WATER RESOURCE RECOVERY FACILITY

ENGAGE. TRANSFORM. SUSTAIN.

Final

Program Management Plan

for the

Water Resource Recovery Facility Project

Prepared for:

Utilities Department
City of San Luis Obispo

Prepared By:

WSC
WATER SYSTEMS CONSULTING, INC.

HDR

2/6/2015

PREP
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PMP REVISION LOG

Date	Reviewer	Summary of Changes

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ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
AACE	Association for the Advancement of Cost Engineering
AB	Assembly Bill
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADWF	Average Dry Weather Flow
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
APCD	Air Pollution Control District
ARC	Architectural Review Committee
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BBQ	Barbeque
BCR	Beginning Curb Return
BIM	Building Information Modeling
CAD	Computer-Aided Design
CBC	California Building Code
CC	City Council
CCO	Commitment Change Order
CEC	California Electrical Code
CEnC	California Energy Code
CEQA	California Environmental Quality Act
CFC	California Fire Code
CFD	Computational Fluid Dynamics
CGBS	California Green Building Standards
CIWQS	California Integrated Water Quality System
CM	Construction Manager
CMAA	Crane Manufacturers Association of America
CMC	California Mechanical Code
CMT	Core Management Team
CO	Change Order
COR	Change Order Request
CPC	California Plumbing Code
CSI	Construction Specifications Institute
CUFC	California Uniform Fire Code

CWEA	California Water Environment Association
DWR	California Department of Water Resources
EIA	Electronics Industries Alliance
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
FMRC	Factory Mutual Research Corporation
GHG	Greenhouse Gas
GIS	Geographic Information System
HMP	Hazardous Material Plan
HVAC	Heating, Ventilation and Air Conditioning
I/O	Input/Output
ICEA	Industrial Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
ISO	International Organization for Standardization
ISA	Instrumentation Systems and Automation
IT	Information Technology
LEED	Leadership in Energy and Environmental Design
MCC	Motor Control Center
mgd	Million gallons per day
MIS	Management Information System
NA	Not Applicable
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAVD	North American Vertical Datum
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
OSHPD	California Office of Statewide Health Planning and Development
P&ID	Piping & Instrumentation Diagram
PC	Planning Commission
PCO	Potential Change Order
PDR	Preliminary Design Report
PDI	Plumbing and Drainage Institute
PG&E	Pacific Gas & Electric

PLC	Programmable Logic Controller
PM	Program Manager
PMP	Program Management Plan
PM Team	Program Management Team
POL	Petroleum, Oil and Lubricants
PREP	Progressive Resource Enhancement Partnership
Project Team	All project participants including City staff, PM Team, and other project participants
PSMP	Process Safety Management Plan
QA/QC	Quality Assurance / Quality Control
RFI	Request for Information
RFP	Request for Proposals
RMP	Risk Management Plan
RWQCB	Regional Water Quality Control Board
SLO	San Luis Obispo
SLOFD	San Luis Obispo Fire Department
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SRF	State Revolving Fund
SSMP	Sewer System Management Plan
SSPC	Steel Structures Painting Council
SST	Sustainable Solutions Turnkey
SPCC	Spill Prevention, Control and Countermeasure
SWRCB	State Water Resources Control Board
TBL	Triple Bottom Line
TIA	Telecommunication Industry Association
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
UBC	Uniform Building Code
UFC	Uniform Fire Code
UL	Underwriters Laboratory
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
UWMP	Urban Water Management Plan
WDR	Waste Discharge Requirements
WIMS	Water Information Management Solutions
WRRF	Water Resource Recovery Facility

1   INTRODUCTION

The City of San Luis Obispo (City) owns and operates the Water Resource Recovery Facility (WRRF) located on Prado Road in San Luis Obispo, CA. The WRRF treats municipal wastewater flow from the City, California Polytechnic State University (Cal Poly), and the San Luis Obispo County Airport. The WRRF is rated to 5.1 million gallons per day (mgd) for average dry weather flow (ADWF) conditions. The facility currently treats an average of approximately 3.89 mgd annually. Current ADWF with Cal Poly is approximately 3.5 mgd. The treated water is then either discharged to the San Luis Obispo Creek or recycled to various users. A process schematic of the WRRF is provided in Figure 1.
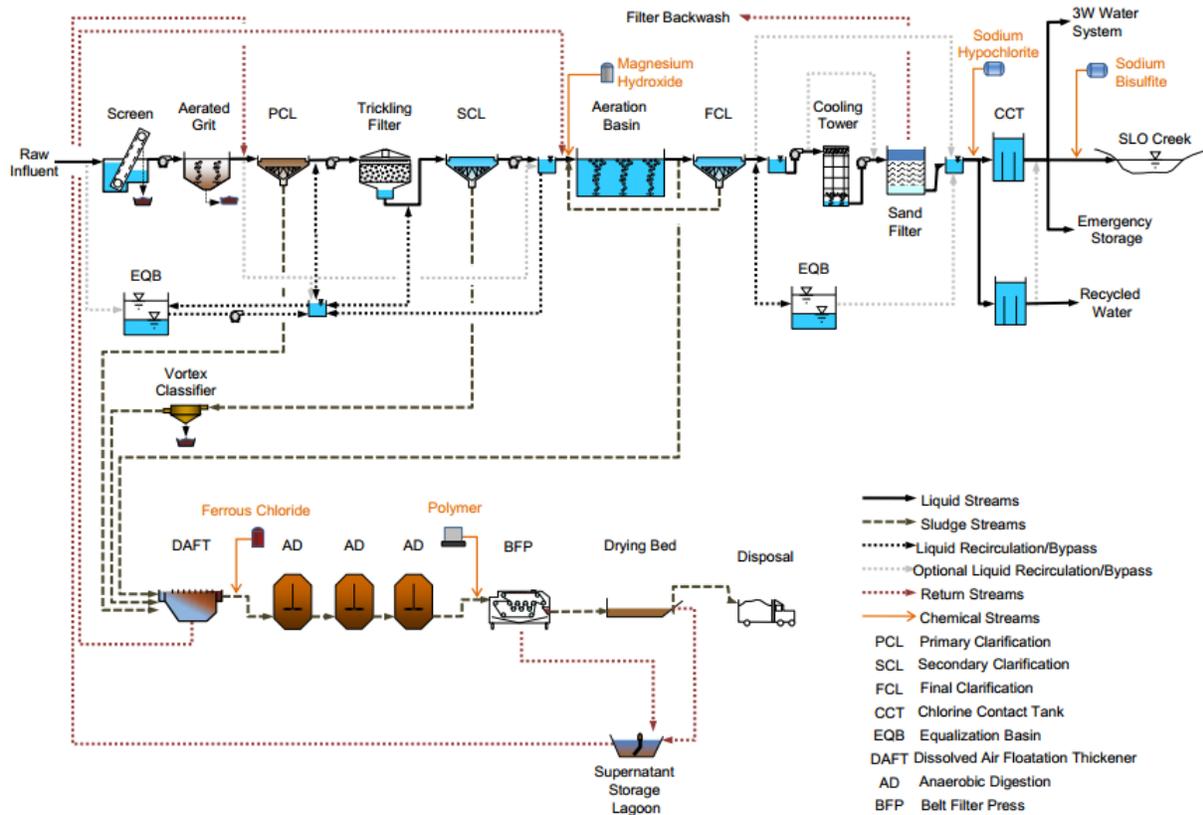
Figure 1. Plant Process Schematic (Typical Operation)

The City is beginning a program to upgrade the WRRF (WRRF Project) to update treatment processes to meet the City's new National Pollutant Discharge Elimination System (NPDES) permit, replace aging equipment, and incorporate interpretive features and public amenities to create a valued community asset. The program is expected to last seven years and is divided into five phases: project planning, preliminary design, final design, construction, and close out. The five phases with approximate start and end dates of each phase are shown in Table 1.

Table 1. Approximate Schedule for WRRF Project

Phase	Approximate Schedule
1 – Project Planning	January, 2014 – June, 2015
2 – Preliminary Design	July, 2015 – April, 2016
3 – Final Design	April, 2016 – October, 2017
4 – Construction	October, 2017 – December, 2020
5 – Close Out	December, 2020 – February, 2021

The City engaged a program management team (PM Team) led by Water Systems Consulting, Inc. (WSC) to manage the WRRF Project. The PM Team also includes HDR Engineering, Inc. and RRM Design. An organization chart for the PM Team is shown in Figure 2. In addition to its program management responsibilities, the PM Team is performing preliminary engineering and outreach, and preparing the Facilities Plan during Phase 1 of the WRRF Project.

With collaboration from the City, the PM Team has prepared this Program Management Plan (PMP). The PMP is intended to be a guiding document for the City, PM Team, and other project participants (collectively referred to as the Project Team). The PMP will be used for the duration of the project and will be updated and/or amended as necessary. As team members identify the need for updates to the PMP, they will forward the issue to a member of the Core Management Team (CMT). The CMT is comprised of senior management representatives from the City and the PM Team. At regular intervals, the CMT will review the issues that have been raised, discuss potential revisions to the PMP, and implement those changes as appropriate.

Program Manager

Jeff Szytel, PE

Subconsultant Legend
[1]HDR
[2]EDEA
[3]RRM

Assistant Program Manager

Lianne Williams, PE

Technical Advisors

Dave Reardon, PE, ENVE SP[1]
Dave Pivetti, PE, AIA[2]
Dave Ludwin, PE[1]

Design

Gabriel Perigault, PE[1]

Facility Planning

Holly Kennedy, PE[1]

Public Outreach

Debbie Rudd, AICP, LEED AP[3]

System-Wide Alternatives Analysis

Josh Reynolds, PE

Construction

Dylan Wade, PE

Figure 2. PM Team Organization

2 PROGRAM CHARTER

2.1 PURPOSE

The Program Charter is intended to establish a clear shared vision and mission among the Project Team and key stakeholders, establish objectives and performance measures to guide effective decision making, and establish a set of values and principles to guide how the Project Team will function and interact throughout the duration of the WRRF Project.

2.2 CHARTERING PROCESS

To initiate the chartering process, the PM Team held a workshop with key City staff to brainstorm the key elements of the Charter. The goals discussed during the workshop were synthesized and grouped into Economic, Environmental and Social categories to reflect the City's commitment to achieving triple bottom line (TBL) benefits. With the information gathered during the workshop, the PM Team developed a draft Program Charter. The City and the PM Team worked through a series of revisions to refine the vision and mission statement to ensure they effectively captured the big picture vision of the project and aligned with the Utility Department's Strategic Plan. City staff, City Council and the PM Team signed the final Program Charter at the Charter Signing BBQ on May 14, 2014 to show support and commitment to the project. The final Program Charter is shown in Figure 3.

Water Resource Recovery Facility Project
PROGRAM CHARTER

Engage. Transform. Sustain.

Vision
Create a community asset that is recognized as supporting health, well-being and quality of life

Mission
Deliver a Water Resource Recovery Facility in partnership with stakeholders that provides economic, social and environmental value to our community

Objectives and Performance Measures

Economic
- Optimize capital investment and life cycle cost
- Maximize value for ratepayers' investment
- Incorporate flexibility and scalability to adapt to future conditions
- Simplify process flow and make treatment more robust
- Optimize application of appropriate technology

Environmental
- Develop and implement a holistic strategy to maximize sustainable resource recovery and manage salts, nutrients and environmental pollutants in the Basin
- Incorporate sustainability practices in planning, design, construction and operation
- Maintain compliance and minimize impacts to operations and the community during construction
- Sustain reliable compliance post-construction

Social
- Create and sustain diverse partnerships that add value to the community
- Provide an interpretive center and dedicated features to engage and educate the community
- Be a good neighbor
- Engender the trust of project stakeholders
- Support the development and empowerment of City employees

Guiding Principles
- Be honest and respectful to build and enhance trust
- Commit to knowledge transfer
- Encourage and embrace innovation and creativity
- Understand the "why" and expand the "possible"
- Maintain a high standard of performance
- Be productive while holding ourselves and others accountable
- Encourage open communication, constructive feedback, and differing points of view
- Actively participate and support knowledge-based decisions
- Maintain transparency and leave egos at the door
- Celebrate our successes while being candid about and learning from our mistakes
- Have fun!

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Figure 3. Program Charter

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3   PROGRAM ADMINISTRATIVE PROCEDURES

3.1   PURPOSE

The purpose of this chapter is to establish standardized administrative procedures for the WRRF Project, including the management information system (MIS), program controls, document management, program branding, contract approvals, project management requirements, and invoicing and pay requests.   Communication and correspondence tracking are described in Chapter 4 and data management considerations are summarized in Chapter 5.

3.2   MANAGEMENT INFORMATION SYSTEM

The PM Team selected Procore to serve as the MIS for the WRRF Project, to manage project documentation, status, controls, deliverables, contract data, and correspondence, among other functions. Procore is a cloud-based project management application designed to support the construction industry, however its tools, features and functionality can support the MIS needs for the WRRF Project from planning through implementation. Procore system components are summarized in Figure 4.
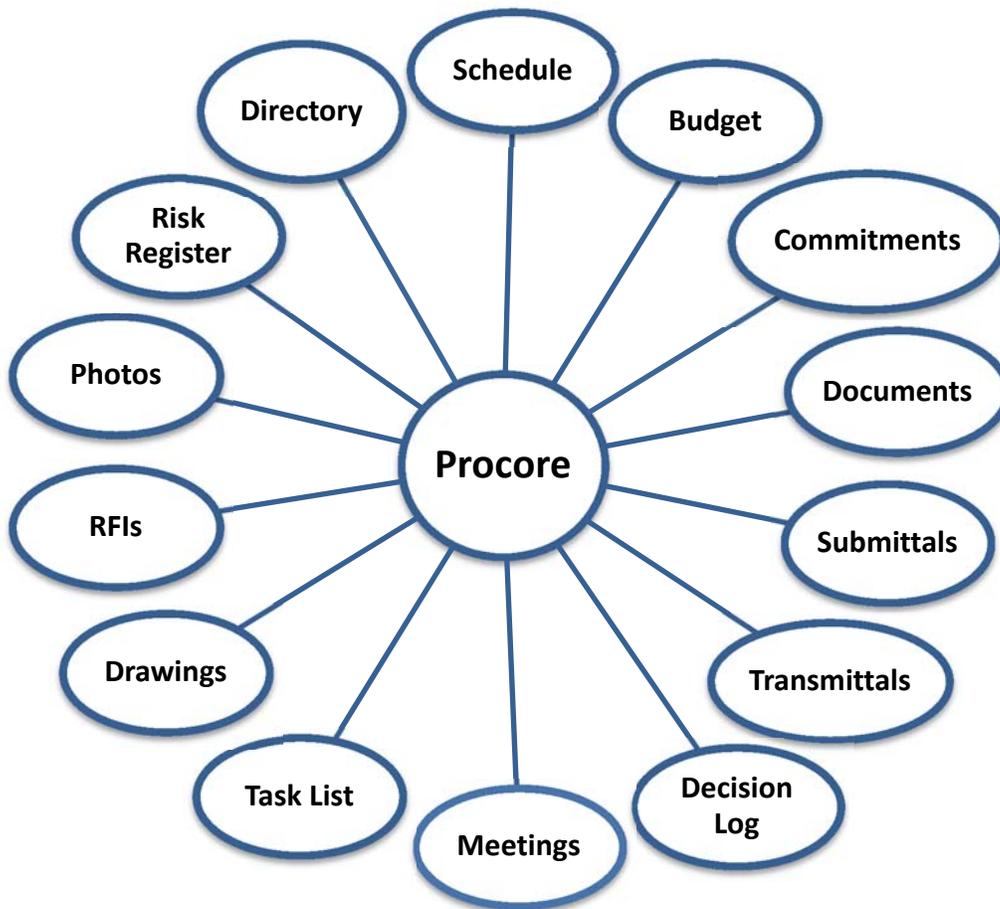
Figure 4. Procore MIS System Components

Project participants that have or anticipated to have access to the MIS include the PM Team, City staff, project consultants and sub-consultants, regulatory agency representatives, contractors and sub-contractors, and select project contributors. User accounts are created and assigned an appropriate permission template by the MIS administrator, and users access the MIS through a web browser (www.procore.com). The permission templates establish and control access and read/write permissions for each module in the Procore system, as outlined in Table 2.

Table 2. User and Permission Templates

Group	Access to	Permissions
Administrator	All	Administrative
Project Manager	All	Administrative
Project Team	All except Admin Tab	Read Only, Standard, Limited Admin
Owner Management	All except Admin and Commitments Tab	Read Only, Standard
Owner Staff	All except Admin, Budget, Commitments, and Change Orders Tabs	Read Only, Standard
Contributor	Home and Documents Tab	Read Only (Home), Standard (Documents)
Owner/CM	All except Budget, Commitments, Change Orders, Risk Register, Decision Log, Task List, and Admin Tab	Read Only, Standard
Subcontractor	Same as Owner/CM	Same as Owner/CM

Procore has a number of modules to aid in collaboration between team members. Many of these modules are intended to capture various project communications and log them in a central database that can be used as a reference by the Project Team. Individual modules are described within this PMP in the context of the specific topics being presented. For example, modules related to program controls, document management, contract approvals, project management requirements and invoicing and pay requests, are summarized in this chapter. Modules that relate to data management are described in Chapter 5, and modules related to other project communications are described in Chapter 4.

3.3   PROGRAM CONTROLS

The PM Team is responsible for monitoring and managing controls for the WRRF Project, including budget, schedule and quality.

3.3.1   Budget

One of the key measures of program success will be spending relative to the established budget. The PM Team will use the Procore Budget and Commitments tools to track spending. WSC has populated the Procore database with the budget for Phase I, which includes program management, preliminary engineering, public outreach and facilities planning. Spending will be updated monthly by the PM Team. Users with access to the Budget module will be able to view Phase 1 spending to-date compared to Phase 1 budget. Spending will also be reported to the City in the monthly and quarterly status reports, as described in section 3.3.4.

In future phases of the program, the budget for the program management effort, design engineering, construction and other services will be updated in Procore. Throughout the course of the WRRF Project, the PM Team will update spending for each contract monthly and this will be tracked against the appropriate budget. Invoicing procedures and requirements for each project participant are outlined in Section 3.8.

3.3.2   Schedule

The PM Team has uploaded the detailed baseline schedule for Phase 1 of the WRRF Project into Procore, which also includes an approximate schedule for future phases. The schedule is in Microsoft Project format and can be accessed directly through Procore. The schedule allows the PM Team to track progress on tasks and make changes to the schedule as appropriate. When changes are made to the schedule in Procore, users are required to provide an explanation for the change. This is tracked in Procore. In addition, if new versions of the schedule are uploaded, previous versions are archived for future reference and become part of the project files. In order to monitor and control changes to the schedule, selected members of the PM Team are the only users with permissions to make changes to the schedule in Procore.

Schedule and progress will be reported in the monthly and quarterly reports, as described in section 3.3.4.

3.3.3   Quality

The PM Team has developed a Quality Assurance / Quality Control (QA/QC) Plan for the project, which is provided as Chapter 10 of this PMP. The QA/QC Plan outlines QA activities of the PM Team and QA and QC expectations for other project participants. As described in the QA/QC Plan, the PM Team will be responsible for periodically monitoring QC documentation of deliverables prepared by other consultants during the program.

Procore will be used to track and record QC and QA activities and documentation. A QA/QC form will be prepared to accompany each deliverable that is submitted for review. In general the preparer of the document will be responsible for preparing the accompanying QA/QC form. The form will be stored in Procore in the same location as the deliverable, and it will be updated with the names and dates of reviews that are completed.

3.3.4   Program Performance Reports

The PM Team will prepare and submit monthly status updates and quarterly status reports to the City to update the City on project performance. The content planned for each report is shown in Table 3.

Table 3. Anticipated Reports to Demonstrate Program Performance

Report	Content/Item
Monthly Status Update	Program Snapshot Chart (planned spending, actual cost, and earned value, vs. schedule)
	Financial Summary
	Risk Summary
	Change Summary
	Activities this Period
	Activities Planned for Next Period
Quarterly Status Report	Program Snapshot Chart (planned spending, actual cost, and earned value, vs. schedule)
	Financial Summary
	Highlights (photos, quotes, etc.)
	Performance Measures – Activities this Quarter
	Guiding Principles – Successes and Opportunities
	S.M.A.R.T. Goals

3.3.5   Project Logs

To support the program controls, the PM Team has developed modules in Procore to track assigned tasks, decisions made, and risks identified. The Task List and Decision Log are described in the Chapter 4, and the Risk Register is described in Chapter 7.

3.4   DOCUMENT MANAGEMENT

In Procore, documents are managed using individual modules, as well as the Documents tab. In the individual modules (e.g. submittals, RFIs), Procore tracks versions, responses, and related items associated with each document. These modules are described further in Chapter 4.

The purpose of this section is to describe the Documents module, which is used solely to share data, reports and information among the Project Team, but not to obtain review, approval or responses from the Project Team. This tool provides a searchable repository of data, maintains version control, and allows an easy way for users to share data and documents. The anticipated filing system is shown in Table 4. Additional folders and subfolders will be added as needed.

The PM Team will manage the document database. In order to keep the document database organized, the City and other project participants are requested to email data and documents as attachments into the "Emailed documents" folder using the Procore email address for importing attachments (doc-inbound-city-of-san-luis-obispo-water-resource-recovery-fa@procoretech.com); this will strip emails of text but will preserve the attachments, which the PM Team will then file in the appropriate folder.

Table 4. Filing System Structure

Folder	Subfolder	Content Description	Examples	Access
Public	Reference Materials	Reference materials that will be used by all parties on the project	Record Drawings, Geotech Reports, Base Map, Environmental Documents, Permits, Photos, Facilities Plan (when complete)	All users
	Bid Packages	Documents used to issue an invitation to bid	Bid set of design plans, front ends and technical specifications	All users
	Charter	Guiding document for the project	Program Charter	All users
	Photos	Photos	Historical photos of WRRF; Reference photos	All users
Owner-PM	Contract	Legal contract which includes scope, schedule, fee	Program Manager Prime Contract	PM Team and CMT
	Management and Controls	Tracking of scope, schedule, budget and workplan	Phase 1 Schedule, budget, earned value	PM Team
	Supporting Data	Data to support the project	WRRF water quality data, WRRF sampling data, WRRF facility info	PM Team, CMT, City staff, Design Engineer, Construction Manager, Contractor
	PM Deliverables	Work products prepared by the PM Team	Technical memoranda, reports	PM team, City staff
	Outreach	Outreach materials	Workshop flier, Stakeholder list	PM Team, CMT
Engineer	Contract	Legal contract which includes scope, schedule, fee	Design Engineer Prime Contract	PM Team, CMT, Design Engineer

Folder	Subfolder	Content Description	Examples	Access
	Deliverables	Work products prepared by the Design Engineer	PDR, 60 Percent Submittal, 95 Percent Submittal, Final Submittal	PM Team, CMT, Design Engineer, Contractor
	Correspondence	Written correspondence	Memos, transmittals	PM Team, CMT, Design Engineer
Construction Manager	Contract	Legal contract which includes scope, schedule, fee	Construction Manager prime contract	PM Team, CMT, Construction Manager
	Construction Photos	Photo documentation during construction	Photos	PM Team, CMT, Design Engineer, Construction Manager
	Testing Reports	Results of testing performed during construction	Compaction testing reports, coating testing reports	PM Team, CMT, Design Engineer, Construction Manager
	Delivery Receipts	Equipment/ materials proof of delivery	Equipment receipts	PM Team, CMT, Construction Manager
	Inspection Reports	Construction Manager reports on construction progress and quality	Daily Logs	PM Team, CMT, Construction Manager
	Safety Documents	Safety compliance documentation	Safety plan(s), procedures	PM Team, CMT, Construction Manager
Contractor	Contract	Complete, and executed contract documents	Conformed construction contract, Change Orders	PM Team, CMT, Construction Manager
	Other	Miscellaneous	Miscellaneous	PM Team, CMT, Construction Manager

3.5   PROGRAM BRANDING

The PM Team and the City, along with the City's contract marketing firm, collaborated to develop limited branding for the WRRF Project. Through a series of discussions, the group chose the formal project name to be the "Water Resource Recovery Facility Project" or "WRRF Project". The project tagline is, "Engage. Transform. Sustain." "Engage" signifies the desire of the City and PM Team to "engage" City staff, key stakeholders and the community in the project and the long-term desire to keep engaged through educational initiatives and public use of the facility. "Transform" signifies the "transformation" of the WRRF into a community asset with upgraded treatment processes and interpretive facilities for the public. "Sustain" signifies the commitment to long-term compliance and sustainability of the WRRF.

The "PREP for Tomorrow" logo, which was previously developed by the City's Utilities Department, will be used on project materials; "PREP" stands for "Progressive Resource Enhancement Partnership."

The team developed project letterhead which reflects the branding for the project; the template is included as Appendix A. Project participants are expected to use the project letterhead for deliverables, public materials, and other documents as appropriate. Modified versions of the branding are acceptable to fit different types of documents.

3.6   CONTRACT APPROVALS

It is anticipated that several other consultants and/or contractors will join the Project Team as the project progresses. The procurement process for each project participant will be determined by the City and PM Team. Once a consultant or contractor is selected, individuals from the City and PM Team will be responsible for negotiating the contact. Once the contract is complete, the designated approver from the City will be responsible for final approval and reporting as required by City policies.

3.7   PROJECT MANAGEMENT REQUIREMENTS

The various consultants who join the project will be expected to follow the project management requirements outlined in this section.

3.7.1   Scope development

Consultants will be required to provide a detailed scope of services for each contract. The scope of services must include:

(1) Work breakdown structure (numbered tasks and subtasks);
(2) List of deliverables (associated task number, deliverable name, format and number of copies);
(3) List of meetings and workshops (associated task number, meeting name, purpose, duration and frequency);
(4) List of any assumptions.

3.7.2 Budget development

Consultants must provide a detailed budget for the approved scope, which aligns with the work breakdown structure. The budget must show hourly rates and list level of effort (hours) by task for each proposed personnel classification. In addition, budgets shall include any itemized reimbursable expenses or other markups.

3.7.3 Schedule

Consultants are to provide a baseline schedule for services, which will become part of the consultant contract. The schedule should align with the work breakdown structure, including clear indication of meetings and deliverables. The schedule should include sufficient allowances for City review time when necessary. Microsoft Project format is preferred for project schedules.

3.7.4 Project progress reporting

Consultants are required to provide monthly progress reports with invoices, which, at a minimum, summarize activities performed in the last period and activities planned for the next period. The PM Team will request more detailed progress reports as needed to address activities with the potential to significantly impact budget and schedule for the program.

3.7.5 Earned Value analysis

Consultants are expected to assess earned value monthly and include a summary of earned value with the monthly progress reports. Various tools can be used to assess earned value. For reporting, a graphical output of cost versus time is preferred, where planned costs, actual costs, and earned value are shown in the figure.

3.7.6 Resource planning

Consultants are expected to assign resources and coordinate work efforts of their respective teams to align with the project priorities and achieve cost-effective performance. This will require advance work planning, active problem solving, coordination, and collaboration with various project participants, including the PM Team.

3.7.7 Team organization and staffing

Consultants are expected to provide an organizational chart which lists individuals in key roles (Key Staff), including the consultant's Project Manager. Changes in Key Staff will require written approval from the City.

3.7.8 Roles, responsibilities and lines of communication

The roles and responsibilities of the key project participants to date are shown in Table 6 in Chapter 4. Lines of communication between current and project participants expected to join the project in the future are shown in Figure 5 in Chapter 4.

3.8 INVOICING AND PAY REQUESTS

3.8.1 Format and content

Consultants are expected to submit invoices in electronic format (pdf) to the City and the PM Team through Procore. In addition, consultants are expected to submit a hard copy of the invoice to the City for payment. At a minimum, the invoices should show labor hours and labor costs by tasks for each labor classification, aligning with the work breakdown structure and contract budget. Expenses are to be itemized and shown clearly on the invoice. In addition to the detailed invoice, consultant should provide a summary sheet with each invoice which provides the information shown in Table 5.

Table 5. Example Invoice Summary/Cover Sheet

Task Number	Task Name	Contract Amount	Current Invoice	Previously Billed	Billed to Date	Budget Remaining

As the construction contract(s) get underway, contractor pay requests will be managed through Procore. Contractors will be provided a log-in account so that they can submit their pay request directly in Procore. The pay request will then be reviewed by the PM Team or the Construction Manager (CM). The reviewer will then be able to approve the request for payment or return it to the contractor for revisions. These actions will be completed within Procore, providing documentation and history of activities related to each pay request.

3.8.2 Supporting documentation

Consultants and contractors will submit supporting documentation as needed with the hard-copy versions of invoices and pay requests. This documentation will be determined by the PM Team as needed and may include employee timesheets, receipts for reimbursable expenses, and certified payroll reports (provided upon request).

3.8.3 Submittal and approval process

Invoices and pay requests are to be submitted electronically through Procore. The PM Team will review invoices then forward to the City for payment.

4 COMMUNICATION PLAN

4.1 PURPOSE

The Communication Plan is intended to set the expectation and systems to enhance coordination, collaboration and relationships among the Project Team and stakeholders, including informal and formal channels and methods. The Communication Plan also describes a set of specific strategies and protocols for conflict avoidance and resolution.

Procore will be utilized by project participants throughout the life of the project to facilitate, organize and archive correspondence and communication. The relevant functionality of Procore as it relates to communication is described in this chapter.

4.2 ROLES, RESPONSIBILITIES AND LINES OF COMMUNICATION

4.2.1 Roles and Responsibilities

The two teams responsible for the management of the program are described below:

Core Management Team (CMT): This team consists of the Utilities Director (City), Deputy Director –Wastewater (City), WRRF Supervisor (City), Program Manager (WSC), Assistant Program Manager (WSC), and Facilities Plan Lead (HDR). The CMT is responsible for making key decisions and for the successful implementation of the WRRF Project.

Program Management Team (PM Team): The larger PM Team consists of staff from WSC, HDR, and RRM. The team is responsible for supporting the program management of the project and performing preliminary engineering, outreach, and facilities planning during Phase 1.

Table 6 lists the key staff involved in the project, their roles and responsibilities, and their contact information.

Table 6. Roles and Responsibilities

Role	Name/ Title	Responsibilities	Contact Information
Program Manager	Jeff Szytel WSC - Principal	Member of the Core Management Team (CMT) and Program Management Team (PM Team)	805-457-8833 x101 jszytel@wsc-inc.com
Assistant Program Manager	Lianne Williams WSC - Project Engineer	Member of the CMT and PM Team.	805-457-8833 x108 lwilliams@wsc-inc.com
Facilities Plan Lead	Holly Kennedy HDR - Associate Vice President	Member of the CMT and PM Team.	925-974-2617 holly.kennedy@hdrinc.com

Role	Name/ Title	Responsibilities	Contact Information
Project Owner	Carrie Mattingly City of SLO –Utilities Director	Member of the CMT. Responsible to City Council.	805-781-7205 cmatting@slocity.org
Project Owner	David Hix City of SLO – Deputy Director - Wastewater	Member of CMT.	805-781-7039 dhix@slocity.org
Project Owner	Howard Brewen City of SLO – WRRF Supervisor	Member of CMT. Will bring successful elements from SST forward.	805-781-7240 hbrewen@slocity.org
Lead Facility Operator	Pam Ouellette City of SLO – WRRF Chief Operator	Manage information from operations staff. Involve and engage ops staff, coordinate involvement at facility.	805-781-7241 pouellet@slocity.org
Public Works Liaison	Jennifer Lawrence City of SLO - Project Manager	Public Works liaison. Will participate in MIS roll-out and branding.	805-781-7226 jlawrence@slocity.org
Liaison to City Engineer	Matt Horn City of SLO - Supervising Civil Engineer, Public Works	Liaison to City Engineer. Role in procurement (active role) and ongoing advisory and review (as-needed).	805-781-7108 mhorn@slocity.org
Technical Advisor	Dave Reardon HDR - Senior Vice President	Technical Advisor. Member of PM Team.	916-817-4820 dave.reardon@hdrinc.com
Technical Advisor	Dave Ludwin HDR - Senior Vice President	Technical Advisor. Member of PM Team.	714-730-2368 david.ludwin@hdrinc.com
Program Controls Lead	Jasmine Diaz WSC - Staff Engineer	Program Controls, Operations Liaison, Member of PM Team.	805-457-8833 x109 jdiaz@wsc-inc.com
Engineering Support	Matt Rodrigues WSC - Staff Engineer	Engineering Support Member of PM Team.	909-483-3200 x203 mrodrigues@wsc-inc.com
Public Outreach Lead	Debbie Rudd RRM - Principal	Public Outreach Lead Member of PM Team.	805-543-1794 dlrudd@rrmdesign.com

4.2.2   Lines of Communication

Figure 5 below is a graphical representation of the contractual relationships between the major parties involved in the project as well as lines of communication. The lines of communication represent both verbal and written communications.
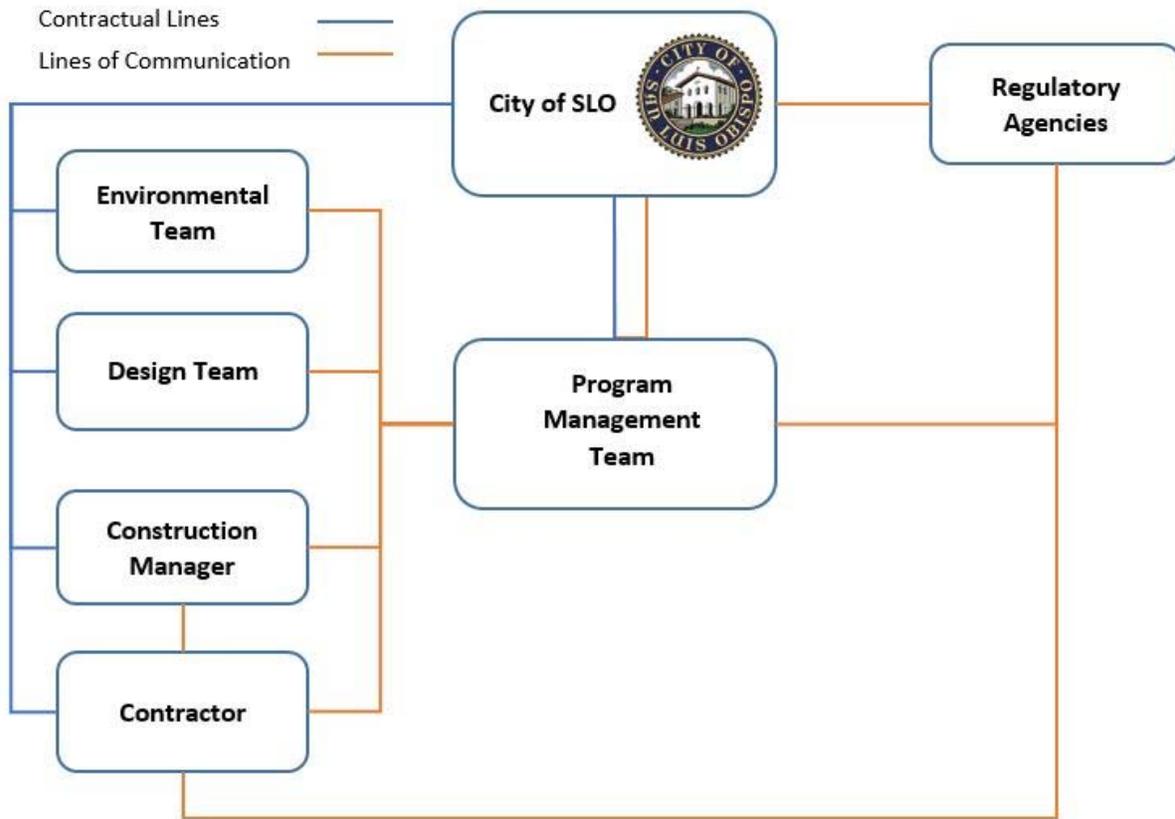
Figure 5. Lines of Communication and Contractual Relationships

4.3   PROCORE COMMUNICATION TOOLS

Procore allows users to view the status of a project, view status of open issues, stay informed about new ideas, see scheduled tasks, and more. Several modules within Procore will assist with communication between different parties involved in the project. These include the following:

Emails: This module allows users to archive important email correspondence and discussions in Procore to become part of the project files. In general, users will utilize their desktop or mobile email systems to correspond via email. When important project decisions are made via email or the discussion becomes significant and is deemed important for the project files, emails should be forwarded into Procore using the Procore email address (com-inbound-city-of-san-luis-obispo-water-resource-recovery-fa@procoretech.com). The Project Team should initiate important emails from Procore.

Requests-for-Information (RFIs): This module allows users to ask other project participants for information, including data and reports. RFIs are assigned to one individual but several other users can be on the distribution list so they stay informed. Recipients of RFIs can reply via email or via the RFI module in Procore. Timely RFI management is key to good schedule management. RFIs can help a project run smoothly and on schedule, or they can cause delays that can lead to budget overruns.

Submittals: This module allows users the ability to create, manage, and track submittals. Users can route deliverables to several approvers for review and comment, as well as add other users to the distribution list so they stay informed. Comments and edits are tracked in Procore. In addition, revised submittals are connected to the original submittal so changes and versions are tracked.

Meetings: This module allows users to document meetings that are scheduled or that have occurred. The documentation can include the location, time, attendees, and discussion items. Individual discussion items can be documented and tracked over a series of meetings until they are resolved and closed.

Task List: This module allows the team to track action items. Each item can be assigned a due date and a responsible party, and the status can be tracked until the item is completed. Assignees can provide a response to keep the Project Team updated on their progress towards completing the task. Once the task is complete, the assignee will indicate the task is resolved and the PM Team will close the task.

Decision Log: This module allows the team to document decisions that have been made. Each decision can be documented with date, the parties involved in the decision, and clarifying notes or comments.

4.4   TYPES OF COMMUNICATION

Both written and verbal communication will be critical to the success of the WRRF Project. Table 7 provides a list of the various types of communication expected to be utilized throughout the WRRF Project, along with the purpose, documentation, tools, audience and timing of each type of communication. It is expected that all project participants will follow the guidelines set forth in Table 7. Updates will be made to this Communication Plan as necessary.

Table 7. Communication Types and Expectations

Category	Type	Purpose	Documentation	Procore Tools*	Audience / Attendees	Timing/ Frequency
Verbal	Core Management Team (CMT) Meetings	Discuss current and upcoming activities Discuss outreach strategies and activities Review critical decision needs and action items Set program priorities and direction Review budget, schedule and quality Discuss contracts, changes, risks, and conflicts	Agenda circulated prior workday Participants take/maintain individual notes PM team documents actions and decisions in the project logs, and distributes to the CMT within one workday	*Meetings, Documents, Task List*, and *Decision Log*	Core Management Team (CMT)	Bi-Weekly, Two hour duration
	PM Team Meetings	Coordinate work efforts to align with Program priorities Review action items Discuss current and upcoming activities Review budget, schedule and quality	Agenda circulated prior to meeting Participants take/maintain individual notes PM team documents actions in the internal action log, and distributes to the PM Team within one workday	*Meetings, Documents* and *Task List*	PM Team staff including WSC, HDR and RRM; individuals as needed	Bi-Weekly with HDR, one hour duration Other meetings as needed
	Workshops	Collaborate and discuss a specific topic, task, or analysis	Agenda circulated prior to the workshop Participants voice opinions and information	*Meetings, Documents, Task List, and Decision Log*	CMT, City staff as necessary, PM team staff as necessary	As scheduled
	Deliverable Review Meetings	Discuss deliverable Address and gather comments and questions	Agenda circulated prior to the workshop, Meeting notes, written comments (if applicable),	*Meetings, Submittals, Documents, Task List*, and *Decision Log*	WSC, party submitting deliverable, and party receiving deliverable	Approximately two weeks after the deliverable has been submitted (not all deliverables will require a review meeting)
	Stakeholder Meetings/Interviews	Coordinate with key stakeholders to obtain ideas from the stakeholders Understand questions and concerns	Internal interviews and stakeholder meetings notes	*Documents, Task List* and *Decision Log*	Stakeholders, Outreach Coordinator, PM staff as necessary	As scheduled
	Public Meetings	Presenting information to the public Obtaining support for the project Understand questions and concerns	Flyer, Slowater.org, Resource Newsletter	*Meetings, Documents, Task List*, and *Decision Log*	Public, Outreach Coordinator, PM staff as necessary, City staff as necessary	As scheduled
	Progress Meetings	Receive updates from the design team and contractor	Agenda circulated prior workday Participants take/maintain individual notes PM team documents actions and decisions in the project logs, and distributes within one workday	*Meetings, Documents, Task List*, and *Decision Log*	CMT, PM Team staff as necessary, Design Team as necessary, Contractor Team as necessary	Bi-Weekly, one hour duration
	Operations staff meetings	Presenting information to the operations staff Address and gather questions and concerns	Presentation	*Meetings, Documents, Task List*, and *Decision Log*	PM Team Staff as necessary, City Operations Staff, City Lab Staff, City Maintenance Staff	Monthly, one hour duration
	Telephone correspondence	Convey or obtain information to/from involved parties	Participants take/maintain individual notes	*Documents, Task List,* and *Decision Log*	Involved parties	As needed
	Impromptu meetings	Convey or obtain information to/from involved parties	Participants take/maintain individual notes	*Documents, Task List,* and *Decision Log*	Involved parties	As needed
	Conversations	Convey or obtain information to/from involved parties	Participants take/maintain individual notes	*Documents, Task List,* and *Decision Log*	Involved parties	As needed

Category	Type	Purpose	Documentation	Procore Tools*	Audience / Attendees	Timing/ Frequency
Written	Contracts	To define scope schedule and fee to fulfill contractual obligations	Written Contract	*Documents, Commitments*	Core Management Team (CMT)	Once per project participant
	Contract Changes	To define changes scope schedule and/or fee	Change orders	*Change Orders*	PM Team	As needed
	Email	Convey or obtain information to recipients	Electronic Correspondence, attachments	*Emails, Documents, Task List* and *Decision Log*	Involved parties	As needed
	Deliverables	Work products from Program Manager, Design Engineer, and other project participants.	Deliverables include Technical Memorandums, Agendas and related handouts, Workshop Flyers, Outreach Material, Reports, Maps, Design submittals	*Submittals*	CMT, PM Team staff as necessary, Design Team as necessary, Contractor Team as necessary	As scheduled
	Memos	Present information and/or obtain approval for various needs	Memorandums (Technical and otherwise)	*Emails, Submittals, Task List* and *Decision Log*	CMT, PM Team staff as necessary, Design Team as necessary, Contractor Team as necessary	As needed
	Requests for Information (RFIs)	Obtain information needed for plans, studies, design, and construction	RFIs, Correspondence	*RFIs, Documents*	CMT, PM Team staff as necessary, City staff as necessary, Design Team as necessary, Contractor Team as necessary	As needed
	Submittals	Obtain approval on materials, equipment, and components during construction.	Submittals, Correspondence	*Submittals, Emails*	CMT, PM Team staff as necessary, Design Team as necessary, Contractor Team as necessary	As needed

*Procore Tools in italics are Procore modules

4.5   PUBLIC RELATIONS

The purpose of public relations is to engage and inform the community, understand community preferences and concerns, and develop solutions that are embraced by the City and community. This takes education, facilitation of goals, exploring visions and ideas, managing expectations, translating community-based ideas into design concepts and implementing solutions in a way that minimizes impacts to the surrounding community. Public outreach will take place through both formal and informal methods. Planned outreach events will led by RRM and will be scheduled to coincide with key activities and deliverables; the approximate timeline for scheduled outreach activities for Phase 1 is shown in Figure 6. Although RRM is the Public Outreach Lead for the PM Team, it anticipated that other project participants will interface with the public as well. The purpose of this section is to outline the protocol and guidelines for interactions with the public. Any questions should be brought to the attention of the Program Manager.

4.5.1   Impromptu Discussion with Public

Conversations between project participants and the public may occur outside workshops and scheduled meetings. Project participants should maintain documentation of the conversation, including person/organization, information gathered, and topics discussed. Project participants should notify the Program Manager of discussions via email and copy the Public Outreach Lead, as well as highlight any areas of concern or required action. The email should also be logged in Procore.

4.5.2   Scheduled Interviews with Public

At various points during the project, a member of a public media organization may request an interview with a Project Team member or the CMT may choose to schedule an interview with the media. The Program Manager should be notified of any requests for interviews from the public. In order to keep consistent messaging, the CMT will develop talking points for public interviews. Project participants should report back to the Program Manager and Public Outreach Lead after the interview to notify them of any issues or required actions.

4.5.3   Scheduled Stakeholder Meetings/Interviews

The PM Team will conduct interviews with key stakeholders during the planning phase of the project (Phase 1) and may conduct additional interviews at various points throughout the project. Key stakeholders include property and business owners, interest groups and neighborhood representatives, decision makers, and other interested parties. During Phase 1, the purpose of the interviews is to listen to the issues, observations, and ideas of the public regarding the WRRF Project and the area surrounding the WRRF. Members of the PM Team conducting the interviews will maintain interview notes. The Public Outreach Lead will consolidate notes, identify items as issues or ideas, and distribute to the CMT and others as appropriate.

4.5.4   Community Workshops

Community workshops will be held at various points throughout the project. During Phase 1, the first Community Workshop will focus on identifying and prioritizing issues, as well as educating the

community on the WRRF upgrade process and understanding the community's preferences for architectural styles and public amenities.

The Project Team has planned a second workshop, which will focus on gathering public feedback on the public amenities site plan, the interpretive center design, and other relevant subjects. The workshop is planned to take the form of a community open house and briefly present the project's purpose, the first Community Workshop results, and how public input has been shaping the project. Public feedback will be gathered at stations that will provide more detailed information on the specific topics such as Design (the interpretive center), Amenities (public amenities site plan), and Science (treatment methods).

	2014											2015			
	March	April	May	June	July	August	September	October	November	December	January	February	March	April
	10 17 24 31	7 14 21 28	5 12 19 26	2 9 16 23 30	7 14 21 28	4 11 18 25	1 8 15 22 29	6 13 20 27	3 10 17 24	1 8 15 22 29	5 12 19 26	2 9 16 23	2 9 16 23 30	6 13 20 27

SITE PLANNING STUDY

Draft and Final Study

INTERPRETIVE CENTER AND PUBLIC FACILITIES

Needs Assessment
Interpretive Center Programming
Conceptual Building Design
Public Facilities Site Plan

STAKEHOLDER OUTREACH

Outreach Strategy TM
Key Stakeholder Interviews and Ongoing Outreach
Community Workshops (approx.)
Visual Preference Survey
Study Session with Council and Planning Commission
Study Session with Architectural Review Committee
Presentation - ARC
Presentation - PC
Presentation - CC

FACILITIES PLAN

Treatment Process Alternative Analysis
Draft Facilities Plan
Final Facilities Plan

■ denotes task duration
● denotes Public Meetings

Figure 6. Approximate Phase 1 Outreach Timeline and Relation to Other Key Phase 1 Activities

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4.5.5   Study Sessions with City Council, Planning Commission, Architectural Review Committee

Throughout the project, the PM Team will facilitate several study sessions with key City organizations to inform them, gather feedback and foster support from City leaders. During Phase 1, the PM Team plans to hold study sessions with City Council (CC), the Planning Commission (PC), and Architectural Review Committee (ARC) to present and get feedback on the draft Interpretive Operations Center Conceptual Plan and the Public Facilities Site Plan. In addition, the PM Team will present the final Facilities Plan to City Council.

4.5.6   Inquiries from Public

Project Team members will receive inquiries from the public for various matters. Project participants are expected to use good judgment when answering inquiries from the public, and may choose to forward inquiries directly to the Program Manager. For tracking purposes, the Program Manager and Public Outreach Lead are to be notified via email about all inquiries from the public. The email should also be logged in Procore.

4.5.7   Program Information/Updates

Updates and information about the WRRF Project will be provided through slowater.org, Utility Department publications (e.g. Resource Newsletter), the Tribune, Facebook, mailers, email newsletters and public workshops.

4.6   NORMS

Project participants are expected to communicate openly and respectfully by following the guiding principles shown in the Program Charter (see Chapter 2). Several guiding principles from the Charter that promote effective communication and collaboration include:

- ➢ Be honest and respectful to build and enhance trust
- ➢ Encourage open communication, constructive feedback, and differing points of view
- ➢ Commit to knowledge transfer
- ➢ Actively participate and support knowledge-based decisions
- ➢ Maintain transparency and leave egos at the door

4.7   CONFLICT AVOIDANCE AND RESOLUTION

One of the key objectives of this document is to encourage and facilitate communication between team members. Open and constructive communication can help avoid conflicts from occurring in the first place. In addition to the guiding principles in the Charter, the Project Team will utilize the following additional strategies to avoid conflict:

- Make decisions at the lowest level possible. The PM Team has been structured to empower all team members with the appropriate amount of decision-making authority.
- Maintain a decision log. The PM Team will maintain a decision log to document key decisions, when they were made, who was involved, and how the results have been communicated.

- Maintain a Risk Register. The Risk Register will allow team members to identify and document potential issues early. The PM team will be monitoring and discussing the items on the Risk Register to identify potential mitigation strategies and reduce the chance of conflicts arising. The Risk Register is discussed in Chapter 7.

When conflicts do arise, the Project Team members involved should attempt to resolve the conflict at the lowest possible level before escalating it to a higher level. The escalation ladder in Figure 7 shows a recommended path for escalating issues to management to attempt a resolution. In all cases, Project Team members are expected to address issues from the perspective of what is best for the project (i.e. what is the best path forward for the project) before considering issues of entitlement.
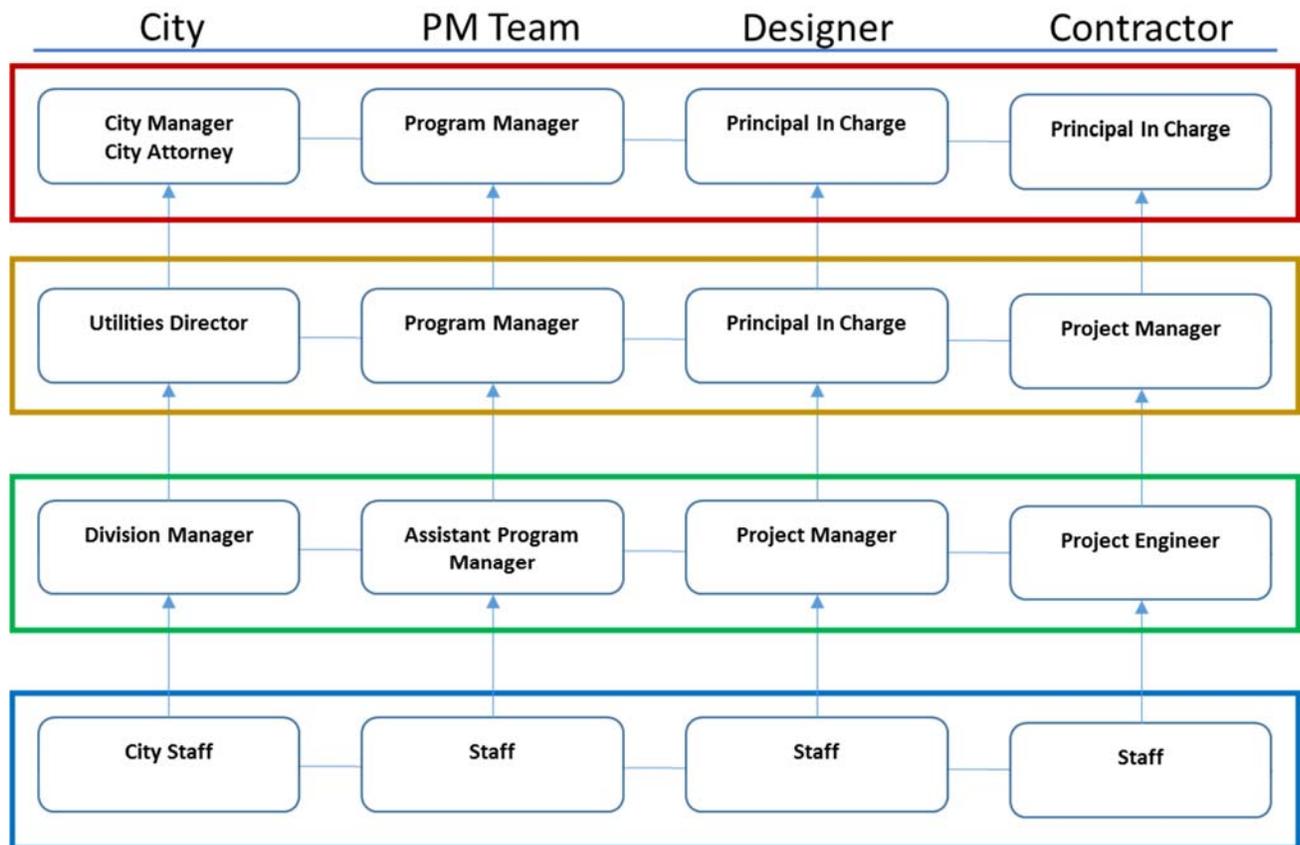

Figure 7. Conflict Resolution Ladder

For conflicts that cannot be resolved after escalation, the appropriate dispute resolution procedures identified in the contract(s) will be followed.

5 DATA MANAGEMENT

5.1 PURPOSE

As part of normal current operations, City staff generate, store, and use large amounts of data related to the WRRF. The City has a number of existing information systems that are used to manage the data, including Hach Water Information Management Solutions (WIMS) and iFix. These systems help City staff to organize the data and generate reports documenting various aspects of the WRRF performance. These reports are then distributed to regulatory agencies, City management, elected officials, and other stakeholders.

The purpose of this chapter is to identify and describe the current systems used to manage data related to the WRRF. This information will allow the PM Team to use the most current and relevant data sources when assessing current operations and planning for upgrades.

5.2 DATA MANAGEMENT WORKSHOP

WSC facilitated a workshop in March 2014 to brainstorm issues related to data management. During the workshop the project team identified:

- Stakeholders for the WRRF Upgrade Program;
- Reports that are provided to stakeholders to document progress in environmental compliance and other success factors; and
- Information systems currently used to manage this information.

The findings are documented in the following sections.

5.3 STAKEHOLDERS

The team identified a broad range of stakeholders that have an interest in data related to operations at the WRRF. These stakeholders can be sorted into four broad categories, ranging from the most to the least involved in day-to-day operations. Staff within the Utilities Department are the most intensive users of data and receive the most frequent reports. Other City departments and City management are actively engaged in WRRF performance but require less frequent reports. Regulators receive reports related to environmental compliance at defined intervals, and members of the general public may request information related to certain aspects of WRRF operations. These stakeholders are summarized in Table 8.

Table 8. Stakeholders

	Utilities Department	City	Regulators	Public
	Utilities Management Team	City Council	Central Coast Regional Water Quality Control Board (CCRWQCB)	Ratepayers
	Operations	City Manager	State Water Resources Control Board (SWRCB)	Birdwatchers
	Maintenance	Engineering Design Staff	U.S. Environmental Protection Agency (EPA)	Industry groups (e.g., CWEA)
	Laboratory	Emergency Responders	Air Pollution Control District (APCD)	Other treatment plants
	Environmental Programs	Public Safety	California Department of Water Resources (DWR)	Media
	Collection System	Natural Resources	National Oceanic and Atmospheric Administration (NOAA)	Utilities location services, other utility companies
	Water Distribution	Finance		Vendors
	PM Team	City Attorney		Educational institutions (e.g., Cal Poly students)
	Design Consultants	Public Works		Hikers and bikers
	Construction Contractors	Community Development		Recycled water users
		IT		Engle & Gray
				Potential biosolids users

5.4 REQUIRED REPORTS

The team identified the reports that are generated to keep stakeholders informed about WRRF operations. These reports are summarized in Table 9.

Table 9. Required Reports

Area of Concern	Report	Data	Frequency	Audience
WRRF	CIWQS	WRRF effluent quality	Monthly and Annual	SWRCB
WRRF	Total Maximum Daily Load (TMDL) Report	WRRF effluent quality	Annual	SWRCB

Area of Concern	Report	Data	Frequency	Audience
WRRF	NPDES Annual Report	WRRF effluent quality	Annual	SWRCB
WRRF	Salt and Nutrient Management Plan Report	WRRF effluent quality	Annual	SWRCB
WRRF	Environmental Laboratory Accreditation Program (ELAP)	Laboratory certification	Annual	U.S. EPA
WRRF	Biosolids report	Biosolids quality	Annual	U.S. EPA
WRRF	Stormwater report	Runoff characteristics	Annual	SWRCB
WRRF	APCD Annual Report	Air quality impacts	Annual	APCD
WRRF	Hazardous Material Reporting	Hazardous material use	Annual	U.S. EPA
WRRF	TSO Annual Report	Progress Report for TSO	Annual	CCRWQCB
San Luis Obispo Creek	NOAA Fisheries Report	Bridge gage creek data	Annual	NOAA
Collection System	CIWQS	SSOs	Monthly and Annual	SWRCB
Collection System	Pretreatment Annual Report	Pretreatment activities	Annual	CCRWQCB, SWRCB, and USEPA
Collection System	Sewer System Management Plan (SSMP)	Collection system operations and planning	Update as needed	SWRCB, public
City-Wide	Urban Water Management Plan (UWMP)	Water supply planning	Every five years	DWR
City-Wide	Recycled Water Master Permit reporting	Recycled water use	Monthly and Annual	CCRWQCB

5.5   INFORMATION SYSTEMS

The team identified the systems that are used to store data and generate reports for stakeholders. These systems are summarized in Table 10.

Table 10. Information Systems

System	Primary Users/Managers of Data	Contents
Pentamation/Finance Plus	Finance & IT Department	City-wide finance system for accounting, payroll
Ops 32	WRRF Staff	Water Quality Info, Daily Equipment run time/use info, Chemical Usage Info
Springbrook	Finance & IT Department	Utility Billing
MP2	Maintenance Staff at WRRF	Equipment inventory, Preventative Maintenance Tasks, Generate Work Orders
CityWorks	Utilities: Water Distribution Staff, Collection System Staff, Storm Water Program Staff; Public Works: Streets, Parks & Rec, Trees, Transportation departments	Asset management, work orders, City-wide infrastructure information, GIS, Laser Fiche (imaging)
NeoGov	Finance & IT Department	Portal used to accept applications for jobs offered within the City.
Spillman	Public Safety	Record and data management, asset management, dispatching
Class	Recreation Department	Portal for public to register for events, reserve public facilities, make payments, etc.
iFix	WRRF Staff	Real time and historical, operational information, Standby alarm system
City Website	Administration Department	Public information
IntelliTime	Finance & IT Department	Citywide timecard system
CIWQS	State Water Resources Control Board	Water Quality information to comply with NPDES permit requirements
HDL	Community Development	Business License
Energov	Finance & IT Department	Permitting, Parcel information, Address and owner information
Web-based data viewer	PG&E	Energy consumption data
Microsoft Exchange Email	Finance & IT Department	Correspondence

The systems that are expected to be most relevant for the upgrades program include:

Ops 32: Currently the program consists of a database full of water quality and process information that can be used to find trends in data or historical information. The process information, and the water quality information, that is gathered daily is entered into the program by one of the operators and any of the Laboratory technicians a daily basis. This system will eventually be replaced by Hach WIMS.

HachWIMS: This is a new program that the WRRF and the Laboratory Staff are in the process of implementing, which will replace Ops 32. The City will eventually store the historic data currently housed in Ops 32 in HachWIMS.

MP2: This program is a computerized maintenance management system that allows WRRF Maintenance staff to organize and track inventory, track equipment history, schedule preventative maintenance tasks, maintain labor records, generate work orders, requisition and purchase parts, allocate resources, and project equipment failures. The maintenance staff keeps track of the work they perform and generate work orders when equipment needs unscheduled maintenance.

iFIX: A new Human Machine Interface (HMI) Supervisory Control and Data Acquisition (SCADA) system that the WRRF was implemented late 2013. This system allows staff to view live and historical information on equipment and data generated throughout the facility.

CIWQS: The California Integrated Water Quality System (CIWQS) is a computer system used by the State and Regional Water Quality Control Boards to track information and allows online submittal of information by Permittees within certain programs and makes data available to the public through reports. The WRRF submits water quality data (and biosolids data) to comply with their NPDES permit requirements.

5.6   USE OF DATA FOR WRRF PROJECT

Throughout the WRRF Project, the current data management processes and systems described above are expected to continue in their current form. The PM Team will be accessing reports and information systems in order to obtain the most current and relevant data for planning of the WRRF Project. As needed, data sets or reports that are used for the program will be incorporated into the PM Team's document management approach described in Chapter 3.

6   CHANGE MANAGEMENT

6.1   PURPOSE

The purpose of this chapter is to document uniform change management guidelines to identify, define and document changes to the scope and/or budget of the WRRF Project. Additionally, this document is intended to establish a process for the initiation, review, approval and execution of changes to the WRRF Project.

6.2   CHANGE MANAGEMENT

Effective change management within the context of a complex, multi-year project such as the WRRF Project requires: 1) proactive identification of issues and potential changes; 2) thorough and timely review of those conditions including development of solution(s) that are in the best interest of the project; 3) fair determination of entitlement; and 4) a systematic and efficient process for enacting the required change, if any. These steps can help minimize schedule delay and budget impacts while reducing the potential for costly disputes.

6.2.1   Issue Identification

The first step in effective change management is proactive identification of issues and potential changes. Change orders are commonly attributed to one of the following events:

1. Unforeseen conditions encountered on the project that impact scope, schedule and/or contract amount;
2. Owner directed changes in scope;
3. Events outside of the control of the consultant and/or contractor that necessitate a change to scope, schedule and/or contract amount.

Issues may also be identified through quality control reviews as outlined in Chapter 10 or through the "Risk Register" (described in Chapter 7) which allows the Project Team to document potential risks, their project impacts, probability of occurrence and mitigation strategies. When issues are identified or risks materialize, the issue shall be communicated to the appropriate personnel to determine if it should be considered a Potential Change Order (PCO). All project participants are expected to engage in issue and risk identification.

6.2.2   Impact Analysis and Solution Development

Once an issue has been identified and documented as a PCO, the Project Team will evaluate and consider options for addressing the issue in the best interests of the project. Solutions should be evaluated by estimating the potential impacts (if any) to the project budget, schedule and quality. This may require additional research, careful site observations, revised cost estimations or further design work. The PM Team is responsible for documenting the preferred solution(s) and estimated impacts identified by the project team. If the potential for a contract change exists, a PCO can be created to document the potential change, along with the estimated cost and schedule impacts.

6.2.3   Negotiations

Change orders may be initiated by the City, PM Team, contractor, and/or other project participants and their subconsultants, and can arise during any phase of the project. Negotiations regarding project changes will begin at the lowest possible approval authority tier and be escalated to higher tiers if negotiations cannot be resolved. Critical project variables, issues and questions can be resolved during CMT meetings and formally documented in the WRRF Project Decision Log. Disputes may be avoided by practicing focused negotiations, maintaining lines of communication, fulfilling roles and responsibilities, and utilizing project tools or procedures such as the WRRF Project Decision Log and CMT meetings (refer to Chapter 4).

6.2.4   Approval Authority

Approval authority for change management is defined by the City's Purchasing System guidelines, which are documented in the City's Financial Management Manual. Figure 8 provides an overview of the City's Purchasing System.

city of san luis obispo
## PURCHASING SYSTEM OVERVIEW

Type	Category	Features

GENERAL PURCHASES

Includes supplies, equipment, operating or maintenance services and construction projects.

Over-the-Counter
Less Than $7,500
- No specific requirements; competitive bidding to be used whenever practical.
- Bid award by department via voucher or purchase order.
- Job Order Contract (JOC) Task Orders by the City Engineer.

Open Market
$7,500 to $25,000
- Department solicits at least 3 proposals; (may be verbal with written quotes).
- Bid award by Finance via purchase order or contract (or JOC Task Order by the City Engineer).

Formal
Greater Than $25,000
- Formal Bid or RFP documents.
- Advertising for sealed bids or proposals. (Mailed notice in the case of construction projects.)
- City Manager approves soliciting for bids or proposals and awards the contract (or approves JOC Task Order)

Greater Than $100,000
- Same as above except the Council approves Bid/RFP documents and soliciting for proposals; contract award generally delegated by Council to the City Manager.
- City Manager authorized to approve all JOC Task Orders within Council-approved annual limits.

CONSULTANT SERVICES

Includes advisory services from professionals such as engineers, architects, attorneys and other specialized consultants.

Less Than $7,500
- No specific requirements; proposals to be solicited whenever practical.
- Proposal award by department via voucher or purchase order.

$7,500 to $25,000
- Proposals solicited whenever practical.
- Contract negotiated by department.
- Contract award by City Manager via purchase order or contract.

Formal
Greater Than $25,000
- Formal RFP document.
- Council authorizes staff to request proposals and generally delegates contract award to the City Manager.

Note: These are general guidelines; the evaluation and selection process for consultant services may vary on a case-by-case basis.

▢ **Formal Bid or Proposal Process**

Figure 8. Purchasing System Overview

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6.2.5   Dispute Resolutions

If the change process creates a conflict between two parties, dispute resolutions may be enacted to facilitate negotiations if the dispute cannot be settled. A well written contract serves as a resource for the dispute resolution procedure. Contracts between parties of the project team will outline the process for dispute resolution.

6.3   PROCORE CHANGE MANAGEMENT PROCESS

For the duration of the WRRF Project, the City and PM Team will utilize Procore's web-based project management platform to track and manage the project (see Chapter 3, Program Administrative Procedures). Users with access to the Commitments module in Procore are able to view any contracts or purchase orders that have been created for the project. The structure of the Commitments module and the Change Orders module and their relation is summarized in Figure 9. The Change Orders module allows a user to initiate a change order specific to a commitment using two different site paths (Figure 10). The change order options include: Potential Change Order (PCO), Change Order Request (COR), and Commitment Change Order (CCO), as described in the following section.
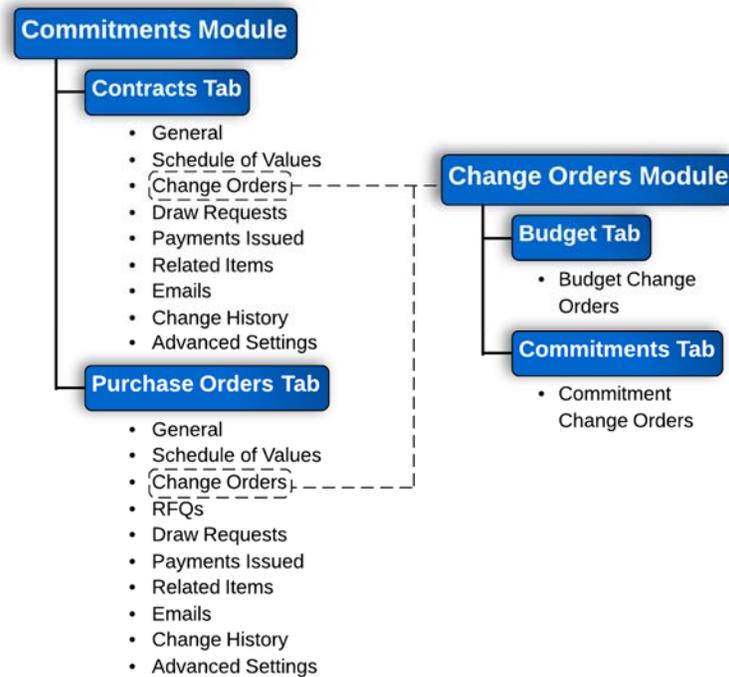
Figure 9. Procore Site Structure of Commitments and Change Order Modules

Figure 10. Procore Commitment Change Order Summary

6.3.1   Managing Change Orders in Procore

The PM Team will use the Procore structure for initiating and managing change orders. Procore has structured the change order process in three steps:

1. **Potential Change Order (PCO).** A PCO initiates the change order process by documenting reasons for the change, the requester, schedule impact, affected contracts, relevant references and attachments, locations and descriptions. The creator of a PCO can schedule budget line items which are likely to be impacted by the change order.

2. **Change Order Request (COR).** A COR is created once a PCO is approved and realized as a necessary change. The COR interface retains options for the user to note the schedule impact and select a corresponding PCO. Selecting a PCO allows the reviewer to reference budget line items, reasons for the change and identify who initially requested the PCO. Several PCOs can be included in a single COR. A CCO can be initiated during the creation of a COR for concurrent review.

3. **Commitment Change Order (CCO).** CCOs are the final step of the change order process before the change is incorporated into the corresponding commitment. The term "commitment" refers to the contract between the City and a project participant. Approval by the reviewer may be preceded by negotiations between the party requesting the change and the reviewer or owner. The creator of the CCO can designate a reviewer, select invoice and paid dates, and reference the COR related to the CCO. When related to unforeseen site conditions, a CCO may not be approved until the work has been completed and all necessary scope or budget changes have been determined.

A user can create a CCO without first establishing a PCO or COR, which may result when a change order decision is unanimously agreed upon by the City and consultant/contractor, or if the change is non-monetary and requires little to no review or negotiation between parties. For most changes, using the stepwise process of progressing from a PCO to a COR and ultimately a CCO is preferred since it: (1) establishes continuity through the change process; (2) allows for more efficient, thorough review; and (3) documents all pertinent information related to the change order.

Each step of the change order process allows the user to save the change order or save and distribute the change order via e-mail directly through Procore. Distribution of the change order maintains effective communication by notifying all affected members of the Project Team of the potential, requested or executed change order. Reviewers can return the change order to the requester through email once the status of the change order has been updated or if responses have been added.

Procore maintains a record of potential and actual change orders, as well as a cumulative total of the dollar amounts. The PM team will monitor and report on the sum of the change orders as a percentage of the total contract value. If the dollar value is such that a contract amendment may be required, the team members will discuss and elevate the issue through the appropriate channels.

7   RISK MANAGEMENT

7.1   PURPOSE

This chapter is intended to assist the PM Team in actively identifying and managing risks to successfully deliver the WRRF Project. This chapter describes risk concepts, implementation strategy, and key tools for identifying and tracking risks. This document will be utilized as a primary reference and guide to manage the risks associated with this program.

7.2   INTRODUCTION

Meeting the objectives of the WRRF Project requires proactive planning, coordination, execution, and program controls with respect to risk management. Risk management involves processes of risk identification, risk assessment, and risk response and monitoring.

Overall, risk management must be integrated into the culture of project delivery in which all project participants share the responsibility of identifying and planning for risks to the project's cost and schedule. Well-established methods of risk analysis must be performed to help assess the understanding of and feedback on the impact of risks. However, risk management ultimately involves active communication about these risks as well as detailed plans for avoiding or minimizing negative impacts, or, potentially, exploiting opportunities.

Active processes of risk management can help the project to:

➢   Detect risks and avoid surprises;
➢   Focus on key issues and prioritize actions;
➢   Make more informed decisions and achieve better outcomes;
➢   Stimulate creative team thinking and innovation;
➢   Communicate with key stakeholders (e.g. City Council) on project status, issues and challenges.

7.3   RISK EVALUATION PROCESS OVERVIEW

A risk evaluation process is a structured approach to assessing project status with respect to known and unknown issues. The structured process includes a number of steps that are intended to ensure the effective use of information revealed in the process. As illustrated in Figure 11, risk management activities follow a circular process of risk assessment, evaluation, review, action, and re-assessment.

Specifically, these activities include:

1.   **Identify and Quantify Risks.** Using a combination of data- and judgment-based methodologies, identify and quantify the risks facing the project. This step produces a Risk Register, which summarizes the risks and can be used in subsequent steps of the process.
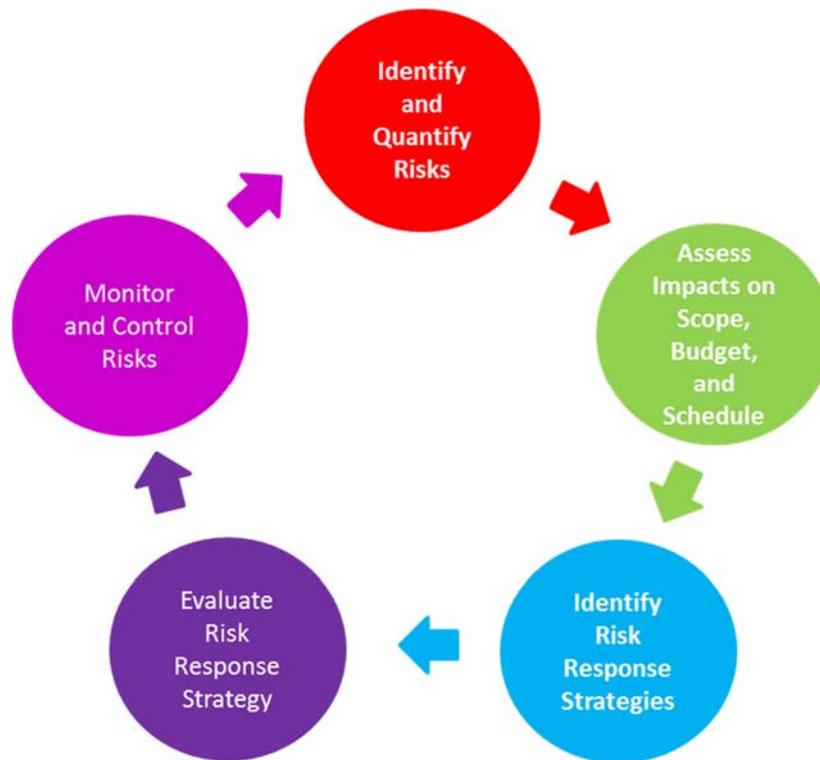
Figure 11. Typical Project Risk Management Plan

2. **Assess Impacts on Scope, Cost and Schedule.** Analyze the impact of identified risks in combination, and their implications for program scope, cost and schedule.
3. **Identify Risk Response Strategies.** Identify potential strategies to mitigate risks.
4. **Evaluate Risk Response Strategies.** Perform a qualitative or quantitative evaluation of the risk response strategies identified in Step 3 to demonstrate "value for money" (i.e. is the strategy worth implementing?). This may result in revisions to the risk response strategies.
5. **Monitor and Control Risks.** This final step is slightly different from the others, as it represents an ongoing process of control, review and revision. It involves: tracking risks over time and flagging potential issues; taking actions prescribed in the risk response strategies; and making revisions to the Risk Register as needed. This step may also involve assigning the risks to different members of the Project Team for closer monitoring.

7.4   RISK ANALYSIS THROUGHOUT THE PROJECT CYCLE

Risk assessment and associated mitigation activities will change throughout the project cycle. In early stages of the project, high levels of uncertainties complicate project planning and analyses. It is not until design has sufficiently progressed that a better handle on project costs and schedule is obtained. And still, a substantial number of issues are often revealed only after construction is underway, for example, when excavation begins to reveal issues that geotechnical surveys missed.

In Figure 12, the conceptual diagram compares the relative levels of known/quantifiable, known/not quantifiable, and unrecognized costs over the project life cycle.
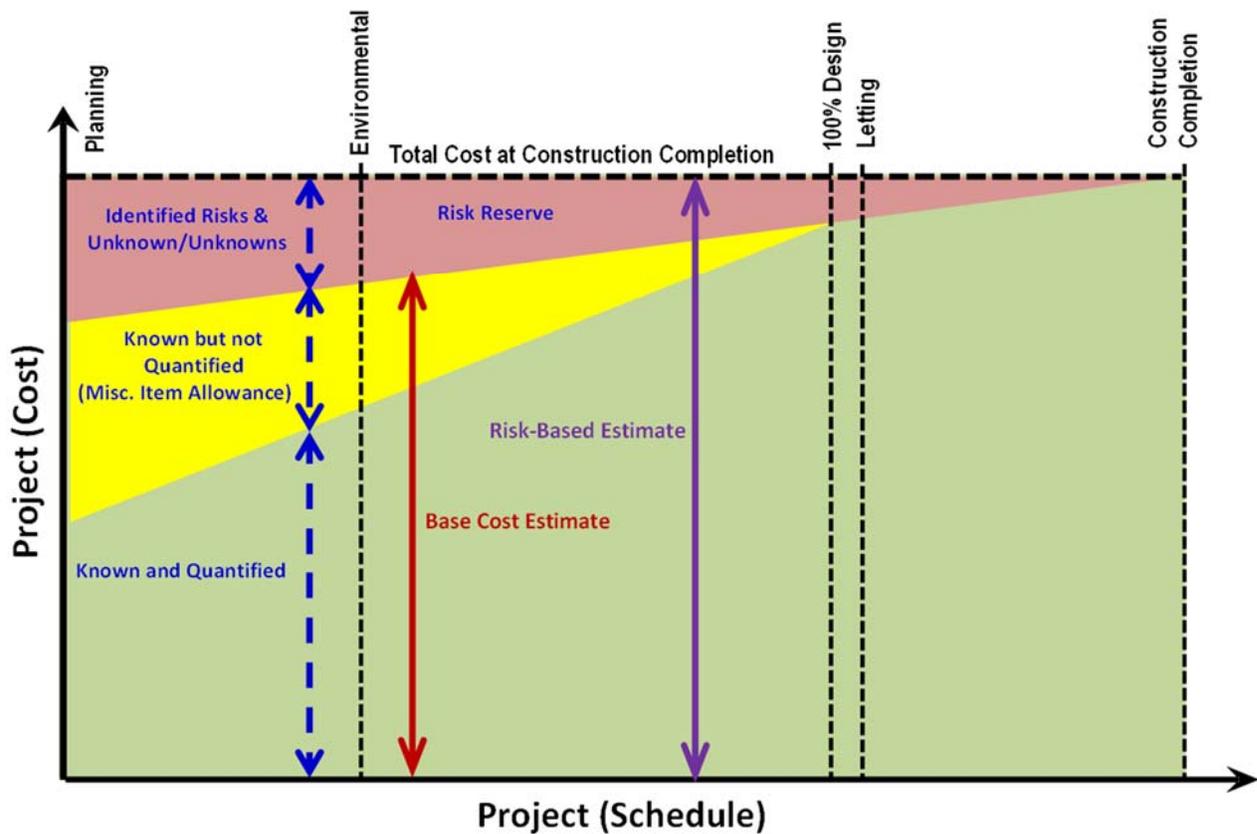

Figure 12. Risk Awareness and Exposure over the Project Life Cycle

In early stages of typical projects, unrecognized issues can represent a relatively higher level of latent cost risk. Conventional contingency percentages are intended to capture these issues but they may not be adequate because they fail to account for unrecognized costs. An underlying purpose of the risk analysis is to identify the risks that represent unrecognized costs and to take mitigation actions, if available.

The focus of a risk assessment also changes during the project cycle as information about the project grows, as shown in Table 11.

Table 11. Description of Risks and Risk Assessment Objectives over Project Cycle
(Source: Risk Assessment and Allocation for Highway Construction Management, FHWA, October 2006)

Phase	Planning / Programming	Preliminary Engineering	Final Design	Construction
Status	• Focus is on general alignment and mode. • Project details not defined; environmental reviews incomplete. • Funding possible not committed. • Public support uncertain.	• Comprehensive definition of project goals. • Environmental reviews approaching completion (Record of Decision). • Initial approvals received but long-term funding commitments still to be determined. • High cost and schedule contingencies.	• Project goals communicated to contracting partners. • Projects scope, cost, and schedule well defined. • Minor open issues since all cost and design detail well advanced. • Construction approvals, including permits and agreements, not yet final.	• Design complete; project defined. • Commitments (funding, policy, etc.) in place. • Construction in progress.
Typical Risk Issue	• Fatal or significant environmental economic impacts. • Funding uncertainty. • Uncertain political and public support. • Competing interests and competing projects.	• Changes to project scope and budget. • Costs of environmental compliance. • Appropriate procurement methods. • Changes in design requirements. • Right-of-way acquisition. • Technical uncertainties. • Errors or omissions in quantities, inaccurate unit prices. • Market conditions. • Funding uncertainty.	• Changes to project scope and budget. • Errors or omissions in quantities, inaccurate unit prices. • Changes in design requirements. • Market conditions, permit requirements.	• Contractor performance, construction quality. • Final permitting, right-of-way acquisition. • Unanticipated site/working conditions. • Field design changes. • Construction safety.
Objectives for Risk Assessment	• Identify implementation challenges-political, public acceptance, approvals. • Establish order of magnitude costs by option. • Identify major design and construction risks.	• Identification, quantification, and likelihood of major scope, budget, and schedule risks for all major project components. • General definition of and total probable project costs. • Risks of alternative design concepts, procurement methods.	• Identification, quantification, and likelihood of all identifiable scope, budget, and schedule risks for all project components. • Detailed definition of base costs, risk costs, and total probable project costs. • Validation of reasonableness of contingencies in project budget and schedule.	• Targeted assessment of construction problems, causes, and potential cost/schedule impacts. • Identification and systematic evaluation of possible corrective actions.
Expected Outcomes	• Better understanding of environmental, engineering, and construction issues facing each project alternative. • Order of magnitude risk costs and possible total cost range for each option.	• List of major project risks. • Reasonable estimate of risk costs and probable total project costs and duration. • Long list of risk mitigation strategies • Preliminary risk management plan, focused on design and constructability risks. • Preliminary risk allocation planning.	• List of major critical risks, prioritization of risks based on impacts to total project cost and duration. • Estimate of risk costs and probable total project costs and duration. • Costs/benefits of risk mitigation and risk allocation strategies. • Risk management and allocation plan.	• Analysis of specific problems. • Costs/benefits of possible corrective actions. • Corrective action plan that will allow project sponsors/owners to maintain (or recover) schedule and avoid cost overruns.

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Table 11 illustrates how typical risk issues change through project stages, from planning to construction. For example, in early phases, a greater uncertainty relates to scope, procurement methods and technical issues. Whereas during design, risks due to errors and omissions, changing design requirements and market conditions become more relevant. Finally, contractor performance and safety are only really risks during construction. The table also shows how the objectives of the risk assessment, and expected outcomes change over time.

7.5   RISK REGISTER

The Risk Register, a key tool for risk management, is used to record important information on project risks. Initially, a risk list is developed to account for specific events that could impact costs and/or schedule. The list can contain both threats and opportunities. These risks can be classified as technical (i.e., geotechnical, structural, or environmental design considerations), non-technical (i.e. right-of-way costs, regulatory concerns, or market conditions), or political (i.e. funding, legal challenges, or scope changes). Examples of event risks include the potential for additional requirements to meet environmental regulations, adverse geotechnical conditions in constructing retaining walls, or the discovery of unexpected utilities.

The Risk Register combines information on the nature of the risk (i.e. a brief description of the event), its probability of occurrence, its cost and/or schedule impact, and the activities potentially impacted. The Risk Register will be maintained in Procore; an illustration is provided in Figure 13.

The Risk Register includes a calculated field called Probability Weighted Cost. This field is calculated by multiplying the potential cost impact by the probability of occurrence. The PM Team will monitor the total Probability Weighted Cost of the items on the Risk Register and provide updates on this value as a percentage of the total contract value.

Figure 13. Risk Register for the WRRF Project

8   DESIGN STANDARDS

8.1   PURPOSE

The purpose of the Design Standards is to provide general guidance for the design development process for the WRRF Project. In general, these standards discuss criteria, parameters, preferences, and philosophies related to certain design aspects as desired by the City.

8.2   INTRODUCTION

8.2.1   Overview

These Design Standards are presented in the following categories:

- **Engineering Procedures**. This includes guidance to establish a systematic, consistent approach to cost estimating and preparation of Design Criteria and Preliminary Design Reports.
  Contract Requirements. This section provides general guidance on how the City would like to incorporate General and Specific Conditions into the WRRF Project specifications.
- **General Design Guidelines**. This includes information on:

  - Applicable codes and standards, requirements for calculations, drafting, and word processing
  - Specifications Format
  - Testability of Systems
  - Equipment Numbering and Coding System
  - Special Area Classification
  - Surveying

- **Discipline-specific Design Requirements**. This includes a table with minimum applicable standard codes for the following disciplines:

  - Civil
  - Architectural
  - Structural
  - Mechanical
  - Electrical
  - Heating, Ventilation, and Air Conditioning (HVAC)
  - Plumbing
  - Instrumentation and Controls (I&C)
  - Corrosion Control

- **Sustainability Elements**. This section describes the City's expectations regarding the potential inclusion of design elements in accordance with environmental and sustainability standards.

- **Operations Manual and Training Requirements**. This section provides guidance on the basic elements that should be included in the Operations Manual and minimum training requirements.
- **Project Test Plans Preparation Guide.** This section provides a general overview of the elements that should be included in the testing plans.
- **Regulatory Requirements.** Provides general information on known regulatory requirements that are applicable to the WRRF Project.

In addition to these Program Design Standards, in order to obtain further information on products, materials, and construction details, the Design Team is encouraged to review other available City Standards and Guidelines, including, but not limited, to the following:

- Benchmark System, City of San Luis Obispo, January 2007.
- Horizontal Control Network, City of San Luis Obispo, January 2007.
- Standard Specifications, City of San Luis Obispo, February 2014.
- Engineering Standards, City of San Luis Obispo, February 2014.
- San Luis Obispo Creek Watershed, Waterway Management Plan – Volume I, City of San Luis Obispo, February 2014.
- Stream Management and Maintenance Program, Waterway Management Plan – Volume II, City of San Luis Obispo, February 2014.
- Drainage Design Manual, Waterway Management Plan – Volume III, City of San Luis Obispo, February 2014.

For the latest version of these documents, please refer to Procore.

In case a portion of this document overlaps and/or conflicts with governing codes and standards, the stricter interpretation or directive shall be followed.

8.2.2   Designer Proposed Changes

It is recognized that not all guidelines may be applicable or appropriate for a project component. When the Design Team believes project-specific changes are warranted, the Design Team shall annotate the specific Design Guideline and propose changes to the Project Team. If accepted by the City, the Design Team shall incorporate the changes, together with the annotated Design Guidelines, into the Project Manual[1].

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[1] Project Manual: The compendium of the technical specifications and the front end specifications for the project. The front end specifications define and prescribe the rights, responsibilities, and relationships of the contracting parties, and makes provisions for the contract's administration.

8.3 DESIGN PHASES, DESIGN SUBMITTALS, AND CONSTRUCTION COST ESTIMATES

This section describes the design phases required to produce construction documents and construction cost estimates for the WRRF Project.

8.3.1 Design Phases

The design delivery process for the WRRF Project is depicted in Figure 14. The Design Team shall include in their design approach these design phases and associated submittals. A description of these phases and associated submittals is provided in the following sections.
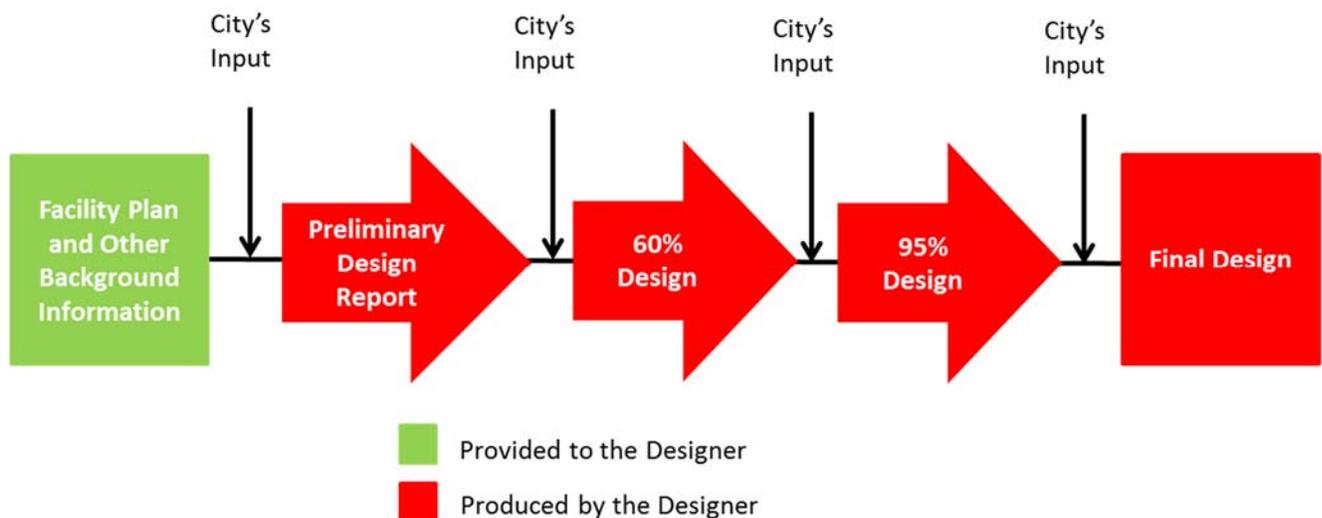

Figure 14. Flow Diagram for WRRF Project Design Phases

8.3.1.1 *Preliminary Design Report*

The Preliminary Design Report (PDR) shall refine and optimize the expansion and upgrade concepts identified in the Facilities Plan produced by the PM Team. The PDR shall result in a final process design and well-conceived treatment process arrangements, equipment selection, building concepts, and site design. As described in this document, the PDR equates to a 30% design submittal.

This information may be presented in either 1) a single report organized into logical chapters, or 2) a series of technical memoranda addressing the specific design needs of each unit process. Either approach must allow each discipline to clearly and efficiently communicate the design concept. Expected contents of the PDR submittal are listed below:

- Updated Design Criteria
  - Flow and loading criteria
  - Treated water quality requirements
  - Residual disposal requirements

- o Applicable codes, standards and design conditions
- o Reliability and redundancy requirements
- Site Investigation
  - o Complete and final base map
  - o Property survey (not standard, but may be required for project)
  - o Potholing of underground piping and utilities
  - o Spot survey of structures and piping
  - o Geotechnical report, including borings results, and final foundation design recommendations for all structures including flood protection facilities
- Process Design
  - o Mass balance diagram
  - o Plant-wide process flow diagram
  - o Process flow diagrams for individual unit processes
  - o Summary of unit process design criteria and projected operating conditions
  - o Process narrative for individual unit processes
- Hydraulics
  - o Hydraulic profile
  - o Line size calculations for major process piping
  - o Identification of special hydraulic analysis requirements (surge, CFD modeling, etc.)
- Site and Civil Design
  - o Site plan showing new and existing structures, including flood control structures
  - o Preliminary grading and paving plan
  - o Preliminary stormwater management plan
  - o Preliminary yard piping plan (major piping systems)
  - o Landscaping concept
- Architectural Design
  - o Architectural theme
  - o Architectural elevations and roof and floor plans
  - o Space and function program for administrative, laboratory and similar support facilities
  - o Area and room classifications
- Buildings and Structures
  - o Footprints and sections of major structures showing rooms and major equipment
  - o Structural design concepts, including conceptual design of foundations and preliminary sizing of wall and slab thicknesses
  - o Building material selection (with input from corrosion engineer)
  - o Structure dimensions
- Process Mechanical Design
  - o Sizing of major equipment

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- o Preliminary equipment lists and data sheets for major equipment
- o Layouts and elevations for equipment areas, including major piping and valves
- o Equipment access and hoisting plan
- o Piping and equipment material selection (with input from corrosion engineer)
- o Chemical storage and feed requirements
- o Utility requirements (natural gas, potable water, non-potable water, compressed air, etc.)
- o Odor control design criteria and mitigation plan
- o Noise control design criteria and mitigation plan
- Mechanical Design
  - o HVAC, plumbing and fire protection concepts
  - o Preliminary equipment lists and data sheets for major equipment
  - o Preliminary layout of major ductwork and HVAC equipment
- Electrical Design
  - o Preliminary electrical load list
  - o Electrical service requirements
  - o Standby power requirements
  - o Electrical power one-line diagrams
  - o Preliminary electrical site plan
  - o Communications and security design concepts
  - o Sizing of major equipment
  - o Preliminary equipment lists and data sheets for major equipment
- Instrumentation and Control
  - o Control philosophy
  - o Control system block diagram
  - o Process control descriptions
  - o P&ID drawings for major equipment and systems
- Cost Estimates
  - o Opinion of probable construction cost
  - o Estimate of annual operation and maintenance cost
- Implementation and Procurement Plan
  - o Preliminary implementation plan and construction schedule
  - o Equipment procurement plan including potential sole-source, pre-purchase, pre-qualification or base-bid candidates
- Regulatory Requirements
  - o Environmental Impact Review (EIR)
  - o Spill Prevention, Control, and Countermeasure Plan (SPCC)
  - o Description of required changes to Risk Management, Process Safety Management, and Hazardous Materials Programs

- Documentation
    - Meeting notes and decision log
    - Action Item Log
    - Calculations
    - Equipment catalogue cuts and vendor information

8.3.1.2 60 Percent Design Submittal

The submittal for the 60 Percent Design Phase shall provide a comprehensive set of design documents in sufficient detail to allow thorough review by the City.

For the 60 Percent Design Submittal, all critical drawings that define the size, configuration, process control and key features of the project components shall be developed to a high level of completion. Other drawings showing details and refinements shall be in progress.

Technical specifications shall be developed to a "first draft" level. Draft front end specifications shall be required for this submittal.

Additional submittal components shall include updated cost estimates, equipment data sheets and catalogue cuts, a construction sequencing plan, and calculations.

Expected contents of the 60 Percent Design Submittal are listed below:

8.3.1.2.1 Drawings:
- General and Civil Drawings
    - Process flow diagrams – draft final
    - Hydraulic profile– draft final
    - Site plan – 80% complete
    - Grading and paving plans – 80% complete
    - Yard piping plans – 80% complete
    - Piping profiles, civil details and site details – in progress
- Flood Control
    - Plans and sections – 80% complete
    - Details – in progress
- Demolition Drawings
    - Plans and sections – 80% complete
    - Details – in progress
- Structural Drawings
    - Structural plans – 80% complete
    - Structural sections and details – in progress
- Architectural Drawings
    - Architectural elevations – draft final
    - Architectural plans, sections and details – in progress

- Process Mechanical Drawings
    - Process mechanical plans and major sections – 80% complete
    - Process minor sections and details – in progress
- HVAC and Plumbing Drawings
    - HVAC and plumbing plans, sections and details – in progress
- Electrical Drawings
    - Single-line diagrams – draft final
    - Electrical site plan – 80% complete
    - Electrical plans, sections and details – in progress
    - Lighting plans, sections and details – in progress
    - Conduit and cable schedules – in progress
- Instrumentation and Control
    - P&IDs and control strategies – draft final
    - Network block diagrams – In progress
    - Draft I/O list – In Progress
    - Control panel elevations and schematics – in progress
    - Instrumentation details – in progress

8.3.1.2.2   Project Specifications:
- Technical specifications
    - Complete Table of Contents
    - Major equipment – 80% complete
    - Other technical specifications – In progress
- Front end sections – draft

8.3.1.2.3   Cost Estimate:
- Updated opinion of probable construction cost
- Updated estimate of operation and maintenance cost

8.3.1.2.4   Project Support Documentation:
- Written responses to client comments received on PDR
- Updated equipment notebook with equipment data sheets and technical cut sheets
- Technical memoranda addressing issues resolved since Preliminary Design Report
- Construction sequencing plan and schedule
- Summary of fire and life safety concerns
- Calculations (as defined in the Design Team's Scope of Work)

8.3.1.3   *95 Percent Design Submittal*
The submittal for the 95 Percent Design Phase shall include all finished, checked and complete drawings and specifications. The Design Team shall consider these documents ready for bidding before submitting them to the City for review.

Expected contents of the 95 Percent Design Submittal are listed below:

8.3.1.3.1 Drawings:
- General and Civil– Final
- Demolition– Final
- Structural– Final
- Architectural– Final
- Process Mechanical– Final
- HVAC and Plumbing– Final
- Electrical– Final
- Instrumentation and Control – Final

8.3.1.3.2 Project Specifications:
- Technical specifications – Final
- Front end sections – Final

8.3.1.3.3 Cost Estimate:
- Final opinion of probable construction cost

8.3.1.3.4 Project Support Documentation:
- Written responses to City comments received on 60 Percent Design Submittal
- Written responses to plan check comments received on 60 percent design plans
- Written responses to SLOFD comments received on 60 Percent Design Submittal
- Final equipment notebook with equipment data sheets and technical cut sheets
- Technical memoranda addressing issues resolved since Preliminary Engineering Report
- Final calculations

8.3.1.4 Final Design
The Final Design submittal shall provide final design documents suitable for bidding.

The Final Bidding Documents shall consist of a complete set of contract documents (front end specifications) and all supporting documentation included in the Design Team's Scope of Work.

Expected contents of the Final Design submittal are listed below:

- Final Drawings
- Final Project Manual
- Final Cost Estimate
- Final Project Support Documentation
- Written responses to plan check comments received on 95 percent design plans

8.3.2   Construction Cost Estimates

The level of accuracy and detail required for the construction cost estimates associated with the design submittals shall follow the AACE International Recommended Practice No. 18R-97[2]. The following are the typical level of accuracy expected for the cost estimates in the submittals for each design phase:

- Construction Cost Estimate in PDR Submittal:

  For the PDR submittal the construction cost estimate shall correspond to a "Class 3" estimate. The typical level of accuracy range for a Class 3 estimate is -10% to -20% on the low side, and +10% to +30% on the high side (after inclusion of an appropriate contingency determination).

- Construction Cost Estimate in 60 Percent Design Submittal:

  For the 60 Percent Design Submittal the construction cost estimate shall correspond to a "Class 2" estimate. The typical level of accuracy range for Class 2 estimate is -5% to -15% on the low side, and +5% to +20% on the high side (after inclusion of an appropriate contingency determination).

- Construction Cost Estimate in 95 Percent Design and Final Design Submittals:

  For the 95 Percent and Final Design Submittals the construction cost estimate shall correspond to a "Class 1" estimate. The typical level of accuracy range for Class 1 estimate is -3% to -10% on the low side, and +3% to +15% on the high side (after inclusion of an appropriate contingency determination).

8.4   FINAL DESIGN SUBMITTAL CONTRACT REQUIREMENTS

8.4.1   Procurement and Contractual Requirements

The City or their designee will prepare all procurement and contractual requirements, including the General Conditions, for the WRRF Project. These procurement and contractual requirements are included in Division 00 of the CSI[3] MasterFormat organization format for commercial building design and construction projects.

Within these documents, the General Conditions include the basic provisions which delineate the rights and duties of the owner and the contractor and define the responsibilities and the limitations of authority of the engineer or architect during construction.

The Design Team shall review the General Conditions authored by the City prior to completion of the 95 Percent Design Submittal to ensure that Technical Specifications coordinate with the General Conditions.

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[2] AACE International Recommended Practice No. 18R-97: Cost Estimate Classification System – As Applied In Engineering, Procurement, And Construction For The Process Industries TCM Framework: 7.3 – Cost Estimating and Budgeting Rev. November 29, 2011.
[3] CSI: Construction Specifications Institute

8.4.2   General Requirements

The City will or their designee prepare the General Requirements for the WRRF Project. The General Requirements are included in Division 01 of the CSI MasterFormat organization format for commercial building design and construction projects.

General Requirements typically include provisions that are work-related, associated with the performance and administration of the work and have common application to other Division Specifications. Examples of items included are scope of work, schedule requirements, measurement and payment, meeting requirements, etc.

The Design Team shall review the final General Requirements authored by the City prior to completion of the 95 Percent Design Submittal to ensure that Technical Specifications coordinate with the General Requirements.

8.5   GENERAL DESIGN GUIDELINES

8.5.1   Codes and Standards

The local governmental jurisdictions associated with the WRRF Project may include the State of California and one or more of the following:

- County of San Luis Obispo
- City of San Luis Obispo

8.5.2   Calculations

In addition to the following requirements for calculations, refer to the scope of work for the Design Team, for specific design calculations submittal information.

Calculations shall be presented on 8-1/2 inch by 11-inch sheets for computations and/or 11-inch by 17-inch foldout sheets for plan layout or details.

Where special equations or source materials are used in calculations, the Design Team shall show the equation and reference so that others can easily follow the computations. Charts or tables used as design aids shall be copied and included with the calculations.

Simulated models used for computer analysis shall be included in the calculations. The computer input/output printout shall be presented in the calculations. Derivation of model geometry, member properties, boundary conditions, and applied loads shall be provided.

Sample calculations depicting how computer results are used in the final design shall be shown. For proprietary models, design shall provide the electronic models and software for City review of models. If necessary, non-disclosure agreements can be used to protect the proprietary nature of the models.

All electronic files such as Excel spreadsheets and MathCAD printouts shall be provided for review. Spreadsheets shall be scrubbed such that all non-essential information is removed from the files. All spreadsheets shall be print ready for 8-1/2 inch by 11-inch pages (portrait or landscape) or 11-inch by 17-inch landscape pages. Spreadsheets shall be annotated with narratives to show the objective, assumptions, references, inputs, and outputs. All formula calculations provided in the cell shall be displayed.

8.5.3 Drafting

The contract drawings need to convey the information required to construct the project. The City's goal is to minimize Requests for Information (RFIs) during construction as well as change orders. All drawings need to be concise and flow without the need of extensive interpretation. Drawings consist of plans, elevations, sections, large scale views, details, schedules, diagrams and 3D models.

The Design Team will be required to submit a CAD Manual to the PM Team for approval that is in substantial conformance with National CAD Standards (NCS). The CAD Manual should contain detailed information on the content and format for drawings, layering and naming conventions, record drawing requirements, etc. See Appendix B for an example CAD Manual.

The City recognizes that many engineering firms are choosing Building Information Modeling (BIM) for designing facilities, which offers benefits throughout the entire life-cycle of the project. Unlike CAD, which uses software to generate digital 2D or 3D drawings, BIM produces models to create the design. These models are complex databases that contain both geometric information and non-graphic data. Drawings, views, equipment data, and other information are views of the underlying database. If the Design Team changes a dimension in the database, that dimension will be actualized in all views, which is not the case for CAD. CAD requires changing the dimension in all the drawings that contain that dimension. Because of the "database nature" of BIM, BIM information can be extremely useful for post construction activities such as asset management. Additionally, BIM software programs possess the functionality to link with and export to CAD programs, thereby promoting consistency in project deliverables and clear communication of design data between the project team. In recognition of these potential benefits, if the Design Team desires to propose to the City the use of BIM for the design of the WRRF project, in lieu of using CAD, the Design Team shall include in their proposal the workflow and post-construction administration of the work products produced by BIM. Additionally, the Design Team will need to submit a CAD/BIM Manual to the PM Team for approval that is in substantial conformance with NCS and National BIM Standards-United States (NBIMS-US).

8.5.4 Word Processing

All reports, manuals, memos, meeting agendas and minutes, etc. shall be compatible with Microsoft Word 2013 and the latest version used by the City, which is currently Microsoft Word 2010.

All printed or typed data shall be a minimum of 9 point font, with 11 point font preferred. All printing shall be done on recycled paper and double-sided.

8.5.5   Specifications

The specifications included in the Project Manual shall follow the CSI Masterformat 50 Division Specification numbering system.

8.5.6   Testability of Systems

Process systems shall be designed with features that allow for pre-operational testing (testing during construction) and operational testing (testing after construction) to verify process operation status and project commissioning. Examples of features include tees and tapped bosses in pipelines for pressure testing and flow diversions.

Design Team shall prepare the installation, operational and reliability test plans concurrently with the final design which will identify any special requirements for testing and start up.

8.5.7   Equipment Numbering and Coding System

A unique tag number shall be assigned to any element at the WRRF that requires any type of maintenance, has one or more moving parts, or is monitored for leakage (e.g., tanks). Tag numbers should be assigned for all equipment covered under a construction contract. This helps assure that the City's Maintenance Staff will receive the appropriate maintenance information for the equipment installed.

The Design Team shall propose to the City a nomenclature or syntax system to be used for equipment, valve and manhole numbers. Equipment includes mechanical, electrical, and instrumentation equipment. Equipment type, manholes and valves that shall be tagged are described in the following sections.

8.5.7.1   Mechanical Equipment

Mechanical equipment is that equipment which is part of the process flow and is considered a discrete piece of equipment, including all the auxiliaries associated with the particular piece of equipment. Auxiliary equipment associated with the mechanical equipment shall contain a suffix character.

8.5.7.2   Electrical Equipment

Electrical Equipment is that equipment which is not considered "discrete equipment" as defined above, but is related to the switchgear. This would include but is not limited to motor control centers (MCCs), transformers, and electric breakers.

8.5.7.3   Instrument Equipment

Instrument Equipment is that equipment which is part of the process flow and is considered a discrete piece of equipment. Separate from the instrument equipment numbering are the PLC/PCCS numbers, which are specified by the Design Team.

8.5.7.4   Manual Valves

Manual Valves are those valves which are manually operated (lever, hand wheel, or chain), with no electric, pneumatic or hydraulic control connected. Manual valve numbers shall be issued to all valves in a process system and shown on process and piping system schematic diagrams.

8.5.7.5 Manholes

Manholes include Process manholes and Electrical manholes. Process manholes are those units that a fluid can flow through. Details and schedules for these units are found in the "General" drawings of the contract documents. Electrical manholes and handholes are those units that power, control and signal cables run through.

8.5.7.6 Slide Gates

Slide Gates are those gates which are manually opened or closed; they are used for isolation of channels. Details and schedules for these gates are found in the "Structural" drawings of the contract documents.

8.5.7.7 Doors and Rooms

Each room in each structure of the facility must be identified for construction and maintenance purposes. These identifications shall always be shown on the "Architectural" drawings of the contract documents.

Each door shall be given a number similar in format to the room numbers. These numbers shall always be shown on the "Architectural" drawings of the contract documents.

Schedules for both rooms and doors shall be located in the "Architectural" drawings of the contract documents. (Note: Temporary facilities, such as trailers, shall also receive room and door numbers for maintenance purposes.)

8.5.8 Special Area Classification

Certain areas of the existing WRRF or new process areas may fall under special classifications, which may require special requirements. During preliminary design, such potential areas shall be identified. Appropriate design details shall be considered and provided in the plans and specifications.

Special classifications include, but are not limited to:

- Hazardous (Classified) Areas – As defined in National Fire Protection Association
- (NFPA) 820
- Corrosive Areas – Areas over open tanks, chemical rooms,
- Wet Areas – All outdoor areas and indoor process areas. Wet areas shall be considered to be subjected to high-pressure water.

8.5.9 Datum

The following Datum information has been extracted from the City's February 2014 Engineering Standards, and shall be used by the Design Team unless this information is superseded by a more recent version. The Design Team is encouraged to contact the City's Department of Public Works to ensure conformance with the latest version on these standards.

Drawings and maps shall be set into real world coordinates and elevations using the City's horizontal and vertical control networks. The Datum used shall be referenced on the cover sheet. Plans based on information furnished by the City, from old plans or survey data, shall include references to the City Plan number, file number, field book number, etc. Any new benchmarks and monuments should be shown on the plans with the associated coordinates and / or elevation.

8.5.9.1   Horizontal Control

The City has established a horizontal control network relative to the California Coordinate System Zone Five, which is defined in Section 8801 through 8819 of the California Public Resources Code. For all projects and maps, two different exterior points or corners shall be tied to at least two different points of the City's horizontal control network for direct import into the Geographic Information System (GIS) database and AutoCAD. The latest Horizontal Control Network is available from the Public Works Department.

8.5.9.2   Vertical Control

The City has established a vertical control network. The benchmarks associated with the vertical control system are on the NAVD 1988 datum. The listed elevations are in feet rounded to the nearest 0.01 foot. The City's benchmarks, in most cases, are lead and tacks set in curbs near the Beginning Curb Return (BCR) approximately 2 mm above the concrete surface.

All projects shall be tied to the nearest benchmark elevation. The Benchmark System is available from the Public Works Department. All projects shall include a drawing in the drawing set with the coordinates and location description for all relevant benchmarks.

8.5.9.3   Grading Plans

Finish and existing grades shall be shown by use of contours on grading plans. Where grades are too flat for contours to be meaningful, grades shall be called out showing existing and final elevations for a number of points reasonable to represent critical grades and drainage. All contours and elevations shall reflect current City Datum.

8.5.10 Units of Measurement

All project plans and maps shall be prepared in English units.

8.6   DISCIPLINE-SPECIFIC DESIGN REQUIREMENTS

This section includes tables with the applicable codes and standards for each of the following disciplines:

- Civil
- Architectural
- Structural
- Mechanical
- Electrical
- HVAC
- Plumbing

- Instrumentation and Control
- Corrosion Control

If the Design Team believes that there is a potential overlap or conflict between any of the applicable codes and standards presented in this section, the Design Team shall annotate the specific issue and propose a resolution to the Project Team. If accepted by the City, the Design Team shall incorporate the proposed resolution into the Project Manual.

8.6.1 Civil Design
The civil design for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 12 below.

Table 12. Applicable Codes and Standards for Civil Design

Standard or Code	Source
ASTM Standards	American Society for Testing and Materials
AWWA Standards and Guidelines	American Water Works Association
Highway Design Manual	California Department of Transportation
State Standard Specifications	California Department of Transportation
Standard Specifications	Standard Specifications, City of San Luis Obispo, February 2014.
Engineering Specifications	Engineering Standards, City of San Luis Obispo, February 2014.
CBC	California Building Code
CUFC	California Uniform Fire Code
AASHTO Standards	American Association of State Highway Transportation Officials
ACI Standards	American Concrete Institute
Cal OSHA Standards	California Occupational Safety & Health Administration
SWRCB Drinking Water Program Guidelines	California Department of Health Services Water & Sewer Separation Guidelines
All applicable state and local codes	

8.6.2 Architectural Design
The architectural design for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 13 below.

Table 13. Applicable Codes and Standards for Architectural Design

Standard or Code	Source
CBC	California Building Code
CEC	California Electrical Code
CMC	California Mechanical Code
CEnC	California Energy Code
CFC	California Fire Code

Standard or Code	Source
CGBS Standards	California Green Building Standards
Cal OSHA Standards and Guidelines	California Division of Occupational Safety and Health
ADA	American's with Disabilities Act
ASTM Standards	American Society for Testing and Materials
ANSI Standards	American National Standards Institute
SMACNA Standards	Sheet Metal and Air Conditioning Contractors National Association
	SMACNA's 2003 Architectural Sheet Metal Manual
NAAMM Standards	National Association of Architectural Metal Manufacturers
UL Standards	Underwriter's Laboratory
FMRC Standards	Factory Mutual Research Corporation
SSPC Standards	Steel Structures Painting Council
NFPA 10 - Portable Fire Extinguishers	National Fire Prevention Association
NFPA 13 - Automatic Fire Sprinklers	National Fire Prevention Association
NFPA 430 - Storage of Liquid and Solid Oxidizers	National Fire Prevention Association
NFPA 820 - Wastewater Treatment and Collection Facilities	National Fire Prevention Association
All applicable state and local codes	

8.6.3 Structural Design

The structural design for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 14 below.

Table 14. Applicable Codes and Standards for Structural Design

Standard or Code	Source
CBC	California Building Code
ACI 318 - Building Code Requirements for Structural Concrete and Commentary	American Concrete Institute
ACI 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary	American Concrete Institute
ACI 350.1 - Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures and Commentary	American Concrete Institute
ACI 350.3 - Seismic Design of Liquid-Containing Concrete Structures and Commentary	American Concrete Institute
ACI 530 - Building Code Requirements for Masonry Structures	American Concrete Institute
AISC 341 - Seismic Provisions for Structural Steel Buildings	American Institute of Steel Construction
AISC 360 - Specification for Structural Steel Buildings	American Institute of Steel Construction
AISC Manual of Steel Construction	
ASCE 7 - Minimum Design Loads for Buildings and Other Structures	American Society of Civil Engineers
Aluminum Design Manual	The Aluminum Association

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AASHTO - -Standard Specifications for Highway Bridges	American Association of State Highway and Transportation Officials
CMAA - Specifications No. 70 and 74 for Cranes	Crane Manufacturers Association of America
AWS -D1.1 -Structural Welding Code	American Welding Society
CBC	California Building Code
OSHA Standards	Code of Federal Regulations, 24 CFR Part 1910, Occupational Safety and Health Administration Standards, with local amendments
All applicable state and local codes	

8.6.4   Mechanical Design

The mechanical design for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 15 below.

Table 15. Applicable Codes and Standards for Mechanical Design

Standard or Code	Source
ASHRAE 90A - Energy Conservation in New Building Design	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME B&PV - Boiler and Pressure Vessel Code	American Society of Mechanical Engineers
OSHPD Standards and Guidelines	California Office of Statewide Health Planning and Development
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
All applicable state and local codes	

8.6.5   Electrical Design

The electrical design for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 16 below.

Table 16. Applicable Codes and Standards for Electrical Design

Standard or Code	Source
IEEE 141, 142, 242, 399, 446, 493 and 739	Institute of Electrical and Electronic Engineers— "Color Book" Series
Lighting Handbook	Illuminating Engineering Society (IES)
NFPA 70 - National Electrical Code (NEC)	National Fire Protection Association
NFPA 72 - Fire Alarm Signaling	National Fire Protection Association
NFPA 101 - Life Safety Code	National Fire Protection Association
NFPA 820 - Standard for Fire Protection in Waste Water Treatment Plants	National Fire Protection Association
Other NFPA Codes as Applicable	National Fire Protection Association
Cal Title 24 - Buildings Standards Code	California Code of Regulations
SLOFD Ordinances	San Luis Obispo Fire Department Ordinances
All applicable state and local codes	

8.6.6   HVAC Design

The HVAC design for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 17 below.

Table 17. Applicable Codes and Standards for HVAC Design

Standard or Code	Source
ASHRAE Standards	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME Standards	American Society of Mechanical Engineers
ANSI Standards	American National Standards Institute
ASTM Standards	American Society for Testing and Materials
AWWA Standards and Guidelines	American Water Works Association
CAL OSHA Standards	California Department of Labor Occupational Safety and Health Administration
CBC	California Building Code
CMC	California Mechanical Code
CPC	California Plumbing Code
SLOFD Ordinances	San Luis Obispo Fire Department Ordinances
OSHA Standards	U.S. Department of Labor Occupational Safety and Health Administration
OSHPD Standards and Guidelines	California Office of Statewide Health Planning and Development
NEC	National Electric Code
NFPA 70 - National Electrical Code (NEC)	National Fire Protection Association
NFPA 72 - Fire Alarm Signaling	National Fire Protection Association
NFPA 101 - Life Safety Code	National Fire Protection Association
NFPA 820 - Standard for Fire Protection in Waste Water Treatment Plants	National Fire Protection Association
Other NFPA Codes as Applicable	National Fire Protection Association
SMACNA Standards	Sheet metal and Air Conditioning Contractors Association
Title 24	California Administrative Code
UBC	Uniform Building Code
UFC	Uniform Fire Code
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
UL Standards	Underwriters Laboratory
All applicable state and local codes	

8.6.7   Plumbing Design

The plumbing design for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 18 below.

Table 18. Applicable Codes and Standards for Plumbing Design

Standard or Code	Source
CBC	California Building Code
CMC	California Mechanical Code
CPC	California Plumbing Code
UBC	Uniform Building Code
UFC	Uniform Fire Code
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
UL Standards	Underwriters Laboratory
OSHA Standards	U.S. Department of Labor Occupational Safety and Health Administration
CAL OSHA Standards	California Department of Labor Occupational Safety and Health Administration
State Building Code Title 24	Regulations for the Accommodation of the Disabled in Public Accommodations, California Administrative Code
NFPA Standards	National Fire Protection Association
NEC	National Electric Code
ASTM Standards	American Society for Testing and Materials
ANSI Standards	American National Standards Institute
PDI Standards	Plumbing and Drainage Institute
AWWA Standards and Guidelines	American Water Works Association
All applicable state and local codes	

8.6.8   Instrumentation and Control Design

The project shall be designed to comply with applicable portions of the codes and standards listed in Table 19 below.

Table 19. Applicable Codes and Standards for Electrical and Instrumentation

Standard or Code	Source
ANSI Standards	American National Standards Institute
ASTM Standards	American Society for Testing and Materials
EIA Standards	Electronics Industries Alliance
IEC Standards	International Electrotechnical Commission
IEEE Standards	Institute of Electrical and Electronic Engineers
IES Standards	Illuminating Engineering Society
ISA Standards	Instrumentation Systems and Automation
NEC	National Electric Code
NFPA 70 - National Electrical Code (NEC)	National Fire Protection Association
NFPA 72 - Fire Alarm Signaling	National Fire Protection Association
NFPA 101 - Life Safety Code	National Fire Protection Association
NFPA 820 - Standard for Fire Protection in Waste Water Treatment Plants	National Fire Protection Association
Other NFPA Codes as Applicable	National Fire Protection Association

TIA	Telecommunication Industry Association
UBC	Uniform Building Code
UFC	Uniform Fire Code
UL Standards	Underwriters Laboratory
All applicable state and local codes	

8.6.9 Corrosion Control Design

The Design Team shall use the appropriate corrosion control methodologies to reduce maintenance requirements and achieve desired design life for systems, subsystems, components, subcomponents, and structures within the WRRF.

In general, the best corrosion control strategy is to make use of appropriate materials selection and coatings/linings at the design stage. Cathodic protection is beneficial in protecting metals but shall only be used as a last resort.

The corrosion control features for the project shall be designed to comply with applicable portions of the codes and standards listed in Table 20 below.

Table 20. Applicable Codes and Standards for Corrosion Control

Standard or Code	Source
ASTM Standards	American Society of Testing and Materials
NEMA Standards	National Electrical Manufacturers Association
ICEA Standards	Industrial Cable Engineers Association
AWWA Standards and Guidelines	American Water Works Association
NACE Standards	National Association of Corrosion Engineers
ANSI Standards	American National Standards Institute

8.7 SUSTAINABILITY ELEMENTS

The design should align with the City's sustainability initiatives outlined in Chapter 9, the Sustainability Plan. At this time, the City does not intend to seek certification under any sustainability rating systems or standards; however, the City desires to incorporate elements from the rating systems into the WRRF Project, as described in Chapter 9.

8.8 OPERATIONS & MAINTENANCE MANUAL REQUIREMENTS

The Design Team shall provide a plant-wide Operations & Maintenance (O&M) Manual, including:

- Detailed descriptions of all new and existing unit processes and treatment systems.
- Detailed information on all equipment and appurtenances for all new unit processes and treatment systems installed at the WRRF.

The O&M Manual shall be specific to the WRRF. General descriptions, procedures, and/or instructions are not acceptable.

In addition to hardcopies, the O&M Manual shall be provided in an electronic format with a searchable index and cross-referenced content. Specific details on this shall be detailed in the scope of work of the Design Team.

The Design Team shall provide a proposed outline with the organization and content for this manual for City's approval and input.

8.8.1 Operations

The operations component of the O&M Manual shall provide technical guidance in the operation and management of the treatment processes and equipment at the WRRF. The O&M Manual is intended for use by plant operators as the primary reference for the control, standard operation, emergency operation, start-up, shutdown, and alarm troubleshooting of the treatment processes and their related equipment. The operations component of the O&M Manual is also intended for the use of administrative personnel both as a reference and as an instructional document in staff training.

8.8.2 Maintenance

The maintenance component of the O&M Manual shall provide technical guidance for maintaining treatment process equipment in consistent working order. The O&M Manual is intended to be used by the plant maintenance staff as the primary reference for preventive maintenance, problem diagnosis and corrective maintenance of treatment process equipment. The maintenance component of the O&M Manual is also intended for the use of administrative personnel as a reference and as an instructional document in staff training.

8.8.3 Manufacturer's Equipment O&M Manuals

The Design Team shall require the Contractor to provide an Equipment O&M Manual, in both hardcopy and electronic formats, for each maintainable piece of equipment or equipment assembly.

Each Equipment O&M Manual shall provide instructions and procedures for all aspects of equipment installation, operation, and maintenance including: delivery, handling, storage, maintenance during storage, assembly, erection, installation, startup, adjusting, testing, operating, shutdown, troubleshooting, maintenance, and as may otherwise be required.

This information will be organized in a consistent format under separate heading for each different procedure, with a logical sequence of instructions for each procedure. Where manufacturers' standard pre-printed manuals are included in Equipment O&M Manuals, they shall be marked to reflect only the model or series of equipment used on the Project.

Non-applicable material shall be neatly crossed out.

The Design Team shall provide a proposed outline with the organization and content for this manual for City's approval and input. This will ensure that the final product will meet the City staff needs and expectations.

8.9   START-UP, TESTING, AND OPERATIONAL TRANSITION REQUIREMENTS

The Design Team shall define, in consultation with City staff, activities, time periods, milestone dates, and other requirements needed to transition treatment operations and responsibility of the improvements smoothly and effectively from the Contractor to City staff.

The necessary activities span from start-up of the improvements through final completion of the project. The specific elements that, at a minimum, need to be addressed are:

- Decommissioning of existing facilities being eliminated or replaced by new facilities.
- Start-Up
- Staff Training
- Acceptance Testing, including Seasonally Dependent Testing if appropriate
- On-Call Period

The Design Team will be responsible for developing a Transition Plan that describes the systematic methods and procedures for successful completion of the respective elements listed above.

The Transition Plan shall include the following major milestones:

Decommissioning Date: The date of the first decommissioned facility or the first start-up, whichever is earlier; signifies the beginning of the Contractor's sole responsibility for the WRRF effluent quality.

Provisional Performance Acceptance: Occurs when Acceptance Testing (less Seasonally-Dependent Testing) has been satisfactorily completed, all improvements except flood control facilities are fully functional, and all training has been completed.

Site Acceptance: Occurs once all improvements including the flood control facilities are fully functional.

Final Performance Acceptance: Occurs once all Acceptance Testing, inclusive of Seasonally-Dependent Testing, has been satisfactorily completed.

Final Completion: Occurs once all work has been satisfactorily completed and all the milestones described above have been met.

8.10 REGULATORY REQUIREMENTS

The following regulatory requirements, at a minimum, should be considered for the WRRF Project. Unless stated otherwise below, the Design Team shall initiate contact with City staff or their designees as described below during the Preliminary Design Phase.

8.10.1   Environmental Impact Review

The California Environmental Quality Act of 1970 (CEQA) requires documentation of environmental impacts and proposed mitigation measures associated with a project.

The Design Team shall provide project information as requested by the City or its representatives and incorporate all necessary environmental impact mitigation measures into the project plans and specifications. Mitigation monitoring and reporting plans shall be included in the project specifications.

8.10.2 Effluent Water Quality Discharge Limits

The WRRF must comply with the State of California Water Recycling Criteria, contained in Sections 60301 through 60355 of the California Code of Regulations, Title 22. A Report of Waste Discharge (ROWD), submitted to the Regional Board, is used to develop waste discharge requirements and any necessary water recycling requirements for adoption by the California Regional Water Quality Control Board, (RWQCB) Regional Board, in accordance with California Water Code Sections 13263 and 13523.

The WRRF operates under Waste Discharge Requirements (WDRs) issued by Central Coast RWQCB (Order No. R3-2014-0033; NPDES Permit No. CA0049224) and a Master Reclamation Permit (Order No. R3-2003-081). The renewed NPDES permit was adopted on September 25, 2014, and became effective December 1, 2014. The WDRs contain the limitations and discharge requirements for the discharge of treated wastewater effluent to the San Luis Obispo Creek. A Time Schedule Order (TSO) (R3-2014-0036) was also issued that prescribes interim effluent limitations for nitrogen species and trihalomethanes with final limitations going into effect on November 30, 2019.

The Design Team shall provide project information as requested by the City or its representatives and incorporate all necessary measures into the project plans and specifications to assure compliance with the California Water Code, the California Plumbing Code and Regional Water Quality Control Board regulatory permits. Proposed technologies will be acceptable for compliance with treatment requirements of the California Water Recycling Criteria (Title 22).

8.10.3 Fire and Life Safety

The San Luis Obispo Fire Department (SLOFD) has jurisdiction on fire and life safety matters at the WRRF. All new construction must meet the applicable fire and life safety requirements contained in the Uniform Fire Code (UFC), Uniform Building Code (UBC), National Electric Code (NEC), National Fire Protection Act (NFPA), and Occupational Safety and Health Act (OSHA). Additionally, the NFPA contains standards specific to wastewater treatment plants (NFPA 820, Recommended Practice for Fire Protection in Wastewater Treatment Plants).

The Design Team shall initiate a meeting with the SLOFD, via the designated City staff, after PDR submittal to introduce the project(s) and to identify potential areas of concern. All areas of concern shall be addressed in the 60 Percent Design Submittal, which will formally be submitted to SLOFD for review. The City shall be responsible for coordinating contact with and payment of fees to the SLOFD.

8.10.4 Spill Prevention, Control, and Countermeasure Plan

The United States Environmental Protection Agency (USEPA) requires that the WRRF maintain a Spill Prevention, Control, and Countermeasure (SPCC) Plan. The objective of the SPCC Plan is to document, define, and describe the practices, procedures, structures, and equipment used to prevent, control, and/or mitigate releases of petroleum, oil, and lubricants (POL) products to the environment.

The Design Team shall require in the project specifications that the Contractor identify all POL products required for the project and provide documentation to the City during preparation of the PDR submittal. Such documentation may include a site plan, estimated quantities required, and proposed storage or containment. All project parameters that may impact the SPCC Plan shall be coordinated with the City.

8.10.5 Air Quality Permit

Air permitting for the District falls under the jurisdiction of the San Luis Obispo County Air Pollution Control District (SLO APCD). Air quality permitting is a two-step process. First, a permit application, including appropriate fees, is filed with the SLO APCD. Upon review of application, an Authority to Construct is issued by the SLO Air District. After the project is built, a representative from the SLO APCD conducts an inspection and issues a Permit to Operate. The SLO APCD's Authority to Construct must be obtained before construction can proceed, and the Permit to Operate must be secured prior to process start-up.

The Design Team shall identify all new pollutant emitting sources and provide documentation to the City during the permitting process. Such documentation may include a site plan, and schematics of process systems and air pollution abatement systems. Communication with the SLO Air District will be managed by the City.

8.10.6 Other Potential Regulatory Requirements

8.10.6.1 Risk Management, Process Safety Management, and Hazardous Materials Programs

Various regulations require that the WRRF maintains a Risk Management Plan (RMP), a Process Safety Management Plan (PSM), and a Hazardous Material Plan (HMP). The RMP/PSM covers acutely hazardous materials (chlorine, sulfur dioxide, and digester gases), while the HMP covers other solids, liquids, and gases.

The City shall be consulted to determine if any material or process associated with the WRRF Project may trigger specific design considerations or necessitate revisions to the existing RMP/PSM and HMP. The addition or modification of WRRF processes covered under the RMP/PSM may require a City review. The Design Team shall initiate a meeting between the City to determine if the project will affect the RMP/PSM or HMP.

9   SUSTAINABILITY PLAN

9.1   PURPOSE

The purpose of the Sustainability Plan is to set sustainability goals and strategies for the WRRF Project and to set a framework for how to approach sustainability through all phases of the project, from planning and design through construction and commissioning.

To understand the City's sustainability priorities, the PM Team held a workshop with City staff to discuss economic, environmental, and social sustainability goals for the WRRF Project, including alignment with City, county, and state initiatives. The workshop included a discussion of relevant sustainability rating systems and brainstorm of sustainability initiatives for the project. Using the results of the workshop, the PM Team synthesized the City's sustainability initiatives and the strategies that will be used to accomplish these goals, which are summarized in Section 9.4.

9.2   RELATED SUSTAINABILITY INITIATIVES

The Sustainability Plan is intended to align with related local and state sustainability initiatives, including those of the City at large, the County of San Luis Obispo and the State of California. In developing this plan, the Project Team reviewed the related initiatives listed in Table 21.

Table 21. Overview of Related Initiatives

Agency	Initiative	Key Features
City of San Luis Obispo	Climate Action Plan	Sets strategies to reduce GHG emissions in the City of San Luis Obispo
	Water Reuse Master Plan	Provides plan to increase recycled water use
County of San Luis Obispo	EnergyWise Plan	Sets strategies to reduce GHG emissions in the County of San Luis Obispo and presents approach to adapt to climate change
State of California	AB 32	Sets strategies to reduce statewide GHG emissions to 1990 levels by 2020, and 80% below 1990 levels by 2050
	Renewable Portfolio Standard	Sets renewable portfolio standard (RPS) for California investor owned utilities of 20% renewable generation by 2010, and 33% by 2020
	Title 24	Sets energy efficiency standards for buildings
	CALGreen Code	Establishes minimum green building standards for new buildings

The City's Climate Action Plan includes several sustainability measures relevant to the WRRF Project (shown in Table 22). These were considered during development of the City's sustainability initiatives for the WRRF Project.

Table 22. Relevant Measures from City's Climate Action Plan

Measure Title	Measure Description
GO2: City Renewable Energy	Generate renewable energy at City owned facilities.
GO5: Water and Wastewater Infrastructure	Continue energy-efficient upgrades at the WRRF.
WTR2: Water Conservation: New Development	Implement CalGreen standards, Water Reuse Master Plan, and Water Efficient Landscape Standards to reduce potable water use in new development.

9.3   SUSTAINABILITY RATING SYSTEMS AND STANDARDS

The Project Team reviewed two relevant sustainability rating systems: (1) Leadership in Energy & Environmental Design (LEED), and (2) Envision. The City does not intend to obtain certification through either of these rating systems at this time; however, the City desires to glean relevant sustainability strategies and elements from these established rating systems and incorporate them into the WRRF Project. An overview of these two rating systems is provided in Table 23.

Table 23. Overview of LEED and Envision

	LEED	Envision
Established	1993	2012
Governing Body	U.S. Green Building Council	Institute for Sustainable Infrastructure
Primary Focus	Framework to recognize best-in-class building strategies and practices	Holistic framework to evaluate community, environmental, and economic benefits of infrastructure projects
Primary Credit Categories	− Energy and Atmosphere − Materials & Resources − Indoor Environmental Air Quality − Water Efficiency − Location and Transportation − Sustainable Sites	− Quality of Life − Leadership − Resource Allocation − Natural World − Climate and Risk

The holistic framework of Envision aligns closely with the City's focus on triple bottom line benefits, which is reflected in the Program Charter. Additionally, Envision is better suited than LEED for infrastructure projects, like the WRRF Project. For these reasons, the Project Team utilized the 5 categories of Envision to categorize and structure the sustainability initiatives for the WRRF Project, which are described in Section 9.4.

In addition to LEED and Envision, the Project Team reviewed ISO 14001, an international standard introduced in 1996 and revised in 2004, which specifies requirements for an environmental management system. The standard provides a framework for organizations to measure and reduce environmental impact. At this time, the City does not intend to implement an ISO 14001 system; however, the Design Team should incorporate sufficient instrumentation to monitor, measure, and register, on a regular basis, the key characteristics of the WRRF operations that can have a significant environmental impact. Supplemental information will be provided with the Facilities Plan.

9.4   WRRF PROJECT SUSTAINABILITY INITIATIVES

Sustainability initiatives for the WRRF Project were developed for the following five categories, which align with the categories of Envision:

(1) Quality of Life
(2) Leadership
(3) Resource Allocation
(4) Natural World
(5) Climate

The initiatives and strategies were developed in collaboration with the City during the workshop. Using the results of the workshop discussion, the PM Team identified which strategies would help the City achieve each initiative and grouped them accordingly. Table 24 through Table 28 present the sustainability initiatives and strategies for the WRRF Project. As the project progresses, initiatives and strategies may be further prioritized, added or deleted.

Table 24. Quality of Life Initiatives

	Initiative/Goal	Strategy
1	Create a community asset to engage and educate the community	(1) Incorporate dedicated community features (2) Connect the Bob Jones trail to the WRRF (3) Incorporate historical aspects in public tours (4) Provide signs/exhibits for self-guided tours (5) Beautify WRRF frontage
2	Layout facility to be accessible for WRRF staff and the public, and more efficient for operations	(1) Improve site layout for WRRF staff (2) Improve accessibility for WRRF staff and public (3) Improve wayfinding for public tours
3	Create a safer facility for WRRF staff and the public	(1) Reduce chemical usage (2) Minimize noise and/or implement strategic layout of high-noise equipment (3) Implement public safety and security plan, including access control and zone designations (4) Plan tours strategically for public safety

4	Support staff development	(1) Enhance operator training program
5	Reduce/eliminate odor	(1) Implement passive and active odor control (2) Consider location of high odor generating processes during site layout (3) Design equalization basins to reduce odor
6	Keep the public informed about the WRRF Project	(1) Create an online dashboard/information portal for the public (2) Make a virtual tour of the WRRF available online
7	Reduce impacts on neighbors and community	(1) Reduce/eliminate odor (see initiative #5 above) (2) Minimize light pollution through smart lighting

Table 25. Leadership Initiatives

	Initiative/Goal	Strategy
1	Apply holistic strategies/approaches throughout the project	(1) Consider social, environmental, and economic factors during decision making (2) Achieve multiple benefits for improvements
2	Collaborate with key City and community stakeholders	(1) Develop a strategy for communication with elected City officials, City departments, and regulatory agencies (2) Interview key City and community stakeholders (3) Maintain communication with key stakeholders and provide project updates
3	Engage WRRF staff	(1) Provide WRRF staff with opportunities to get involved and provide input (2) Maintain communication with WRRF staff and provide regular updates
4	Optimize operations	(1) Leverage/strengthen controls systems (2) Perform long-term monitoring
5	Leverage experience of others	(1) Collaborate internally with City operations, lab, maintenance and management staff (1) Collaborate with staff from other wastewater facilities and their management (2) Reach out to professional organizations (3) Stay connected with industry
6	Support training and collaboration	(1) Provide space for internal training and meetings (2) Invite individuals and organizations outside the City to utilize training spaces available at the WRRF (3) Establish research partnership(s) with Cal Poly
7	Plan for the future	(1) Look ahead when making decisions
8	Extend useful life of equipment	(1) Perform regular maintenance (2) Operate equipment as it is intended to operate
9	Lead by example	(1) Implement dual-plumbing in buildings

Table 26. Resource Allocation Initiatives

	Initiative/Goal	Strategy
1	Reduce energy consumption	(1) Optimize energy usage of process (2) Avoid overdesign (3) Minimize headloss (hydraulics) (4) Monitor energy in real-time (5) Implement sub-metering
2	Re-evaluate renewable energy	(1) Perform updated economic analysis to evaluate applicable renewable energy technologies
3	Reduce chemical usage	(1) Consider process/ components that minimize chemicals (e.g. disinfection) (2) Utilize appropriate level of measurement and control
4	Maximize water reuse	(1) Improve water quality and quantity of tertiary treated water (2) Collaborate with City Recycled Water Program Manager
5	Recycle biosolids	(1) Continue biosolids recycling (2) Develop additional biosolids disposal regimes while recognizing constraints (3) Consider collaborating with others (e.g. other wastewater facilities and/or Cal Poly)
6	Reduce on-site potable usage	(1) Utilize water efficient fixtures (2) Install dual-plumbing in WRRF buildings
7	Recycle and/or re-purpose existing facilities	(1) Utilize existing facilities, buildings, equipment, and/or materials in new WRRF facility as appropriate

Table 27. Natural World Initiatives

	Initiative/Goal	Strategy
1	Manage stormwater	(1) Develop on-site stormwater management plan (2) Incorporate low-impact development (LID) features (3) Incorporate flood protection (4) Continue/expand use of bioswales (5) Utilize southern portion of plan for stormwater as appropriate
2	Manage salts, nutrients and environmental pollutants	(1) Meet or exceed guidelines in the Central Coast Basin Plan
3	Preserve the San Luis Obispo Creek	(1) Maintain reliable compliance

	Initiative/Goal	Strategy
4	Support avian population	(1) Preserve lower pond (wetlands) as fly-over for birds (2) Consider mitigation banks
5	Support native species	(1) Use native plants for landscaping and bioswale (2) Utilize southern portion of plant for natural elements and features

Table 28. Climate Initiatives

	Initiative/Goal	Strategy
1	Utilize biogas to generate electricity (SST)	(1) Utilize biogas to generate electricity (cogeneration)
2	Prepare to adapt to future conditions	(1) Incorporate flexibility and scalability into design and layout
3	Protect against potential effects of climate change and/or other disasters	(1) Plan for potential backup of the San Luis Obispo Creek and/or extreme floods (2) Prepare a flood protection contingency plan (3) Assess construction cost difference to protect against 200 year flood versus 100 year flood (4) Provide reliable backup power
4	Reduce greenhouse gas (GHG) emissions	(1) Align GHG reduction goals with City's Climate Action Plan (2) Continue employee vanpool/carpool (3) Provide charging stations for electric vehicles for WRRF staff and the public (4) Design chemical storage to accept bulk deliveries (5) Reduce GHG emissions throughout process as appropriate
5	Reduce chemical usage	(1) Optimize chemical usage (2) Avoid methanol usage

All project participants are expected to review the sustainability initiatives and strategies described above and incorporate them into the planning, design, and construction of the WRRF Project and ongoing operation of the WRRF.

10 QA/QC PLAN

10.1 PURPOSE

The purpose of the Quality Assurance (QA) and Quality Control (QC) Plan is to describe the QA activities of the PM Team and to set consistent QA/QC expectations of the consultants and contractors that will contribute to the WRRF Project.

The goals of the QA/QC Plan are:

- Minimize errors and omissions;
- Reduce risk of schedule delays and cost changes;
- Maintain compliance during and after construction.

Although this plan helps to reduce risk, it is focused on QA/QC of deliverables. Refer to Chapter 7 for a discussion on risk management strategies that will be employed throughout the project.

The intent of the QA/QC Plan is to set clear quality management requirements and procedures for all project participants. Questions about the QA/QC Plan should be directed to the Program Manager.

10.2 OVERVIEW OF QUALITY MANAGEMENT

The QA/QC Plan covers quality management requirements of all project participants, including, but not limited to: the PM Team; design consultants; non-design consultants; construction manager (CM); and contractor. All project participants are expected to proactively conduct quality management. Each project participant is responsible for maintaining a high standard of performance and providing high-quality work that incorporates industry best practices, complies with local, state and federal requirements and guidelines, meets the expectations of the City, and is consistent with the Program Charter (Chapter 2).

Table 29 provides a high-level overview of the QA/QC process. All QA and QC documentation will become part of the project files.

Table 29. Overview of the QA/QC Process

	Step 1	Step 2	Step 3	Step 4	Step 5
Activity	Develop Work Products	Conduct Reviews	Address and Resolve Review Comments	Audit/Approve QC Activities for Work Products	Submit Documentation of QC Audit to PM Team for Approval
Participants	Originators	QC Reviewers	Originator, QC Reviewers	Consultant/ Contractor Project Manager	Consultant/ Contractor Project Manager, PM Team
Documentation Required	Calculations, assumptions, other documentation, etc.	Consultant QC Forms	Responses and resolution of QC comments	Consultant QA Forms	QC and QA forms logged in Procore

Table 30 presents an overview of the QA/QC requirements for the PM Team and project participants. The exact requirements will be adjusted as needed based on the contractual arrangements that are defined for participants in future phases and their approved QA/QC plans. For construction phases, QC requirements for the contractor as well as QA/QC activities for the Designer and PM/CM will be defined in the construction contract(s).

Table 30. Overview of QA/QC Requirements

Participant		Quality Management Activities
PM Team	Quality Assurance	• Verify QC documentation is submitted by project participants with deliverables. • Periodically audit QA/QC documentation of project participants.
Other Project Participants	Quality Control	• Conduct independent QC reviews of each deliverable prior to submittal to the PM Team. • Document responses to review comments and sign-off that QC comments have been addressed with the reviewer. • Provide written documentation of QC reviews to the PM Team along with the deliverables.
	Quality Assurance	• Conduct and provide written documentation to the PM Team that QA audits have been conducted for QC activities. • Audit documentation must include auditor's sign-off.

10.3 PM TEAM REQUIREMENTS

The PM Team will conduct QA activities throughout the life of the project. Additionally, the PM Team will perform QC review of documents and deliverables generated by the PM Team during the planning phase of the project (Phase 1). The following sections summarize the anticipated PM Team activities for both QA and QC efforts.

10.3.1 Quality Assurance Requirements

The PM Team will be responsible for conducting QA reviews to monitor compliance of project participants with the QA/QC Plan. The QA will include review of QC forms provided with deliverables and periodic audit of project participants QA and QC documentation.

10.3.2 Quality Control Requirements

The PM Team will perform QC reviews of work products that are generated by the PM Team, which will include technical memoranda (TM) and reports. For Phase 1 and future phases, the PM Team will also perform QC reviews of documents produced for distribution to the public or to other consultants, including request for proposals (RFP). The work products for Phase 1 are summarized in Table 31.

Table 31. Deliverables for Phase 1 – Project Planning

Phase	Deliverables
1 – Project Planning	Program Management Plan
	Procurement Strategies and Management Plan
	RFP for Design Engineer
	State Revolving Fund (SRF) Application
	Base Map
	Interpretive Operations Center Program and Conceptual Building Design
	Public Facilities Site Plan
	Disinfection Study Workplan
	TM#1 Wastewater Characterization
	TM#2 System-Wide Conceptual Alternatives
	TM#3 Site Planning
	TM#4 Disinfection Study
	TM#5 Asset Planning and Rehabilitation
	TM#6 Renewable Energy Generation
	TM#7 Outreach Strategy
	TM#8 Regulatory Compliance
	TM#9 Capacity Consideration
	TM#10 Infrastructure Planning
	TM#11 Environmental and Permitting Strategy
	TM#12 Process Alternatives Analysis
	TM#13 Funding and Financing Plan
	Facilities Plan
	Value Engineering Report

10.3.3 Procurement Requirements

During preparation of RFPs and bid documents, the PM Team will establish specific requirements for QC and QA programs to be provided and followed by each project participant. These requirements will be tailored to the type of service and/or professional.

10.4 PROJECT PARTICIPANT REQUIREMENTS

Other project participants in the WRRF Project, including design consultants, non-design consultants, contractors, and CM will be responsible for conducting QA/QC activities that adhere to this QA/QC Plan and as specified by each respective RFP.

Each consultant and contractor will be required to prepare and submit a QA/QC Plan to the PM Team for approval. The QA/QC Plan must specify the QC reviewers, budget and schedule for QC reviews, QC forms to document reviews and responses to QC comments, QA auditors, budget and schedule for QA audits, and QA documentation. The documentation from the project participants will become part of the project files and stored in Procore.

The PM Team expects that project participants will plan work to allow sufficient time and budget to properly execute their QA/QC Plan.

10.4.1 Quality Control Reviews

The project participants will be responsible for conducting QC reviews. In order to facilitate QC and QA reviews, it is expected that the project participants maintain organized and clear project files, documentation and calculations. The QC reviews include verifying the following (as appropriate to each participant):

(1) Information, assumptions, and data used in analysis;
(2) Basis of design, calculations, rationale for decisions, results, etc.;
(3) Methodology;
(4) Deliverable is complete according to the scheduled level of completeness;
(5) Deliverable meets industry standards, regulations, project requirements and City expectations;
(6) Clarity of writing, proper format and correct grammar;
(7) Deliverable was prepared by qualified individuals;
(8) Meets contractual scope;
(9) Maintains consistency with the Program Charter.

QC reviews shall be performed before deliverables are submitted to the PM Team or the City. For services that do not result in a document, QC activities shall be performed to align with this QA/QC Plan.

Table 32 provides a summary of anticipated deliverables from project participants for Phases 2 through 5 of the WRRF Project. Deliverables for each project participant will be defined in each RFP.

Table 32. Anticipated Deliverables from Project Participants for Phases 2 through 5

Phase	Deliverables/Work Products
All	QA/QC Plan
2 – Preliminary Design	Technical standards, guidelines, and basis of design criteria
	Technical memoranda, fact sheets, and design reports
	Spreadsheet and model validation
	Validated base map
	Design development drawings, data sheets, preliminary specifications
	Preliminary Design Report
	Preliminary cost estimates
	Environmental Document
3 – Final Design	Spreadsheet and model validation
	Design development drawings, revised data sheets, preliminary specifications
	Design discipline checklists for stages of design
	Contract documents including construction drawings and specifications
	Design development cost estimates and preliminary vendor quotes
4 – Construction	Conformed bid documents with all addenda
	Submitted bid price and schedule of values
	RFIs, responses, and status reports
	Shop Drawings, review comments, and status reports
	Field Orders and their status reports
	Change Order Requests and status reports
	Work Change Directives and status reports
	Contract Change Orders and their status reports
	Functional Testing plans
	Start-up plan with interface provisions for existing facilities
	Performance Testing plans
	Process narratives of systems
	Systems integration plan with existing SCADA system
	O&M manuals
	Staff training plan
	Performance testing and certification
5 – Close Out	Final acceptance
	Record drawings
	Warranty documentation
	File closeout and archiving

10.4.2 Quality Assurance

The assigned QA auditor for each project participant will be responsible for conducting QA audits to verify compliance with their QA/QC plan.

APPENDIX A. WRRF PROJECT LETTERHEAD

APPENDIX B. COMPUTER-AIDED DESIGN (CAD) MANUAL

TABLE OF CONTENTS

1 INTRODUCTION

This Computer-Aided Design (CAD) Production Guidelines Manual (CAD Manual) contains guidelines for the creation of bidding and construction-related drawings. The CAD Manual sets forth the required CAD Production Standards. This CAD Manual was developed using the National CAD Standard (NCS) as a guide but deviates to account for specific compelling needs.

Use of these guidelines is a means of maintaining quality production by accomplishing the following objectives:

➢ Expedite drawing production.

➢ Aid in the retrieval, exchange, and reuse of drawing information.

➢ Improve consistency and efficiency of production.

➢ Provide top-quality, consistently produced drawings that accurately and clearly communicate information.

2 DRAWING PRODUCTION

2.1 MODEL FILES

Base files are plan views and are drawn at a scale of 1:1. These files generally do not include annotation of any kind. The three types of base files are Survey Base Existing, Civil Unit Base Plans and Architectural Unit Base Plans. Survey Base Existing, Civil Unit Base Plans include information relative to the site, while Architectural Unit Base Plans contain information relative to a building or structure. Architectural Unit Base Plans not only contain information of primary concern to the architectural, structural, and mechanical disciplines but are also the background drawings used for the coordination of all disciplines.

Architectural Unit Base Plans show the building layout, column grid lines, and all building elements. These base plans are developed for each relevant cut plane for a structure. For example, a single-story concrete structure may require only a foundation/floor plan, while a multi-story administration building may require one base plan at the foundation/floor plan level, additional base plans for each subsequent floor level, and a base plan for the roof level.

2.2 SHEET FILES

Sheet files are the final assembly point for a working drawing and represent the finished product. Drawing borders, base files, and model files are referenced into the sheet files and arranged within the context of the drawing border. Sheet files include sheet-specific information such as drawing border information, annotation, general notes, key note legends, and north arrows. For linear projects this will include plan view text for the proposed work be oriented to the reader. This text shall be placed in model space within the sheet file.

3 CAD LAYER/LEVEL

3.1 LAYER/LEVEL NAMING CONVENTION

The naming convention for CAD layers and levels is based on the layer name format established in the NCS. The following format defines four layer name data fields: discipline designator, major group, minor group, and status.

A		-	A	A	A	A	-	A	A	A	A	-	A	A	A	A	-	A
DISCIPLINE			**MAJOR**					**MINOR**					**MINOR**					**STATUS**

Use of the discipline designators and major groups is mandatory. Use of the minor groups is optional as required to identify the graphic components on a given layer/level. Layer names may contain one or two minor group data fields as required to identify the elements on the layer. The status field is optional and is used only when required to identify the status or sequence of a layer.

The screen below is an example of common major/minor group modifiers used to differentiate layers.
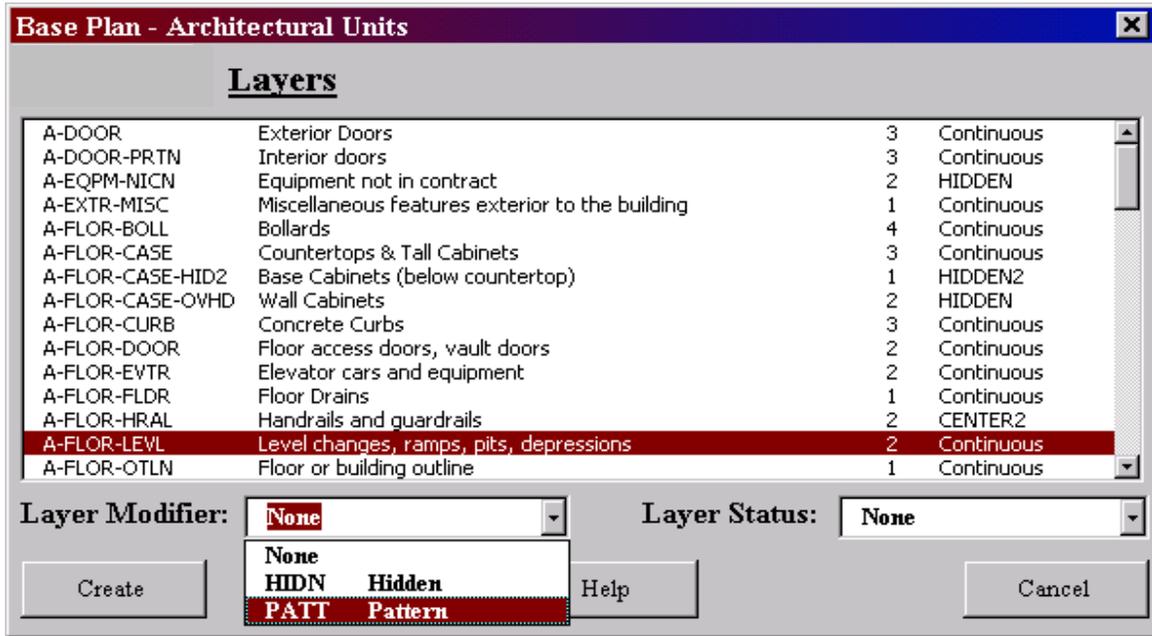
3.2 DISCIPLINE DESIGNATORS

The discipline designators identify work associated with various disciplines. These discipline designators come into play in both the CAD layering nomenclature and the ordering of the sheets in a drawing set. The following table lists the discipline designators.

Discipline Description	Discipline Designator
General	G
Hazardous Materials	H
Surveying/Mapping	V
Geotechnical	B

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Discipline Description	Discipline Designator
Civil	C
Landscape	L
Structural	S
Architectural	A
Interiors	I
Equipment	Q
Fire Protection	F
Plumbing	P
Process	D
Mechanical	M
Electrical	E
Telecommunications	T
Railroad	R
Other Disciplines (Demolition)	X
Contractor Shop Drawings	Z
Operations	O
Instrumentation & Control	Y
Universal (2 or more disciplines)	U

3.3 MAJOR GROUP DESIGNATORS

The major group designator identifies the project system. Although major groups are logically grouped with specific discipline designators, it is possible to combine major group designators with any of the discipline designators.

3.4 MINOR GROUP DESIGNATORS

The optional minor group designator is a four-character field for further differentiation of major groups. For example, A-WALL-CAVI indicates Architectural, wall, cavity. Minor groups vary by discipline.

3.5 STATUS FIELD

The status field is a single-character designator that can be used to differentiate new construction from existing, future, or demolition. This field can also be used to identify the sequencing of phased construction, items to be relocated, temporary construction, or construction equipment that is not in the contract (NIC). It is only used when required to facilitate layer manipulation. Defined values for this field are as follows:

D	Demolition
E	Existing
F	Future
M	Move
R	Remove & Salvage
T	Temp
X	By others (NIC)
1	Phase 1
2	Phase 2
3	Phase 3
4	Phase 4
5	Phase 5

Standard Layer Name with Only Major Group

Discipline Designator
A - WALL
Major Group

Layer Name with Major and Minor Group

Discipline Designator — Minor Group
A - WALL - CAVI
Major Group

Layer Name with Major Group and Status Field

Discipline Designator — Status
A - WALL - D
Major Group

Layer Name with Major Group, Minor Group, and Status Field

Discipline Designator — Minor Group
A - WALL - CAVI - D
Major Group — Status

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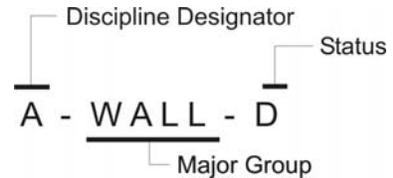
As a default, layers without a status field are new construction. Status fields are appended to the layer name as shown in the example below:

A-WALL	New Walls
A-WALL-D	Walls to be demolished
A-WALL-E	Existing walls to remain

3.6 ANNOTATION LAYERS

Annotation is composed of text, dimensions, drawing borders, detail references, and other elements on CAD drawings that do not represent physical aspects of a project. The major group ANNO designates annotation. Types of annotation are designated as follows:

Layer Name	Description	Color
G-ANNO-AREA-IDEN	Room identification tags	2
G-ANNO-BRKL	Break lines	2
G-ANNO-CNTR	Centerlines	2
G-ANNO-DIMS	Dimensions	2
G-ANNO-ENOT	Editor's Note – Non-Plot	7
G-ANNO-IDEN	Identification Tags (Equip, Devices)	2
G-ANNO-KEYN	Key notes	2
G-ANNO-LEGN	Legends and schedules	3
G-ANNO-MTCH	Match lines	5
G-ANNO-NOTE	Notes	2
G-ANNO-NPLT	Non-plotting information	1
G-ANNO-REDL	Redline	1
G-ANNO-REVS-NOTE	Revisions Triangles	2
G-ANNO-REVS-CLDS	Revision clouds	5
G-ANNO-SECT	Section lines	5
G-ANNO-SUBT	Subtitle (text and line work)	4
G-ANNO-SYMB	Reference symbols	4
G-ANNO-SYMB-ATTB	Reference symbol attributes	2
G-ANNO-TITL	Title text	5
G-ANNO-TTLB	Border and title block	2
G-ANNO-TTLB-LOGO	Client logo	1
G-ANNO-TTLB-TRIM	Paper trim line	1

4 PLOTTING

To obtain consistent plots, it is necessary to create tables that define the relationships between the elements in the drawing file and the printed output. This table represents the mapping of drawing elements to plot elements using the proper pen tables, color tables, and character tables.

The purpose of the plotting guidelines is to allow consistent black and white printed output from a standard color configuration within CAD programs. The plotting guidelines also allow consistent color mapping and data translation between MicroStation and AutoCAD. Hardware adjustments may be required to attain these standards. All construction drawings shall follow these plotting guidelines.

The following output mapping table is standard.

Color	Plotted Line Weight	
	(mm)	(inches)
1, 11, 21, … 51	0.18	0.007
2, 12, 22, … 52	0.25	0.010
3, 13, 23, … 53	0.35	0.014
4, 14, 24, … 54	0.50	0.020
5, 15, 25, … 55	0.70	0.028
6, 16, 26, … 56	0.90	0.035
7, 17, 27, … 57	1.20	0.047
8, 18, 28, … 58	(30% halftone) 0.25	0.010
9, 19, 29, … 59	(30% halftone) 0.35	0.014
10, 20, 30, … 60	(10% halftone) 0.25	0.010
61-254	color	color
255	mask	mask

5 DRAWING SET ORGANIZATION

The system for organizing a drawing set uses series, discipline, and sheet type designators to establish the order of sheets within a drawing set. These designators are the same as those used in layer and file naming as documented in CAD Layer/Level Guidelines and File Naming, respectively.

5.1 DESIGNATORS

5.1.1 Series Designators

The series designator indicates the area or structure that is included in a given series of drawings. Series 00 always designates general drawings. Series numbers 01 through 99 can be used to designate different areas of a site, buildings, or structures in a drawing set or segments of a linear project. The use of alphanumeric series designators is discouraged due to the potential for confusion between the series and discipline designators.

5.1.1.1 Types of Projects

The set content and sheet order has been separated into three different types of projects: single series designator projects, multiple series designator projects, and linear projects.

5.1.1.2 Single Series Designator Projects

Single series designator projects consist of only one structure or area and use a single series designator for all sheets in the drawing set. On these projects, the series designator 00 is used for file naming purposes (see *File Naming*); however, the sheet number shown in the title block does not need to use the series designator. Typical sheet numbers for this type of project include the following:

File Name	Sheet Number	Sheet Title
00G000.xxx	G000	Cover/Title Sheet, Location Maps and Vicinity Maps
00G001.xxx	G001	General Notes, Abbreviations, and Legends
00C101.xxx	C101	Site Paving Plan
00C102.xxx	C102	Site Grading Plan
00S101.xxx	S101	Pump Station Foundation and Floor Plans

5.1.1.3 Multiple Series Designator Projects

Multiple series designator projects consist of multiple structures or areas and use more than one series designator for all sheets in the drawing set. For multiple series designator projects, the series designator is used consistently for both file and sheet naming. An example is as follows:

Series Designator	Series Description
00	General
01	Main Water Treatment Facility
02	Disinfection/Reservoir
03	High Service/Backwash Pump Station
04	Sludge Thickeners

5.1.1.4 Linear Projects

The set content and sheet order for linear projects (such as roadways or pipelines) is currently under development.

5.1.2 Discipline Designators

The discipline designator is used to identify work associated with various disciplines, as explained in CAD Layer/Level Guidelines. Not all disciplines available for layer naming are necessarily used for sheet organization.

5.1.3 Sheet Type Designators

The sheet type designator is a single numeric character used to identify the primary content of a sheet. (See *Sheet Layout* for detailed information on the sheet layout and Drawing Types for a detailed discussion of sheet types.). Sheet type designators are consistent across all disciplines. Whether or not sheet type designators are used in file naming (see *Sheet File Naming/Sheet Number*), the order of sheets in a drawing set shall be as follows:

Sheet Type	Description
0	General (symbol legends, notes, etc.)
1	Plans
2	Elevations
3	Sections
4	Large-Scale Plans
5	Details
6	Schedules and Diagrams
7	User Defined
8	User Defined
9	3D Representations (isometrics, perspectives, photographs)

5.2 SHEET ORDER

Sheets within the drawing sets are organized by discipline following the same hierarchy as shown in Layer/Level Naming Convention. Sheets within a discipline are organized by sheet type as shown in Sheet Type Designators.

5.2.1 Combination of Sheets by Discipline

For projects on which it is determined to be beneficial to combine the work of more than one discipline on a single sheet, the order of sheets shall follow the order established in the table in Discipline Designators. For example, a sheet that combines the process and structural disciplines would be identified as a Structural-Process (U) sheet.

5.2.2 Combination of Sheets within a Discipline Set

On some projects, it may be appropriate to combine sheets within a discipline in order to make the most efficient use of the drawing sheets. In the case of general sheets, combining general notes, abbreviations, and legends is acceptable. When combining different types of sheets within a discipline, the order of sheets shall follow the hierarchy shown in Order of Drawing Sets. For example, a structural sheet that contains structural notes and common details should be identified as "Notes and Details". A process sheet with a plan, details, and photographs should be titled "Plan, Details and Photographs."

The listings in Order of Drawing Sets show the general order of sheets within a drawing set. The sheets listed represent those that may occur in a typical drawing set. The list is not intended to be all inclusive, and not all sheets listed will necessarily be required.

5.3 ORDER OF DRAWING SETS
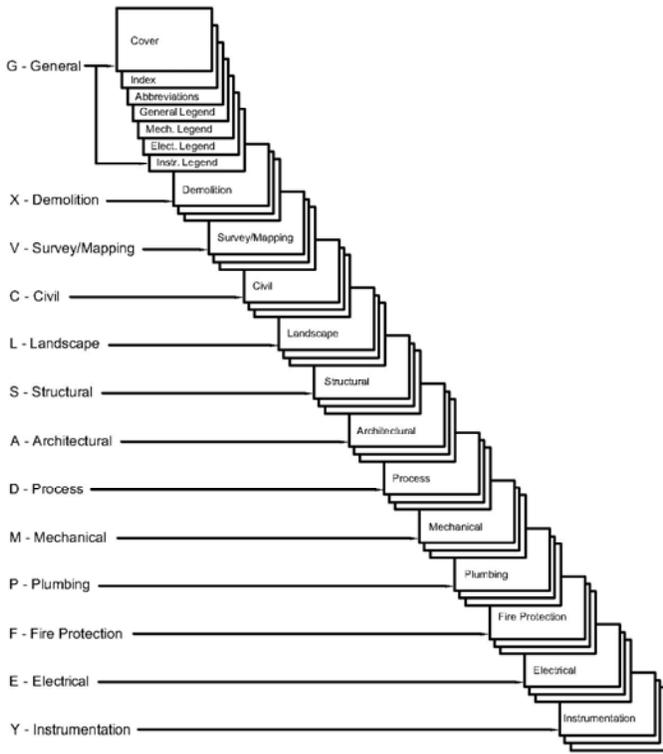
6 FILE NAMING

6.1 BASE/MODEL FILE NAMING

Base/model file names are 11 characters in length. The following format is used for creating base/model file names:

N	N	A	-	A	A	N	N	-	N	N

Series Designation

N	N	A	-	A	A	N	N	-	N	N

Discipline Designator

N	N	A	-	A	A	N	N	-	N	N

Placeholder

N	N	A	-	A	A	N	N	-	N	N

Model Type

N	N	A	-	A	A	N	N	-	N	N

Level/Sequence Designation

N	N	A	-	A	A	N	N	-	N	N

Placeholder/Additional Scale Factor

N	N	A	-	A	A	N	N	-	N	N

Scale Factor

As indicated in the above format, some of the characters are numeric (N), and others are alpha (A). All 11 character spaces, outlined below, must be used. For example, if the plot factor used for the file is 8, then 08 should be entered.

The first two characters are numeric (01-99). They designate an area number that can be used to differentiate between separate buildings or building areas.

The third character is a single letter discipline designator. See *Discipline Designators* for the complete list.

The fourth character is a placeholder and is always a hyphen.

The fifth and sixth characters are letters designating the model type. The following lists the model type options:

BD	Border
BP	Base Plan
CP	Ceiling Plan
DG	Diagram
DT	Detail
EL	Elevation
FD	Foundation Plan
FP	Floor Plan, Fire Protection, Framing Plan
GP	Grading Plan, Grounding Plan
HP	HVAC Plan
LP	Lighting Plan, Landscaping Plan
MS	Miscellaneous System Plan
OP	Orientation Plan
PP	Plumbing Plan, Piping Plan, Power Plan
PR	Profile
SC	Section
SP	Site Plan
XS	Cross Section

The seventh and eighth characters are numeric. The following is an example from an actual project:

Level Designator	Level Description	Applicable Structure
01	Lower Level	All Structures
02	Intermediate Level-Elevation xxx	Series 2-Filter Foundation Plan, Admin. Mezzanine
03	Intermediate Level-Elevation xx	Series 2-Intermediate Piping
04	Ground Level	All Structures
05	Intermediate Level-Elevation xx	Series 2-Intermediate Chemical Unit
06	Roof Level	All Structures
07	Chemical Storage Access	Series 2-Chemical Storage Tanks

The ninth character is normally a hyphen and is a placeholder that makes the name more readable and easier to manage. The hyphen can be replaced with an additional scale factor numeric character if necessary.

The 10th and 11th characters are numeric designators that display the scale factor of text entities.

The following are examples of model file names:

01A-FP01-48.dwg/dgn = Area 01 Architectural Floor Plan of level 01 at a scale of 1/4"=1'-0"

05M-HP03192.dwg/dgn = Area 05 Mechanical HVAC Plan of level 03 at a scale of 1/16"=1'-0"

06D-PP02-96.dwg/dgn = Area 06 Process Piping Plan of level 02 at a scale of 1/8"=1'-0"

6.2 SHEET FILE NAMING/SHEET NUMBER

The following standards shall be used for naming files and numbering sheets:

N	N	A	-	N	N

Series Designation

N	N	A	-	N	N

Discipline Designator

N	N	A	-	N	N

Placeholder/Second Discipline Designator/Sheet Type Designator/Sheet Sequence Number

N	N	A	-	N	N

Sequence Numbers

The first two characters designate an area number or series. This can be used to differentiate between separate buildings or building areas (numeric 01-99).

The third character is the single-letter discipline designator. See *Discipline Designators* for the complete list.

The fourth character is normally a hyphen and is a placeholder that makes the name easier to read. The hyphen can be replaced with an alpha-numeric character, as follows:

➢ A second discipline designator for multi-discipline files (for example, SP for Structural/Process, as in 01SP01)

➢ A sheet type designator, which is a numeric character from 0 to 9 (for example, 2 for elevations, as in 01A201); see *Sheet Type Designators*

➢ A sheet sequence number for use on long linear projects that may need more than 99 sheets (for example, 01C145)

The fifth and sixth characters are sequence numbers within the set.

The general sheets are numbered series 00 (for example, 00G-01), and site work is numbered series 01 (for example, 01C-01).