During Construction | 4.5% | $ 8,865 | 15% | $ 1,330 | $ 11,000 | $ 11,000 |
| 5.3.010 CM | Construction Mgt | 5.5% | $ 10,835 | 20% | $ 2,167 | $ 14,000 | $ 14,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 256,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Higher percentage was used due to small capital cost of the project.

## Project 5.3.012

**Chiller for Cogen Engine Building**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-14 |
| Initial Estimate | Dec-13 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Improvements on HVAC system | 1 | LS | $ 50,000.00 | $ 50,000 | 0% | $ - | $ 50,000 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 50,000** |
| Contractor Overhead & Profit @ | | 27% | | $ 14,000 |
| Shipping Rate | 40% of total is shipped @ | 15% | | $ 3,000 |
| Sales Tax | 50% of total is taxed @ | 7.75% | | $ 2,000 |
| Project Contingency @ | | 40% | | $ 28,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 97,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2014 | 10760 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.022 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 100,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 5.3.012 CA | Condition Assessment | 1.5% | $ 1,500 | 20% | $ 300 | $ 2,000 | Not Applicable |
| 5.3.012 CS | Conceptual Study | 2.5% | $ 2,500 | 20% | $ 500 | $ 3,000 | Not Applicable |
| 5.3.012 DS | Design (3) | 15.0% | $ 15,000 | 15% | $ 2,250 | $ 18,000 | $ 18,000 |
| 5.3.012 EDC | Engr During Construction | 4.5% | $ 4,500 | 15% | $ 675 | $ 6,000 | $ 6,000 |
| 5.3.012 CM | Construction Mgt | 5.5% | $ 5,500 | 20% | $ 1,100 | $ 7,000 | $ 7,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 131,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Higher percentage was used due to small capital cost of the project.
4. Cost Estimate will be Refined after Design is Performed in 2015.

## Project 6.1.201

**SCADA Network and Computer Room Upgrades (OT_ES01)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| **Design Labor Included Below** | | | | | | | |
| *Network Design (30%, 60%, 90%) $150,000+* | *2654* | *Hrs* | *$ 155* | *$ 411,370* | *0%* | *$ -* | *$ -* |
| *Control Room Design $25,000+* | *320* | *Hrs* | *$ 155* | *$ 49,600* | *0%* | *$ -* | *$ -* |
| *Computer Room Modifications $20,000+* | *240* | *Hrs* | *$ 155* | *$ 37,200* | *0%* | *$ -* | *$ -* |
| *Network Logicaland Security Design $25,000+* | *300* | *Hrs* | *$ 155* | *$ 46,500* | *0%* | *$ -* | *$ -* |
| *Prepare Bid Documents $5,000+* | *80* | *Hrs* | *$ 155* | *$ 12,400* | *0%* | *$ -* | *$ -* |
| *UPS Design $25,000+* | *320* | *Hrs* | *$ 155* | *$ 49,600* | *0%* | *$ -* | *$ -* |
| *Backup Control Room at Faraday $25,000+* | *320* | *Hrs* | *$ 155* | *$ 49,600* | *0%* | *$ -* | *$ -* |
| *Project Management $6,000+* | *120* | *Hrs* | *$ 155* | *$ 18,600* | *0%* | *$ -* | *$ -* |
| **Implementation and Hardware** | | | | | | | |
| Configure and Test Network | 800 | Hrs | $ 155 | $ 124,000 | 0% | $ - | $ 124,000 |
| Build Structured Cabling | 1 | LS | $ 600,000 | $ 600,000 | 0% | $ - | $ 600,000 |
| Build Network Closets and Network Core | 1 | LS | $ 400,000 | $ 400,000 | 0% | $ - | $ 400,000 |
| Build Control Room | 1 | LS | $ 150,000 | $ 150,000 | 0% | $ - | $ 150,000 |
| Build Computer Room | 1 | LS | $ 150,000 | $ 150,000 | 0% | $ - | $ 150,000 |
| Build Plant UPS | 1 | LS | $ 150,000 | $ 150,000 | 0% | $ - | $ 150,000 |
| Build backup control room | 1 | LS | $ 150,000 | $ 150,000 | 0% | $ - | $ 150,000 |
| **Project Management** | | | | | | | |
| Project Management | 240 | Hr | $ 190 | $ 45,600 | 0% | $ - | $ 45,600 |
| Admin Support | 80 | Hr | $ 80 | $ 6,400 | 0% | $ - | $ 6,400 |
| QC | 80 | Hr | $ 175 | $ 14,000 | 0% | $ - | $ 14,000 |
| P-6.1.202: SCADA Pilot Project | 1 | LS | $ 400,000 | $ 400,000 | | | $ 400,000 |
| **Subtotal** | | | | | | | **$ 2,190,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | Included |
| Shipping Rate | 40% | of total is shipped @ | 15% | | | | Not Applicable |
| Sales Tax | 50% | of total is taxed @ | 7.75% | | | | Not Applicable |
| Project Contingency @ | | | 25% | | | | $ 547,500 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 2,738,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2013 | 10740 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 2,810,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.1.201 CA | Condition Assessment | 1.5% | $ 42,150 | 20% | $ 8,430 | $ 51,000 | Not Applicable |
| 6.1.201 CS | Conceptual Study | 2.5% | $ 70,250 | 20% | $ 14,050 | $ 85,000 | Not Applicable |
| 6.1.201 DS | Design (5) | 0.0% | $ - | 35% | $ - | $ - | $ 493,000 |
| 6.1.201 EDC | Engr During Construction | 4.5% | $ 126,450 | 15% | $ 18,968 | $ 146,000 | $ 175,000 |
| 6.1.201 CM | Construction Mgt | 5.5% | $ 154,550 | 20% | $ 30,910 | $ 186,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 3,478,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Refined in 2014 by EWA Staff Performing Work In-house
5. Design Labor in Estimate moved to Project Phases Cost.

## Project 6.1.204

**Co-Gen Facility and Biosolids SCADA Integration (OT_ES04)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2019 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Design Labor Included Below** | | | | | | | |
| SCADA Architecture and Block Diagrams $15,000 | 80 | Hrs | $ 155 | $ 12,400 | 0% | $ - | $ - |
| Bill of Materials $10,000 | 64 | Hrs | $ 155 | $ 9,920 | 0% | $ - | $ - |
| Detailed Mitigation Plan $20,000 | 120 | Hrs | $ 155 | $ 18,600 | 0% | $ - | $ - |
| Prep Bid Documents $20,000 | 120 | Hrs | $ 155 | $ 18,600 | 0% | $ - | $ - |
| Project Management and QC $6,000 | 40 | Hrs | $ 155 | $ 6,200 | 0% | $ - | $ - |
| **Implementation** | | | | | | | |
| Install, Config, Test Workstations, laptops | 232 | Hrs | $ 110 | $ 25,520 | 0% | $ - | $ 25,520 |
| Program, commission SCADA System | 3556 | Hrs | $ 135 | $ 480,060 | 0% | $ - | $ 480,060 |
| Software Costs | | | | | | | |
| **Project Management** | | | | | | | |
| Project Management | 160 | Hr | $ 190 | $ 30,400 | 0% | $ - | $ 30,400 |
| Admin Support | 60 | Hr | $ 80 | $ 4,800 | 0% | $ - | $ 4,800 |
| QC | 100 | Hr | $ 175 | $ 17,500 | 0% | $ - | $ 17,500 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 559,000** |
| Contractor Overhead & Profit @ | | 27% | | Included |
| Shipping Rate | 40% of total is shipped @ | 15% | | Not Applicable |
| Sales Tax | 50% of total is taxed @ | 7.75% | | Not Applicable |
| Contingency @ | | 25% | | $ 139,750 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 699,000** |
| **ENR CCI Corresponding to Year of Estimate** | | LA CCI Nov-2013 | 10740 | |
| **ENR CCI Corresponding to CAMP Report Year** | | LA CCI Jan-2015 | 10999 | 1.024 |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 716,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.1.204 CA | Condition Assessment | 1.5% | $ 10,740 | 20% | $ 2,148 | $ 13,000 | Not Applicable |
| 6.1.204 CS | Conceptual Study | 2.5% | $ 17,900 | 20% | $ 3,580 | $ 22,000 | Not Applicable |
| 6.1.204 DS | Design | 8.0% | $ 57,280 | 15% | $ 8,592 | $ 66,000 | $ 75,000 |
| 6.1.204 EDC | Engr During Construction | 4.5% | $ 32,220 | 15% | $ 4,833 | $ 38,000 | $ 38,000 |
| 6.1.204 CM | Construction Mgt | 5.5% | $ 39,380 | 20% | $ 7,876 | $ 48,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 829,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Refined in 2014 by EWA Staff Performing Work In-house
5. Design Labor in Estimate moved to Project Phases Cost.

## Project 6.1.301

**Implement ODMS Layer 1 (OT_ID01)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Needs Assessment | 120 | Hrs | $ 175 | $ 21,000 | 0% | $ - | $ 21,000 |
| Design ODMS Level 1 | 184 | Hrs | $ 175 | $ 32,200 | 0% | $ - | $ 32,200 |
| Define Reports (6), Manual Data Entry Forms (3) | 72 | Hrs | $ 155 | $ 11,160 | 0% | $ - | $ 11,160 |
| Vendor Selection and Procurement | 64 | Hrs | $ 155 | $ 9,920 | 0% | $ - | $ 9,920 |
| Cfg ODMS Level 1 (Historians, DMZ, portal, wrkstns) | 360 | Hrs | $ 151 | $ 54,360 | 0% | $ - | $ 54,360 |
| Program and Test Manual Data Entry Forms (3) | 72 | Hrs | $ 151 | $ 10,872 | 0% | $ - | $ 10,872 |
| Program and Test six (6) Reports and four (4) dashboards | 256 | Hrs | $ 151 | $ 38,656 | 0% | $ - | $ 38,656 |
| End-user (3) and DBA Training (1) | 120 | Hrs | $ 151 | $ 18,120 | 0% | $ - | $ 18,120 |
| One Year Support | 120 | Hrs | $ 151 | $ 18,120 | 0% | $ - | $ 18,120 |
| Production Historians | 2 | LS | $ 10,000 | $ 20,000 | 0% | $ - | $ 20,000 |
| Production WebPortal | 1 | LS | $ 10,000 | $ 10,000 | 0% | $ - | $ 10,000 |
| DMZ Historian | 1 | LS | $ 10,000 | $ 10,000 | 0% | $ - | $ 10,000 |
| DMZ WebPortal | 1 | LS | $ 10,000 | $ 10,000 | 0% | $ - | $ 10,000 |
| Software costs | 1 | LS | $ 80,000 | $ 80,000 | 0% | $ - | $ 80,000 |
| **Project Management** | | | | | | | |
| Project Management | 137 | Hr | $ 190 | $ 26,030 | 0% | $ - | $ 26,030 |
| Admin Support | 69 | Hr | $ 80 | $ 5,520 | 0% | $ - | $ 5,520 |
| QC | 69 | Hr | $ 175 | $ 12,075 | 0% | $ - | $ 12,075 |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 389,000** |
| **EWA Revised Subtotal** | | | | **$ 200,000** |
| Contractor Overhead & Profit @ | | 27% | | Included |
| Shipping Rate | 40% of total is shipped @ | 15% | | Not Applicable |
| Sales Tax | 50% of total is taxed @ | 7.75% | | Not Applicable |
| Contingency @ | | 0% | | $ - |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 200,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2014 | 10760 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.022 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 205,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.1.301 CA | Condition Assessment | 1.5% | $ 3,075 | 20% | $ 615 | $ 4,000 | Not Applicable |
| 6.1.301 CS | Conceptual Study | 2.5% | $ 5,125 | 20% | $ 1,025 | $ 7,000 | Not Applicable |
| 6.1.301 DS | Design | 8.0% | $ 16,400 | 15% | $ 2,460 | $ 19,000 | Not Applicable |
| 6.1.301 EDC | Engr During Construction | 4.5% | $ 9,225 | 15% | $ 1,384 | $ 11,000 | In House |
| 6.1.301 CM | Construction Mgt | 5.5% | $ 11,275 | 20% | $ 2,255 | $ 14,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 205,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.1.302

**SCADA Integration with WIMS and Dashboards (OT_ID03)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2019 |

| Main Project Cost[1] | | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | | |
| Needs Assessment | | 80 | Hrs | $ 155 | $ 12,400 | 0% | $ - | $ 12,400 |
| Integration of SCADA Prod Hist WIMS | | 64 | Hrs | $ 155 | $ 9,920 | 0% | $ - | $ 9,920 |
| Report and Dashboard Narratives | | 52 | Hrs | $ 155 | $ 8,060 | 0% | $ - | $ 8,060 |
| Update ODMS standards | | 80 | Hrs | $ 155 | $ 12,400 | 0% | $ - | $ 12,400 |
| Configure and test WIMS Integr. | | 200 | Hrs | $ 135 | $ 27,000 | 0% | $ - | $ 27,000 |
| Deploy BI and Middleware | | 200 | Hrs | $ 135 | $ 27,000 | 0% | $ - | $ 27,000 |
| Dev 5 reports and 2 dashboards | | 200 | Hrs | $ 135 | $ 27,000 | 0% | $ - | $ 27,000 |
| Hardware - Enterprise Historian | | 1 | LS | $ 15,000 | $ 15,000 | 0% | $ - | $ 15,000 |
| Software | | 1 | LS | $ 40,000 | $ 40,000 | 0% | $ - | $ 40,000 |
| WIMS Middleware Adapter | | 1 | LS | $ 20,000 | $ 20,000 | 0% | $ - | $ 20,000 |
| Enterprise Historian | | 1 | LS | $ 20,000 | $ 20,000 | 0% | $ - | $ 20,000 |
| | | 880 | | | | | | |
| **Project Management** | | | | | | | | |
| Project Management | 5% | 44 | Hr | $ 190 | $ 8,360 | 0% | $ - | $ 8,360 |
| Admin Support | 2% | 17.6 | Hr | $ 80 | $ 1,408 | 0% | $ - | $ 1,408 |
| QC | 2% | 17.6 | Hr | $ 175 | $ 3,080 | 0% | $ - | $ 3,080 |
| **Subtotal** | | | | | | | | **$ 232,000** |
| Contractor Overhead & Profit @ | | 27% | | | | | | Included |
| Shipping Rate | 40% of total is shipped @ | 15% | | | | | | Not Applicable |
| Sales Tax | 50% of total is taxed @ | 7.75% | | | | | | Not Applicable |
| Contingency @ | | 20% | | | | | | $ 46,400 |
| **Total Main Project Cost from Previous Reports** | | | | | | | | **$ 278,400** |
| Project Contingency @ | | 0% | | | | | | $ - |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | | **$ 279,000** |
| **ENR CCI Corresponding to Year of Estimate** | | LA CCI Nov-2013 | | | 10740 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | LA CCI Jan-2015 | | | 10999 | | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | | **$ 286,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.1.302 CA | Condition Assessment | 1.5% | $ 4,290 | 20% | $ 858 | $ 6,000 | Not Applicable |
| 6.1.302 CS | Conceptual Study | 2.5% | $ 7,150 | 20% | $ 1,430 | $ 9,000 | Not Applicable |
| 6.1.302 DS | Design | 8.0% | $ 22,880 | 15% | $ 3,432 | $ 27,000 | Included |
| 6.1.302 EDC | Engr During Construction | 4.5% | $ 12,870 | 15% | $ 1,931 | $ 15,000 | $ 15,000 |
| 6.1.302 CM | Construction Mgt | 5.5% | $ 15,730 | 20% | $ 3,146 | $ 19,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 301,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.1.401

**Electronic Operator Logbook and Pass-Down (OT_OI03)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| **Design Labor** | | | | | | | |
| Research Technologies | 40 | Hrs | $ 155 | $ 6,200 | 0% | $ - | $ 6,200 |
| Faciltate workshops and product demonstrations | 64 | Hrs | $ 155 | $ 9,920 | 0% | $ - | $ 9,920 |
| Draft and Final Design Report | 80 | Hrs | $ 155 | $ 12,400 | 0% | $ - | $ 12,400 |
| **Implementation Labor** | | | | | | | |
| Procure Product and Implementation | 200 | Hrs | $ 155 | $ 31,000 | 0% | $ - | $ 31,000 |
| | 384 | Hrs | | | | | |
| | 9.6 | Wks | | | | | |
| **Software Costs** | | | | | | | |
| Standard Components (select from pull-down list) | 1 | LS | $ 30,000 | $ 30,000 | 0% | $ - | $ 30,000 |
| **Project Management** | | | | | | | |
| Project Management | 18 | Hr | $ 190 | $ 3,420 | 0% | $ - | $ 3,420 |
| Admin Support | 18 | Hr | $ 80 | $ 1,440 | 0% | $ - | $ 1,440 |
| QC | 0 | Hr | $ 175 | $ - | 0% | $ - | $ - |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 95,000** |
| Contractor Overhead & Profit @ | | 27% | | Included |
| Shipping Rate | 40% | of total is shipped @ | 15% | Not Applicable |
| Sales Tax | 50% | of total is taxed @ | 7.75% | Not Applicable |
| Contingency @ | | | 20% | $ 19,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 114,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2013 10740 | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 10999 | 1.024 |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 117,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.1.401 CA | Condition Assessment | 1.5% | $ 1,755 | 20% | $ 351 | $ 3,000 | Not Applicable |
| 6.1.401 CS | Conceptual Study | 2.5% | $ 2,925 | 20% | $ 585 | $ 4,000 | Not Applicable |
| 6.1.401 DS | Design | 8.0% | $ 9,360 | 15% | $ 1,404 | $ 11,000 | Included |
| 6.1.401 EDC | Engr During Construction | 4.5% | $ 5,265 | 15% | $ 790 | $ 7,000 | $ 7,000 |
| 6.1.401 CM | Construction Mgt | 5.5% | $ 6,435 | 20% | $ 1,287 | $ 8,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 124,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.1.407

**Automation Study Implementation**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2016+ |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Implementation FY2016 | 1 | LS | $ 204,000 | $ 204,000 | 0% | $ - | $ 204,000 |
| Implementation FY2017 | 1 | LS | $ 357,000 | $ 357,000 | 0% | $ - | $ 357,000 |
| Implementation FY2018 | 1 | LS | $ 357,000 | $ 357,000 | 0% | $ - | $ 357,000 |
| Implementation FY2019 | 1 | LS | $ 357,000 | $ 357,000 | 0% | $ - | $ 357,000 |
| Implementation FY2020 | 1 | LS | $ 357,000 | $ 357,000 | 0% | $ - | $ 357,000 |
| **Subtotal** | | | | | | | **$ 1,632,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | Included |
| Shipping Rate | 40% | of total is shipped @ | 15% | | | | Not Applicable |
| Sales Tax | 50% | of total is taxed @ | 7.75% | | | | Not Applicable |
| Project Contingency @ | | | 40% | | | | $ 652,800 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 2,285,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Jan-2015 | 10999 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.000 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 2,285,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.1.407 CA | Condition Assessment | 1.5% | $ 34,275 | 20% | $ 6,855 | $ 42,000 | Not Applicable |
| 6.1.407 CS | Conceptual Study | 2.5% | $ 57,125 | 20% | $ 11,425 | $ 69,000 | Not Applicable |
| 6.1.407 DS | Design | 8.0% | $ 182,800 | 15% | $ 27,420 | $ 211,000 | $ 211,000 |
| 6.1.407 EDC | Engr During Construction | 4.5% | $ 102,825 | 15% | $ 15,424 | $ 119,000 | $ 119,000 |
| 6.1.407 CM | Construction Mgt | 5.5% | $ 125,675 | 20% | $ 25,135 | $ 151,000 | $ 151,000 |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 2,766,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate are placeholder value and will be revised after Study is completed.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.2.102

**Technology Master Plan Upgrades (BT_TDG02)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2019 |

| Main Project Cost[1] | | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | | |
| **Design Labor** | | 1 | LS | $ 200,000 | $ 200,000 | 0% | $ - | $ 200,000 |
| Includes changes to planned projects, additions of new projects, update Master Plan | | | | | | | | |
| **Project Management** | | | | | | | | |
| Project Management | 5% | 1 | LS | $ 10,000 | $ 10,000 | 0% | $ - | $ 10,000 |
| Admin Support | 2% | 1 | LS | $ 4,000 | $ 4,000 | 0% | $ - | $ 4,000 |
| QC | 2% | 1 | LS | $ 4,000 | $ 4,000 | 0% | $ - | $ 4,000 |
| **Subtotal** | | | | | | | | **$ 218,000** |
| Contractor Overhead & Profit @ | | 27% | | | | | | Included |
| Shipping Rate | 40% of total is shipped @ | 15% | | | | | | Not Applicable |
| Sales Tax | 50% of total is taxed @ | 7.75% | | | | | | Not Applicable |
| Contingency @ | | 20% | | | | | | Included |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | | **$ 218,000** |
| **ENR CCI Corresponding to Year of Estimate** | | LA CCI Nov-2013 | | 10740 | | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | LA CCI Jan-2015 | | 10999 | | 1.024 | | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | | **$ 224,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.2.102 CA | Condition Assessment | 1.5% | $ 3,360 | 20% | $ 672 | $ 5,000 | Not Applicable |
| 6.2.102 CS | Conceptual Study | 2.5% | $ 5,600 | 20% | $ 1,120 | $ 7,000 | Not Applicable |
| 6.2.102 DS | Design | 8.0% | $ 17,920 | 15% | $ 2,688 | $ 21,000 | Not Applicable |
| 6.2.102 EDC | Engr During Construction | 4.5% | $ 10,080 | 15% | $ 1,512 | $ 12,000 | In House |
| 6.2.102 CM | Construction Mgt | 5.5% | $ 12,320 | 20% | $ 2,464 | $ 15,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 224,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.2.103

**Data Management Standards (BT_TDG03)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| Data Management Standards (BT_TDG03) | 382.3 | Hrs | $ 155 | $ 59,256 | 0% | $ - | $ 59,256 |
| Includes organization/business value, program value, project value standards | | | | | | | |
| | 382.3 | Hrs | | | | | |
| | 9.5575 | Wks | | | | | |
| **Project Management** | | | | | | | |
| Project Management | 16 | Hr | $ 190 | $ 3,040 | 0% | $ - | $ 3,040 |
| Admin Support | 8 | Hr | $ 80 | $ 640 | 0% | $ - | $ 640 |
| QC | 8 | Hr | $ 175 | $ 1,400 | 0% | $ - | $ 1,400 |
| **Subtotal** | | | | | | | **$ 65,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | Included |
| Shipping Rate | 40% | of total is shipped @ | 15% | | | | Not Applicable |
| Sales Tax | 50% | of total is taxed @ | 7.75% | | | | Not Applicable |
| Contingency @ | | | 20% | | | | $ 13,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | **$ 78,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2013 | 10740 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | 10999 | | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | **$ 80,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.2.103 CA | Condition Assessment | 1.5% | $ 1,200 | 20% | $ 240 | $ 2,000 | Not Applicable |
| 6.2.103 CS | Conceptual Study | 2.5% | $ 2,000 | 20% | $ 400 | $ 3,000 | Not Applicable |
| 6.2.103 DS | Design | 8.0% | $ 6,400 | 15% | $ 960 | $ 8,000 | Included |
| 6.2.103 EDC | Engr During Construction | 4.5% | $ 3,600 | 15% | $ 540 | $ 5,000 | In House |
| 6.2.103 CM | Construction Mgt | 5.5% | $ 4,400 | 20% | $ 880 | $ 6,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 80,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.2.202

**Management Reporting Enhancements (BT_BME08)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2017 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| **Design Labor** | | | | | | | |
| Implement Core Mgmt Trending, Analysis and Reporting | 1 | LS | $ 250,000 | $ 250,000 | 0% | $ - | $ 250,000 |
| - Finance | | | | | | | |
| - Human Resources | | | | | | | |
| - Maintenance/Operations | | | | | | | |
| - Environmental and Regulatory Compliance | | | | | | | |
| - Capital Improvements Team | | | | | | | |
| - also implement SQL Server Reporting Services | | | | | | | |
| - This project will be completed partially w/EWA staff | | | | | | | |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 250,000** |
| Contractor Overhead & Profit @ | | 27% | | Included |
| Shipping Rate | 40% of total is shipped @ | 15% | | Not Applicable |
| Sales Tax | 50% of total is taxed @ | 7.75% | | Not Applicable |
| Contingency @ | | 20% | | Not Applicable |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 250,000** |
| **ENR CCI Corresponding to Year of Estimate** | | LA CCI Nov-2013 | 10740 | |
| **ENR CCI Corresponding to CAMP Report Year** | | LA CCI Jan-2015 | 10999 | 1.024 |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 257,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.2.202 CA | Condition Assessment | 1.5% | $ 3,855 | 20% | $ 771 | $ 5,000 | Not Applicable |
| 6.2.202 CS | Conceptual Study | 2.5% | $ 6,425 | 20% | $ 1,285 | $ 8,000 | Not Applicable |
| 6.2.202 DS | Design | 8.0% | $ 20,560 | 15% | $ 3,084 | $ 24,000 | Included |
| 6.2.202 EDC | Engr During Construction | 4.5% | $ 11,565 | 15% | $ 1,735 | $ 14,000 | In House |
| 6.2.202 CM | Construction Mgt | 5.5% | $ 14,135 | 20% | $ 2,827 | $ 17,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 257,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.2.302

**WIMS Enhancements (BT_RC02)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2016 |

| Main Project Cost[1] | | | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | | | |
| WIMS Enhancements (BT_RC02) | | | 1470.1 | Hrs | $ 155 | $ 227,872 | 0% | $ - | $ 227,872 |
| | | | 1470.1 | Hrs | | | | | |
| | | | 36.754 | Wks | | | | | |
| **Project Management** | | | | | | | | | |
| Project Management | 0.05 | | 73.507 | Hr | $ 190 | $ 13,966 | 0% | $ - | $ 13,966 |
| Admin Support | 0.02 | | 29.403 | Hr | $ 80 | $ 2,352 | 0% | $ - | $ 2,352 |
| QC | 0.02 | | 29.403 | Hr | $ 175 | $ 5,146 | 0% | $ - | $ 5,146 |
| **Subtotal** | | | | | | | | | **$ 250,000** |
| Contractor Overhead & Profit @ | | | 27% | | | | | | Included |
| Shipping Rate | 40% | of total is shipped @ | 15% | | | | | | Not Applicable |
| Sales Tax | 50% | of total is taxed @ | 7.75% | | | | | | Not Applicable |
| Project Contingency @ | | | 20% | | | | | | $ 50,000 |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | | | | | | **$ 300,000** |
| **ENR CCI Corresponding to Year of Estimate** | | | LA CCI Nov-2013 | | | 10740 | | | |
| **ENR CCI Corresponding to CAMP Report Year** | | | LA CCI Jan-2015 | | | 10999 | | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | | | | | | **$ 308,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.2.302 CA | Condition Assessment | 1.5% | $ 4,620 | 20% | $ 924 | $ 6,000 | Not Applicable |
| 6.2.302 CS | Conceptual Study | 2.5% | $ 7,700 | 20% | $ 1,540 | $ 10,000 | Not Applicable |
| 6.2.302 DS | Design | 8.0% | $ 24,640 | 15% | $ 3,696 | $ 29,000 | Included |
| 6.2.302 EDC | Engr During Construction | 4.5% | $ 13,860 | 15% | $ 2,079 | $ 16,000 | In House |
| 6.2.302 CM | Construction Mgt | 5.5% | $ 16,940 | 20% | $ 3,388 | $ 21,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 308,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

## Project 6.2.703

**Business Continuity Readiness (BT_ITI03)**

| Main Project Type | |
|---|---|
| New Facility | |
| Facility Rehabilitation | X |
| Major Maintenance | |
| Asset Replacement | |
| Special Study | |

| Key Dates | |
|---|---|
| CAMP Report | Jan-15 |
| Initial Estimate | Nov-13 |
| Estimate Update | Feb-15 |
| Const Year | 2018 |

| Main Project Cost[1] | Quantity No. | Units | Material Cost Unit Cost | Material Cost Total | Labor Cost % of Mat'l | Labor Cost Total | Total Cost |
|---|---|---|---|---|---|---|---|
| **Project Task Elements** | | | | | | | |
| **Business Continuity Readiness (BT_ITI03)** | 1 | LS | $ 100,000 | $ 100,000 | 0% | $ - | $ 100,000 |
| Includes: plan for business continuity and disaster recovery disaster scenarios, testing schedule, eval, action plan | | | | | | | |
| **Consider as PAR** | | | | | | | |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | | | **$ 100,000** |
| Contractor Overhead & Profit @ | | 27% | | Included |
| Shipping Rate | 40% of total is shipped @ | 15% | | Not Applicable |
| Sales Tax | 50% of total is taxed @ | 7.75% | | Not Applicable |
| Project Contingency @ | | 20% | | Included |
| **Total Main Project Cost from Previous Reports** | | | | **$ 100,000** |
| Project Contingency @ | | 0% | | $ - |
| **Total Main Project Cost(Year of Estimate or Estimate Update)** | | | | **$ 100,000** |
| **ENR CCI Corresponding to Year of Estimate** | LA CCI Nov-2013 | 10740 | | |
| **ENR CCI Corresponding to CAMP Report Year** | LA CCI Jan-2015 | 10999 | 1.024 | |
| **Total Main Project Cost (CAMP Report Year)** | | | | **$ 103,000** |

| Project Phases Cost | | Rate[2] | Amount | Contingency | | Subtotal | Total |
|---|---|---|---|---|---|---|---|
| 6.2.703 CA | Condition Assessment | 1.5% | $ 1,545 | 20% | $ 309 | $ 2,000 | Not Applicable |
| 6.2.703 CS | Conceptual Study | 2.5% | $ 2,575 | 20% | $ 515 | $ 4,000 | Not Applicable |
| 6.2.703 DS | Design | 8.0% | $ 8,240 | 15% | $ 1,236 | $ 10,000 | Included |
| 6.2.703 EDC | Engr During Construction | 4.5% | $ 4,635 | 15% | $ 695 | $ 6,000 | In House |
| 6.2.703 CM | Construction Mgt | 5.5% | $ 5,665 | 20% | $ 1,133 | $ 7,000 | In House |
| **Total Project Cost (Present Value in 2015 Dollars)** | | | | | | | **$ 103,000** |

**Notes:**

1. For most projects Main Project cost is construction cost, however Main Project Cost could be bypass pumping or similar costs.
2. Percent of Total Main Project Cost
3. Cost estimate from EWA Technology Master Plan 2013.
4. Estimate Revised per EWA Direction 2015
5. Estimate Refined in 2014 by EWA Staff Performing Work In-house

**APPENDIX E**

**MAJOR ASSET REGISTER**

**This page intentionally left blank**

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) 9770 | Cost to Replace @ LA ENR (Jan 2015) 109999 | Cost Total with 1.5 Multiplier |
| 2001 | unknown | LEVEL CONTROL PANEL-SEC.SCUM PIT | Ele/Inst | SECONDARIES. | 1984 | | 15 | | to be replaced P-5.3.006 | 1999 | $30,000 | $58,000 | $87,000 |
| 2002 | unknown | LEVEL CTRL.PNL.-CL2 CONTACT TANK | Mech | EFFLUENT | 1984 | | 15 | | | 1999 | $30,000 | $58,000 | $87,000 |
| 2003 | unknown | LEVEL CTRL.PNL.-PRI.TANK DRAIN | Ele/Inst | PRIMARIES | 1984 | | 15 | | | 1999 | $30,000 | $58,000 | $87,000 |
| 2004 | unknown | SKIMMER-#1 CHLORINE CONTACT TANK | Mech | EFFLUENT | 1984 | | 15 | | | 1999 | $55,000 | $106,000 | $159,000 |
| 2005 | unknown | SKIMMER-#2 CHLORINE CONTACT TANK | Mech | EFFLUENT | 1984 | | 15 | | | 1999 | $55,000 | $106,000 | $159,000 |
| 2006 | AHU-6691-000 | AHU-SECOND FLOOR SUPPLY FAN (DEWAT) | AGP | DEWATERING | 1984 | | 20 | | | 2004 | $30,000 | $58,000 | $87,000 |
| 2007 | unknown | LEVEL CONTROL PANEL-#1 DAF TWAS | Ele/Inst | DAFT | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2008 | unknown | LEVEL CONTROL PANEL-#2 DAF TWAS | Ele/Inst | DAFT | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2009 | unknown | LEVEL CONTROL PANEL-#2 DIGESTER | Ele/Inst | DIGESTERS | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2010 | unknown | LEVEL CONTROL PANEL-#3 DAF TWAS | Ele/Inst | DAFT | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2011 | unknown | LEVEL CONTROL PANEL-#4 DIGESTER | Ele/Inst | DIGESTERS | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2012 | unknown | LEVEL CONTROL PANEL-#5 DIGESTER | Ele/Inst | DIGESTERS | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2013 | unknown | LEVEL CONTROL PANEL-#6 DIGESTER | Ele/Inst | DIGESTERS | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2014 | unknown | LEVEL CTRL.PNL.-DIGESTER DRAINPIT | Ele/Inst | DIGESTERS | 1991 | | 15 | | | 2006 | $30,000 | $58,000 | $87,000 |
| 2015 | unknown | LEVEL CTRL.PNL-TANK DRAINAGE PIT | Ele/Inst | SECONDARIES. | 1992 | | 15 | | | 2007 | $30,000 | $58,000 | $87,000 |
| 2016 | unknown | FAN-FOUL AIR BOOSTER(ML CHANNEL) | Mech | SECONDARIES | 1984 | | 25 | | | 2009 | $30,000 | $58,000 | $87,000 |
| 2017 | unknown | ODOR CONTROL FAN / DEWATERING, HEAT DRYING | Mech | DEWATERING | 1984 | | 25 | | | 2009 | $133,000 | $255,000 | $383,000 |
| 2018 | unknown | LEVEL CTRL.PNL-STORM WATER PUMPS | Ele/Inst | NON-SPECIFIC | 2000 | | 15 | | | 2015 | $30,000 | $58,000 | $87,000 |
| 2019 | unknown | ACTIVATED CARBON - ORF #1 | Mech | HEADWORKS | 2015 | | 2 | | scheduled maintenance | 2017 | $93,000 | $178,000 | $267,000 |
| 2020 | unknown | A & B NO. 1 FINE BUBBLE MEMBRANE DIFFUSER | Mech | SECONDARIES | 2001 | | 12 | 17 | to be replaced P-1.3.005 | 2018 | $69,000 | $132,000 | $198,000 |
| 2021 | unknown | AB NO. 3 FINE BUBBLE MEMBRANE DIFFUSER | Mech | SECONDARIES | 2006 | | 12 | | not operated continuously | 2018 | $69,000 | $132,000 | $198,000 |
| 2022 | unknown | DO PROBE SYSTEM | Mech | SECONDARIES | 2005 | | 8 | 13 | to be replaced P-1.3.012 | 2018 | $256,000 | $490,000 | $735,000 |
| 789 | CHF-6921-000 | CEPT POLYMER BLENDING UNIT,DYNABLEND (EAST) | Mech | CEPT. CHEMICAL STORAGE | 2009 | | 10 | | | 2019 | $132,000 | $253,000 | $380,000 |
| 790 | CHF-6922-000 | CEPT POLMER BLENDING UNIT,DYNABLEND (WEST) | Mech | CEPT. CHEMICAL STORAGE | 2009 | | 10 | | | 2019 | $132,000 | $253,000 | $380,000 |
| 2023 | unknown | AB NO. 2 FINE BUBBLE MEMBRANE DIFFUSER | Mech | SECONDARIES | 2002 | | 12 | 17 | not operated continuously | 2019 | $69,000 | $132,000 | $198,000 |
| 2024 | unknown | CONDENSER WATER FLOW METER | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 10 | | | 2019 | $79,000 | $151,000 | $227,000 |
| 2025 | unknown | ODOR REDUCTION CARBON TOWER / DEWATERING ORF # 2 | Struc | DEWATERING | 1984 | | 30 | 35 | | 2019 | $268,000 | $513,000 | $770,000 |
| 2026 | unknown | TANK-#1 DIGESTER ROOF | Mech | DIGESTERS | 1984 | | 35 | | not in use | 2019 | $81,000 | $155,000 | $233,000 |
| 2027 | unknown | TANK-#3 DIGESTER ROOF | Mech | DIGESTERS | 1984 | | 35 | | not in use | 2019 | $81,000 | $155,000 | $233,000 |
| | | | | | | | | | **Sub-total for Projects Requiring Replacement in next 5 years (prior to 2019)** | | | | **$5,825,000** |
| 679 | 12" 3WL | PIPE-12" NO. 3 WATER LOW PRESSURE, DI | Mech | NON-SPECIFIC | 1980 | | 40 | 40 | | 2020 | $58,000 | $111,000 | $167,000 |
| 669 | 16" FA | PIPE-16" FOUL AIR, FRP | Mech | NON-SPECIFIC | 1980 | | 40 | 40 | | 2020 | $70,000 | $134,000 | $201,000 |
| 678 | 21" D | PIPE-21"DRAIN, DI | Mech | NON-SPECIFIC | 1980 | | 40 | 40 | | 2020 | $89,000 | $171,000 | $257,000 |
| 697 | 30" D | PIPE-30" DRAIN, DI | Mech | NON-SPECIFIC | 1980 | | 40 | 40 | | 2020 | $71,000 | $136,000 | $204,000 |
| 1 | AHU-1601-000 | AHU-SCREENINGS ROOM | AGP | HEADWORKS | 1984 | 2000 | 20 | 20 | Appendix A | 2020 | $30,000 | $58,000 | $87,000 |
| 2 | AHU-1606-000 | AHU-MCC ROOM-SCREENINGS | AGP | HEADWORKS | 1984 | 2000 | 20 | 20 | Appendix A | 2020 | $30,000 | $58,000 | $87,000 |
| 3 | AHU-1610-000 | FAN-ROOM, ORF, & PRIMARY GALLERY | AGP | HEADWORKS | 1984 | 2000 | 20 | 20 | Appendix A | 2020 | $30,000 | $58,000 | $87,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) 9770 | Cost to Replace @ LA ENR (Jan 2015) 109999 | Cost Total with 1.5 Multiplier |
| 4 | AHU-3720-000 | AHU-CHLORINE BLD. MCC | AGP | CHLORINE | 1984 | 2000 | 20 | 20 | | 2020 | $30,000 | $58,000 | $87,000 |
| 7 | AHU-4067-000 | AHU-MCC ROOM (POWER BLDG.) | AGP | COGENERATION | 1984 | 2000 | 20 | 20 | Appendix A | 2020 | $30,000 | $58,000 | $87,000 |
| 8 | AHU-4510-000 | AHU - WAREHOUSE | AGP | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $30,000 | $58,000 | $87,000 |
| 14 | AHU-6692-000 | AHU-SECOND FLOOR SUPPLY FAN (DEWAT) | AGP | DEWATERING | 1984 | 2000 | 20 | 20 | Appendix A | 2020 | $30,000 | $58,000 | $87,000 |
| 15 | AHU-8054-000 | AHU-SEC.BLDG. | AGP | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $30,000 | $58,000 | $87,000 |
| 34 | BLD-4200-000 | CONST OFFICES (OLD MAINT BUILDING) | Struc | COGENERATION | 1965 | | 50 | 55 | Upgrade project P-5.3.003 | 2020 | $2,451,000 | $4,685,000 | $7,028,000 |
| 43 | COL-7101-000 | COLLECTOR-#1 DAF.TANK SCUM | Mech | DAFT | 1984 | 1995 | 25 | 25 | Appendix A | 2020 | $85,000 | $163,000 | $245,000 |
| 44 | COL-7201-000 | COLLECTOR-#2 DAF.TANK SCUM | Mech | DAFT | 1984 | 1995 | 25 | 25 | Appendix A | 2020 | $85,000 | $163,000 | $245,000 |
| 45 | COL-7301-000 | COLLECTOR-#3 DAF TANK SCUM | Mech | DAFT | 1992 | 1995 | 25 | 25 | | 2020 | $85,000 | $163,000 | $245,000 |
| 113 | HU-1506-000 | HYDRAULIC UNIT-SCREENINGS PRESS | Mech | HEADWORKS | 1984 | 2005 | 10 | 15 | to be replaced w/P-1.1.005 | 2020 | $83,000 | $159,000 | $239,000 |
| 118 | MCC-3500-D00 | MCC-D (CHLORINE BLDG.) | Ele/Inst | CHLORINE | 1980 | | 40 | 40 | | 2020 | $250,000 | $478,000 | $717,000 |
| 119 | MCC-3500-E00 | MCC-E (CHLORINE BDLG.) | Ele/Inst | CHLORINE | 1980 | | 40 | 40 | | 2020 | $250,000 | $478,000 | $717,000 |
| 122 | MCC-4000-M00 | MCC-M (BLOWERS) | Ele/Inst | COGENERATION | 1980 | | 40 | 40 | | 2020 | $250,000 | $478,000 | $717,000 |
| 123 | MCC-4000-N00 | MCC-N (BLOWERS) | Ele/Inst | COGENERATION | 1980 | | 40 | 40 | | 2020 | $250,000 | $478,000 | $717,000 |
| 124 | MCC-4000-P00 | MCC-P (POWER & MAINT.BLDG.) | Ele/Inst | COGENERATION | 1980 | | 40 | 40 | | 2020 | $250,000 | $478,000 | $717,000 |
| 125 | MCC-4000-R00 | MCC-R (POWER & MAINT.BLDG.) | Ele/Inst | COGENERATION | 1980 | | 40 | 40 | | 2020 | $250,000 | $478,000 | $717,000 |
| 126 | MCC-6000-H00 | MCC-H (SLUDGE DEWATERING BLDG.) | Ele/Inst | DEWATERING | 1980 | | 40 | 40 | | 2020 | $250,000 | $478,000 | $717,000 |
| 710 | OUTFALL PRE-PII | PIPE-OUTFALL PRE-PHASE III | Mech | NON-SPECIFIC | 1970 | | 50 | 50 | | 2020 | $13,856,000 | $26,482,000 | $39,723,000 |
| 201 | P-3062-000 | PUMP-#2 FINAL EFFLUENT | Mech | EFFLUENT | 1984 | 2000 | 20 | 20 | | 2020 | $66,000 | $127,000 | $191,000 |
| 282 | P-7310-000 | PUMP-#3 TWAS | Mech | DAFT | 1981 | 2000 | 20 | 20 | | 2020 | $74,000 | $142,000 | $213,000 |
| 286 | P-8004-000 | PUMP-#1 WAS | Mech | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $45,000 | $87,000 | $131,000 |
| 287 | P-8005-000 | PUMP-#2 WAS | Mech | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $45,000 | $87,000 | $131,000 |
| 289 | P-8008-000 | PUMP-#5 WAS | Mech | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $45,000 | $87,000 | $131,000 |
| 294 | P-8023-000 | PUMP-# 1 RAS PUMP | Mech | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $32,000 | $62,000 | $93,000 |
| 295 | P-8024-000 | PUMP-# 2 RAS PUMP | Mech | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $32,000 | $62,000 | $93,000 |
| 296 | P-8025-000 | PUMP-# 3 RAS PUMP | Mech | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $32,000 | $62,000 | $93,000 |
| 297 | P-8026-000 | PUMP-# 4 RAS PUMP | Mech | SECONDARIES | 1984 | 2000 | 20 | 20 | | 2020 | $32,000 | $62,000 | $93,000 |
| 375 | SCR-1512-000 | BARSCREEN #2 | Mech | HEADWORKS | 1984 | 1998 | 20 | 22 | to be replaced w/P-1.1.005 | 2020 | $287,000 | $549,000 | $824,000 |
| 376 | SCR-1513-000 | BARSCREEN #3 | Mech | HEADWORKS | 1984 | 1996 | 20 | 24 | to be replaced w/P-1.1.005 | 2020 | $287,000 | $549,000 | $824,000 |
| 2028 | SCR-1514-000 | BARSCREEN #4 | Mech | HEADWORKS | 1984 | 1998 | 20 | 22 | to be replaced w/P-1.1.005 | 2020 | $287,000 | $549,000 | $824,000 |
| 2029 | unknown | DRIVE UNIT-#1 BAR SCREEN | Mech | HEADWORKS | 2001 | | 16 | 19 | to be replaced w/P-1.1.005 | 2020 | $57,000 | $109,000 | $164,000 |
| 2030 | unknown | DRIVE UNIT-#2 BAR SCREEN | Mech | HEADWORKS | 1990 | | 30 | | | 2020 | $57,000 | $109,000 | $164,000 |
| 2031 | unknown | DRIVE UNIT-#3 BAR SCREEN | Mech | HEADWORKS | 2001 | | 16 | 19 | to be replaced w/P-1.1.005 | 2020 | $57,000 | $109,000 | $164,000 |
| 2032 | unknown | DRIVE UNIT-#4 BAR SCREEN | Mech | HEADWORKS | 1990 | | 30 | | | 2020 | $57,000 | $109,000 | $164,000 |
| 2033 | unknown | LEVEL CONTROL PANEL-#2 BARSCREEN (MILTRONICS) | Ele/Inst | HEADWORKS | 1984 | 1996 | 15 | 24 | rehab w/P-1.1.005 | 2020 | $30,000 | $58,000 | $87,000 |
| 2034 | unknown | LEVEL CONTROL PANEL-#3 BARSCREEN (MILTRONICS) | Ele/Inst | HEADWORKS | 1980 | 1998 | 15 | 22 | to be replaced P-1.3.005 | 2020 | $30,000 | $58,000 | $87,000 |
| 2035 | unknown | LEVEL CONTROL PANEL-#4 BARSCREEN (MILTRONICS) | Ele/Inst | HEADWORKS | 1984 | 2005 | 15 | | | 2020 | $30,000 | $58,000 | $87,000 |
| 2036 | unknown | MOTOR-AHU 1271 - SUPPLY FAN | Mech | OPERATIONS BLDG | 2000 | | 20 | | | 2020 | $30,000 | $58,000 | $87,000 |
| 2037 | unknown | MOTOR-FUME HOOD #1 SUPPLY FAN | Mech | OPERATIONS BLDG | 2000 | | 20 | | | 2020 | $30,000 | $58,000 | $87,000 |
| 2038 | unknown | MOTOR-FUME HOOD #2 SUPPLY FAN | Mech | OPERATIONS BLDG | 2000 | | 20 | | | 2020 | $30,000 | $58,000 | $87,000 |
| 2039 | unknown | MOTOR-FUME HOOD #3 SUPPLY FAN | Mech | OPERATIONS BLDG | 2000 | | 20 | | | 2020 | $30,000 | $58,000 | $87,000 |
| 2040 | unknown | MOTOR-FUME HOOD #4 SUPPLY FAN | Mech | OPERATIONS BLDG | 2000 | | 20 | | | 2020 | $30,000 | $58,000 | $87,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) 9770 | Cost to Replace @ LA ENR (Jan 2015) 109999 | Cost Total with 1.5 Multiplier |
| 2041 | unknown | MOTOR-FUME HOOD #5 SUPPLY FAN | Mech | OPERATIONS BLDG | 2000 | | 20 | | | 2020 | $30,000 | $58,000 | $87,000 |
| 2042 | unknown | PANEL - HVAC CONTROL PANEL | Ele/Inst | OPERATIONS BLDG | 2000 | | 15 | 20 | | 2020 | $30,000 | $58,000 | $87,000 |
| 2043 | unknown | VARIABLE FREQUENCY DRIVE - FINAL EFFLUENT PUMP #1 | Ele/Inst | EFFLUENT | 1984 | 2000 | 20 | | | 2020 | $363,000 | $694,000 | $1,041,000 |
| 2044 | unknown | VARIABLE FREQUENCY DRIVE - FINAL EFFLUENT PUMP #2 | Ele/Inst | EFFLUENT | 1984 | 2000 | 20 | | | 2020 | $245,000 | $469,000 | $704,000 |
| 2045 | unknown | VEHICLE-#48 (10 TON) CRANE TRUCK | Fleet | NON-SPECIFIC | 1997 | 2000 | 20 | | not managed by CIP | 2020 | $125,000 | $239,000 | $359,000 |
| 107 | GDW-1501-000 | GRIT DEWATERER-#1 - SCREW | Mech | HEADWORKS | 1984 | 2001 | 20 | 20 | | 2021 | $252,000 | $482,000 | $723,000 |
| 108 | GDW-1502-000 | GRIT DEWATERER-#2 - SCREW | Mech | HEADWORKS | 1984 | 2001 | 20 | 20 | | 2021 | $252,000 | $482,000 | $723,000 |
| 202 | P-3063-000 | PUMP-#3 FINAL EFFLUENT | Mech | EFFLUENT | 1991 | | 30 | 30 | | 2021 | $66,000 | $127,000 | $191,000 |
| 203 | P-3064-000 | PUMP-#4 FINAL EFFLUENT | Mech | EFFLUENT | 1991 | | 30 | 30 | | 2021 | $66,000 | $127,000 | $191,000 |
| 230 | P-5530-000 | PUMP-#5-A DIGESTER MIXING (NORTH) | Mech | DIGESTERS | 1991 | | 30 | 30 | | 2021 | $270,000 | $517,000 | $776,000 |
| 231 | P-5531-000 | PUMP-#5-B DIGESTER MIXING (SOUTH) | Mech | DIGESTERS | 1991 | | 30 | 30 | | 2021 | $270,000 | $517,000 | $776,000 |
| 234 | P-5630-000 | PUMP-#6-A DIGESTER MIXING (NORTH) | Mech | DIGESTERS | 1991 | | 30 | 30 | | 2021 | $270,000 | $517,000 | $776,000 |
| 235 | P-5631-000 | PUMP-#6-B DIGESTER MIXING (SOUTH) | Mech | DIGESTERS | 1991 | | 30 | 30 | | 2021 | $270,000 | $517,000 | $776,000 |
| 1579 | RTO-540-000 | REGENERATIVE THERMAL OXIDIZER | Misc | DRYING/EMISSIONS CONTROL | 2009 | 2011 | 10 | | ongoing maintenance | 2021 | $1,000,000 | $1,912,000 | $2,868,000 |
| 2046 | SCR-1511-000 | BARSCREEN #1 | Mech | HEADWORKS | 2001 | | 20 | | | 2021 | $287,000 | $549,000 | $824,000 |
| 2047 | unknown | ACTIVATED CARBON - ORF #2 | Mech | DEWATERING | 2006 | | 15 | | | 2021 | $93,000 | $178,000 | $267,000 |
| 2048 | unknown | ACTIVATED CARBON - ORF #3 | Mech | SECONDARIES. | 2006 | | 15 | | | 2021 | $93,000 | $178,000 | $267,000 |
| 2049 | unknown | ACTIVATED CARBON - ORF #3 | Mech | SECONDARIES. | 2006 | | 15 | | | 2021 | $93,000 | $178,000 | $267,000 |
| 2050 | unknown | DRIVE UNIT-SCREENINGS CONVEYOR | Mech | HEADWORKS | 1989 | | 30 | 32 | rehab w/P-1.1.005 | 2021 | $57,000 | $109,000 | $164,000 |
| 2051 | unknown | LEVEL CONTROL PANEL-#1 BARSCREEN (MILLTRONICS) | Ele/Inst | HEADWORKS | 2001 | 1999 | 15 | 22 | to be replaced P-1.3.005 | 2021 | $250,000 | $478,000 | $717,000 |
| 2052 | unknown | TWAS PIPELINE | Mech | DAFT | 1981 | | 40 | | | 2021 | $320,000 | $612,000 | $918,000 |
| 101 | FLT-8830-000 | ODOR REDUCTION CARBON TOWER # 3 (EAST) | Mech | SECONDARIES. | 1992 | 2002 | 20 | 20 | | 2022 | $268,000 | $513,000 | $770,000 |
| 102 | FLT-8831-000 | ODOR REDUCTION CARBON TOWER # 3 (WEST) | Mech | SECONDARIES. | 1992 | 2002 | 20 | 20 | | 2022 | $268,000 | $513,000 | $770,000 |
| 298 | P-8027-000 | PUMP-# 5 RAS PUMP | Mech | SECONDARIES | 1992 | | 30 | 30 | | 2022 | $32,000 | $62,000 | $93,000 |
| 299 | P-8027-A00 | PUMP-# RAS (SPARE) | Mech | SECONDARIES | 1992 | | 30 | 30 | | 2022 | $32,000 | $62,000 | $93,000 |
| 300 | P-8028-000 | PUMP-# 6 RAS PUMP | Mech | SECONDARIES | 1992 | | 30 | 30 | | 2022 | $32,000 | $62,000 | $93,000 |
| 301 | P-8029-000 | PUMP-# 8 RAS PUMP | Mech | SECONDARIES | 1992 | | 30 | 30 | | 2022 | $32,000 | $62,000 | $93,000 |
| 2053 | unknown | COVER - PRIMARY SEDIMENTATION #07 | Struc | PRIMARIES | 1992 | | 30 | | | 2022 | $65,000 | $125,000 | $188,000 |
| 2054 | unknown | COVER - PRIMARY SEDIMENTATION #08 | Struc | PRIMARIES | 1992 | | 30 | | | 2022 | $65,000 | $125,000 | $188,000 |
| 2055 | unknown | COVER - PRIMARY SEDIMENTATION #09 | Struc | PRIMARIES | 1992 | | 30 | | | 2022 | $65,000 | $125,000 | $188,000 |
| 2056 | unknown | COVER - PRIMARY SEDIMENTATION #10 | Struc | PRIMARIES | 1992 | | 30 | | | 2022 | $65,000 | $125,000 | $188,000 |
| 2057 | unknown | PIPE - 72" DIFFUSER SECTION TO END | Mech | OUTFALL | 1972 | | 50 | | From asset list-sample calc | 2022 | $2,200,000 | $4,205,000 | $6,308,000 |
| 2058 | unknown | PIPE - 72" INCREASER TO DIFFUSER SECTION | Mech | OUTFALL | 1972 | | 50 | | From asset list-sample calc | 2022 | $4,000,000 | $7,645,000 | $11,468,000 |
| 2059 | unknown | PROTECTIVE ARCH | Struc | OUTFALL | 1992 | | 30 | | outfall protection file | 2022 | $251,000 | $480,000 | $720,000 |
| 2060 | unknown | REBALLASTING | Mech | OUTFALL | 1992 | | 30 | | From asset list-sample calc | 2022 | $1,100,000 | $2,103,000 | $3,155,000 |
| 2061 | unknown | SECURITY SYSTEM AND CAMERA | Mech | NON-SPECIFIC | 2012 | | 10 | | | 2022 | $125,000 | $239,000 | $359,000 |
| 2062 | DU-2511-000 | SLUDGE COLLECTOR - #1 PRI. TANK | Mech | PRIMARIES | 1984 | 1999 | 20 | 24 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2063 | DU-2511-000 | SLUDGE COLLECTOR - #2 PRI. TANK | Mech | PRIMARIES | 1984 | 1999 | 20 | 24 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2064 | DU-2512-000 | SLUDGE COLLECTOR - #3 PRI. TANK | Mech | PRIMARIES | 1984 | 1999 | 20 | 24 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2065 | DU-2512-000 | SLUDGE COLLECTOR - #4 PRI. TANK | Mech | PRIMARIES | 1984 | 1996 | 20 | 27 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) 9770 | Cost to Replace @ LA ENR (Jan 2015) 109999 | Cost Total with 1.5 Multiplier |
| 2066 | DU-2513-000 | SLUDGE COLLECTOR - #5 PRI. TANK | Mech | PRIMARIES | 1984 | 1996 | 20 | 27 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2067 | DU-2513-000 | SLUDGE COLLECTOR - #6 PRI. TANK | Mech | PRIMARIES | 1984 | 1996 | 20 | 27 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2068 | DU-2514-000 | SLUDGE COLLECTOR - #7 PRI. TANK | Mech | PRIMARIES | 1992 | 2000 | 20 | 23 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2069 | DU-2514-000 | SLUDGE COLLECTOR - #8 PRI. TANK | Mech | PRIMARIES | 1992 | 2000 | 20 | 23 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2070 | DU-2515-000 | SLUDGE COLLECTOR - #10 PRI. TANK | Mech | PRIMARIES | 1992 | 2000 | 20 | 23 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 2071 | DU-2515-000 | SLUDGE COLLECTOR - #9 PRI. TANK | Mech | PRIMARIES | 1992 | 2000 | 20 | 23 | Cost provided by J. Fetu 2011 | 2023 | $300,000 | $574,000 | $861,000 |
| 98 | FLT-0030-000 | FILTER-3WHP/2W SANDFILTER | Mech | 1W & 2W | 1993 | | 25 | 30 | | 2023 | $110,000 | $211,000 | $317,000 |
| 140 | MME-2501-A00 | HELICAL SCUM SKIMMER-#1 PRI.TANK | Mech | PRIMARIES | 1984 | 1999 | 20 | 24 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 141 | MME-2501-B00 | HELICAL SCUM SKIMMER-#2 PRI.TANK | Mech | PRIMARIES | 1984 | 1999 | 20 | 24 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 142 | MME-2502-A00 | HELICAL SCUM SKIMMER-#3 PRI.TANK | Mech | PRIMARIES | 1984 | 1999 | 20 | 24 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 143 | MME-2502-B00 | HELICAL SCUM SKIMMER-#4 PRI.TANK | Mech | PRIMARIES | 1984 | 1996 | 20 | 27 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 144 | MME-2503-A00 | HELICAL SCUM SKIMMER-#5 PRI.TANK | Mech | PRIMARIES | 1984 | 1996 | 20 | 27 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 145 | MME-2503-B00 | HELICAL SCUM SKIMMER-#6 PRI.TANK | Struc | PRIMARIES | 1984 | 1996 | 20 | 27 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 146 | MME-2504-A00 | HELICAL SCUM SKIMMER-#7 PRI.TANK | Struc | PRIMARIES | 1992 | 2000 | 20 | 23 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 147 | MME-2504-B00 | HELICAL SCUM SKIMMER-#8 PRI.TANK | Struc | PRIMARIES | 1992 | 2000 | 20 | 23 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 148 | MME-2505-A00 | HELICAL SCUM SKIMMER-#9 PRI.TANK | Struc | PRIMARIES | 1992 | 2000 | 20 | 23 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 149 | MME-2505-B00 | HELICAL SCUM SKIMMER-#10 PRI.TANK | Struc | PRIMARIES | 1992 | 2000 | 20 | 23 | Appendix A; P-1.1.006 | 2023 | $63,000 | $121,000 | $182,000 |
| 480 | T-2401-000 | TANK-#1 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1965 | | 50 | 58 | rehab incl in P-1.1.006 | 2023 | $771,000 | $1,474,000 | $2,211,000 |
| 481 | T-2402-000 | TANK-#2 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1965 | | 50 | 58 | Identified P-1.2.006 | 2023 | $709,000 | $1,356,000 | $2,034,000 |
| 2072 | T-2403-000 | TANK-#3 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1969 | | 50 | 54 | Identified P-1.2.006 | 2023 | $716,000 | $1,369,000 | $2,054,000 |
| 2073 | T-2404-000 | TANK-#4 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1971 | | 50 | 52 | Identified P-1.2.006 | 2023 | $664,000 | $1,270,000 | $1,905,000 |
| 2074 | T-2405-000 | TANK-#5 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1975 | | 50 | 48 | Identified P-1.2.006 | 2023 | $1,134,500 | $2,169,000 | $3,254,000 |
| 2075 | T-2406-000 | TANK-#6 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1975 | | 50 | 48 | Identified P-1.2.006 | 2023 | $1,134,500 | $2,169,000 | $3,254,000 |
| 486 | T-2407-000 | TANK-#7 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1984 | | 50 | 39 | Estimated Repair cost | 2023 | $837,250 | $1,601,000 | $2,402,000 |
| 487 | T-2408-000 | TANK-#8 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1984 | | 50 | 39 | Estimated Repair cost | 2023 | $837,250 | $1,601,000 | $2,402,000 |
| 488 | T-2409-000 | TANK-#9 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1984 | | 50 | 39 | Estimated Repair cost | 2023 | $837,250 | $1,601,000 | $2,402,000 |
| 489 | T-2410-000 | TANK-#10 PRIMARY SEDIMENTATION | Struc | PRIMARIES | 1984 | | 50 | 39 | Estimated Repair cost | 2023 | $837,250 | $1,601,000 | $2,402,000 |
| 558 | VEH-4057-000 | VEHICLE-#57 (FORKLIFT/YALE) | Fleet | NON-SPECIFIC | 2003 | | 15 | 20 | veh not managed in E-CAMP | 2023 | $55,000 | $106,000 | $159,000 |
| 559 | VEH-4058-000 | VEHICLE-#58 TRAILER JOCKEY | Fleet | NON-SPECIFIC | 2003 | | 15 | 20 | veh not managed in E-CAMP | 2023 | $65,500 | $126,000 | $189,000 |
| 2076 | unknown | PLANT ROADWAYS | Mech | NON-SPECIFIC | 1984 | 2013 | 10 | | seal coat | 2023 | $3,000,000 | $5,734,000 | $8,601,000 |
| 2077 | unknown | SUMP PUMP CONTROL PANEL FOR CENTRIFUGE FEED PIT | Mech | CENTRIFUGE FEED PIT | 2008 | | 15 | | | 2023 | $250,000 | $478,000 | $717,000 |
| 617 | 12" D | PIPE-12" TANK DRAIN, PVC | Mech | NON-SPECIFIC | 1989 | | 35 | 35 | | 2024 | $95,000 | $182,000 | $273,000 |
| 630 | 24" SE | PIPE-24" SECONDARY EFFLUENT, DI | Mech | SECONDARIES | 1979 | | 40 | 45 | | 2024 | $195,000 | $373,000 | $560,000 |
| 700 | 24" SE | PIPE-24" SECONDARY EFFLUENT, DI | Mech | SECONDARIES | 1979 | | 40 | 45 | | 2024 | $56,000 | $108,000 | $162,000 |
| 1580 | CND-500-000 | CONDENSER / SATURATOR | Misc | DRYING/EMISSIONS CONTROL | 2009 | | 10 | 15 | | 2024 | $80,000 | $153,000 | $230,000 |
| 116 | MCC-1500-F00 | MCC-F (HEADWORKS-SCREENINGS BLD) | Ele/Inst | HEADWORKS | 1984 | | 40 | 40 | | 2024 | $250,000 | $478,000 | $717,000 |
| 117 | MCC-1500-G00 | MCC-G (HEADWORKS-SCREENINGS BLD) | Ele/Inst | HEADWORKS | 1984 | | 40 | 40 | | 2024 | $250,000 | $478,000 | $717,000 |
| 204 | P-3065-000 | PUMP-#5 FINAL EFFLUENT | Mech | EFFLUENT | 1984 | | 40 | 40 | | 2024 | $66,000 | $127,000 | $191,000 |
| 1008 | P-5100-000 | DIG#2 RECIRCULATION PUMP | Mech | CENTRIFUGE FEED PIT | 2009 | | 15 | 15 | | 2024 | $50,000 | $96,000 | $144,000 |
| 283 | P-7410-000 | PUMP-#4 TWAS | Mech | DAFT | 1992 | 2009 | 15 | 15 | | 2024 | $74,000 | $142,000 | $213,000 |
| 1213 | PNL-CCP-6100 | PLC PANEL CENTRIFUGE #1 (EAST) | Ele/Inst | DRYING/CENTRIFUGE SYSTEM | 2009 | | 15 | 15 | | 2024 | $155,000 | $297,000 | $446,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ref No.** | **Asset ID** | **Asset Description** | **Asset Classes** | **Location** | **Install Date** | **Last Refurb or Replace Date (Year)** | **Nominal Useful Life (Years)** | **Assessed Useful Life (Years)** | **Comments** | **Replace Date (Year)** | **Estimated Replace Cost Book Value (Mar 2010)** | **Cost to Replace @ LA ENR (Jan 2015)** | **Cost Total with 1.5 Multiplier** |
| | | | | | | | | | | | 9770 | 109999 | |
| 1241 | PNL-CCP-6200 | PLC PANEL CENTRIFUGE #2 (WEST) | Ele/Inst | DRYING/CENTRIFUGE SYSTEM | 2009 | | 15 | 15 | | 2024 | $155,000 | $297,000 | $446,000 |
| 997 | PNL-PLC-CFP | PLC CONTROLS FOR CENTRIFUGE FEED PIT | Ele/Inst | CENTRIFUGE FEED PIT | 2009 | | 15 | 15 | | 2024 | $50,000 | $96,000 | $144,000 |
| 1476 | T-600-100 | NITROGEN STORAGE TANK | Mech | DRYING/NITROGEN SYSTEM | 2009 | | 15 | 15 | | 2024 | $60,000 | $115,000 | $173,000 |
| 797 | T-6910-000 | FERRIC CHLORIDE STORAGE TANK | Mech | CEPT. CHEMICAL STORAGE | 2009 | | 15 | 15 | | 2024 | $60,000 | $115,000 | $173,000 |
| 798 | T-6920-000 | CEPT POLYMER STORAGE TANK | Mech | CEPT. CHEMICAL STORAGE | 2009 | | 15 | 15 | | 2024 | $60,000 | $115,000 | $173,000 |
| 1220 | VFD-6100-001 | VFD MAINDRIVE CENTRIFUGE #1 (EAST) | Ele/Inst | DRYING/CENTRIFUGE SYSTEM | 2009 | | 10 | 15 | | 2024 | $154,000 | $295,000 | $443,000 |
| 1223 | VFD-6100-002 | VFD BACK DRIVE CENTRIFUGE #1 (EAST) | Ele/Inst | DRYING/CENTRIFUGE SYSTEM | 2009 | | 10 | 15 | | 2024 | $154,000 | $295,000 | $443,000 |
| 1221 | VFD-6200-001 | VFD MAIN DRIVE CENTRIFUGE #2 (WEST) | Ele/Inst | DRYING/CENTRIFUGE SYSTEM | 2009 | | 10 | 15 | | 2024 | $154,000 | $295,000 | $443,000 |
| 1224 | VFD-6200-002 | VFD BACK DRIVE CENTRIFUGE #2 (WEST) | Ele/Inst | DRYING/CENTRIFUGE SYSTEM | 2009 | | 10 | 15 | | 2024 | $154,000 | $295,000 | $443,000 |
| 1581 | VS-510-000 | VENTURI SCRUBBER | Misc | DRYING/EMISSIONS CONTROL | 2009 | | 10 | 15 | | 2024 | $85,000 | $163,000 | $245,000 |
| 1416 | YS-30-1-1 | FUGITIVE DUT RUPTURE DISK MONITOR | Misc | DRYING/CENTRIFUGE SYSTEM | 2009 | | 15 | 15 | | 2024 | $66,000 | $127,000 | $191,000 |
| 2078 | unknown | CONVEYOR-SCREENINGS BDLG. | Mech | HEADWORKS | 1984 | | 40 | | | 2024 | $280,000 | $536,000 | $804,000 |
| 2079 | unknown | COVERS - A & B AERATION TANK #1 | Struc | SECONDARIES | 1994 | | 30 | | Project P-1.3.003 | 2024 | $82,500 | $158,000 | $237,000 |
| 2080 | unknown | COVERS - A & B AERATION TANK #2 | Struc | SECONDARIES | 1994 | | 30 | | Project P-1.3.003 | 2024 | $82,500 | $158,000 | $237,000 |
| 2081 | unknown | COVERS - A & B AERATION TANK #3 | Struc | SECONDARIES | 1994 | | 30 | | Project P-1.3.003 | 2024 | $82,500 | $158,000 | $237,000 |
| 2082 | unknown | COVERS - A & B AERATION TANK #4 | Struc | SECONDARIES | 1994 | | 30 | | Project P-1.3.003 | 2024 | $82,500 | $158,000 | $237,000 |
| 2083 | unknown | EMERGENCY STANBY GENERATOR,FLOW EQ | Mech | SECONDARIES | 2004 | | 20 | | | 2024 | $205,000 | $392,000 | $588,000 |
| 2084 | unknown | EMERGENCY STANBY GENERATOR,FLOW EQ / 1000 KW | Mech | SECONDARIES | 2004 | | 20 | | | 2024 | $205,000 | $392,000 | $588,000 |
| 2085 | unknown | GENERATOR CONTROL PANEL ENG # 1 | Ele/Inst | POWER BLDG. | 2009 | | 15 | | | 2024 | $91,000 | $174,000 | $261,000 |
| 2086 | unknown | GENERATOR CONTROL PANEL ENG # 2 | Ele/Inst | POWER BLDG. | 2009 | | 15 | | | 2024 | $91,000 | $174,000 | $261,000 |
| 2087 | unknown | GENERATOR CONTROL PANEL ENG # 3 | Ele/Inst | POWER BLDG. | 2009 | | 15 | | | 2024 | $91,000 | $174,000 | $261,000 |
| 2088 | unknown | GENERATOR CONTROL PANEL ENG # 4 | Ele/Inst | POWER BLDG. | 2009 | | 15 | | | 2024 | $91,000 | $174,000 | $261,000 |
| 2089 | unknown | MIXER-#2 POLYMER TANK | Mech | DEWATERING | 2009 | | 10 | 15 | | 2024 | $83,000 | $159,000 | $239,000 |
| 2090 | unknown | MIXER-#3 POLYMER TANK | Mech | DEWATERING | 2009 | | 10 | 15 | | 2024 | $83,000 | $159,000 | $239,000 |
| 2091 | unknown | MIXER-#4 POLYMER TANK | Mech | DEWATERING | 2009 | | 10 | 15 | | 2024 | $83,000 | $159,000 | $239,000 |
| 2092 | unknown | MIXER-#5 POLYMER TANK | Mech | DEWATERING | 2009 | | 10 | 15 | | 2024 | $83,000 | $159,000 | $239,000 |
| 2093 | unknown | MIXER-#6 POLYMER TANK | Mech | DEWATERING | 2009 | | 10 | 15 | | 2024 | $83,000 | $159,000 | $239,000 |
| 2094 | unknown | MIXER-#7 POLYMER TANK | Mech | DEWATERING | 2009 | | 10 | 15 | | 2024 | $83,000 | $159,000 | $239,000 |
| 2095 | unknown | MIXER-#8 POLYMER TANK | Mech | DEWATERING | 2009 | | 10 | 15 | | 2024 | $83,000 | $159,000 | $239,000 |
| 2096 | unknown | MOTOR-#1 ABSORPTION CHILLER | Mech | OPERATIONS BLDG | 1999 | | 20 | 25 | | 2024 | $243,000 | $465,000 | $698,000 |
| 2097 | unknown | MOTOR-#2 ABSORPTION CHILLER | Mech | OPERATIONS BLDG | 1999 | | 20 | 25 | | 2024 | $243,000 | $465,000 | $698,000 |
| 2098 | unknown | PLYMER FEEDER/BLENDER PUMP #1 | Mech | DEWATERING | 2009 | | 15 | | | 2024 | $132,000 | $253,000 | $380,000 |
| 2099 | unknown | POLYMER BLENDING UNIT / SECONDARY | Mech | SECONDARIES. | 2009 | | 15 | | | 2024 | $132,000 | $253,000 | $380,000 |
| 2100 | unknown | SURVELLANCE VIDEO MONITORING SYSTEM | Mech | NON-SPECIFIC | 2004 | | 10 | 20 | | 2024 | $93,000 | $178,000 | $267,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) | Cost to Replace @ LA ENR (Jan 2015) | Cost Total with 1.5 Multiplier |
| | | | | | | | | | | | 9770 | 109999 | |
| 2101 | unknown | TANKS - STORAGE SODIUM HYPOCHLORITE | Struc | CHLORINE | 2004 | | 20 | | | 2024 | $49,000 | $94,000 | $141,000 |
| 2102 | unknown | VIBRATING SCREEN | Mech | DRYER SYSTEM | 2009 | | 7 | 15 | | 2024 | $55,000 | $106,000 | $159,000 |
| | | | | | | | Sub-total for Projects Requiring Replacement in next 5 to 10 years (2020 to 2024) | | | | | | $157,509,000 |
| 57 | CON-6203-000 | CONVEYOR-#1 SCREW (NORTH) | Mech | DEWATERING | 1984 | 2000 | 25 | 25 | | 2025 | $55,000 | $106,000 | $159,000 |
| 58 | CON-6204-000 | CONVEYOR-#2 SCREW (SOUTH) | Mech | DEWATERING | 1984 | 2000 | 25 | 25 | | 2025 | $55,000 | $106,000 | $159,000 |
| 278 | P-7110-000 | PUMP-#1 TWAS | Mech | DAFT | 1991 | 2010 | 15 | 15 | | 2025 | $74,000 | $142,000 | $213,000 |
| 280 | P-7210-000 | PUMP-#2 TWAS | Mech | DAFT | 1992 | 2010 | 15 | 15 | | 2025 | $74,000 | $142,000 | $213,000 |
| 2103 | unknown | PARKING LOT IN FRONT OF ADMIN BLDG | Struc | OPERATIONS BLDG | 2000 | | 25 | | | 2025 | $230,000 | $440,000 | $660,000 |
| 2104 | unknown | WEIGHT SCALE & INDICATING DIAL | Mech | NON-SPECIFIC | 2000 | | 25 | | | 2025 | $83,000 | $159,000 | $239,000 |
| 2105 | unknown | WEIGHT SCALE & INDICATING DIAL | Mech | NON-SPECIFIC | 2000 | | 25 | | | 2025 | $83,000 | $159,000 | $239,000 |
| 2106 | unknown | WEIGHT SCALE & INDICATING DIAL | Mech | NON-SPECIFIC | 2000 | | 25 | | | 2025 | $83,000 | $159,000 | $239,000 |
| 2107 | unknown | WEIGHT SCALE & INDICATING DIAL | Mech | NON-SPECIFIC | 2000 | | 25 | | | 2025 | $83,000 | $159,000 | $239,000 |
| 2108 | unknown | PIPE - FOUL AIR COLLECTION PIPING | Mech | SECONDARIES | 1980 | | 45 | | | 2025 | $140,000 | $268,000 | $402,000 |
| 378 | SEP-1505-000 | ROTARY SCREEN | Mech | HEADWORKS | 1984 | 2006 | 20 | 20 | Cond. Assessment ES1 | 2026 | $138,000 | $264,000 | $396,000 |
| 2109 | unknown | WEIR GATE - GRIT TANK #1 | Mech | HEADWORKS | 1990 | 2006 | 20 | | | 2026 | $60,000 | $115,000 | $173,000 |
| 2110 | unknown | WEIR GATE - GRIT TANK #2 | Mech | HEADWORKS | 1990 | 2006 | 20 | | | 2026 | $60,000 | $115,000 | $173,000 |
| 2111 | unknown | WEIR GATE - GRIT TANK #3 | Mech | HEADWORKS | 1990 | 2006 | 20 | | | 2026 | $60,000 | $115,000 | $173,000 |
| 2112 | unknown | AB NO. 4 FINE BUBBLE MEMBRANE DIFFUSER | Mech | SECONDARIES | 2001 | | 25 | | not operated | 2026 | $69,000 | $132,000 | $198,000 |
| 727 | AH-1 | AIR HANDLER UNIT FIRST FLOOR SUPPLY & RETURN | Mech | ADMIN. BLDG. | 2007 | | 20 | 20 | | 2027 | $105,000 | $201,000 | $302,000 |
| 730 | AH-2 | AIR HANDLER UNIT SUPPLY 2ND FLOOR | Mech | ADMIN. BLDG. | 2007 | | 20 | 20 | | 2027 | $105,000 | $201,000 | $302,000 |
| 731 | AH-3 | AHU SUPPLY & RETURN 2ND FLR BOARD ROOM ROOF | Mech | ADMIN. BLDG. | 2007 | | 20 | 20 | | 2027 | $105,000 | $201,000 | $302,000 |
| 5 | AHU-3750-000 | AHU-CHLORINATOR ROOM | AGP | CHLORINE | 1984 | 2007 | 20 | 20 | | 2027 | $55,000 | $106,000 | $159,000 |
| 726 | CH-1 | CHILLER FOR ADMIN BLD | Mech | ADMIN. BLDG. | 2007 | | 20 | 20 | | 2027 | $243,000 | $465,000 | $698,000 |
| 2113 | unknown | PUMP-#1 EFFLUENT SAMPLE (EAST) | Mech | EFFLUENT | 2012 | | 15 | | | 2027 | $66,000 | $127,000 | $191,000 |
| 2114 | unknown | PUMP-#2 EFFLUENT SAMPLE (WEST) | Mech | EFFLUENT | 2012 | | 15 | | | 2027 | $66,000 | $127,000 | $191,000 |
| 18 | B-4006-000 | BLOWER-#3 AERATION AIR | Mech | COGENERATION | 1984 | 2008 | 20 | | Rehab for Phase V | 2028 | $210,000 | $402,000 | $603,000 |
| 2115 | B-4007-000 | BLOWER-#4 AERATION AIR | Mech | COGENERATION | 1984 | 2008 | 20 | | Rehab for Phase V | 2028 | $210,000 | $402,000 | $603,000 |
| 2116 | B-4008-000 | BLOWER-#5 AERATION AIR | Mech | COGENERATION | 1984 | 2008 | 20 | | Rehab for Phase V | 2028 | $210,000 | $402,000 | $603,000 |
| 2117 | B-4011-000 | BLOWER-#6 AERATION AIR | Mech | COGENERATION | 2009 | 2008 | 20 | | Rehab for Phase V | 2028 | $210,000 | $402,000 | $603,000 |
| 41 | CHR-4044-000 | CHILLER- (POWER BLDG.) | Mech | COGENERATION | 1984 | 1998 | 20 | 30 | Appendix A | 2028 | $243,000 | $465,000 | $698,000 |
| 2118 | unknown | 3WLC STRAINER | Mech | EFFLUENT | 1980 | 2013 | 15 | | | 2028 | $210,000 | $402,000 | $603,000 |
| 677 | 30" WW | PIPE-30" WASTEWATER, CISP | Mech | NON-SPECIFIC | 1979 | | 50 | 50 | | 2029 | $75,000 | $144,000 | $216,000 |
| 674 | 54" WW | PIPE-54" WASTEWATER, CISP | Mech | NON-SPECIFIC | 1979 | | 50 | 50 | | 2029 | $121,000 | $232,000 | $348,000 |
| 695 | 84" SE | PIPE-84" SECONDARY EFFLUENT, RCP | Mech | SECONDARIES | 1979 | | 50 | 50 | | 2029 | $277,000 | $530,000 | $795,000 |
| 866 | AHU-4019-000 | SUPPLY AIR FOR BLOWER ROOM NEXT TO CHILLER | Mech | POWER BLDG. | 2009 | | 20 | 20 | | 2029 | $91,000 | $174,000 | $261,000 |
| 865 | AIT-4000-100 | GAS CHROMATOGRAPH FOR ENGINES | Misc | POWER BLDG. | 2009 | | 20 | 20 | | 2029 | $60,000 | $115,000 | $173,000 |
| 965 | B-5110-000 | MIXED GAS BLOWER # 1 | Mech | DIGESTER PHASE | 2009 | | 20 | 20 | | 2029 | $225,000 | $431,000 | $647,000 |
| 966 | B-5120-000 | DIGESTER GAS BLOWER # 2 | Mech | DIGESTER PHASE | 2009 | | 20 | 20 | | 2029 | $225,000 | $431,000 | $647,000 |
| 1462 | DST-031-000 | SILO AREA DUST COLLECTOR | Misc | DRYING/PELLET TRANSFER AND STORAGE | 2009 | | 20 | 20 | | 2029 | $95,000 | $182,000 | $273,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) | Cost to Replace @ LA ENR (Jan 2015) | Cost Total with 1.5 Multiplier |
| | | | | | | | | | | | 9770 | 109999 | |
| 881 | EG-4610-000 | ENGINE GENERATOR # 1 | Mech | POWER BLDG. | 2009 | | 20 | 20 | | 2029 | $417,000 | $797,000 | $1,196,000 |
| 882 | EG-4620-000 | ENGINE GENERATOR # 2 | Mech | POWER BLDG. | 2009 | | 20 | 20 | | 2029 | $417,000 | $797,000 | $1,196,000 |
| 883 | EG-4630-000 | ENGINE GENERATOR # 3 | Mech | POWER BLDG. | 2009 | | 20 | 20 | | 2029 | $417,000 | $797,000 | $1,196,000 |
| 884 | EG-4640-000 | ENGINE GENERATOR # 4 | Mech | POWER BLDG. | 2009 | | 20 | 20 | | 2029 | $417,000 | $797,000 | $1,196,000 |
| 711 | OUTFALL PIII | PIPE-OUTFALL PHASE III | Mech | NON-SPECIFIC | 1979 | | 50 | 50 | | 2029 | $2,869,000 | $ 5,484,000 | $8,226,000 |
| 967 | P-5000-000 | DIG#2 DIGESTED SLUDGE TRANSFER PUMP | Mech | DIGESTER PHASE | 2009 | | 20 | 20 | | 2029 | $62,000 | $119,000 | $179,000 |
| 288 | P-8007-000 | PUMP-#4 WAS | Mech | SECONDARIES | 1984 | 2009 | 20 | 20 | | 2029 | $45,000 | $87,000 | $131,000 |
| 1266 | T-2760-620-200 | MINERAL OIL TANK | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 20 | 20 | | 2029 | $54,000 | $104,000 | $156,000 |
| 2119 | unknown | PIPE - 84" SURGE TOWER TO WYE STRUCTURE | Struc | OUTFALL | 1979 | | 50 | | From asset list-sample calc | 2029 | $2,860,000 | $5,466,000 | $8,199,000 |
| 2120 | unknown | PIPE - 84" X 84" WYE BOX CHANNEL TO 48" OUTFALL | Struc | OUTFALL | 1979 | | 50 | | From asset list-sample calc | 2029 | $504,800 | $965,000 | $1,448,000 |
| 2121 | unknown | TANKS - STORAGE SODIUM HYPOCHLORITE | Struc | CHLORINE | 2009 | | 20 | | | 2029 | $49,000 | $94,000 | $141,000 |
| 704 | 16" SE | PIPE-16" SIPHON, RCP | Mech | NON-SPECIFIC | 1980 | | 50 | 50 | | 2030 | $57,000 | $109,000 | $164,000 |
| 703 | 24" SE | PIPE-24" SIPHON, RCP | Mech | NON-SPECIFIC | 1980 | | 50 | 50 | | 2030 | $84,000 | $161,000 | $242,000 |
| 699 | 72" PE | PIPE-72" PRIMARY EFFLUENT, RCP | Mech | PRIMARIES | 1980 | | 50 | 50 | | 2030 | $480,000 | $918,000 | $1,377,000 |
| 680 | 72" SE | PIPE-72" SECONDARY EFFLUENT, RCP | Mech | SECONDARIES | 1980 | | 50 | 50 | | 2030 | $70,000 | $134,000 | $201,000 |
| 2122 | unknown | ODOR REDUCTION CARBON TOWER/ SCREENINGS ORF # 1 | Mech | HEADWORKS | 2010 | | 20 | | | 2030 | $268,000 | $513,000 | $770,000 |
| 2123 | unknown | PIPE - 3WLC INTERTIE TO 3WHP SYSTEM | Mech | NON-SPECIFIC | 1980 | | 50 | | | 2030 | $70,000 | $134,000 | $201,000 |
| 2124 | unknown | PIPE - 4" PVC 3WHP PIPING | Mech | SECONDARIES | 1980 | | 50 | | | 2030 | $60,000 | $115,000 | $173,000 |
| 2125 | unknown | PIPELINE - WAS PIPELINE | Mech | SECONDARIES | 1980 | | 50 | | | 2030 | $51,000 | $98,000 | $147,000 |
| 2126 | unknown | SEPERATOR-#1 BLOWER ENGINE STEAM | Mech | POWER BLDG. | 2010 | | 20 | | | 2030 | $217,000 | $415,000 | $623,000 |
| 2127 | unknown | SEPERATOR-#1 GEN.ENGINE STEAM | Mech | POWER BLDG. | 2010 | | 20 | | | 2030 | $217,000 | $415,000 | $623,000 |
| 2128 | unknown | SEPERATOR-#2 BLOWER ENGINE STEAM | Mech | POWER BLDG. | 2010 | | 20 | | | 2030 | $217,000 | $415,000 | $623,000 |
| 2129 | unknown | SEPERATOR-#2 GEN.ENGINE STEAM | Mech | POWER BLDG. | 2010 | | 20 | | | 2030 | $217,000 | $415,000 | $623,000 |
| 2130 | unknown | SEPERATOR-#3 GEN.ENGINE STEAM | Mech | POWER BLDG. | 2010 | | 20 | | | 2030 | $217,000 | $415,000 | $623,000 |
| 120 | MCC-4000-K00 | MCC-K (DIGESTERS) | Ele/Inst | DIGESTERS | 1980 | 1991 | 40 | 40 | | 2031 | $250,000 | $478,000 | $717,000 |
| 2131 | unknown | ROOF-#4 DIGESTER TANK | Mech | DIGESTERS | 1984 | 2006 | 25 | | | 2031 | $81,000 | $155,000 | $233,000 |
| 2132 | unknown | ROOF-#5 DIGESTER TANK | Mech | DIGESTERS | 1992 | 2006 | 25 | | | 2031 | $81,000 | $155,000 | $233,000 |
| 2133 | unknown | ROOF-#6 DIGESTER TANK | Mech | DIGESTERS | 1992 | 2006 | 25 | | | 2031 | $81,000 | $155,000 | $233,000 |
| 2134 | unknown | TANK-# 2 DIGESTER/SOLIDS STORAGE ROOF | Mech | DIGESTERS | 1984 | 2006 | 25 | | | 2031 | $81,000 | $155,000 | $233,000 |
| 2135 | B-5063-000 | BLOWER, #2 DILUTED NATURAL GAS (WAREHOUSE) | Mech | COGENERATION | 1984 | 2012 | 20 | | | 2032 | $175,000 | $335,000 | $503,000 |
| 24 | B-5064-000 | BLOWER, #1 DILUTED NATURAL GAS | Mech | DIGESTERS | 1984 | 2012 | 20 | | | 2032 | $165,000 | $316,000 | $474,000 |
| 46 | COL-8501-000 | COLLECTOR-SLUDGE & SCUM No. 01 | Mech | SECONDARIES. | 1984 | 2012 | 20 | 20 | Appendix A | 2032 | $482,000 | $922,000 | $1,383,000 |
| 47 | COL-8502-000 | COLLECTOR-SLUDGE & SCUM No. 02 | Mech | SECONDARIES. | 1984 | 2012 | 20 | 20 | Appendix A | 2032 | $482,000 | $922,000 | $1,383,000 |
| 48 | COL-8503-000 | COLLECTOR-SLUDGE & SCUM No. 03 | Mech | SECONDARIES. | 1984 | 2012 | 20 | 20 | Appendix A | 2032 | $482,000 | $922,000 | $1,383,000 |
| 49 | COL-8504-000 | COLLECTOR-SLUDGE & SCUM No. 04 | Mech | SECONDARIES. | 1984 | 2012 | 20 | 20 | Appendix A | 2032 | $482,000 | $922,000 | $1,383,000 |
| 54 | COL-8508-000 | COLLECTOR-SLUDGE & SCUM No. 08 | Mech | SECONDARIES. | 1992 | 2007 | 25 | 25 | Replaced drive & recoated | 2032 | $482,000 | $922,000 | $1,383,000 |
| 724 | ELV-4700-000 | ADMINISTRATION BUILDING ELEVATOR | Mech | ADMIN. BLDG. | 2007 | | 25 | 25 | | 2032 | $57,000 | $109,000 | $164,000 |
| 109 | GDW-1503-000 | GRIT DEWATERER-#3 - SCREW | Mech | HEADWORKS | 1992 | 2012 | 20 | | Replaced by EWA | 2032 | $252,000 | $482,000 | $723,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) 9770 | Cost to Replace @ LA ENR (Jan 2015) 109999 | Cost Total with 1.5 Multiplier |
| 121 | MCC-4000-L00 | MCC-L (DIGESTERS) | Ele/Inst | DIGESTERS | 1992 | | 40 | 40 | | 2032 | $270,000 | $517,000 | $776,000 |
| 127 | MCC-6000-J00 | MCC-J (SLUDGE DEWATERING BLDG.) | Ele/Inst | DEWATERING | 1992 | | 40 | 40 | | 2032 | $250,000 | $478,000 | $717,000 |
| 476 | T-0021-000 | TANK-1W WATER AIR BREAK | Struc | 1W & 2W | 1982 | | 50 | 50 | | 2032 | $55,000 | $106,000 | $159,000 |
| 2136 | unknown | D.I EXHAUST FAN | Mech | ADMIN. BLDG. | 2007 | | 25 | | | 2032 | $55,000 | $106,000 | $159,000 |
| 152 | MME-6213-000 | SCALE-#1 TRAILER (SOUTH) | Misc. | DEWATERING | 1984 | 2008 | 25 | 25 | | 2033 | $83,000 | $159,000 | $239,000 |
| 153 | MME-6214-000 | SCALE-#2 TRAILER (NORTH) | Misc. | DEWATERING | 1984 | 2008 | 25 | 25 | | 2033 | $83,000 | $159,000 | $239,000 |
| 1577 | B-540-000 | RTO COMBUSTION BLOWER | Mech | DRYING/EMISSIONS CONTROL | 2009 | | 25 | 25 | | 2034 | $450,000 | $861,000 | $1,292,000 |
| 1429 | BIN-013-000 | RECYCLE MATERIAL BIN | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $88,000 | $169,000 | $254,000 |
| 1268 | BIN-015-100 | WET CAKE MATERIAL BIN # 1 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $84,000 | $161,000 | $242,000 |
| 1269 | BIN-015-200 | WET CAKE MATERIAL BIN # 2 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $84,000 | $161,000 | $242,000 |
| 29 | BLD-1500-000 | BUILDING-SCREENINGS | Struc | HEADWORKS | 1984 | | 50 | 50 | 3150 SF, Est. $200/SF | 2034 | $687,000 | $1,313,000 | $1,970,000 |
| 30 | BLD-3500-000 | BUILDING-CHLORINE | Struc | CHLORINE | 1984 | | 50 | 50 | 2275 SF, Est. $200/SF | 2034 | $496,000 | $948,000 | $1,422,000 |
| 31 | BLD-4000-PWR | BUILDING-CO-GEN POWER | Struc | COGENERATION | 1984 | | 50 | 50 | | 2034 | $1,500,000 | $2,867,000 | $4,301,000 |
| 32 | BLD-4000-SHP | BUILDING-MAINTENANCE SHOP | Struc | COGENERATION | 1984 | | 50 | 50 | 2325 SF, Est. $200/SF | 2034 | $510,000 | $975,000 | $1,463,000 |
| 33 | BLD-4100-000 | BUILDING-MAINTENANCE ANNEX | Struc | COGENERATION | 1984 | | 50 | 50 | 2500 SF, Est. $200/SF | 2034 | $500,000 | $956,000 | $1,434,000 |
| 36 | BLD-6000-000 | BUILDING-SLUDGE DEWATERING PHASE III | Struc | DEWATERING | 1984 | | 50 | 50 | 9375 SF, Est. $200/SF | 2034 | $2,043,000 | $3,905,000 | $5,858,000 |
| 38 | BLD-8000-000 | BUILDING-SECONDARY | Struc | SECONDARIES | 1984 | | 50 | 50 | 5040 SF, Est. $200/SF | 2034 | $1,099,000 | $2,101,000 | $3,152,000 |
| 1256 | CFG-6100-000 | CENTRIFUGE # 1 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $2,208,000 | $4,220,000 | $6,330,000 |
| 1257 | CFG-6200-000 | CENTRIFUGE # 2 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $2,208,000 | $4,220,000 | $6,330,000 |
| 1461 | CLR-060-000 | PELLET COOLER | Misc | DRYING/PELLET TRANSFER AND STORAGE | 2009 | | 25 | 25 | | 2034 | $133,000 | $255,000 | $383,000 |
| 50 | COL-8505-000 | COLLECTOR-SLUDGE & SCUM No. 05 | Mech | SECONDARIES | 1992 | 2012 | 22 | | to be replaced w/P-1.3.007 | 2034 | $482,000 | $922,000 | $1,383,000 |
| 51 | COL-8506-000 | COLLECTOR-SLUDGE & SCUM No. 06 | Mech | SECONDARIES | 1992 | 2012 | 22 | | to be replaced w/P-1.3.007 | 2034 | $482,000 | $922,000 | $1,383,000 |
| 1270 | CON-016-100 | LIVE BOTTOM SCREW CONVEYOR TO CAKE PMP # 1 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $133,000 | $255,000 | $383,000 |
| 1267 | CON-016-200 | LIVE BOTTOM SCREW CONVEYOR TO CAKE PMP # 2 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $133,000 | $255,000 | $383,000 |
| 1264 | CON-6100-000 | WET CAKE SCREW CONVEYOR TO CAKE BIN # 1 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $131,000 | $251,000 | $377,000 |
| 1260 | CON-6200-000 | WET CAKE SCREW CONVEYOR CAKE BIN # 2 | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | 25 | | 2034 | $131,000 | $251,000 | $377,000 |
| 1430 | ELV-012-000 | RECYCLE FEED BUCKET ELEVATOR | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $58,000 | $111,000 | $167,000 |
| 1463 | ELV-019-000 | FINAL PRODUCT BUCKET ELEVATOR | Mech | DRYING/PELLET TRANSFER AND STORAGE | 2009 | | 25 | 25 | | 2034 | $48,000 | $92,000 | $138,000 |
| 1359 | F-001-100 | DRYER COMBUSTION BLOWER | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $449,000 | $859,000 | $1,289,000 |
| 1582 | F-005-000 | MAIN INDUCED DRAFT FAN | Mech | DRYING/EMISSIONS CONTROL | 2009 | | 25 | 25 | | 2034 | $48,000 | $92,000 | $138,000 |
| 1629 | F-DF-1 | INLINE FAN | Mech | DRYING/UTILITIES | 2009 | | 25 | 25 | | 2034 | $118,000 | $226,000 | $339,000 |
| 1356 | MIX-017-000 | DRYER MIXER | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $83,000 | $159,000 | $239,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) | Cost to Replace @ LA ENR (Jan 2015) | Cost Total with 1.5 Multiplier |
| | | | | | | | | | | | 9770 | 109999 | |
| 1386 | PCY-004-000 | POLYCYCLONE SEPARATOR | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $58,000 | $111,000 | $167,000 |
| 1441 | PDV-9-1-1 | PRODUCT DIVERTER | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $50,000 | $96,000 | $144,000 |
| 1426 | RC-010-000 | PELLET ROLLER CRUSHER | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $59,000 | $113,000 | $170,000 |
| 1384 | SCR-009-000 | SHAKER SCREEN | Mech | DRYER SYSTEM | 2009 | | 25 | 25 | | 2034 | $61,000 | $117,000 | $176,000 |
| 457 | STR-0001-000 | STRUCTURE-BRIDGE OVER CHAN. EAST | Struc | NON-SPECIFIC | 1984 | | 50 | 50 | | 2034 | $437,000 | $836,000 | $1,254,000 |
| 458 | STR-0002-000 | STRUCTURE-BRIDGE OVER CHAN. WEST | Struc | NON-SPECIFIC | 1984 | | 50 | 50 | | 2034 | $219,000 | $419,000 | $629,000 |
| 459 | STR-0012-000 | STRUCTURE-STORM WATER PUMP | Struc | NON-SPECIFIC | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 460 | STR-0032-000 | STRUCTURE-PLANT DRAINAGE | Struc | NON-SPECIFIC | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 462 | STR-0100-000 | STORM WATER BROW DITCH | Struc | SECONDARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 464 | STR-3000-000 | STRUCTURE-EFF.PUMPING STATION | Struc | EFFLUENT | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 465 | STR-3001-000 | STRUCTURE-FAIL SAFE VAULT | Struc | EFFLUENT | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 466 | STR-3100-000 | STRUCTURE-EFF.SAMPLER PUMP PIT | Struc | EFFLUENT | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 467 | STR-3200-000 | STRUCTURE-FAIL SAFE LINE (WEST) | Struc | EFFLUENT | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 477 | T-2101-000 | TANK-#1 GRIT - CENTER | Struc | PRIMARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $291,000 | $557,000 | $836,000 |
| 478 | T-2102-000 | TANK-#2 GRIT - EAST. | Struc | PRIMARIES | 1984 | | 50 | 50 | Recoat Interior 1996 | 2034 | $291,000 | $557,000 | $836,000 |
| 479 | T-2103-000 | TANK-#3 GRIT - WEST | Struc | PRIMARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $291,000 | $557,000 | $836,000 |
| 490 | T-3001-000 | TANK-#1 CHLORINE CONTACT (EAST) | Struc | EFFLUENT | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 491 | T-3002-000 | TANK-#2 CHLORINE CONTACT (WEST) | Struc | EFFLUENT | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $55,000 | $106,000 | $159,000 |
| 2137 | T-5200-000 | TANK-#2 DIGESTER | Struc | DIGESTERS | 1984 | | 50 | | | 2034 | $2,100,000 | $4,014,000 | $6,021,000 |
| 516 | T-8100-000 | TANK-#1 A & B AERATION | Struc | SECONDARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $2,545,000 | $4,864,000 | $7,296,000 |
| 517 | T-8200-000 | TANK-#2 A & B AERATION | Struc | SECONDARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $2,545,000 | $4,864,000 | $7,296,000 |
| 520 | T-8501-000 | TANK-#1 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $927,000 | $1,772,000 | $2,658,000 |
| 521 | T-8502-000 | TANK-#2 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $927,000 | $1,772,000 | $2,658,000 |
| 522 | T-8503-000 | TANK-#3 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $927,000 | $1,772,000 | $2,658,000 |
| 523 | T-8504-000 | TANK-#4 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1984 | | 50 | 50 | Estimated Repair cost | 2034 | $927,000 | $1,772,000 | $2,658,000 |
| 2138 | unknown | CENTRATE DRAIN LINE FOR CENTRIFUGES | Mech | DRYING/CENTRIFUGE SYSTEM | 2009 | | 25 | | | 2034 | $185,000 | $354,000 | $531,000 |
| 2139 | unknown | HEAT DRY SCALE | Mech | DRYER SYSTEM | 2009 | | 25 | | | 2034 | $83,000 | $159,000 | $239,000 |
| 2140 | unknown | STRAINER-MANUAL 3WHP WATER | Mech | EFFLUENT | 1984 | | 50 | | | 2034 | $55,000 | $106,000 | $159,000 |
| 2142 | unknown | STRAINER-MANUAL 3WLC WATER | Mech | EFFLUENT | 1984 | | 50 | | | 2034 | $55,000 | $106,000 | $159,000 |
| 2143 | unknown | STRAINER-MOTOR OPERATED-3W WATER | Mech | EFFLUENT | 1984 | | 50 | | | 2034 | $55,000 | $106,000 | $159,000 |
| | | | | | | | **Sub-total for Projects Requiring Replacement in next 10 to 20 years (2025 to 2034)** | | | | | | **$135,704,000** |
| 1464 | TRN-070-000 | PNEUMATIC TRANSPORT SYSTEM | Misc | DRYING/PELLET TRANSFER AND STORAGE | 2009 | 2013 | 25 | 25 | | 2038 | $80,000 | $153,000 | $230,000 |
| 2144 | unknown | ECLIPSE - NATURAL GAS BLENDING SYSTEM | Mech | DIGESTERS | 1991 | 2013 | 25 | | | 2038 | $240,000 | $459,000 | $689,000 |
| 628 | 72" PE | PIPE-72" PRIMARY EFFLUENT, RCP | Mech | PRIMARIES | 1989 | | 50 | 50 | | 2039 | $251,000 | $480,000 | $720,000 |
| 867 | B-4011-000 | AGITATION AIR BLOWER | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $210,000 | $402,000 | $603,000 |
| 1357 | DD-002-000 | ROTARY DRUM DRYER | Mech | DRYER SYSTEM | 2009 | | 30 | 30 | | 2039 | $288,000 | $551,000 | $827,000 |
| 1358 | FUR-001-000 | FURNACE | Misc | DRYER SYSTEM | 2009 | | 30 | 30 | | 2039 | $249,000 | $476,000 | $714,000 |
| 872 | HEX-4150-000 | PLATE HEAT EXCHANGER | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 873 | HEX-4160-000 | PLATE HEAT EXCHANGER | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 901 | HEX-4610-000 | HEAT EXCHANGER ENGINE 1 | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 948 | HEX-4620-000 | HEAT EXCHANGER ENGINE 2 | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) 9770 | Cost to Replace @ LA ENR (Jan 2015) 109999 | Cost Total with 1.5 Multiplier |
| 949 | HEX-4630-000 | HEAT EXCHANGER FOR ENGINE 3 | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 950 | HEX-4640-000 | HEAT EXCHANGER ENGINE 4 | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 885 | HEX-4710-000 | HEAT EXCHANGER ENG # 1 PLATE AND FRAME | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 907 | HEX-4720-000 | HEAT EXCHANGER # 2 PLATE AND FRAME | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 886 | HEX-4730-000 | HEAT EXCHANGER ENG # 3 PLATE AND FRAME | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 2145 | unknown | HEAT EXCHANGER ENG # 4 PLATE AND FRAME | Mech | POWER BLDG. | 2009 | | 30 | 30 | | 2039 | $218,000 | $417,000 | $626,000 |
| 2146 | unknown | PIPE - 48" Vert Trans TO 48" X 72" INCREASER | Mech | OUTFALL | 1964 | | 50 | 75 | From asset list-sample calc | 2039 | $5,846,000 | $11,173,000 | $16,760,000 |
| 2147 | unknown | PIPE - 48" WYE TO Vert Trans STRUCTURE | Mech | OUTFALL | 1964 | | 50 | 75 | From asset list-sample calc | 2039 | $3,627,000 | $6,932,000 | $10,398,000 |
| 2148 | unknown | SHELL AND TUBE HEAT EXCHANGERS | Mech | POWER BLDG. | 2009 | | 30 | | | 2039 | $269,000 | $515,000 | $773,000 |
| 2149 | unknown | SHELL AND TUBE HEAT EXCHANGERS | Mech | POWER BLDG. | 2009 | | 30 | | | 2039 | $269,000 | $515,000 | $773,000 |
| 2150 | unknown | SHELL AND TUBE HEAT EXCHANGERS | Mech | POWER BLDG. | 2009 | | 30 | | | 2039 | $269,000 | $515,000 | $773,000 |
| 2151 | unknown | SHELL AND TUBE HEAT EXCHANGERS | Mech | POWER BLDG. | 2009 | | 30 | | | 2039 | $269,000 | $515,000 | $773,000 |
| 2152 | unknown | WASTE GAS FLARE SYSTEM | Mech | NON-SPECIFIC | 2009 | | 30 | | | 2039 | $874,000 | $1,671,000 | $2,507,000 |
| 21 | B-4009-000 | BLOWER-#1 AGITATION AIR | Mech | COGENERATION | 2000 | | 30 | 40 | 6,000 cfm, 250 Hp | 2040 | $210,000 | $402,000 | $603,000 |
| 22 | B-4010-000 | BLOWER-#2 AGITATION AIR | Mech | COGENERATION | 2000 | | 30 | 40 | 6,000 cfm, 250 Hp | 2040 | $210,000 | $402,000 | $603,000 |
| 2153 | unknown | CORROSION CONTROL | Mech | OUTFALL | 2010 | | 30 | | From asset list-sample calc | 2040 | $1,200,000 | $2,294,000 | $3,441,000 |
| 40 | BNR-5007-000 | BURNER WASTE GAS | Mech | DIGESTERS | 2011 | | 30 | 30 | | 2041 | $874,000 | $1,671,000 | $2,507,000 |
| 469 | STR-7000-000 | STRUCTURE-TWAS.PUMP PIT | Struc | DAFT | 1991 | | 50 | 50 | Estimated Repair cost | 2041 | $55,000 | $106,000 | $159,000 |
| 470 | STR-7300-000 | STRUCTURE-TWAS.PUMP PIT | Struc | DAFT | 1991 | | 50 | 50 | Estimated Repair cost | 2041 | $55,000 | $106,000 | $159,000 |
| 472 | STR-8400-000 | STRUCTURE-PRI.FLOW EQUALIZATION | Struc | SECONDARIES | 1991 | | 50 | 50 | Estimated Repair cost | 2041 | $55,000 | $106,000 | $159,000 |
| 495 | T-5500-000 | TANK-#5 DIGESTER | Struc | DIGESTERS | 1992 | 1991 | 50 | 50 | Cleaned in 2003 | 2041 | $3,792,000 | $7,248,000 | $10,872,000 |
| 496 | T-5600-000 | TANK-#6 DIGESTER | Struc | DIGESTERS | 1992 | 1991 | 50 | 50 | Cleaned in 2003 | 2041 | $3,792,000 | $7,248,000 | $10,872,000 |
| 2154 | T-7101-DAF | TANK-#1 DAF. | Struc | DAFT | 1991 | | 50 | | | 2041 | $719,000 | $1,375,000 | $2,063,000 |
| 2155 | T-7201-DAF | TANK-#2 DAF. | Struc | DAFT | 1991 | | 50 | | | 2041 | $719,000 | $1,375,000 | $2,063,000 |
| 2156 | T-7301-DAF | TANK-#3 DAF | Struc | DAFT | 1991 | | 50 | | | 2041 | $842,000 | $1,610,000 | $2,415,000 |
| 518 | T-8300-000 | TANK-#3 A & B AERATION | Struc | SECONDARIES | 1991 | | 50 | 50 | Estimated Repair cost | 2041 | $3,331,000 | $6,367,000 | $9,551,000 |
| 519 | T-8400-000 | TANK-#4 A & B AERATION | Struc | SECONDARIES | 1991 | | 50 | 50 | Estimated Repair cost | 2041 | $3,331,000 | $6,367,000 | $9,551,000 |
| 2157 | unknown | STRUCTURE - OUTFALL SAMPLER STATION | Struc | OUTFALL | 1991 | | 50 | | | 2041 | $67,000 | $129,000 | $194,000 |
| 35 | BLD-4500-000 | BUILDING-(WAREHOUSE) | Struc | COGENERATION | 1992 | | 50 | 50 | Insurance Report | 2042 | $2,000,000 | $3,823,000 | $5,735,000 |
| 37 | BLD-6000-001 | BUILDING-SLUDGE DEWATERING Phase IV | Struc | DEWATERING | 1992 | | 50 | 50 | 5184 SF, Est. $200/SF | 2042 | $1,130,000 | $2,160,000 | $3,240,000 |
| 471 | STR-8000-000 | STRUCTURE-MIX LIQUOR CHANNEL | Struc | SECONDARIES | 1992 | | 50 | 50 | Estimated Repair cost | 2042 | $55,000 | $106,000 | $159,000 |
| 473 | STR-8500-000 | STRUCTURE-SEC.CLARIFIER TANK AREA | Struc | SECONDARIES. | 1992 | | 50 | 50 | Estimated Repair cost | 2042 | $55,000 | $106,000 | $159,000 |
| 474 | STR-8800-000 | STRUCTURE-SECONDARY CHEM. PIT | Struc | SECONDARIES | 1992 | | 50 | 50 | Estimated Repair cost | 2042 | $55,000 | $106,000 | $159,000 |
| 475 | T-0016-000 | TANK-2W WATER AIR BREAK | Struc | 1W & 2W | 1992 | | 50 | 50 | | 2042 | $55,000 | $106,000 | $159,000 |
| 524 | T-8505-000 | TANK-#5 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1992 | | 50 | 50 | Estimated Repair cost | 2042 | $1,458,000 | $2,787,000 | $4,181,000 |
| 525 | T-8506-000 | TANK-#6 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1992 | | 50 | 50 | Estimated Repair cost | 2042 | $1,458,000 | $2,787,000 | $4,181,000 |
| 526 | T-8507-000 | TANK-#7 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1992 | | 50 | 50 | Estimated Repair cost | 2042 | $1,458,000 | $2,787,000 | $4,181,000 |
| 527 | T-8508-000 | TANK-#8 SECONDARY SEDIMENTATION | Struc | SECONDARIES | 1992 | | 50 | 50 | Estimated Repair cost | 2042 | $1,458,000 | $2,787,000 | $4,181,000 |
| 2158 | unknown | COVER - PRIMARY SEDIMENTATION #01 | Struc | PRIMARIES | 1984 | 2012 | 30 | | | 2042 | $65,000 | $125,000 | $188,000 |
| 2159 | unknown | COVER - PRIMARY SEDIMENTATION #02 | Struc | PRIMARIES | 1984 | 2012 | 30 | | | 2042 | $65,000 | $125,000 | $188,000 |
| 2160 | unknown | COVER - PRIMARY SEDIMENTATION #03 | Struc | PRIMARIES | 1984 | 2012 | 30 | | | 2042 | $65,000 | $125,000 | $188,000 |

| Table E-1: Encina Water Pollution Control Facility Major Asset List, FY 2015 E-CAMP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref No. | Asset ID | Asset Description | Asset Classes | Location | Install Date | Last Refurb or Replace Date (Year) | Nominal Useful Life (Years) | Assessed Useful Life (Years) | Comments | Replace Date (Year) | Estimated Replace Cost Book Value (Mar 2010) | Cost to Replace @ LA ENR (Jan 2015) | Cost Total with 1.5 Multiplier |
| | | | | | | | | | | | 9770 | 109999 | |
| 2161 | unknown | COVER - PRIMARY SEDIMENTATION #04 | Struc | PRIMARIES | 1984 | 2012 | 30 | | | 2042 | $65,000 | $125,000 | $188,000 |
| 2162 | unknown | COVER - PRIMARY SEDIMENTATION #05 | Struc | PRIMARIES | 1984 | 2012 | 30 | | | 2042 | $65,000 | $125,000 | $188,000 |
| 2163 | unknown | COVER - PRIMARY SEDIMENTATION #06 | Struc | PRIMARIES | 1984 | 2012 | 30 | | | 2042 | $65,000 | $125,000 | $188,000 |
| 2164 | unknown | PLANT - P.A. SYSTEM | Mech | NON-SPECIFIC | 2014 | | 30 | | | 2044 | $53,000 | $102,000 | $153,000 |
| 2165 | unknown | WASTE RECEIEVING STATION | Struc | HEADWORKS | 1984 | 2014 | 30 | | | 2044 | $2,468,000 | $4,717,000 | $7,076,000 |
| 52 | COL-8507-000 | COLLECTOR-SLUDGE & SCUM No. 07 | Mech | SECONDARIES | 2020 | | 25 | | Future equipment | 2045 | $482,000 | $922,000 | $1,383,000 |
| 138 | MCC-8000-B00 | MCC-B (SEC.BLDG.) EAST-MCC | Ele/Inst | SECONDARIES | 1984 | 2005 | 40 | 40 | Appendix A | 2045 | $250,000 | $478,000 | $717,000 |
| 139 | MCC-8000-C00 | MCC-C (SEC.BLDG.) WEST-MCC | Ele/Inst | SECONDARIES | 1984 | 2005 | 40 | 40 | Appendix A | 2045 | $250,000 | $478,000 | $717,000 |
| | unknown | MCC COMBINED PUMP STATION | Ele/Inst | COMB. PUMP STATION | 2005 | | 40 | | | 2045 | $250,000 | $478,000 | $717,000 |
| 494 | T-5400-000 | TANK-#4 DIGESTER | Struc | DIGESTERS | 1984 | 1996 | 50 | 50 | Recoat Interior in 1996 | 2046 | $3,324,000 | $6,353,000 | $9,530,000 |
| 1101 | MCC-4600-000 | MCC MAINTENANCE BUILDING | Ele/Inst | MAINT. BLDG. | 2007 | | 40 | 40 | | 2047 | $250,000 | $478,000 | $717,000 |
| 468 | STR-6300-000 | STRUCTURE-CHEMICAL STORAGE AREA | Struc | DEWATERING | 1997 | | 50 | 50 | Estimated Repair cost | 2047 | $55,000 | $106,000 | $159,000 |
| 992 | MCC-6000-003 | MCC-3 CENTRIFUGE FEED PIT | Ele/Inst | CENTRIFUGE FEED PIT | 2009 | | 40 | 40 | | 2049 | $52,000 | $100,000 | $150,000 |
| 1701 | T-021-000 | PRODUCT STORAGE TANK SILO # 1 | Mech | DRYING/FINAL LOAD OUT | 2009 | | 40 | 40 | | 2049 | $125,000 | $239,000 | $359,000 |
| 1700 | T-021-100 | PRODUCT STORAGE TANK SILO # 2 | Mech | DRYING/FINAL LOAD OUT | 2009 | | 40 | 40 | | 2049 | $125,000 | $239,000 | $359,000 |
| 2166 | unknown | CEPT CONTROL SYSTEM | Ele/Inst | CEPT. CHEMICAL STORAGE | 2010 | | 40 | | | 2050 | $250,000 | $478,000 | $717,000 |
| 2167 | unknown | HEAT LOOP PIPING SYSTEM | Mech | NON-SPECIFIC | 2000 | | 50 | | | 2050 | $100,000 | $192,000 | $288,000 |
| 2168 | unknown | 48" SCREENING CHANNEL PIPE - #1 | Mech | HEADWORKS | 1982 | 2014 | 30 | 38 | rehab w/P-1.1.005 | 2052 | $87,000 | $167,000 | $251,000 |
| 2169 | unknown | 48" SCREENING CHANNEL PIPE - #2 | Mech | HEADWORKS | 1982 | 2014 | 30 | 38 | rehab w/P-1.1.005 | 2052 | $87,000 | $167,000 | $251,000 |
| 2170 | unknown | 48" SCREENING CHANNEL PIPE - #3 | Mech | HEADWORKS | 1982 | 2014 | 30 | 38 | rehab w/P-1.1.005 | 2052 | $87,000 | $167,000 | $251,000 |
| 2171 | unknown | 48" SCREENING CHANNEL PIPE - #4 | Mech | HEADWORKS | 1982 | 2014 | 30 | 38 | rehab w/P-1.1.005 | 2052 | $87,000 | $167,000 | $251,000 |
| 1209 | BLD-4600-000 | BUILDING-MAINTENANCE/ NEW | Struc | MAINT. BLDG. | 2007 | | 50 | 50 | | 2057 | $1,820,000 | $3,479,000 | $5,219,000 |
| 1210 | BLD-4600-SHP | BUILDING-MAINTENANCE SHOP/ NEW | Struc | MAINT. BLDG. | 2007 | | 50 | 50 | | 2057 | $1,001,000 | $1,914,000 | $2,871,000 |
| 759 | BLD-4700-000 | BUILDING-ADMINISTRATION / NEW | Struc | ADMIN. BLDG. | 2007 | | 50 | 50 | | 2057 | $5,256,000 | $10,046,000 | $15,069,000 |
| 760 | BLD-4700-0PS | BUILDING-OPERATIONS DEPT / NEW | Struc | ADMIN. BLDG. | 2007 | | 50 | 50 | | 2057 | $4,043,000 | $7,727,000 | $11,591,000 |
| 761 | BLD-4700-LAB | BUILDING - LABORATORY DEPT / NEW | Struc | ADMIN. BLDG. | 2007 | | 50 | 50 | | 2057 | $2,022,000 | $3,865,000 | $5,798,000 |
| 463 | STR-2000-000 | STRUCTURE-PRIMARY GALLERY | Struc | PRIMARIES | 2007 | | 50 | 50 | Exterior Walls Repaired 2007 | 2057 | $55,000 | $106,000 | $159,000 |
| 2172 | unknown | BUILDING, OPERATIONS - LAB.DEPT. | Struc | OPERATIONS BLDG | 2007 | | 50 | | | 2057 | $2,000,000 | $3,823,000 | $5,735,000 |
| 2173 | unknown | BUILDING, OPERATIONS - OPS. DEPT. | Struc | OPERATIONS BLDG | 2007 | | 50 | | | 2057 | $4,000,000 | $7,645,000 | $11,468,000 |
| 2174 | unknown | BUILDING-OPERATIONS | Struc | OPERATIONS BLDG | 2007 | | 50 | | | 2057 | $4,043,000 | $7,727,000 | $11,591,000 |
| 1289 | BLD-6000-DRYER | BUILDING-HEAT DRYING INCL. FINAL LOAD OUT | Struc | DRYING/CENTRIFUGE SYSTEM | 2009 | | 50 | 50 | | 2059 | $3,858,000 | $7,374,000 | $11,061,000 |
| 2175 | unknown | CENTRIFUGE POLYMER STORAGE TANK | Mech | DEWATERING | 2009 | | 50 | | | 2059 | $60,000 | $115,000 | $173,000 |
| 625 | 42" AIR | PIPE-42" AIR PIPE, STEEL w/36" COMP LINER | Mech | SECONDARIES | 1980 | 2011 | 50 | 50 | | 2061 | $900,000 | $1,721,000 | $2,582,000 |
| 2176 | unknown | PIPE - 3WHP PIPING | Mech | SECONDARIES | 2011 | | 50 | | | 2061 | $92,000 | $176,000 | $264,000 |
| 2177 | unknown | WASTE GAS BURNER | Mech | NON-SPECIFIC | 2011 | | 50 | | | 2061 | $165,000 | $316,000 | $474,000 |
| 2178 | unknown | VACTOR DUMPING FACILITY | Struc | HEADWORKS | 2012 | | 50 | | | 2062 | $220,000 | $421,000 | $632,000 |
| 2179 | unknown | PIPELINE - NATURAL GAS PIPELINE | Mech | DIGESTERS | 1980 | 2013 | 50 | | | 2063 | $350,000 | $669,000 | $1,004,000 |
| 461 | STR-0035-000 | STRUCTURE-INFLUENT STRUCTURE | Struc | HEADWORKS | 1984 | 2014 | 50 | 50 | Replaced w/P-1.1.001 | 2064 | $2,400,000 | $4,587,000 | $6,881,000 |
| | | | | | | | | | | | | Sub-total for Projects Requiring Replacement in over 20 years (past 2034) | $242,093,000 |
| | | | | | | | | | | | | TOTAL COST | $541,131,000 |

**This page intentionally left blank**