Inland Empire Utilities Agency

Asset Management Plan

Fiscal Year 2016/17

Acknowledgments

This Asset Management Plan was developed by staff members of the Inland Empire Utilities Agency. The Agency gratefully acknowledges the important contributions of the authors of the various sections of this plan. In particular, the authors of the Asset Management System Summaries put forth a great deal of effort to develop system summaries that are proving to be a valuable tool in guiding asset management decisions.

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Executive Summary

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The Inland Empire Utilities Agency is committed to providing services for its rate payers to reliably meet the business goals approved by the Agency's Board of Directors. This commitment requires the Agency to diligently and carefully manage their assets. Through asset management, the Agency can coordinate decisions and take actions that allow them to meet these business goals at the lowest lifecycle cost.

This Asset Management Plan is intended to be a useful document for those who have a deep understanding of the Agency as well as for those who are only somewhat familiar with it. To meet the needs of both audiences, this plan contains introductory and overview chapters on the Agency's function, service area, business goals, and future growth (Chapters 1 – 4) as well as more detailed information on the Agency's asset valuation, financial projections, and physical assets (Chapters 5 – 7).

The current values for Agency assets are $845 million for replacement and $534 million for depreciation. The various components of these values are summarized in Table 5-1.

The Long-Range Plan of Finance (LRPF) aligns the Agency's financial capacity with long-term service objectives. The LRPF uses forecasts to provide insight into the Agency's future financial capacity so that Agency strategies can achieve long-term sustainability of financial and service objectives. Development of the LRPF is ongoing, with a complete robust and dynamic LRPF model anticipated in summer 2015. Some of the proposed features of the new financial model include extending the scope from 10 to 50 years, execution of multiple "what if" scenarios to highlight the effect of certain variables, and on-screen graphic presentations to more effectively communicate the alternatives and outcomes.

The Agency's physical assets are described in Chapter 7, Asset Management System Summaries, where they are organized according to the following systems:

1. Agency-wide Projects
2. Regional Water Recycling Plant No. 1 (RP-1)
3. Regional Water Recycling Plant No. 2 (RP-2)
4. Carbon Canyon Water Recycling Facility (CCWRF)
5. Regional Water Recycling Plant No. 4 (RP-4)
6. Regional Water Recycling Plant No. 5 (RP-5)
7. Recycled Water Distribution (RW) & Ground Water Recharge (GWR) Systems
8. Inland Empire Regional Composting Facility (IERCF)
9. Agency Lift Stations (LS)
10. Regional Sewer System (RS)
11. Non-Reclaimable Wastewater System (NRW)
12. Agency Laboratory (Lab)
13. Agency Headquarters (HQ)
14. Business (BIZ) & Process Automation Control (PAC) Networks

Each system summary comprises six sections: an asset profile, a capacity profile, an asset rating, key issues, history of key assets, and potential projects. Of particular note is that the system summaries identify both existing and potential projects to address needed rehabilitation, replacement, and upgrades to assets. As such, these summaries provide key information for budgeting and project planning.

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1. Introduction

1.1. Purpose of the Asset Management Plan

The Asset Management Plan presents the physical assets of the Inland Empire Utilities Agency and discusses the funding required to manage these assets to deliver the services expected by customers.

1.2. Full Economic Cost of Infrastructure Service Delivery

The cost of providing infrastructure services depends on the standard, or level of service, required by the Agency and the community. The Agency must show the full cost of providing that level of service so that they can set a realistic level of service based on customer expectations and appropriate service fees. The cost of infrastructure asset services is a function of the lifecycle costs and the current position of the asset in the asset lifecycle, as shown in Figure 1-1.

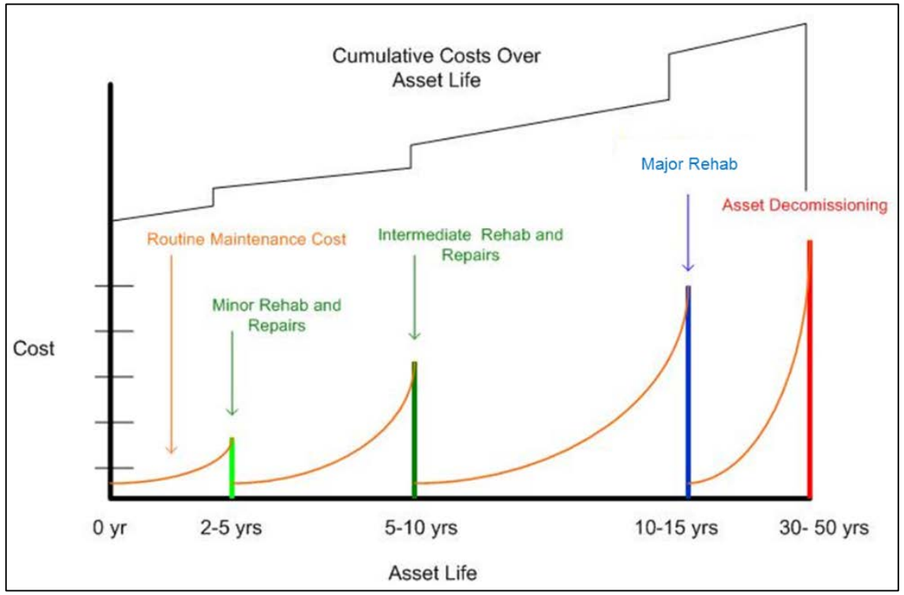

Figure 1-1: Lifecycle Cost

The Agency is better able to make decisions when they consider the lifecycle cost of assets. If costs increase in one area, then a suitable reduction or trade-off must be reflected in another area. For example, in order for the Agency to reduce operating and maintenance cost or business risk exposure, they can either invest capital or improve the offered levels of service.

2. Inland Empire Utilities Agency Overview

2.1. Service Area

The Inland Empire Utilities Agency is a regional wastewater treatment and water agency that provides sewage treatment, biosolids handling, and recycled water to the west end of San Bernardino county. Its 242-square-mile service area includes the cities of Upland, Montclair, Ontario, Fontana, Chino, Chino Hills; the Cucamonga Valley Water District, which services the City of Rancho Cucamonga; and the unincorporated areas of San Bernardino County, including the Chino Agricultural Preserve.

The Agency, a special assessment district, is governed by a five-seat publicly elected Board of Directors. Each director is assigned to one of the five divisions: Division 1 – Upland/Montclair; Division 2 – Ontario/Agricultural Preserve; Division 3 – Chino/ Chino Hills; Division 4 – Fontana; Division 5 – Rancho Cucamonga. The regional technical and policy committees provide information on technical and policy issues and include representatives from each of the contracting agencies.

Five regional water recycling plants are used to treat raw wastewater from the Agency's service area: Regional Water Recycling Plant No. 1 (RP-1), located in the City of Ontario; Regional Water Recycling Plant No. 2 (RP-2), located in the City of Chino; Regional Water Recycling Plant No. 4 (RP-4), located in the City of Rancho Cucamonga; Carbon Canyon Water Recycling Facility (CCWRF), located in the City of Chino; and Regional Water Recycling Plant No. 5 (RP-5), located in the City of Chino.

The Agency has two main service areas: Northern Service Area and Southern Service Area. The area north of Riverside Drive in Ontario is referred to as the Northern Service Area, and the area south of Riverside Drive is the Southern Service Area. The Northern Service Area is about 162 square miles and has two active treatment plants, RP-1 and RP-4, and one decommissioned treatment plant, RP-3. The Southern Service Area has CCWRF, RP-2, RP-5, and the Agency's Administration Headquarters, certified by *Leadership in Energy & Environmental Design*.

Along with these facilities, the Agency maintains and operates a desalter facility in the City of Chino (Chino I Desalter) on behalf of the Chino Basin Desalter Authority and a biosolids composting facility in the City of Rancho Cucamonga (Inland Empire Composting Facility) on behalf of the Inland Empire Regional Composting Authority. The Agency is also the representative of the Metropolitan Water District of Southern California for the contracting agencies. Figure 2-1 shows the Agency service area.

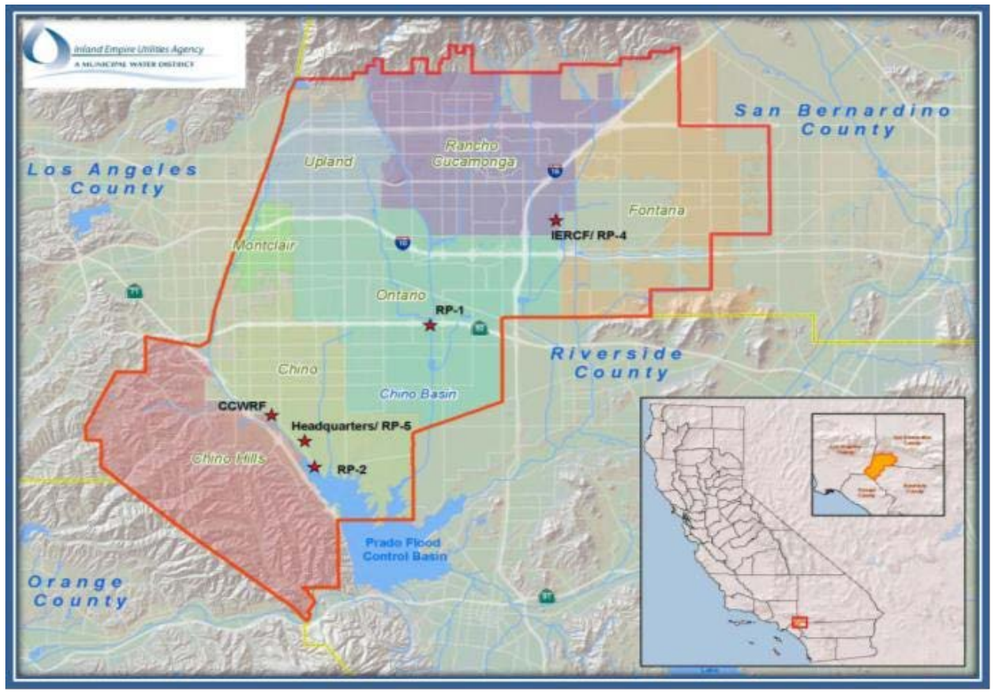

Figure 2-1: Agency Service Area

3. Agency Business Goals

3.1. Background of Agency Policy

Agency policy goals have guided the Agency's decisions and actions in executing their mission, while maintaining their values. Over the last several years, the Agency has categorized these Agency-wide policy goals into nine themes: (1) conservation and water quality, (2) technological innovation, (3) rate stabilization and cost effectiveness, (4) operational and maintenance efficiency, (5) strategic planning and capital implementation, (6) waste management and resource use, (7) interagency relationships and community partnerships, (8) fiscal accountability and regulatory compliance, and (9) staff training, development, and wellbeing. Each budget cycle, these Agency-wide policy goals guide them in developing the capital improvement program, operational budget, and organizational goals and objectives.

As a way to define the Agency's levels of service (LOS), the Agency held several workshops in 2011 with their Board of Directors. The levels of service developed during these workshops focused primarily on the Agency's operational functions. In early 2013, staff recommended that the levels of service be developed into more broad-based business goals. The Agency further decided that to better develop Agency Business Goals they should include input from their stakeholders, which include their Board of Directors, staff, Technical Committee members, and Policy Committee members.

3.2. Purpose of Agency Business Goals

Agency policy goals have guided the Agency's decisions and actions in executing their mission, while maintaining their values. To define the mission, vision, and values, the Agency looked to the needs of their stakeholders and the value of service provided to the public. To develop Agency-wide business goals, the Agency reviewed their existing policy goals and refined these goals according to their current and future needs. The Agency Business Goals sets the framework for developing additional planning documents that will shape and guide the Agency's fundamental decisions and actions over the next several years.

The adopted Agency Business Goals are fundamental to the development of several planning documents, including the Agency Strategic Plan, the Integrated Water Resources Plan, the individual Facility Master Plan Updates, and the Asset Management Plan. For any organization to remain relevant and effective, it must be able to prepare for change and to adapt. As illustrated in Figure 3-1, the Agency Business Goals must be continually evaluated as part of the planning process to ensure that the Agency meets the current and future needs of the region.

Figure 3-1: Relevance of Agency Business Goals to the Planning Process

3.3. Structure of Agency Business Goals

The Agency Business Goals were categorized into six main areas: (1) fiscal responsibility, (2) workplace environment, (3) business practices, (4) water reliability, (5) wastewater management, and (6) environmental stewardship. Within each business goal, the Agency established several objectives to support that business goal. For example, within water reliability, the Agency established the beneficial use of recycled water. For each objective, the Agency developed a commitment to define the level of service that they will provide. For example, the Agency is committed to developing the recycled water infrastructure, so they meet the objective of reusing 50,000 AFY by 2025. The structure of the Agency Business Goals is shown in Figure 3-2.

Figure 3-2: Structure of Agency Business Goals

3.4. Adopted Agency Business Goals

The remainder of this chapter presents the adopted Agency Business Goals, with each business goal presented on a single page.

A. Business Goal: Fiscal Responsibility

The Agency will safeguard their fiscal health through organizational efficiency, adoption of balanced multiyear budgets, and rates that (1) meet full cost-of-service targets, (2) maintain a high-quality credit rating, and (3) preserve established fund balance reserves to effectively address short-term and long-term economic variability. Furthermore, the Agency will provide open and transparent communication to educate member agencies on the Agency's fiscal policies.

1. **Funding & Appropriation (Agency Management; Financial Planning; Accounting; Fiscal Management)**

   ***Objective*:** To appropriately fund operational, maintenance, and capital investment costs.
   ***Recommended Commitment*:** The Agency will adopt service rates and fees that fully support the costs of service and provide a reliable and steady flow of operating revenue to support all operational expenses, capital replacement, and debt service costs. In addition, the Agency will ensure that service rates and fees support their goal to sustain high-quality commitment levels.

2. **Budget Planning (Agency Management; Financial Planning; Accounting; Fiscal Management)**

***Objective*:** To forecast as accurately as possible costs for operation, repair and replacement, capital improvement, and debt service in an effort to provide financial stability for the Agency and member agencies.
***Recommended Commitment*:** The Agency will provide multiyear forecast for costs of operation, repair and replacement, capital investment, and debt service to support the Agency's Board and member agencies' adoption of multiyear budgets and rates, enhancing the Agency's dependability and stability.

3. **Reserves (Financial Planning; Accounting; Fiscal Management)**

   ***Objective*:** To preserve fund reserves that sustain the Agency's long-term fiscal health and high-quality credit rating and that ensure their ability to effectively address economic variability.
   ***Recommended Commitment*:** The Agency will adopt financial policies to establish and preserve fund reserves above legally or contractually mandated levels so that they can maintain commitment levels. In addition, the Agency will support short- and long-term funding requirements. The Agency will also sustain their long-term fiscal health and high-quality credit rating to reduce future borrowing costs.

4. **Creditworthiness (Financial Planning; Accounting; Fiscal Management)**

   Objective: To sustain a high-quality credit rating and debt-service-coverage ratio to safeguard the Agency's fiscal health and reduce future borrowing costs.
   Recommended Commitment: The Agency will reinstate their credit rating to AAA by FY 2017/18 to reduce borrowing costs anticipated for expanding and improving existing facilities required to meet future growth in their service area.

B. Business Goal: Workplace Environment

The Agency is committed to providing a positive workplace environment by recruiting, retaining, and developing a highly skilled team dedicated to their mission, vision, and values.

1. **Mission, Vision, and Values (All Agency Staff and Board)**

   ***Objective*:** To uphold Agency Business Goals, objectives, and commitment levels that support and advance the Agency's mission, vision, and values.
   ***Recommended Commitment*:** The Agency will require the highest standard of ethical conduct from all Agency staff, promoting prudent leadership, integrity, collaboration, open communication, respect, accountability, high quality, passion, and efficiency.

2. **Employer of Choice (Human Resources; Agency Management)**

   ***Objective*:** To be an employer of choice.
   ***Recommended Commitment*:** The Agency will provide a work environment that will attract and retain highly skilled, motivated, professional, and committed employees.

3. **Training (Agency Management; Human Resources)**

   ***Objective*:** To provide employees with state-of-the-art skills and knowledge to meet current and anticipated Agency needs.
   ***Recommended Commitment*:** The Agency will facilitate and provide opportunities for staff to further their personal and professional development in support of maintaining a highly skilled workforce.

4. **Staff Safety (Safety; Human Resources; Agency Management)**

   ***Objective*:** To promote and ensure a safe, healthy work environment to protect employees and stakeholders.
   ***Recommended Commitment*:** The Agency will have no more than one day of lost time because of work-related illness or injury per 1,000 days worked.

C. Business Goal: Business Practices

The Agency is committed to applying ethical, fiscally responsible, and environmentally sustainable principles to all aspects of business and organizational conduct.

1. **Efficiency and Effectiveness (All Departments)**

   ***Objective*:** To promote standards of efficiency and effectiveness in all Agency business practices and processes.
   ***Recommended Commitment*:** The Agency will integrate lean techniques to evaluate their current business practices and processes and will identify ways to improve the quality, cost, and value of their services to the member agencies and the public.

2. **Customer Service (All Departments)**

   ***Objective*:** To provide excellent customer service that is cost-effective, efficient, innovative, and reliable.
   ***Recommended Commitment*:** The Agency will respond to member agencies and meet the Member Agencies' expectation for enhanced value-added services. The Agency will solicit stakeholder feedback on performance and goal alignment each year.

3. **Regional Leadership and Community Relations (Agency Management; Planning; Engineering)**

   ***Objective*:** To cultivate a positive and transparent relationship with stakeholders to enhance quality of life, preserve heritage, and protect the environment.
   ***Recommended Commitment*:** The Agency will partner with stakeholders on common issues to create and implement integrated and innovative solutions, minimize duplication of efforts, and support education and outreach to the public. Furthermore, the Agency will incorporate member agencies and regional water agencies into their various related projects and programs to achieve a transparent and broader regional representation.

4. **Policy Leadership (Agency Management; Planning; Engineering)**

   ***Objective*:** To effectively guide, advocate, and campaign for the development of policies and legislation that benefit the region that the Agency serve.
   ***Recommended Commitment*:** The Agency will promote a collaborative approach to develop positions on policies, legislation, and regulations that affect Agency policy objectives.

D. Business Goal: Water Reliability

The Agency is committed to developing and implementing an integrated water resource management plan that promotes cost-effective, reliable, efficient, and sustainable water use along with economic growth within the Agency's service area.

1. **Water Use Efficiency and Education (Planning; Engineering; Public Information)**

   ***Objective*:** To promote water-use efficiency through public education to enhance water supplies within the region and exceed state goals for reduction in per capita water use within the Agency's service area.
   ***Recommended Commitment*:** The Agency will reduce water use in their service area to less than 200 gallons per capita per day by 2018.

2. **New Water Supplies (Planning; Engineering)**

   ***Objective*:** To support member agencies and regional water agencies, the Agency will develop reliable, drought-proof, and diverse local water resources and supplemental water supplies to reduce dependence on imported water supplies.
   ***Recommended Commitment*:** The Agency will promote efforts to reduce demand for imported water during dry and normal years and to store imported water into the Chino Groundwater Basin during wet years. In addition, The Agency will support maximizing the beneficial use of existing water infrastructure, while meeting future increased demands through investment in local water resources, supplemental water supplies, and conservation efforts.

3. **Recycled Water (Planning; Engineering; Operations & Maintenance)**

   ***Objective*:** To support maximizing the beneficial reuse of recycled water to enhance reliability and to reduce dependence on imported water.
   ***Recommended Commitment*:** The Agency will finish developing a recycled-water infrastructure and will support the member agencies in achieving reuse of 50,000 AFY by 2025.

4. **Groundwater Recharge (Planning; Engineering; Operations & Maintenance)**

   ***Objective*:** To maximize all sources of groundwater recharge.
   ***Recommended Commitment*:** The Agency will support the recharge of all available stormwater and maximize the recharge of recycled water within the Chino Groundwater Basin. Furthermore, the Agency will pursue the purchase and storage of cost-effective supplemental water supplies.

E. Business Goal: Wastewater Management

The Agency will develop master plans for Agency systems and manage and construct these systems to ensure that when expansion planning is triggered, designs and construction can be completed to meet regulatory and growth needs in an expeditious, environmentally responsible, and cost-effective manner.

1. **Capacity (Planning; Engineering; Construction Management)**

   ***Objective*:** To maintain capacity within systems and facilities to meet essential service demands and to protect public health and environment.
   ***Recommended Commitment*:** The Agency will ensure that systems are managed and constructed so that 90 percent of capacity is never exceeded.

2. **On-Time Construction (Engineering; Construction Management)**

   ***Objective*:** To ensure capital projects are designed and implemented in a timely and economically responsible manner.
   ***Recommended Commitment*:** The Agency will design and construct facilities through efficient project management to ensure that 80 percent of projects are completed on schedule and 90 percent of projects are on budget.

3. **Biosolids Management (Operations & Maintenance)**

   ***Objective*:** To manage all Agency-produced biosolids in a US EPA compliant, fiscally prudent, and environmentally sustainable manner.
   ***Recommended Commitment*:** The Agency will ensure that 95 percent of the capacity of the Inland Regional Compost Facility is used, that all biosolids produced by the Agency are treated at this facility, that Agency solids generation is minimized through efficient dewatering operations, and that all compost is marketed for beneficial use.

4. **Energy Management (Planning; Engineering; Operations & Maintenance)**

   ***Objective*:** To optimize facility energy use and effectively manage renewable resources to achieve peak power independence, contain future energy costs, achieve statewide renewable energy, distribute generation and greenhouse-gas reduction goals, and provide for future rate stabilization.
   ***Recommended Commitment*:** The Agency will achieve peak power independence by 2020 by implementing renewable projects, energy management agreements, and operational efficiencies.

F. Business Goal: Environmental Stewardship

The Agency is committed to the responsible use and protection of the environment through conservation and sustainable practices.

1. **Regulatory Compliance (Compliance; Operations & Maintenance)**

   ***Objective*:** To comply with all federal, state, and local laws at each Agency facility.
   ***Recommended Commitment*:** The Agency will have no more than two notices of violation annually from the State Water Resources Control Board, Air Quality Management District, or Non-Reclaimable Waste System for all Agency-owned and operated facilities.

2. **Good Neighbor Policy (Compliance; Operations & Maintenance)**

   ***Objective*:** To control odors at all Agency facilities for the purpose of improving the environment and being a good neighbor to the local community.
   ***Recommended Commitment*:** The Agency will perform a quarterly odor-monitoring assessment to develop actual and acceptable baseline odor thresholds. Acceptable baseline thresholds will be used to measure treatment plant performance and drive necessary capital improvements.

3. **Response and Complaint Mitigation (Compliance; Operations & Maintenance)**

***Objective*:** To investigate any environmental issue or complaint received at any Agency facility and to respond appropriately and promptly.
***Recommended Commitment*:** The Agency will immediately respond to any event that threatens public health and safety and will respond within five working days to any non-emergency complaint or suggestion.

4. **Environmental Responsibility (Agency Management; Planning; Engineering)**

   ***Objective*:** To strive to implement actions that enhances or promotes environmental sustainability and preservation of the region's heritage.
   ***Recommended Commitment*:** The Agency will consider and assess environmental sustainability, public use, and heritage preservation options for all programs and projects.

4. Future Demand and Growth

4.1. Wastewater Flow Projection

The Agency conducts wastewater flow forecasts annually, deriving the forecast from three components: (1) historical wastewater flow trends; (2) per capita or per dwelling-unit wastewater-generation factors; and (3) expected future growth numbers provided by contracting agencies. Using these projections, the Agency determines future demands on their facilities and anticipates needed modifications to Regional Water Recycling Plants (RWRP).

Based on analyses of the three components, the Agency has made ten-year flow projections for each of their RWRPs and for the service area as a whole. The Agency then compares the projected flows to current and future-planned plant capacities, presenting alternative scenarios that reflect possible diversions, bypasses, and recycle streams. For these forecasts, the "tributary area flow" is defined as raw wastewater flow from the service area that is a natural tributary to a particular RWRP without pumps, diversion, or bypasses. In contrast, the "treated influent flow" is the actual flow that is received and treated at the RWRP. The treated influent flow is different from the tributary area flow because the RWRPs are interconnected, allowing some of the tributary flow to be re-routed between plants. In addition, treated influent flow includes the recycle streams generated during solids processing that are sent back to the plant's headworks for additional treatment.

4.2. Wastewater Flow Trends

Figure 4-1 illustrates the Agency's historical wastewater flow and the total wastewater for all facilities combined. In FY 2013/14, the average raw wastewater flow treated was 52.2 MGD. Since FY 2006/07, the Agency's wastewater flows have declined by about 10 percent (similar to other local agencies). However, even though wastewater flows declined, the Agency has been able to increase the amount of recycled water supplied to users. The Agency has done so by using the San Bernardino Avenue lift station and the Montclair lift station to route additional raw wastewater to the recycling plants in the Northern Service Area, where the system has been expanded and where groundwater recharge basins are located.

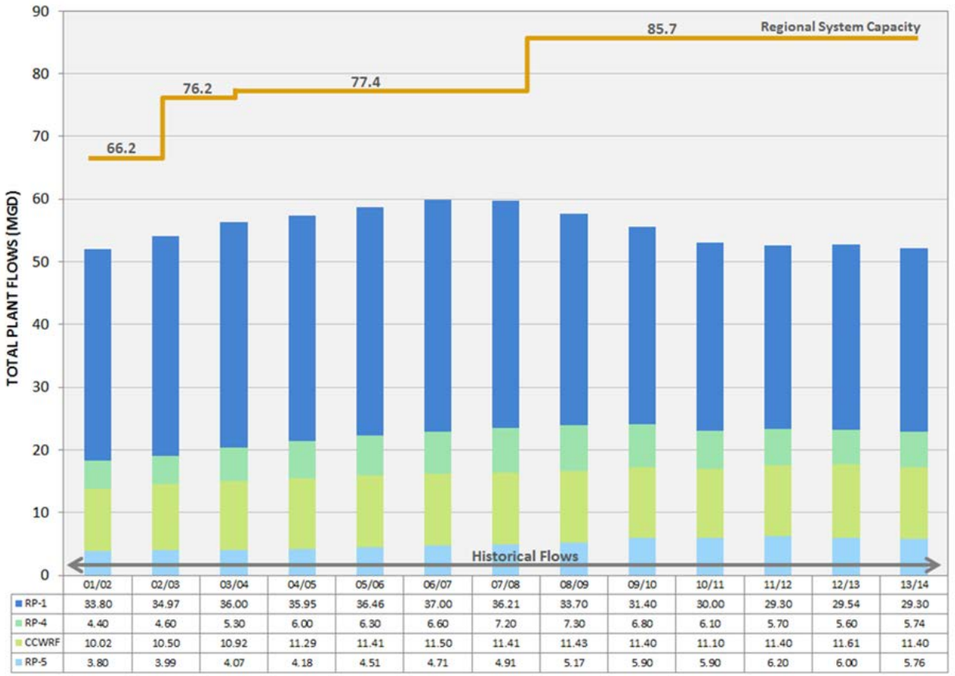

Figure 4-1: Regional Plant Wastewater Flow History

5. State of the Assets Summary

5.1. Asset Valuation

The replacement and depreciated values for Agency assets are summarized in Table 5-1, as of June 30, 2015.

Table 5-1: Agency Replacement and Depreciated Values

Asset Group	Acquisition Value	Book Value (Depreciated Value)	Book Value / Replacement Value
Land	$ 14,067,873.90	$ 14,067,873.92	100%
Land Improvements	$ 29,863,056.27	$ 19,655,404.02	66%
Wells/Basins	$ 5,373,717.45	$ 4,562,367.83	85%
Collection, Outfalls & Transfer Lines	$ 123,643,101.33	$ 54,747,518.06	44%
Interceptors, Tie-Ins	$ 36,721,245.30	$ 26,752,207.69	73%
Recycled Water System	$ 135,233,756.03	$ 118,105,651.63	87%
Reservoirs, Basins, Ponds	$ 119,404,396.97	$ 92,425,181.39	77%
Treatment Plants, Pump Stations	$ 241,119,196.30	$ 135,013,310.18	56%
Plant Office Buildings	$ 30,759,436.93	$ 19,537,811.06	64%
Office Facilities	$ 12,076,618.82	$ 9,367,777.90	78%
Equipment	$ 196,794,592.75	$ 103,733,406.58	53%
Office Furniture & Fixtures	$ 2,812,579.64	$ 275,327.15	10%
Autos & Trucks	$ 3,942,531.16	$ 887,252.17	23%
Computer Software	$ 10,937,114.29	$ 4,691,205.13	43%
CSDLAC Capacity Rights	$ -	$ -	0%
SAWPA Capacity Rights	$ 12,467,002.13	$ 6,072,253.39	49%
MWD Connections	$ 198,891.13	$ 21,878.04	11%
Corps of Engineers Connections	$ 43,489.41	$ 17,041.85	39%
Contributions - LAND	$ 48,075.86	$ 29,646.78	62%
Organizational Costs	$ 1,939,804.67	$ 1,287,790.50	66%
Total	**$ 977,446,480.34**	**$ 611,250,905.27**	**63%**

6. Long-Term Asset Management

6.1. Long-Range Plan of Finance (LRPF) Model

The Long-Range Plan of Finance (LRPF) aligns the Agency's financial capacity with long-term service objectives. The LRPF uses forecasts to provide insight into the Agency's future financial capacity so that Agency strategies can achieve long-term sustainability of financial and service objectives. Actions taken in the short-term can have implications over multiple years. By projecting financial trends over a long period, the Agency can better anticipate and prepare for necessary adjustments and reduce any sudden impact to its stakeholders and operations. This projection allows for the most cost-effective funding strategy for supporting operations and capital requirements that are in line with established policies and goals of the Agency. As outlined in the FY 2011/12 LRPF, the Agency's financial policies are to

- Maintain programs that are self-supported through user fees and charges;
- Levy moderate rate increases to support program requirements;
- Employ cost containment measures that will ensure achievement of debt-coverage ratio targets recommended by the Board of Directors;
- Maintain adequate fund balances consistent with bond covenant requirements; and
- Minimize the Agency's borrowing costs.

Development of the LRPF is ongoing, and it is anticipated in fall 2016. Some of the proposed features of the new financial model include extending the scope from 10 to 30 years, execution of multiple "what if" scenarios to highlight the effect of certain variables, and on-screen graphic presentations to more effectively communicate the alternatives and outcomes.

This chapter will be developed further in subsequent Asset Management Plans to present results of modeling work.

7. Asset Management System Summaries

7.1. Introduction

To assemble a comprehensive description of assets, the Agency developed summaries of each asset management system. These summaries provide the Agency with a useful tool to determine those assets that are most critical to focus on. The Agency assets are organized according to the following twelve systems.

1. Agency-wide Projects
2. Regional Water Recycling Plant No. 1 (RP-1)
3. Regional Water Recycling Plant No. 2 (RP-2)
4. Carbon Canyon Water Recycling Facility (CCWRF)
5. Regional Water Recycling Plant No. 4 (RP-4)
6. Regional Water Recycling Plant No. 5 (RP-5)
7. Recycled Water Distribution (RW) & Ground Water Recharge (GWR) Systems
8. Inland Empire Regional Composting Facility (IERCF)
9. Agency Lift Stations (LS)
10. Regional Sewer System (RS)
11. Non-Reclaimable Wastewater System (NRW)
12. Agency Laboratory (Lab)
13. Agency Headquarters (HQ)
14. Business (BIZ) & Process Automation Control (PAC) Networks

When appropriate, systems have been divided into subsystems to aid in the logical presentation of information. For example, the regional water recycling plants have been divided into the following treatment process subsystems.

- Preliminary Treatment
- Primary Treatment
- Secondary Treatment
- Tertiary Treatment
- Solids Treatment
- Dewatering Treatment
- Auxiliary Systems

The Recycled Water & Ground Water Recharge Systems have been divided into the following pressure zone subsystems.

- 800-foot pressure zone
- 930-foot pressure zone
- 1050-foot pressure zone
- 1158-foot pressure zone
- 1299-foot pressure zone
- 1630-foot pressure zone (east and west)

Each summary has been developed by engineers with extensive operations experience to ensure that the systems have been thoroughly evaluated and the critical assets identified.

7.2. Structure of Asset Management System Summaries

The Asset Management System Summaries have been developed with a common base structure, providing a foundation for their continued use and development. The summaries are updated to reflect the current condition of each system. Each system summary follows the structure described below, beginning with a schematic, followed by a project summary table, and culminating in a summary sheet or sheets.

- **System Schematic** – Displays a schematic representation of the system.
- **Project Summary Table for System** – Lists the existing projects relating to the system along with yearly budget allocations over a ten-year period. Please note that Agency departments will individually budget for routine replacement and rehab of system assets, and most of these budgets items will not be summarized in the project summary tables.
- **Subsystem Summaries** – Describes the subsystem of a given system on a single 11 x 17-inch sheet divided into the following six sections:
    - Asset Profile – Describes the assets and their primary functions.
    - Capacity Profile – Describes the key capacity-design values for assets in terms of average flow requirements.
    - Asset Ratings – Presents a summary score on a 1 (best) to 5 (worst) scale, based on the current performance of the asset. The standards for the scoring scale are defined in Appendix A.
    - Key Issues – Lists treatment process and equipment issues (deficiencies) based on performance data and Operations and Maintenance Department Staff knowledge and will indicate which existing project will address the issue. If an issue is not being addressed by an existing project, then the need for a potential project will be noted within the key issue description.
    - History of Select Assets – Provides dates of past capital improvement project activity and of planned or completed condition-assessment reports.
    - Potential Projects – Lists potential projects to consider for addressing deficiencies not being addressed by existing projects.

7.3. Future Development of Asset Management System Summaries

The Agency will continue to maintain, update, and expand Asset Management System Summaries for future Asset Management Plans. The Asset Management System Summary for the Regional Sewer System could only be partially developed for this Asset Management Plan and will be developed further in the future.

7.4. Asset Management System Summaries

This section starts with Table 7-1 that summarizes Agency-wide projects relating to multiple systems—that is, those not included in project tables for individual systems—followed by the Asset Management System Summaries.

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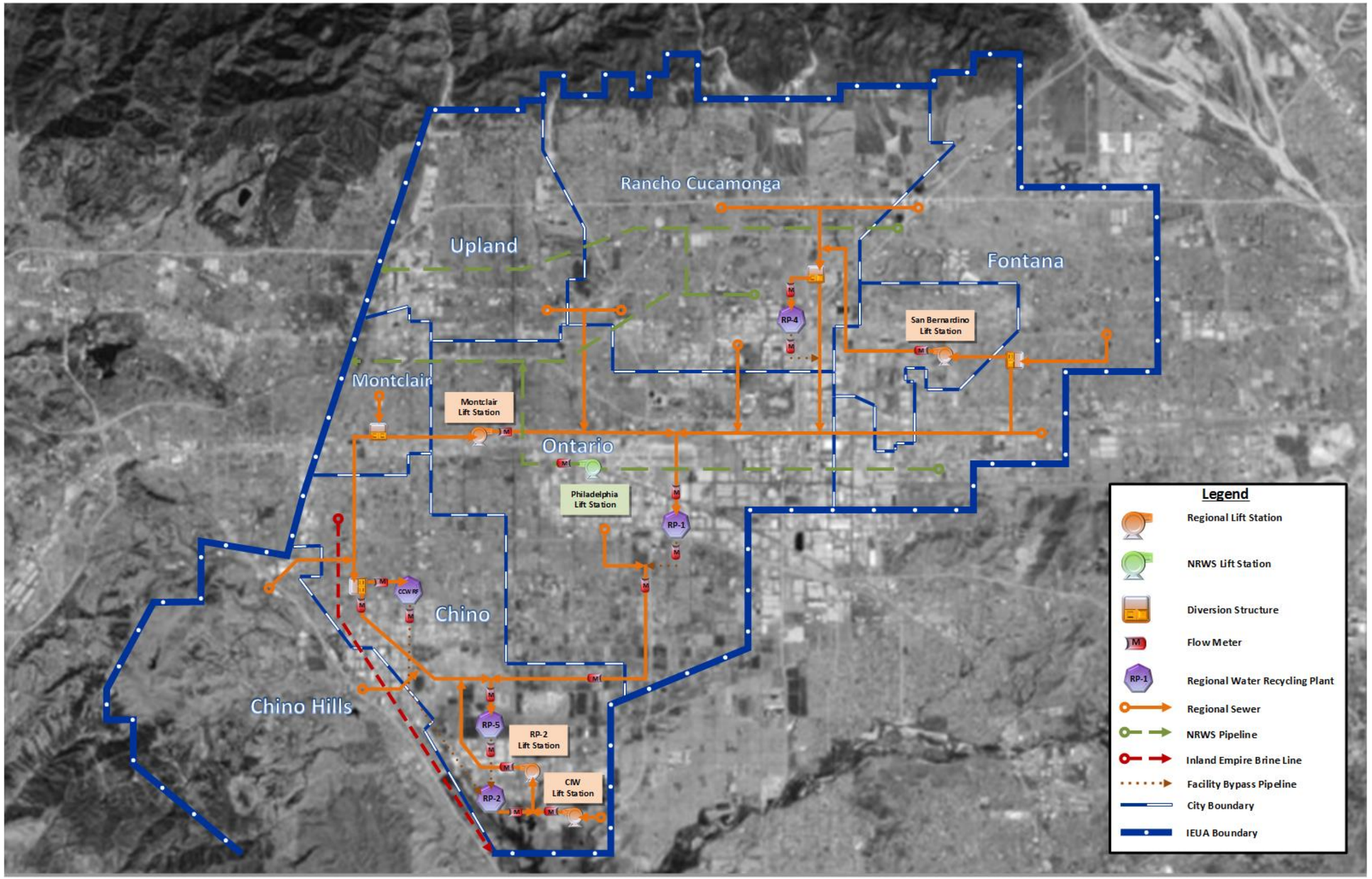

Figure 7-1: Agency-wide – Schematic

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Table 7-1: Agency-wide Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN17021	RC On-Call Operations & Maintenance Support	Repair and replace sewer collection system manhole frames and covers.	RC	OM	250,000	-	-	-	-	-	-	-	-	-	***250,000***
2	CP16001	Regional Plant Facilities Aesthetics	Most of the Agency's buildings and paved structures are aging and require periodic rehab or repairs. This project will ensure buildings and structures for each facility is properly maintained.	RO	OM	80,000	40,000	-	-	-	-	-	-	-	-	***120,000***
3	CW17003	RC OE Projects FY 16/17	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	50,000	-	-	-	-	-	-	-	-	-	***50,000***
4	CW18003	RC OE Projects FY 17/18	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	50,000	-	-	-	-	-	-	-	-	***50,000***
5	CW19003	RC OE Projects FY 18/19	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	-	50,000	-	-	-	-	-	-	-	***50,000***
6	CW20003	RC OE Projects FY 19/20	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	-	-	50,000	-	-	-	-	-	-	***50,000***
7	CW21003	RC OE Projects FY 20/21	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection,	RC	OM	-	-	-	-	50,000	-	-	-	-	-	***50,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			and closeout for office engineering projects related to sewer connections and modifications.													
8	CW22003	RC OE Projects FY 21/22	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	-	-	-	-	50,000	-	-	-	-	***50,000***
9	CW23003	RC OE Projects FY 22/23	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	-	-	-	-	-	50,000	-	-	-	***50,000***
10	CW24003	RC OE Projects FY 23/24	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	-	-	-	-	-	-	50,000	-	-	***50,000***
11	CW25003	RC OE Projects FY 24/25	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	-	-	-	-	-	-	-	50,000	-	***50,000***
12	CW26003	RC OE Projects FY 25/26	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	-	-	-	-	-	-	-	-	-	50,000	***50,000***
13	EN16012	Capital Project's Document Management Program	Purchase, implementation, and training of Construction Management documentation program.	GG	CC	175,000	-	-	-	-	-	-	-	-	-	***175,000***
14	EN16070	Agency-wide Pump Efficiencies Improvements		RO	RP	1,260,000	15,000	-	-	-	-	-	-	-	-	***1,275,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
15	EN17003	Aeration System Improvements	Agencywide aeration system improvements. TS currently evaluating membranes: to be completed in 2015. Once complete, will implement across all facilities.	RC	CC	-	-	-	-	-	-	250,000	3,000,000	3,000,000	-	***6,250,000***
16	EN17018	RC Emergency O&M Projects FY 16/17	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	600,000	-	-	-	-	-	-	-	-	-	***600,000***
17	EN17019	RO Emergency O&M Projects FY 16/17	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention.	RO	OM	600,000	-	-	-	-	-	-	-	-	-	***600,000***
18	EN17022	RO On-Call Operations & Maintenance Support	Funds special projects request from operations and maintenance departments and will have a value of less than $100,000.00	RO	OM	250,000	-	-	-	-	-	-	-	-	-	***250,000***
19	EN17026	RO Safety Operations & Maintenance Support	Funds special projects request from operations and maintenance departments and will have a value of less than $100,000.00	RO	OM	250,000	-	-	-	-	-	-	-	-	-	***250,000***
20	EN17027	RC Safety Operations & Maintenance Support	Repair and replace sewer collection system manhole frames and covers.	RC	OM	250,000	-	-	-	-	-	-	-	-	-	***250,000***
21	EN17034	Agency-wide Lighting Improvements, Phase 2		RO	CC	1,385,000	15,000	-	-	-	-	-	-	-	-	***1,400,000***
22	EN17050	Septic Conversion PDR	First package of septic conversion PDR	RC	CC	200,000	800,000	-	-	-	-	-	-	-	-	***1,000,000***
23	EN18018	RC Emergency O&M Projects FY 17/18	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities	RC	OM	-	600,000	-	-	-	-	-	-	-	-	***600,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.													
24	EN18019	RO Emergency O&M Projects FY 17/18	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	OM	-	600,000	-	-	-	-	-	-	-	-	***600,000***
25	EN19018	RC Emergency O&M Projects FY 18/19	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	-	-	600,000	-	-	-	-	-	-	-	***600,000***
26	EN19019	RO Emergency O&M Projects FY 18/19	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with	RO	OM	-	-	600,000	-	-	-	-	-	-	-	***600,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			yearly allocations to be able to handle these issues each fiscal year.													
27	EN20018	RC Emergency O&M Projects FY 19/20	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	-	-	-	600,000	-	-	-	-	-	-	***600,000***
28	EN20019	RO Emergency O&M Projects FY 19/20	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	OM	-	-	-	600,000	-	-	-	-	-	-	***600,000***
29	EN21018	RC Emergency O&M Projects FY 20/21	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	-	-	-	-	600,000	-	-	-	-	-	***600,000***
30	EN21019	RO Emergency O&M Projects FY 20/21	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency	RO	OM	-	-	-	-	600,000	-	-	-	-	-	***600,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.												
31	EN22018	RC Emergency O&M Projects FY 21/22	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	-	-	-	-	-	600,000	-	-	-	-	***600,000***
32	EN22019	RO Emergency O&M Projects FY 21/22	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	OM	-	-	-	-	-	600,000	-	-	-	-	***600,000***
33	EN23018	RC Emergency O&M Projects FY 22/23	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each	RC	OM	-	-	-	-	-	-	600,000	-	-	-	***600,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			fiscal year under different project numbers.													
34	EN23019	RO Emergency O&M Projects FY 22/23	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	OM	-	-	-	-	-	-	600,000	-	-	-	***600,000***
35	EN24018	RC Emergency O&M Projects FY 23/24	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	-	-	-	-	-	-	-	600,000	-	-	***600,000***
36	EN24019	RO Emergency O&M Projects FY 23/24	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	OM	-	-	-	-	-	-	-	600,000	-	-	***600,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
37	EN25018	RC Emergency O&M Projects FY 24/25	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	-	-	-	-	-	-	-	-	600,000	-	***600,000***
38	EN25019	RO Emergency O&M Projects FY 24/25	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	OM	-	-	-	-	-	-	-	-	600,000	-	***600,000***
39	EN26018	RC Emergency O&M Projects FY 25/26	The project will allow Engineering and Construction Management to address and fund unforeseen emergency repairs and modifications to regional facilities during a given fiscal year. The project will be budgeted with annual allocations to address unforeseen regional issues each fiscal year under different project numbers.	RC	OM	-	-	-	-	-	-	-	-	-	600,000	***600,000***
40	EN26019	RO Emergency O&M Projects FY 24/26	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and	RO	OM	-	-	-	-	-	-	-	-	-	600,000	***600,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.													
41	EP16001	RP1/RP2 Digester Cleaning Project	Cleaning and rehabilitation of one digester per year (remove debris, inspect, repair corrosion, replace valves and seals, and maintain related equipment).	RO	OM	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	***5,000,000***
42	EP16002	Major Facilities Repair/ Replacements	Agency-wide annual R&R of major equipment (pumps, heat exchangers, compressors, etc.)	RO	EQ	400,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	***5,800,000***
43	EP17004	Agency-Wide Vehicle Replacement	Vehicle replacement	GG	CC	600,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	***1,950,000***
44	EP17005	Agency-Wide Condition Assessments	Agency-wide annual work to inspect and assess the condition of Agency assets (e.g., temporary pumping, scaffolding, material testing, professional fees, etc.)	RO	OM	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	***2,500,000***
45	IS14001	IEUA Website Consultant	Updating and maintaining website per contract.	GG	OM	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	***42,000***
46	IS17002	RACO Alarm System Replacement		RO	RP	61,100	-	-	-	-	-	-	-	-	-	***61,100***
47	PA15002	Agency Wide Coatings and Paving	Agency-wide annual maintenance for coatings and paving	GG	OM	200,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	***1,100,000***
48	PA15008	Major Asset Repair/Replace	Agency-wide annual R&R of major assets (buildings, vehicles, etc)	GG	OM	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	***500,000***
49	PA17006	Agency-Wide Aeration Panel Replacement	Aeration Panel Replacement	RO	OM	2,400,000	2,500,000	500,000	-	-	-	500,000	1,200,000	2,500,000	-	***9,600,000***
50	PL16010	CEQA Document Impl. of WWFMP,IRP RWPS		RC	CC	250,000	-	-	-	-	-	-	-	-	-	***250,000***
51	PL16015	Septic to Sewer Feasibility Study		RC	OM	350,000	-	-	-	-	-	-	-	-	-	***350,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
52	PL16016	Sewer Use Fee Evaluation	Professional services contract to evaluate the calculation and collection of sewer connection fees	RC	OM	350,000	-	-	-	-	-	-	-	-	-	***350,000***
53	PL17001	RO Planning Documents		RO	OM	250,000	-	250,000	-	250,000	-	250,000	-	250,000	-	***1,250,000***
54	WR15022	Water Use Assessments	Carryover project of drought fee funds.	WW	OM	188,382	-	-	-	-	-	-	-	-	-	***188,382***
55	WR16001	Water Softener Removal Rebate Program	Rebate program which offers up to $2000 for residents to remove their self-regenerating water softener.	WC	OM	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	***600,000***
56	WR16002	CBWCD Landscape Audit & Monitoring Program	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	40,000	-	-	-	-	-	-	-	-	-	***40,000***
57	WR16004	Garden in Every School	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	78,128	-	-	-	-	-	-	-	-	-	***78,128***
58	WR16006	Residential Landscape Device Retrofit - Lg Landscape	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	200,000	-	-	-	-	-	-	-	-	-	***200,000***
59	WR16007	Residential Rebate Incentives	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	RE	114,185	-	-	-	-	-	-	-	-	-	***114,185***
60	WR16008	CII Rebate Incentives	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	200,000	-	-	-	-	-	-	-	-	-	***200,000***
61	WR16009	National Theater for Children	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	60,000	-	-	-	-	-	-	-	-	-	***60,000***
62	WR16010	Reg Educational Outreach Activities	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	16,000	-	-	-	-	-	-	-	-	-	***16,000***
63	WR16011	Freesprinklernozzles.com Program	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	243,750	-	-	-	-	-	-	-	-	-	***243,750***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
64	WR16013	Sponsorships & Public Outreach	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	80,000	-	-	-	-	-	-	-	-	-	***80,000***
65	WR16015	Residential Landscape Training Classes	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	15,000	-	-	-	-	-	-	-	-	-	***15,000***
66	WR16017	Residential Pressure Regulation Program	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	400,000	-	-	-	-	-	-	-	-	-	***400,000***
67	WR16018	IEUA WUE Model Update & Workshops	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	4,500	-	-	-	-	-	-	-	-	-	***4,500***
68	WR16019	Technology Based Software	Carryover project of drought fee funds.	WW	OM	150,000	-	-	-	-	-	-	-	-	-	***150,000***
69	WR16020	Budget Based Water Rates	Carryover project of drought fee funds.	WW	OM	450,000	-	-	-	-	-	-	-	-	-	***450,000***
70	WR16022	Water reliability and sustainability Projects (IRP Phase II)		WW	OM	-	100,000	100,000	100,000	100,000	1,544,000	1,544,000	1,544,000	1,544,000	1,544,000	***8,120,000***
71	WR16027	Residential Education, Surveys and Controller Upgrade Program	Due to the nature of rebate programs, budget must be carried over to finish applications from FY15/16	WW	OM	300,000	-	-	-	-	-	-	-	-	-	***300,000***
72	WR17002	CBWCD Landscape Audit & Monitoring Program	FY16/17 budget for annual conservation program.	WW	OM	40,000	-	-	-	-	-	-	-	-	-	***40,000***
73	WR17004	Garden in Every School	FY16/17 budget for annual conservation program.	WW	OM	45,000	-	-	-	-	-	-	-	-	-	***45,000***
74	WR17006	Residential Landscape Device Retrofit - Lg Landscape	FY16/17 budget for annual conservation program.	WW	OM	200,000	-	-	-	-	-	-	-	-	-	***200,000***
75	WR17007	Residential Rebate Incentives	FY16/17 budget for annual conservation program.	WW	RE	100,000	-	-	-	-	-	-	-	-	-	***100,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
76	WR17008	CII Rebate Incentives	FY16/17 budget for annual conservation program.	WW	OM	100,000	-	-	-	-	-	-	-	-	-	***100,000***
77	WR17009	National Theater for Children	FY16/17 budget for annual conservation program.	WW	OM	60,000	-	-	-	-	-	-	-	-	-	***60,000***
78	WR17010	Reg Educational Outreach Activities	FY16/17 budget for annual conservation program.	WW	OM	16,000	-	-	-	-	-	-	-	-	-	***16,000***
79	WR17011	Freesprinklernozzles.com Program	FY16/17 budget for annual conservation program.	WW	OM	243,750	-	-	-	-	-	-	-	-	-	***243,750***
80	WR17013	Sponsorships & Public Outreach	FY16/17 budget for annual conservation program.	WW	OM	80,000	-	-	-	-	-	-	-	-	-	***80,000***
81	WR17015	Residential Landscape Training Classes	FY16/17 budget for annual conservation program.	WW	OM	15,000	-	-	-	-	-	-	-	-	-	***15,000***
82	WR17017	Residential Pressure Regulation Program	FY16/17 budget for annual conservation program.	WW	OM	400,000	-	-	-	-	-	-	-	-	-	***400,000***
83	WR17018	Member Agency Locally Implemented Programs	FY16/17 budget for annual conservation program.	WW	OM	100,000	-	-	-	-	-	-	-	-	-	***100,000***
84	WR17019	Residential Education, Surveys and Controller Upgrade Program	FY16/17 budget for annual conservation program.	WW	OM	300,000	-	-	-	-	-	-	-	-	-	***300,000***
85	WR17020	IEUA WUE Model Update & Workshops	FY16/17 budget for annual conservation program.	WW	OM	4,500	-	-	-	-	-	-	-	-	-	***4,500***
86	WR17022	Ag Conservation		WW	OM	100,000	-	-	-	-	-	-	-	-	-	***100,000***
87	WR18XX	Conservation Programs	Total conservation project budget estimated at $1.125 M/Y from IEUA budget with grants to bring total annual budget up to $3M/Y. individual project line items will be developed out of this item	WW	OM	-	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	***11,250,000***
88	WR18XX	Conservation Programs-grant share	Total conservation project budget estimated at $1.125 M/Y from IEUA budget with grants to bring total annual budget up to $3M/Y.	WW	OM	-	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	***11,250,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			individual project line items will be developed out of this item													
89	EN17052	RP-1 and RP-4 Safety Improvements	Safety Improvements related to Block Walls at RP-4 and RP-1 have been identified by the Agency's' Health and Safety and Facilities Management groups	RO	CC	760,000	-	-	-	-	-	-	-	-	-	***760,000***
90	PL19001	Purchase Existing Solar Installations	Purchase existing Sunpower solar facilities, conversion from existing PPA	RC	CC	-	-	7,500,000	-	-	-	-	-	-	-	***7,500,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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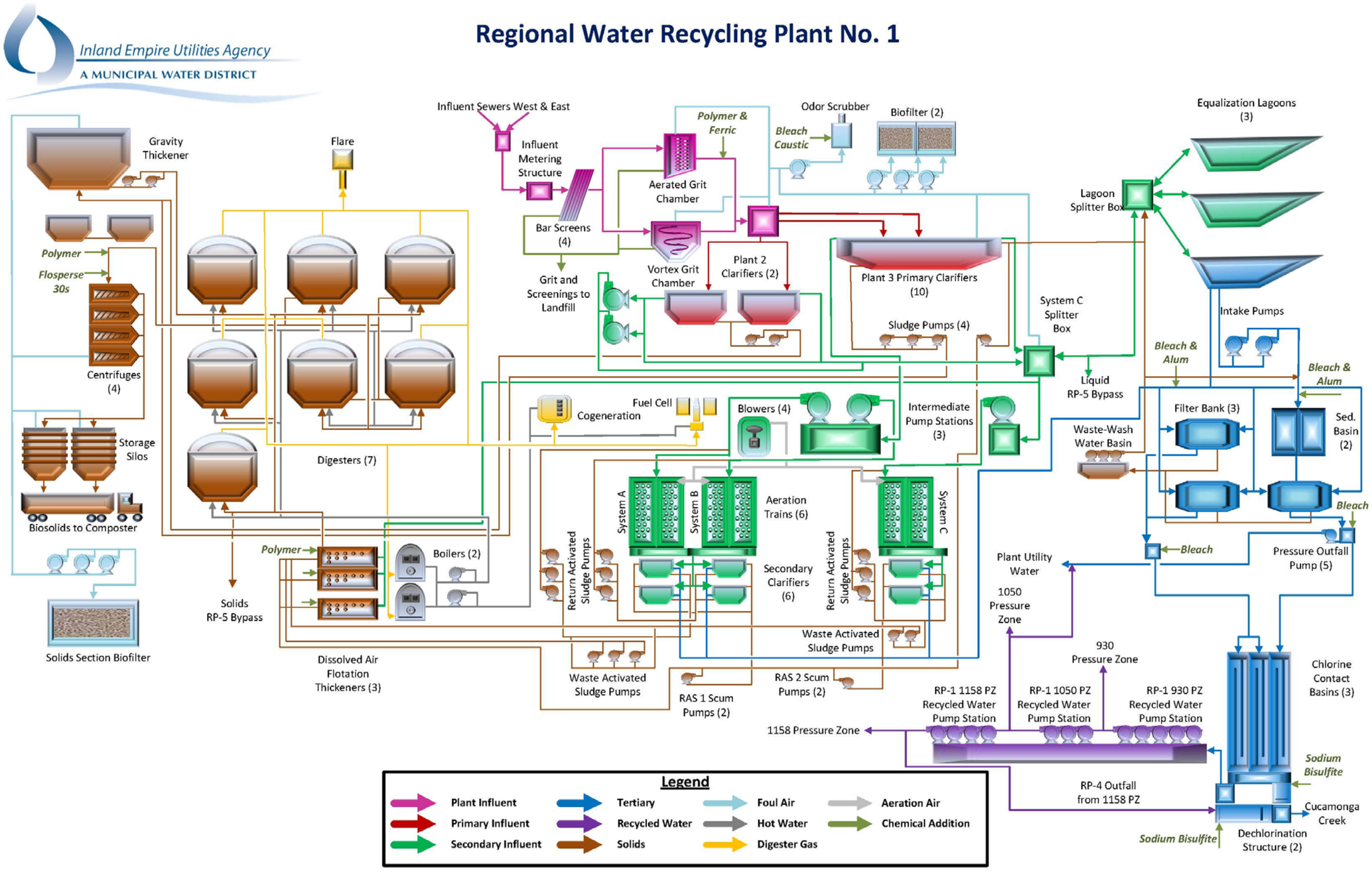

Figure 7-2: Regional Water Recycling Plant No. 1 (RP-1) – Schematic

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Table 7-2: Regional Water Recycling Plant No.1 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2017	2025	2026	Ten-Year Total
1	EN11039	TP-1 Disinfection Pump Improvements	Engineering project to upgrade dosing facilities at OES and NES to allow full post filtration chlorination.	RC	RP	225,000	969,000	-	-	-	-	-	-	-	-	***1,194,000***
2	EN13048	RP-1 Power System Upgrades	The project will deliver a single line diagram for RP-1 and will be provide a PDR for additional power feed based on the total electrical load (current +2 year from now). In addition, the project will evaluate the possible viable options to add a back-up power source and the requirements for back-up source.	WC	CC	200,000	600,000	400,000	15,000	-	-	-	-	-	-	***1,215,000***
3	EN14019	RP-1 Headworks Primary and Secondary Upgrade	Engineering project to comprehensively rehab and upgrade the Preliminary Treatment Process. Gate Replacement. Start design in FY15/16.	RC	CC	1,500,000	3,425,000	-	-	-	-	-	-	-	-	***4,925,000***
4	EN14020	RP-1 Sludge Thickening Upgrades	Project to upgrade the sludge thickening processes for primary and secondary sludge. Start design in FY18/19.	RC	CC	-	-	-	-	-	-	-	-	-	500,000	***500,000***
5	EN15012	RP-1 East Primary Effluent Pipe Rehab	Rehab of the east primary effluent piping between the rectangular primary clarifiers and the Intermediate Pump Station wet well. Also includes the IPS structure updates	RO	CC	500,000	700,000	620,000	-	-	-	-	-	-	-	***1,820,000***
6	EN15013	RP-1 TWAS and Primary Effluent Piping Re	Replace failing TWAS and Primary Effluent piping	RO	CC	120,000	395,000	-	-	-	-	-	-	-	-	***515,000***
7	EN16024	RP-1 Mixed Liquor Return Pumps	Install Mixed Liquor Return pumps to the six aeration trains at RP-1.	RC	EQ	2,850,000	2,835,000	15,000	-	-	-	-	-	-	-	***5,700,000***
8	EN16025	RP-1 Expansion PDR	As recommended by the WWFMPand also needs to include the Headworks assessment, GT, Odor Control, Septage Dump Station	RC	CC	350,000	-	-	-	-	-	-	-	-	-	***350,000***
9	EN16051	RP-1 Utility Water Flow Meter & Control	Add a Cla-Val and four valves to the in-plant recycled water turn-out. Add control and wiring and provide meter ranging for an in-line meter on the Cla-Val.	WC	CC	260,000	-	-	-	-	-	-	-	-	-	***260,000***
10	EN17042	Digester 6 and 7 Roof Repairs	Repair cracks to the roof of digesters 6 and 7. This work should include the development of a performance standard and or metric for "gas	RO	CC	400,000	3,400,000	-	-	-	-	-	-	-	-	***3,800,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2017	2025	2026	Ten-Year Total
			tightness" of tanks, pipes, and other components of digester gas systems.													
11	EN17044	RP-1 Power Reliability Building Controls Upgrades	Upgrade and replace the out of date PLCs for the emergency generation system at RP-1. Equipment is over 20 years old and is critical to the facility. 5 Panels complete construction	RC	CC	350,000	1,150,000	-	-	-	-	-	-	-	-	***1,500,000***
12	EN17045	RP-1Filter Valve Replacement	Replace leaking Filter Backwash valves	RO	CC	-	150,000	500,000	-	-	-	-	-	-	-	***650,000***
13	EN17047	RP-1 Dewatering Silo/Conveyor Safety Repairs	Provide additional safety repairs to the dewatering building's silo and conveyor system by installing protective grating along sections of the inclined conveyors for fall protection and widen access walkways on the south silo to prevent unsafe conditions when accessing and maintaining equipment.	RO	CC	231,000	-	-	-	-	-	-	-	-	-	***231,000***
14	EN17048	RP-1 Dewatering Vertical Conveyor Repair	Remove and replace eight sections of the outside housing on the vertical conveyors. Sludge material is leak through the housing because the inside housing walls are worn through by the screw conveyors. The existing screws are in constant contact with the insides of the sealed house wall. This project will replace the sectional housing walls with a protective support bar to prevent the screw conveyor from making contact with the inside wall.	RO	CC	375,000	-	-	-	-	-	-	-	-	-	***375,000***
15	EN18004	RP-1 IPS System Improvements		RC	CC	-	250,000	750,000	-	-	-	-	-	-	-	***1,000,000***
16	EN18006	RP-1 Flare Improvements	This project will install two new fully redundant flares at RP-1.	RC	CC	600,000	2,600,000	800,000	-	-	-	-	-	-	-	***4,000,000***
17	EN20006	RP-1 Digester Mixing Upgrade		RC	CC	-	-	-	-	-	-	-	250,000	500,000	-	***750,000***
18	EN24001	RP-1 Liquid Treatment Expansion	Repair and replace sewer collection system manhole frames and covers.	RC	CC	-	-	-	-	-	-	-	5,700,000	5,700,000	19,650,000	***31,050,000***
19	EN24002	RP-1 Solids Treatment Expansion		RC	CC	-	-	-	-	-	-	-	1,617,500	1,617,500	4,450,000	***7,685,000***
20	EN26026	RP-1 Headworks Rehab	Engineering project to comprehensively rehab and upgrade the Preliminary Treatment Process. Bar Screens and Grit/Sand Removal System. Start design in FY18/19.	RC	RP	-	-	-	-	-	-	-	-	-	500,000	***500,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2017	2025	2026	Ten-Year Total
21	EP17003	RP-1 Training Room	Transition RP-1 paint booth to training room	GG	CC	200,000	-	-	-	-	-	-	-	-	-	***200,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (O&M), Reimbursable Project (RE), or Capital Replacement Project (RP)

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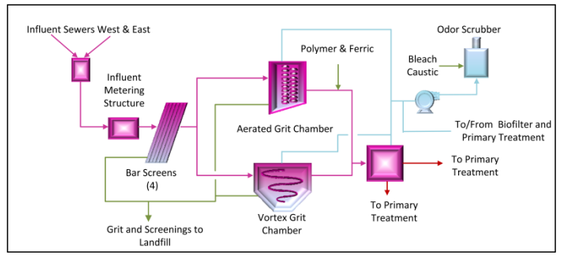
Asset Management System Summary – RP-1
Preliminary Treatment Process

1. Asset Profile



Influent Channel and Metering Station
Two main trunk lines (east and west) bring influent sewer flows into RP-1 through the influent structure with gates to divert flow to either of two Parshall flume flow meters. Flow from the influent metering station enters a common channel before the bar screening structure. A septage dump station for private haulers is located upstream of the screening equipment.

Screening Equipment
Gates divert flow to six channels, four mechanical bar screens, one manual bar screen, and one bypass channel. The 5/8-inch spaced bar screens capture large debris, protecting downstream processes. A mechanical climber rake collects debris and drops the screenings on the screening conveyance/disposal system. Liquid flow passes through the bar screen into a common channel that feeds the grit removal systems.

Aerated Grit System
Flow enters a series of three square aerated grit chambers (AGC) through five gates. Three air-lift pumps, supplied by two air blowers, pump collected grit up to the grit washing/disposal system. Air from the blowers also provides air for agitation. Liquid flows pass through gates to a common channel and then to the headworks splitter box.

Vortex Grit System
Flow from the bar screens are directed to the influent of the circular vortex grit chamber. A paddle mixer pushes flow in a circular path; grit collects at the bottom, where it is pumped to the grit washing/disposal system.

Grit Washing/Disposal System
Grit pumped from the AGC and vortex grit chamber enter the Headworks Building where it flows to two grit classifiers. The grit sinks to a submerged screw that pulls the grit out of the water and drops grit into two screw conveyors. The conveyors lift and transport the grit to a roll-off bin. The excess liquid spills out of the grit classifiers and is directed back to the bar screen structure effluent channel.

Screenings Conveyance/Disposal System
Screenings collected by the bar screens are transported by a conveyor and dropped into a hydraulic compactor. The compactor compresses the collected screenings, squeezes out excess water, and pushes the screenings to the roll-off bin.

Ferric Chloride System
Ferric chloride is added to the liquid flow after grit removal to enhance primary treatment and to control sulfide emissions. Ferric chloride can also be valved to the digesters. The ferric station consists of a truck filling station, storage tank, three chemical metering pumps, and associated piping.

Polymer System
Polymer is added the liquid flow after grit removal to enhance primary treatment. The polymer system includes a tote stand, chemical metering pump, mixing chamber, and associated piping.

Headworks Splitter Box
The headworks splitter box receives flow from both grit systems, the bar screens structure bypass, and the overflow from the solids section gravity thickener. Flow can be diverted to the Plant 3 rectangular clarifiers or to the Plant 2 circular clarifiers for primary treatment.

Odor Scrubber
Foul air collected in the preliminary and primary treatment processes is forced through the odor scrubber tower with plastic porous media, where a solution of bleach and caustic soda trickles against the air flow to oxidize hydrogen sulfide and other compounds. The odor scrubber is used to supplement the foul air treatment provided by the biofilter.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	44 MGD	
Influent Channel and Metering Station		
East Sewer	42-inch	Per Unit
West Sewer	42-inch	
Parshall Flumes	2 @ 55 MGD	
Gates	2 units	
Septage Station	1 unit	
Screening Equipment		
Mechanical Screen	4 @ 27.5 MGD	Per Unit
Manual Screen	2 @ 27.5 MGD	
Gates	15 units	
Aerated Grit System		
Chambers	1 @ 44 MGD	
Pumps	3 @ 150 gpm	Per Unit
Blowers	2 @ 360 scfm	Per Unit
Gates	10 units	
Vortex Grit System		
Chamber	1 @ 20.4 MGD	
Pump	1 @ 300 gpm	
Gates	4 units	
Grit Washing/Disposal System		
Classifiers	2 @ 300 gpm	Per Unit
Conveyors	2 @ 3 wet tons per hr	Per Unit
Screening Conveyance/ Disposal System		
Conveyor	5.0 hp	
Compactor	5.0 hp	
Ferric Chloride System		
Tank	13,000 gallons	
Pumps	3 @ 37.4 gph	Per Unit
Polymer System		
Pump	1 @ 4.5 gph	
Headworks Splitter Box		
Gates	3 units	
Odor Scrubber		
Blowers	2 @ 8,000 scfm	Per Unit
Valves	2 units	> 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Channel and Metering Station	4	2	3	3
Screening Equipment	3	2	3	3
Aerated Grit System	5	4	4	3
Vortex Grit System	4	4	4	5
Grit Washing/Disposal System	5	5	4	5
Screening Conveyance/Disposal System	2	3	3	3
Ferric Chloride System	3	3	3	3
Polymer System	2	3	3	3
Headworks Splitter Box	4	5	3	3
Odor Scrubber	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues

Influent Channel and Metering Station
The east isolation gate leaks. In addition, there is currently no odor control directly tied into the influent channel. A condition assessment planned for 2015 may identify the need for odor control. Project EN14019 will evaluate and may replace the isolation gates.

The septage dump station is out of date and requires manual sampling of the septic flow prior to dumping. A potential project should evaluate a modern septage dump system at the most appropriate location within the Agency. The next major capital project within the preliminary treatment process may address this issue.

Screening Equipment
The bar spacing allows a significant amount of debris to reach downstream processes. A substantial number of the gates are broken and inoperable. In addition, the foul air containment leaks, as evident by internal smoke tests. Project EN14019 will evaluate and may replace the broken and inoperable gates.

Aerated Grit System
The AGC allows large amounts of grit to pass through to downstream processes. Many of the gates are broken and inoperable. A structural condition assessment identified significant concrete degradation in the vapor space of the AGC. Project EN14019 will replace the broken gates and upgrade or replace the AGC.

Vortex Grit System
The vortex grit chamber is not operated because the grit piping clogs frequently when the chamber is in operation. A potential maintenance project will rehab this system. Project EN14019 will repair/replace broken gates and install new grit pumps and piping.

Grit Washing/Disposal
Recent failures of the classifier and the conveyors screws have indicated excessive wear from heavy use. The availability of spare parts results in parts from both systems being pieced together to have one working system. Project EN14019 will rehab this system.

Screenings Conveyance/Disposal System
Most main pieces of equipment were replaced in 2015 through a Maintenance Project.

Ferric Chloride System
The ferric chloride system operates effectively, but the equipment is approaching the end of its useful life. Project EN14019 will rehab this system.

Polymer System
This system will be rehabbed by Project EP14002 or EN14019.

Headworks Splitter Box
Concrete in the vapor space is showing significant deterioration.

Odor Scrubber
The odor scrubber is a viable alternative if the primary section biofilter needs to be taken offline.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Influent Channel and Metering Station	1977 1987	
Screening Equipment	1977 1987	
Aerated Grit System	1987	2015
Vortex Grit System	1987	
Grit Washing/Disposal System	1977 1987 2009	2015
Screening Conveyance/Disposal System	1977 1987 2015	2015
Ferric Chloride System	1987 1992	
Polymer System	2015	2015
Headworks Splitter Box	1977	2015
Odor Scrubber	1996	

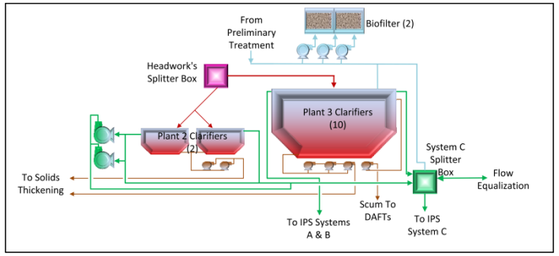
* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Preliminary Treatment	RP-1 Headworks Rehab	Project to comprehensively rehab and upgrade the Preliminary Treatment Process. Bar Screens and Grit/Sand Removal System.
Grit Washing Rehabilitation	RP-1 Grit Washing and Disposal Upgrades	Upgrade and repair the existing grit washer and conveyor
Influent Channel and Metering Station	Septage Dump System	Provide a modernized septage dump system at the most appropriate location within the Agency.

Asset Management System Summary – RP-1
Primary Treatment Process

1. Asset Profile



Plant 3
Influent Channel
Two pipes from the headwork's splitter box divert flow to the Plant 3 influent channel. Each clarifier has three gates from the influent channel to allow flow to enter each clarifier. The channel is aerated with air from blowers to keep solids in suspension.

Primary Clarifiers
The rectangular clarifiers consist of chain-driven flights, which push settled solids and collected floatables to a sludge hopper for pumping or to scum troughs for solids processing. Each clarifier consists of three or four effluent troughs with V-notch weirs. The clarifiers are covered for odor control.

Effluent Channel
Each effluent trough discharges into a common channel. Two legs with valves direct flow from the effluent channel to the intermediate pump system A&B wet well or the system C splitter box. The effluent channel is covered and has odor control ducting to the biofilter.

Sludge Pumping System
A series of valves opens and closes to direct solids collected in each clarifier to three pumps, sending flow to solids thickening processes.

Scum System
Scum collected by the primary clarifiers is directed to a common wet well. Periodically a pump will pull from the wet well and pump to solids thickening processes.

Plant 2
Primary Clarifiers
Flow from the headworks splitter box is directed through a flow meter and a series of valves/gates to two circular clarifiers. The clarifiers are center feed with a rotating arm to push solids to a sludge hopper and floatables to the scum removal trough. Effluent from the clarifiers is piped to the Intermediate pump station wet wells. These clarifiers are put in service when flow needs to be diverted from Plant 3, but are not used during normal operation.

Solids Pumping System
Solids collected from the Plant 2 clarifiers are directed to two pumps. The pumps send flow to solids thickening processes in the solids section.

Trickling Filter Pumps
Effluent from the west Plant 2 clarifier can be pumped via the trickling filter pumps to the system C splitter box. The effluent collects in an old trickling filter wet well and is pumped through a series of splitter boxes until it reaches the system C splitter box.

Odor Control System
Three blowers pull foul air from the Plant 3 primary clarifiers, system C splitter box, and the preliminary treatment section, forcing the air through two beds of carbon rich media to allow for the biological consumption of hydrogen sulfide and other compounds.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Plant 3	33.6 MGD	
Influent Channel Blowers	 3 @ 25 hp	 Per Unit
Primary Clarifiers Flight Drives Gates	10 @ 2,400 gpd/ft^2 3,500 ft^2 5 @ 0.5 hp 34 units	Per Unit Per Unit
Effluent Channel Bladder Valves	 2 units	
Sludge Pumping System Pumps	 3 @ 412 gpm 30/20/20 hp	 Per Unit
Scum Pumping System Pump	 1 @ 130 gpm 7.5 hp	 Per Unit
Plant 2	15.1 MGD	
Primary Clarifiers Gates Valve	2 @ 2,400 gpd/ft^2 7,854 ft^2 4 units 1 unit	Per unit
Sludge Pumping System Pumps	 2 @ 175 gpm 15 hp	
Trickling Filter Pumps	2 @ 9,000 gpm 100 hp	
Odor Control System Media Blowers Valves	 9,293 ft^2 4.5 ft depth 2 @ 11,700 scfm 40 hp 1 @ 12,205 scfm 50 hp 15 units	 Per Unit > 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant 3				
Influent Channel	3	3	3	3
Primary Clarifiers	3	1	3	3
Effluent Channel	4	3	3	3
Sludge Pumping System	3	3	3	3
Scum Pumping System	3	4	4	3
Plant 2				
Primary Clarifiers	3	3	3	3
Sludge Pumping System	3	3	3	3
Trickling Filter Pumps	3	3	3	3
Odor Control System	2	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues

Plant 3
Influent Channel
The influent channel operates effectively; however, floatable solids have a tendency to collect in the channel, requiring collections crew to make semi-regular cleanings of the channel.

Primary Clarifiers
Small pieces of the chain/flight system break requiring significant maintenance activities to repair. The chain and flight of all the Primary Clarifier are experiencing extensive failures. Remedies are currently being installed as part of project EN08023.

Effluent Channel
Half of the effluent channel was recoated and the western bladder valve was replaced through Project EN08023.05. Recent evaluations of underground piping to the intermediate pump stations have indicated extensive corrosion. Project EN15012 will replace the east primary effluent piping, including structure upgrades.

Sludge Pumping System
No issues require special attention.

Scum System
The scum wet well has limited controls and instrumentation. The floatables form a raft in the wet well, and the scum pump suction pulls from the bottom of the scum box. The floatables are required to be vactored regularly. The scum collection system is currently being retrofitted to a tipping trough under project EN08023; however, EN15020 will address scum accumulation in the wet well is not being addressed; a future project is required.

Plant 2
Primary Clarifiers
The clarifiers are not covered to control odors and have a limited capacity. The current flow meter for the system is a temporary strap-on flow meter placed after the original flow meter and headwork's isolation gate failed. Because of the limited use of these clarifiers, the cost-effectiveness of a rehab will have to be evaluated.

Solids Pumping System
No issues require special attention.

Trickling Filter Pumps
The equipment is left over from an abandoned trickling filter system. Although it's not the original intent, the equipment is used occasionally to increase capacity of the Plant 2 system.

Odor Control System
The biofilter was constructed on top of the old trickling filter infrastructure and has experienced leaks in the past. .

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant 3		
Influent Channel	1977 1982	Planned 14/15
Primary Clarifiers	1977 1982 2007 2013-2015	
Effluent Channel	1977 1982 2014	
Sludge Pumping System	1977 1982	
Scum System	1977 1982 2013	
Plant 2		
Primary Clarifiers	1966 1987 1997	Planned 15/16
Solids Pumping System	1966 1985 1987	
Trickling Filter Pumps	1966	
Odor Control System	2008 2013	

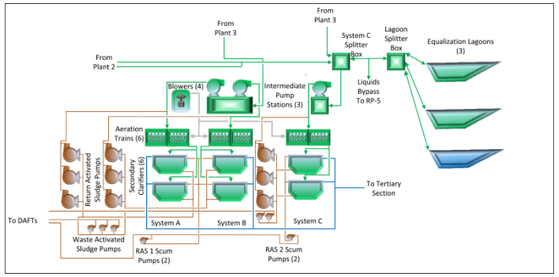
* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RP-1
Secondary Treatment Process

1. Asset Profile



Intermediate Pumps Stations
Primary effluent flows to the intermediate pump station wet wells. The wet wells can divert high flows to the flow equalization system. Three sets of pumps (System A – 3 pumps, System B – 3 pumps, System C – 4 Pumps) pump to each designated aeration system.

Flow Equalization System
Primary effluent can flow to three flow equalization lagoons to hold flows and introduce them back to the intermediate pump station at a later time. Flow is diverted to the three lagoons via motorized gates. Two lagoons have floating aerators to slow the rate at which the stored flows become septic.

Activated Sludge System
The three activated sludge systems consist of two aeration trains each (six total). Influent gates divert a combined flow of primary effluent and return activated sludge to each train. Each train consists of four basins. The first basin mixes flows with a paddle mixer. The next three basins can add air via the fine bubble diffusion system supplied by four large blowers with automated valves to control the dissolved oxygen concentrations such that biochemical oxygen demand and total inorganic nitrogen removals are optimized.

Secondary Clarifiers
Effluent from two aeration trains flows in a common channel to two circular clarifiers per system (six in total). Each peripheral feel clarifier has a rotating sludge and skimmer arm. Solids settle out of the liquid flow and are pushed to a center sludge hopper for pumping. Liquid overflows the V-notched weirs.

Return Activated Sludge (RAS) Pumping System
The settled sludge in the secondary clarifiers is pumped back to the influent of the aeration system as return activated sludge (RAS) to mix with primary effluent from the intermediate pump station. The organisms in the RAS must be returned to sustain the biological process. Also, the RAS flow returns nitrate for further removal. Each system has three dedicated pumps (nine in total). The return activated sludge and wasted activated sludge pumps are located inside two separate buildings: RAS 1 (Systems A and B) and RAS 2 (System C).

Waste Activated Sludge (WAS) Pumping System
The waste activated sludge (WAS) pumping system controls the activated sludge (biomass) concentrations in the aeration system. A portion of the settled solids from the secondary clarifiers is pumped out of the secondary system to solids processing as WAS.

Scum Pumping System
Scum collected by the skimmer arm of the secondary clarifiers is routed to two scum wells, where it is pumped out of the system to solids processing.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	50 MGD	
Intermediate Pump Station		
System A Pumps	3 @ 4,200 gpm 60 hp	Per Unit
Valves	4 units	> 18-inch
System B Pumps	3 @ 5,600 gpm 75/60/60 hp	Per Unit
Valves	5 units	> 18-inch
System C Pumps	4 @ 5,600 gpm 75 hp	Per Unit
Valves	5 units	> 18-inch
Gates	5 units	
Flow Equalization System		
Lagoon 1	1 @ 5.8 MG	
Lagoon 2	1 @ 6.2 MG	
Lagoon 3	1 @ 10.3 MG	
Gates	3 units	
Activated Sludge System	2 @ 14.1 MGD 1 @ 15.9 MGD	
Blowers	4 @ 13,426 scfm 700 hp 9.25 psig	Per Unit
System A & B		
Trains	4 @ 1.91 MG	Per Unit
Depth	17.8 ft	
Mixers	4 @ 15 hp	Per Unit
System C		
Trains	2 @ 1.96 MG	Per Unit
Depth	17.8 ft	
Mixers	2 @ 15 hp	Per Unit
Air Panels	142 per train	
Gates	22 per train	
Valve	1 per system	> 18-inch
Valves (air)	6 units	> 18-inch
Secondary Clarifiers		
System A & B	4 @ 700 gpd/ft^2 11,310 ft^2	Per Unit
System C	2 @ 700 gpd/ft^2 13,273 ft^2	Per Unit
RAS Pumping System		
RAS 1: Pumps	6 @ 5,600 gpm 60 hp	Per Unit
RAS 2: Pumps	3 @ 5,600 gpm 60 hp	Per Unit
Valves	40 units	> 14-inch
WAS Pumping System		
RAS 1: Pumps	3 @ 450 gpm 7.5 hp	Per Unit
RAS 2: Pumps	2 @ 600 gpm 7.5 hp	Per Unit
Scum Pumping System		

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RAS 1	2 @ 400 gpm	Per Unit
RAS 2	2 @ 200 gpm	Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Intermediate Pump Stations	4	3	4	3
Flow Equalization System	4	3	3	3
Activated Sludge System	3	4	4	4
Secondary Clarifiers	3	4	3	3
RAS Pumping System	4	4	3	3
WAS Pumping System	3	3	3	3
Scum Pumping System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues

Intermediate Pump Stations
EN18004 will install new variable frequency drive technology to replace older clutch drives. The System C primary effluent splitter box concrete is corroding, and the gates are not functional. A potential engineering project is needed to address this area. Project EN15012 will replace the east primary effluent piping, including structure upgrades to System C.

Flow Equalization System
Recent crack-repair projects have eliminated the cracks in one of the lagoons. Operations and Maintenance staff monitor the status of cracks in the lagoons. Project EN19007 will provide odor control for the flow equalization system or will provide the ability to equalize secondary effluent. Several of the water cannons used to wash the lagoons leak.

Activated Sludge System
Project 16024 will address upgrades to improve nutrient removal (e.g., mixed-liquor recirculation, baffeling and anoxic mixers). A potential Maintenance Project will replace the diffuser membranes on all six systems. Concrete walls show signs of cracking.

Secondary Clarifiers
Concrete walls show signs of cracking.

Return Activated Sludge (RAS) Pumping System
Backup pumps are powered by VFD reducing process efficiencies and often have issues when called to run. A potential maintenance project will evaluate and repair these pumps.

Waste Activated Sludge (WAS) Pumping System
The waste activated sludge piping clogs frequently. Flush water is provided; however, the plugging reduces process efficiency. Project EN15020 will address this issue.

Scum Pumping System
The scum discharge piping combines with flow from primary Plant 3 scum pumping system. When all the pumps are running at the same time, the pump station output decreases dramatically, reducing process reliability. This issue will be addressed by Project EN15020.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Intermediate Pump Stations	1977 1987	
Flow Equalization System	1977 1987 1995 2013	
Activated Sludge System	1977 1987 1997	
Secondary Clarifiers	1977 1987	1: Planned 15/16 2: Complete 14/15 3: Planned 15/16 4: Planned 15/16 5: Planned 15/16 6: Complete 14/15
RAS Pumping System	1977 1987	
WAS Pumping System	1977 1987	
Scum Pumping System	1977 1987	

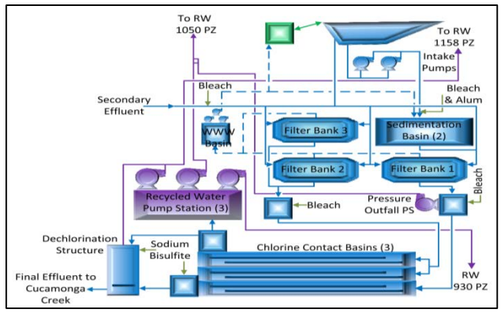
* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Secondary Clarifiers	RP1 Secondary Clarifier Rehab	This project will rehab Clarifiers 5 and 6 and will upgrade the weir and launder washing system for algae control.
Plant Expansion	RP-1 Capacity Expansion	Expand existing RP-1 liquid and solids treatment capacity.
RAS Pumping	Backup RAS pump rehabilitation	Rehabilitate the backup RAS pumps to be ready to run when called upon.

Asset Management System Summary – RP-1
Tertiary Treatment Process

1. Asset Profile



Intake Pump Station
Secondary effluent is conveyed across the Cucamonga Creek through a 60-inch pipeline, which feeds the tertiary section or can be diverted to Lagoon 3. The intake pumps convey flow from Lagoon 3 to the sedimentation basin.

Aluminum Sulfate (Alum) System
The aluminum sulfate system consists of two large storage tanks, four pumps, piping, and appurtenances. Alum is added to the process at two locations: (1) flash mixer (FM) 1 and (2) flash mixer 2. FM-1 injects chemical into the main feed to the tertiary section. Alum is a coagulant that helps with the removal of suspended materials in the flow path. FM-2 injects alum to into the sedimentation basin influent flow, acting as a coagulant for the suspended material from the waste-wash water basin

Sedimentation Basin
The sedimentation basin can receive tertiary section drainage and filter backwash water from the waste-wash water basin. The flow is mixed with aluminum sulfate at FM-2 and introduced to the mixing tank. The solids in the flow coagulate and settle to the bottom of the tank. The collected solids are pumped to solids processing, while the overflowing liquid is sent to the filters.

Chlorination System
Three chemical tanks hold 12.5 percent bleach. Two pumps draw from the tanks to feed an injection point ahead of the filters at FM-1. Two additional pumps supply chlorine to a looped pipe system from the tanks to the filter effluent structures (OES and NES). The effluent structures each have a duty and standby peristaltic dosing pump. The duty pumps inject bleach through a mixer into the process streams. Chlorine residual is measured throughout the tertiary process to control the chlorine dose.

Filters
There are three filter banks, consisting of a total of 26 down-flow filters. The flow travels through layers of anthracite, sand, and gravel. The filters are regularly backwashed to remove the solids that have been filtered from the secondary effluent. Backwash water is sent to the waste-wash water basin and pumped back into the lagoons or sedimentation basin.

Waste-Wash Water (WWW) Basin
The waste-wash water (WWW) basin collects drainage from the entire tertiary section of RP-1 and also collects filter backwash and leakage from the three filter banks. The collected water is pumped by three pumps to: (1) equalization lagoons or (2) the sedimentation basin.

Filter Effluent Structures
Flow from the filters enters OES or NES. The structures are equipped with chlorine analyzers and peristaltic bleach pumps to maintain the chlorine residual set point at the end of each effluent structure. Chlorinated flow is conveyed to the chlorine contact basins.

Chlorine Contact Basin (CCB)
The chlorine contact basins (CCB) have a serpentine flow path that allows for the injected chlorine to gain contact time with the treated water to meet permit requirements. The contact basins are covered and have continuous monitoring of chlorine residual. Flow from all three contact basins merge into a common effluent channel and flow to the CCB splitter box.

Effluent Splitter Box
Flow entering the CCB splitter box is directed to the dechlorination structure, recycled water wet well, or the pressure outfall pipeline. Flow is controlled by gates.

Dechlorination System
Flow entering the dechlorination structures is dosed with sodium bisulfite (SBS) and travels through a serpentine flow path to allow for the SBS to neutralize any chlorine residual before flowing into Cucamonga Creek. SBS is stored in two large chemical tanks and is metered into the system via six chemical metering pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	44 MGD	
Intake Pump Station	2 @ 14,000 gpm 60 hp	Per Unit
Alum System Tanks Pumps	 2 @ 20,000 gallons 2 @ 20.25 gph 1 @ 32.20 gph 1 @ 58.50 gph	
Sedimentation Basin Total Weir Length Total Settling Tube Area Chemical Mixer Traveling Bridge Pump	 800 ft 7,600 ft^2 8 @ 3 hp 1 @ 1.5 hp 2 @ 130 gpm	
Filters Bank No.1 Bank No.2 & 3 Filter Loading Rate Valves	 8 @ 299 ft^2 18 @ 299 ft^2 5 gpm/ft^2 118 units	 Per Unit Per Unit 12 - 42-inch
Waste-Wash-Water Basin Pumps Valve	 3 @ 2,100 gpm 2 units	 Per Unit > 18-inch
Filter Effluent Structures Gate Valves	 4 units 2 unit	 > 18-inch
Chlorination System Tanks ME-18 Pumps OES Pumps NES Pumps Mixers	 3 @ 10,300 gal 2 @ 317 gph 2 @ 205 gph 2 @ 205 gph 3 water champs	 Per Unit Per Unit Per Unit Per Unit
Chlorine Contact Basins Gates Valves	3 @ 1.3 MG 6 units 1 unit	Per Unit >18-inch
Effluent Splitter Box Gates	 3 units	
Dechlorination System Tanks Pumps	 2 @ 12,500 gal 4 @ 9-90 gph 2 @ 2-20 gph	 Per Unit Per Unit Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Intake Pump Station	3	3	3	3
Alum System	4	3	3	3
Sedimentation Basin	5	3	3	4
Chlorination System	4	3	4	4
Filters	4	3	3	3
Waste-Wash Water Basin	3	3	3	3
Filter Effluent Structures	4	3	3	3
Chlorine Contact Basins	3	3	3	3
Effluent Splitter Box	3	3	3	3
Dechlorination System	2	2	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues

Intake Pump Station
No issues require special attention.

Aluminum Sulfate (Alum) System
The main alum pumps feeding FM-2 have not been run since the sedimentation basin was taken offline. The pumps will be rehabilitated under project EN11039 in order to put the sedimentation basin back in service.

Sedimentation Basin
The sedimentation basin has not been in operation for several years. During this time the settling tubs were removed from one of the tanks. An engineering project is rehabbing this system.

Chlorination System
Project EN11039 will upgrade this system to provide more efficient and effective chemical dosing for full post filtration.

Filters
The filters backwash valves leak continuously sending flow to the waste-wash water basin, where the flow must be pumped, resulting in process inefficiencies. Some of the observed underground pipe appears to have significant corrosion. The influent channel of Filter Bank Number 1 shows signs of leakage into the filter bank gallery. EN11039 will address filter bank 1 influent channel leakage. A potential maintenance project will address the valve issue and rehab the internals components of the filters.

Waste-Wash Water (WWW) Basin
The increased on/off cycling of the WWW-basin pumps from the leaking filter-backwash valves results in significantly higher run time than expected. This problem will be addressed by a potential maintenance project.

Effluent Structures
No issues require special attention.

Chlorine Contact Basins (CCB)
A potential maintenance project will rehab these basins and address any leaks.

Effluent Splitter Box
No issues require special attention.

Dechlorination System
The south Dechlorination structure receive leaves and other trash debris that plug pumps and screen eliminating pumping to the plant drain system and may result in an overflow.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Intake Pump Station	1977	
Alum System	1977 1998	
Sedimentation Basin	1977 1998	Planned 15/16
Chlorination System	1977 2004	
Filters	1977 1982 1987	Planned 15/16
Waste-Wash Water Basin	1977 1987	
Filter Effluent Structures	1977 1987	
Chlorine Contact Basins	1997	
Effluent Splitter Box	2002	
Dechlorination System	1992 2011	

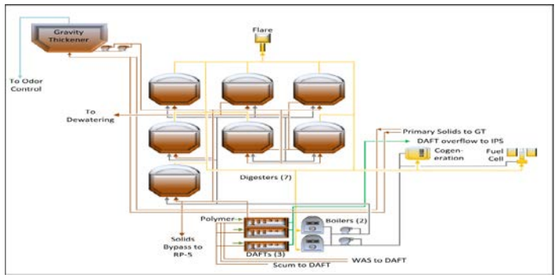
* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Filters	Filter Valve Leakage	Replace filter gallery backwash valves to eliminate leakage

Asset Management System Summary – RP-1
Solids Treatment Process

1. Asset Profile



Gravity Thickener System
Solids collected from the primary clarifiers are pumped to the gravity thickener (GT) and mixed with sweetener water supplied by the utility water system. Solids are allowed to settle to the bottom of the GT. Solids are increased from 1 percent total solids to 2 to 4 percent total solids. The thickened solids are pumped to the digestion system. The liquid overflow is conveyed back to the RP-1 headworks splitter box.

Dissolved Air Flotation Thickener (DAFT) System
The three DAFTs receive solids from the scum collection systems of the primary and secondary clarifiers and also receive waste activated sludge from the secondary system. Solids entering the DAFTs are mixed with recycled flow that has been pressurized with compressed air from two large compressors and dosed with polymer. Solids float to the top, where they are skimmed off and pumped to the digestion system. Solids are thickened from ~1 percent to 4 percent total solids through this process. The liquid underflow of the DAFT flows to the system C splitter box. A solids bypass allows for the diversion of solids to the regional collection system, which flows to RP-5.

Digestion System
Seven digesters receive thickened sludge. Digesters 1 and 2 have floating domes, while Digesters 3, 4, 5, 6, and 7 have fixed covers. The hot water system provides heat, and the sludge recirculation system transfers heat to maintain temperatures from 97 to 128 degrees Fahrenheit. Each recirculation system is equipped with a grinder. Gas-mixing systems mix the contents of the digesters. Gas piping connected to the top of each digester allows the produced gas to enter the gas conveyance system. Several pressure/vacuum relief valves and J-tube safety blow-offs are on each digester to prevent over and under pressurization.

Sludge Transfer System
To allow for phased digestion, RP-1 is equipped with several pump stations and automated valves to transfer sludge throughout the digestion system. The transfer system is designed to offer the greatest flexibility of transferring sludge to each of the seven digesters. Valves are operated from a centralized compressed air system.

Hot Water System
The hot water system consists of two loops: (1) primary (heating) and (2) secondary (delivery). The primary loop collects heat from heat exchangers at the boilers and the fuel cell (note: fuel cell owned by private firm). The secondary loop pulls heated water from the primary loop and sends it to the heat exchangers at each digester. Two boilers are fueled by digester or natural gas, or both. The cogeneration heat exchangers collect heat from the water jacket and the exhaust of the cogeneration engines when the engines are in service. The fuel cell has a heat exchanger on the exhaust stack that collects waste heat.

Gas Conveyance and Waste Gas System
Gas collected from the digestion system enters the gas loop, which can deliver low-pressure gas to the compressors for use in the boiler or fuel cell or to the flare. The gas loop has several J-tubes to prevent over-pressurization. Iron sponges are used to remove hydrogen sulfide from the digester gas. Digesters 1 and 2 have a waste gas line that can deliver low-methane content gas directly to the flare.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Solids Treatment Process	60 MGD	
GT System		
Tank	1 @ 299 gal/ft^2/day 3,848 ft^2	Per Unit
Drive	1 @ 1.0 hp	Per Unit
Pumps	2 @ 150 gpm 15 hp	
DAFT System		
Tanks	3 @ 85 gal/ft^2/day 2,100 ft^2	Per Unit
Recirculation Pumps	3 @ 1,260 gpm	Per Unit
Sludge Pumps	6 @ 200 gpm	Per Unit
Polymer Blending Units	4 @ 8.0 gph	Per Unit
Pressurization Tanks	3 @ 2,000 gal.	Per Unit
Compressors	2 @ 40 hp	Per Unit
Digester System		
Digester No.1 & 2	2 @ 112,122 ft^3	Per Unit
Digester No.3 & 4	2 @ 99,500 ft^3	Per Unit
Digester No.5	1 @ 172,995 ft^3	
Digester No.6 & 7	2 @ 224,332 ft^3	Per Unit
Recirc. Pumps	5 @ 600 gpm 30 hp	Per Unit
	2 @ 500 gpm 30 hp	Per Unit
Heat Exchangers		
Tube in Tube	1 @ 6.0 MMBTU/hr	
Spiral	6 @ 1.5 MMBTU/hr	Per Unit
Gas Mixers	4 @ 504 SCFM 30 hp	Per Unit
	3 @ 3,839 SCFM 70 hp	Per Unit
Sludge Transfer System		
Transfer A Pumps	2 @ 400 gpm	Per Unit
Transfer B Pumps	6 @ 400 gpm	Per Unit
Hot Water System		
Boiler	2 @ 10.5 MMBTU/hr	Per Unit
Fuel Cell	1 @ 4.4 MMBTU/hr	
Primary Loop Pumps	2 @ 25 hp 900 gpm	Per Unit
Secondary Loop Pumps	3 @ 15 hp 550 gpm	Per Unit
Gas Conveyance System		
Flare	1 @ 40,000 SCFH	
Iron Sponges	2 @ 210 ft^3 1 @ 546 ft^3 1 @ 350 ft^3	Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Gravity Thickener System	2	5	5	5
DAFT System	3	3	4	3
Digester System	4	3	3	3
Sludge Transfer System	3	3	4	3
Hot Water System	3	3	3	3
Gas Conveyance System	4	4	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues

Gravity Thickeners System
Currently, the gravity thickener is heavily loaded, and regular upsets require the diversion of primary solids to the DAFT system or the bypass system. A potential project will address optimizing the current thickening system or addressing alternative sludge thickening methods.

Dissolved Air Flotation Thickeners (DAFT) System
A potential project will address upgrades to this system. Project EN15013 will replace above-ground sludge piping to the digester system.Piping restrictions in the DAFT 3 basement clogs pump suction lines or limits pump discharge. A potential project should evaluate and upgrade piping sections in the DAFT 3 Basement.

Digester System
Maintenance has an established regimen to clean and rehab one digester a year to remove collected grit, replace piping, install new seals, and maintain critical pieces of equipment. A potential engineering project will upgrade the mixing systems in 5–10 years. Digester No 4's dome is currently being recoated under maintenance project EP15001. The roofs of Digesters 6 and 7 are starting to experience cracks that is an indication of significant concrete degradation. A potential project should address structural concerns related to the roofs of Digesters 6 and 7 Flame Arrestors do not have hard piped bypasses, making maintaining flame arrestors very difficult if not impossible.

Sludge Transfer System
The sludge transfers system was designed to be robust. However, during phased digester with an acid phase digester online, there is a single point of failure on the main transfer pump from the first/acid phase to the second phase digesters. Project EN2006 will upgrade the mixing systems in 5–10 years. A potential project is needed to install grinders throughout the digester area.

Hot Water System
To meet the strict emission requirements of the Southern California Air Quality Management District, the Agency installed new boilers in FY2012/13. The fuel cell heat exchanger was also installed in FY2012/13. The new additions and limited time of operations have posed challenges for operations related to the controls of the boiler system.

Gas Conveyance System
Project EN13046 is upgrading the flare system and piping system to ensure adequate control of the digester gas pressures and adding iron sponges to the Gas Conveyance system. A potential project is needed to size the digestion flare system to meet peak digester gas projection. A condition assessment is being performed on the gas conveyance piping

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Gravity Thickener System	1987	2013
DAFT System	1977 1987	
Digester System	1975 1977 1985 1982 1992 1999 2008	1: Complete 2010 2: Complete 2010 4: Complete 2014
Sludge Transfer System	2008	
Hot Water System	1977 1985 2012	
Gas Conveyance System	1975 1985 2008	Planned 15/16

* Appendix B – Condition Assessment Reports

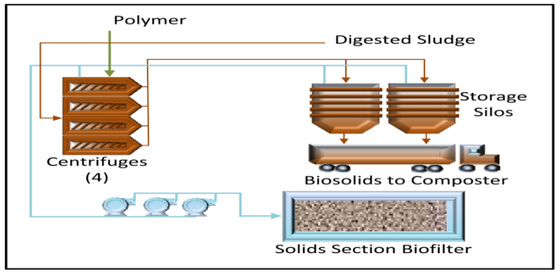
Table 4 Potential Projects

System	Project Name	Project Description
Gravity Thickener System and DAFT System	RP-1 Sludge Thickening Upgrades	Project to upgrade the sludge thickening processes for primary and secondary sludge.
Digester System	Digester Cleaning and Rehab	The Agency has established an Agency-wide digester annual cleaning and rehabilitation regimen to remove solids and inorganics collected at the bottom of the digesters, replace valves, install new seals, and maintain critical pieces of equipment. Include in Agency-wide TYCIP.
Digester System	Flame Arrestor Bypass	Install bypass piping around the existing flame arrestors to allow for proper maintenance.
Gas Conveyance System	RP-1 Flare Improvements	RP-1 Flare improvements and gas system upgrades.
Sludge Transfer System	RP-1 Solids Grinders	Install grinders in the digester area to reduce the frequency of pump clogging and amount of inorganic material settling in the digesters.

Asset Management System Summary – RP-1

Dewatering Treatment Process

1. Asset Profile



Sludge Grinding System
Two inline grinders ensure that large solid objects in the sludge flow are broken up into small pieces to limit the possibility of large objects causing obstructions in downstream piping or equipment.

Sludge Feed Pump System
Four rotary lobe pumps pull sludge from the grinders and pumps flow to the influent of the centrifuges. The sludge pumps are variable speed with flow meters, instrumentation, and controls. A series of cross-connects in the pump discharge piping allows for sludge pumps to feed different centrifuges.

Polymer Blending System
Totes of polymer are transferred to a large day tank via two rotary lobe transfer pumps. Four polymer blending units meter polymer and dilution water to a mixing chamber. The discharge of the polymer blending unit is conveyed through a network of pipes and cross connection valves to three separate dosing points in the sludge piping.

Centrifuge System
The sludge flow mixed with polymer enters the feed tube of the centrifuge and discharges into a spinning bowl. The centrifugal force of the spinning bowl forces the heavier solids to the edge of the bowl and the centrate to rest on top of the solids. A scroll, spinning slightly faster than the bowl, scrapes the solids around the edge of the bowl to one end of the centrifuge, up a beach, and into the discharge shoot to the conveyor. The bowl has dam plates to maintain a depth of centrate until it overflows at the other end to the centrate wet well.

Conveyor System
Two separate screw conveyor systems, configured in parallel, collect dewatered solids (cake) from each centrifuge. Solids are diverted to each system via a diverter gate and then through a series of shaftless screws until solids are discharged into the storage silos.

Storage Silo System
Solids from the conveyor system are dropped into two separate storage silos. The silos hold collected cake until a loading sequence is initiated, and solids are dropped through a series of gates and discharge screws into a truck trailer for hauling to an offsite facility.

Centrate and Drainage Pump System
Centrate collected from the centrifuge operation is conveyed to the centrate pump station where it is pumped to the Non-Reclaimable Wastewater System. The centrate pumps are variable speed to maintain a wet well level. Process flows generated during centrifuge startup and shutdown are conveyed to the drainage pump station, where they are pumped back into the RP-1 process by constant speed drainage pumps.

Anti-Struvite System
Five pumps pull chemical from a storage tote and inject into the centrate pipes of each centrifuge and the centrate wet well. The chemical inhibits Struvite formation that forms naturally in centrate and adheres to walls of downstream piping.

Odor Control System
Three blowers pull foul air from the gravity thickener, miscellaneous sumps, and either the belt press or centrifuge buildings, forcing the air through a bed of carbon-rich media to allow for the biological consumption of hydrogen sulfide and other compounds.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Dewatering Treatment Process	60 MGD	
Sludge Grinding System	2 @ 10 hp	Per Unit
Sludge Feed System Pump	 4 @ 360 gpm	 Per Unit
Polymer System Blending System	 4 @ 5 to 30 gph	 Per Unit
Centrifuge System Centrifuge	 4 @ 360 gpm	 Per Unit
Conveyor System	2 trains w/ 5 conveyors ea. from 7.5 to 30 hp	
Storage Silo System	2 @ 5,636 ft^3	Per Unit
Centrate Pump System Drainage Pump System	3 @ 450 gpm 2 @ 450 gpm	Per Unit Per Unit
Anti-Struvite System Pump	 4 @ 4.0 gpm 1 @ 8 gpm	 Per Unit
Odor Control System Blower Media Depth Valves	 1 @ 4,600 scfm 2 @ 13,700 scfm 5 ft 10 units	 Per Unit > 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Sludge Grinding System	1	3	3	3
Sludge Feed Pump System	2	2	3	3
Polymer Blending System	4	4	4	5
Centrifuge System	1	2	3	3
Conveyor System	1	3	3	3
Storage Silo System	1	3	4	3
Centrate and Drainage Pump System	1	3	3	3
Anti-Struvite System	1	2	3	3
Odor Control System	3	3	4	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues

Sludge Grinding System
No issues require special attention.

Sludge Feed Pump System
No issues require special attention.

Polymer Blending System
The current polymer blending units are no longer being supported by the manufacturer, and small linkages that control water valves failure regularly. A potential project will review the potential replacement or modification to these systems.

Centrifuge System
The Centrifuge System will be evaluated in 2015 to assess the effectiveness of the Anti-Struvite System.

Conveyor System
The inclined conveyors have been determined to be inaccessible for routine maintenance. Engineering project EN06015 is currently addressing these access issues.

Storage Silo System
Level sensing equipment does not operate reliability. A potential project should replace level sensing equipment in the storage silos.

Centrate Drainage Pump System
No issues require special attention.

Anti-Struvite System
No issues require special attention.

Odor Control System
Condensate drains on the blower suction lines plug with grit and sludge accumulation. The drains are inaccessible and a potential project should consider alternatives to clearing clogged blower suction drain lines

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Sludge Grinding System	2013	
Sludge Feed Pump System	2013	
Polymer Blending System	2013	
Centrifuge System	2013	Planned 15/16
Conveyor System	2013	Planned 17/18
Storage Silo System	2013	Planned 17/18
Centrate and Drainage Pump System	2013	Planned 17/18
Anti-Struvite System	2013	Planned 17/18
Odor Control System	2003	Planned 17/18

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
RP-1 Centrifuge Polymer Blending Units	RP-1 Poly Blending Units Replacement	This project will replace the polymer blending units at the RP-1 Centrifuge Building.
RP-1 Storage Silos	RP-1 Centrifuge Bldg. Storage Silo Level Sensor replacement	Replace unreliable level sensing equipment.
Odor Control	Biofilter condensate drain line Improvements	Install cleanouts to drains on the suction side of the odor control blowers.

Asset Management System Summary – RP-1

Auxiliary Systems

1. Asset Profile

RP-1 Plant Drain
The RP-1 plant drain collects and pumps surface runoff from storm events, wash-down water, and drains some of the treatment plants tanks and processes in the preliminary, primary, secondary, solids, and dewatering sections. The drain system receives gravity flows to a wet well, where it is pumped to the System C splitter box.

TP-1 Plant Drain
The TP-1 plant drain collects and pumps surface runoff from storm events, wash-down water, and drains TP-1 tanks and processes in the tertiary section. The drain system receives gravity flows to a wet well, where it is pumped to the waste-wash water basin. A second pump station (West Wind Storm Water Pump Station) collects surface runoff and pumps water to the main TP-1 Plant Drain wet well.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 Power Reliability Building, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-1 electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. Three generators are located in the Energy Recovery Building and supply power to the preliminary, primary, secondary, solids and dewatering sections. One generator supplies power to the tertiary section. A final generator supplies power to the Dechlorination System.

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water System
Utility water is used for cleaning, supplying pump seal water, cooling, dilution, flushing of clogged pipes, irrigation, and other inner plant uses. The system can be supplied by the 1050-foot pressure zone pump station or the pressure outfall (PO) pump station. The PO pump station is operated on occasion during shutdowns and other activities to supply process water to the treatment plant. The utility water system piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a service on Philadelphia Street and another service on Walnut Avenue from the city of Ontario. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-1. Nearly all of the processes at the plant are observed and controlled from a centralized control system known as the Supervisory Control and Data Acquisition or SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to three main control terminals at (1) Main Control Building, (2) Dewatering Building, and (3) the Tertiary Control Building.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 Plant Drain	2 @ 1,585 gpm 40 hp	
TP-1 Plant Drain	2 @ 1,000 gpm 15 hp	
Electrical System		
Utility Voltage	12 kV	
Transformers	12 kV to 480 V 2 @ 12 kV to 4,160 V	
Switchgear	1 @ 12 kV	
Distribution	22 @ 480 V 1 @ 4160 V	MCCs MCCs
RP-1 Generator	3 @ 1,250 kW 1,801 Bhp	
TP-1 Generator	1 @ 670 kW 896 Bhp	
Dechlorination Generator	1 @ 30 kW	
Mounted Lighting	> 145 units	
Utility Water System		
Pipelines	Various sizes	
Pressure Outfall	3 @ 800 gpm	
Pump Station	2 @ 1500 gpm	
Potable Water System		
Backflow Devices	31 units	
Instrumentation and Control System		
HMI Workstations	6 Units	
PLC	16 Units	
I/O Hub		
Radio Transmitter	1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 Plant Drain	3	3	3	3
TP-1 Plant Drain	4	4	4	4
Electrical System	4	4	3	4
Utility Water System	4	3	4	4
Potable Water System	4	3	4	3
Instrumentation and Control System	3	3	3	3
Yard Piping	TBD	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues

RP-1 Plant Drain
Standing water within the plant does result in vector issues.

TP-1 Plant Drain
The West Wind Storm Water pumps Station has experienced pump failures. Intense rainfall events have overwhelmed the low capacity pumps station. Several factors can be attributed to the low capacity; inadequate pump sizing, small pump discharge piping and obstructions that clog pumps/piping limiting flow.

Electrical System
Project EN13048 will address the installation of a second 12 kV feeder from the power reliability building to TP-1. Additional information for this project can be found in the asset summary section for recycled water.

The System C main control computer (MCC) panel is located outdoors. Maintenance is planning a project to rehab and provide protection for the MCC.

The Plant 3 primary MCC is aging and no longer supported by the manufacturer. Project EN14019 will rehab and replace the MCC.

Lighting rehab and improvements are being evaluated and implemented by the Engineering Department.

Recent investigation into the backup generator switchgear has indicated the controls are near the end of their useful life. A potential project is needed to replace 20 year old PLC.

Utility Water System
A potential maintenance project will rehab deteriorated portions of this system. Recent condition assessments of the main utility water feed have indicated active corrosion occurring in piping supplying most of the treatment plant. Several of the valves meant for isolation of the utility water system do not hold.

The pressure outfall pump station is minimally maintained since the 1050 RW pumps are used to supply utility water throughout RP-1.

Potable Water System
A potential maintenance project will rehab deteriorated portions of this system. Several leaks have been observed and fixed in the potable water system.

Instrumentation and Control System
The control system will be updated in 2017 as part of Project EN13016.

Yard Piping
A 2011 condition assessment of the secondary effluent piping showed it to be in good condition. Observations suggest that piping around preliminary, primary, and solids processes that do not run full may have significant deterioration. Condition assessment planned for 2014 will determine the scope of a potential maintenance project to rehab this system.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 Plant Drain	1999	
TP-1 Plant Drain	2001	
Electrical System	1994	
Lighting	1977	2011
Utility Water System	1977	2015
Potable Water System	1977	
Instrumentation and Controls	1977	
Yard Piping	1977	Planned 2014

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Plant Utility and Potable Water Systems	RP-1 Utility/Potable Water Rehab	This project will provide replacement pipe and valves for an aging conveyance system within RP-1.
Electrical System	RP-1 Power Reliability Building Controls Upgrades	Upgrade and replace the out of date PLCs for the emergency generation system at RP-1. Equipment is over 20 years old and is critical to the facility.

End of System Summary

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Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Regional Water Recycling Plant No. 2

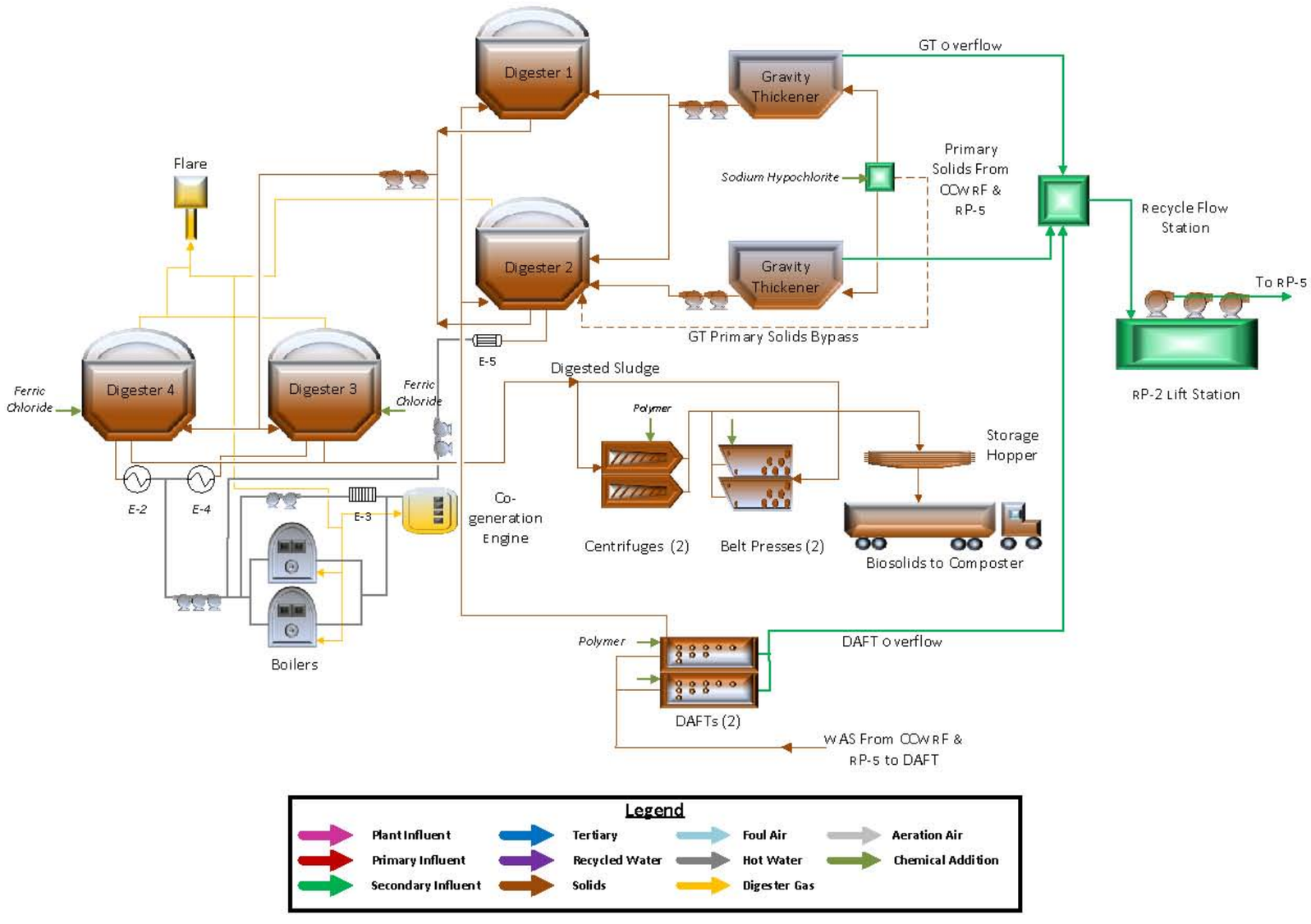

Figure 7-3: Regional Water Recycling Plant No. 2 (RP-2) – Schematic

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Table 7-3: Regional Water Recycling Plant No.2 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN14012	RP-2 Drying Beds Rehabilitation	Add additional AC and curb and gutter, repair push walls and cap recycled distribution lines.	RO	CC	350,000	-	-	-	-	-	-	-	-	-	***350,000***
2	EN26025	RP-2 Preliminary Design Report for Decommissioning	Preliminary design report for decommissioning all RP-2 assets	RO	OM	-	-	-	-	-	-	-	-	-	600,000	***600,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 10-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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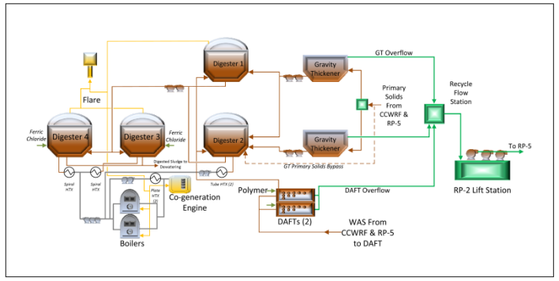
Asset Management System Summary – RP-2
Solids Treatment Process

1. Asset Profile



Gravity Thickener (GT) System START HERE
The gravity thickener (GT) distribution box receives primary clarifier sludge and scum from Carbon Canyon Water Recycling Facility (CCWRF) and RP-5 and distributes flow to GT #1 or #2 or both. Sodium hypochlorite may be introduced to the GT if needed from a 1600-gallon storage tank onsite. Solids are allowed to settle at the bottom of the GT. Solids are increased from ~1 percent total solids (TS) to ~4 percent TS. The thickened solids are then pumped to the digestion system.

Dissolved Air Flotation Thickener (DAFT) System
The DAFT system consists of two circular tanks. Waste activated sludge from the secondary system from CCWRF and RP-5 enters the DAFT and is mixed with recycled flow that has been pressurized with compressed air and dosed with polymer. Solids float to the top, where they are skimmed off and pumped to the digestion system. Solids are thickened from 1 percent TS to 4 percent TS. The overflow of the DAFT flows to the recycle flow station. Flow from the recycle flow station flows to the RP-2 lift station, where it is returned to the RP-5 headworks.

Digestion System
The digestion system consists of three anaerobic digesters and one aerobic digester. Digester 1 is operated only when capacity is limited. Digester 2 is a fixed-dome acid anaerobic digester and receives thickened sludge from the GT and DAFT systems. Digested sludge from Digester 2 is transferred to Digesters 3 and 4. Digesters 3 and 4 are floating-dome digesters and may be fed in series or parallel depending on the mode of operation. Plate and frame heat exchangers from the hot water system and recirculation pumps maintain temperatures from 97 to 128 degrees Fahrenheit. Gas mixers recirculate digester gas and use it to mix the digesters' sludge content with gas cannon mixers. Gas piping connected to the top of each digester allows the digester gas produced to enter the gas conveyance system. Several pressure vacuum regulated valves and J-tube safety blow-offs are installed on each digester to prevent over-pressurization.

Sludge Transfer System
RP-2 is equipped with several pumps and automated valves to transfer sludge through the digestion system.

Hot Water System
The hot water system generates heat in the boilers and cogeneration engines. Two boilers are fueled by digester or natural gas or both. Two tubes in tube heat exchangers are dedicated to heat Digester 2 and two spiral heat exchangers are dedicated to Digesters 3 and 4.The hot water is pumped into a hot water loop, where heat exchangers are used to heat the digestion system.

Gas Conveyance and Waste System
Digester gas collected from the digestion system enters the gas loop and is used for sludge mixing, fuel for boiler, and engine co-generation, or could be wasted to a waste gas burner (flare) when excess gas is in the system. The digester gas may be stored in either a low- or high-pressure tank. Gas compressors are used to compress digester gas into the high-pressure tank. The gas loop has several J-tubes and pressure-vacuum relief valves to prevent over-pressurization. An iron sponge using ferric oxide-impregnated media is used to reduce the hydrogen sulfide content in the gas of Digester 2 before entering the gas loop.

RP-2 Lift Station
The RP-2 lift station collects raw sewage from the Mountain Avenue interceptor, Chino Institute for Women (CIW) sewer, Butterfield force main, and recycle flows from the solids treatment facilities at RP-2, and discharges through a 24-inch pipeline to the RP-5 headworks.

Gas Conveyance and Waste Gas System
Gas collected from the digestion system enters the gas loop, which can deliver low-pressure gas to the compressors for use in the boiler or fuel cell or to the flare. The gas loop has several J-tubes to prevent over-pressurization. Iron sponges are used to remove hydrogen sulfide from the digester gas. Digester 2 has a waste gas line that can deliver low-methane-content gas directly to the flare.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Solids Treatment Process	26.4 MGD	
GT System		
Tank	2 @ 760 gpd/ft^2 1,590 ft^2	Per Unit
Drive	2 @ 10 hp	Per Unit
Pumps	210 gpm 15 hp	
DAFT System		
Tanks	2 @ 25 gpd/ft^2 707 ft^2	Per Unit
Recirculation Pumps	5 @ 40 hp	Per Unit
Sludge Pumps	3 @ 210 gpm 10 hp	Per Unit
Polymer Blending Units	2 @ 8.0 gph	Per Unit
Compressors	4.5 hp	
Digester System		
Digester No.1 & 2	2 @ 489,565 gallon	Per Unit
Digester No.3 & 4	2 @ 1.79 MG	Per Unit
Recirc. Pumps	3 @ 530 gpm 10 hp	Per Unit
	3 @ 412 gpm 15 hp	Per Unit
Heat Exchangers		
Tube in Tube	2 @ 2.5 MMBTU/hr	Per Unit
Spiral	2 @ 2.0 MMBTU/hr	Per Unit
Plate	2 @ 2.6 MMBTU/hr	Per Unit
Gas Mixers	3 @ 200 SCFM 25 hp	Per Unit
Sludge Transfer System		
Digester No.2 Pumps	2 @ 300 gpm 15 hp	Per Unit
Digester 3 & 4 Pumps	2 @ 500 gpm 25 hp	Per Unit
Hot Water System		
Boiler	1 @ 3.1 MMBTU 1 @ 3.7 MMBTU	
Hot Water Pumps	2 @ 400 gpm	
Engine Recovery	3 @ 500 gpm 2 @ 640 gpm 2.15 MMBTU/hr 2.68 MMBTU/hr	
Gas Conveyance System		
Waste Gas Burner	1 @ 350 ACFM 12.6 MMBTU/hr	
Iron Sponges	1 @ 224 ft^3	
Gas Compressors	2 @ 60 hp 1 @ 50 hp	
RP-2 Lift Station		
Pumps	3 @ 3,300 gpm 100 hp	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
GT System	3	3	4	3
DAFT System	3	3	3	3
Digester System	3	3	3	3
Sludge Transfer System	3	3	3	3
Hot Water System	3	3	3	3
Gas Conveyance System	3	3	3	3
RP-2 Lift Station	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Gravity Thickeners System
Rags and large debris pass through the influent distribution box and into the GT influent center-feed columns, where frequent clogging occurs. A project is not needed

DAFT System
No issues require special attention.

Digester System
Digester 2 is has recently been rehabbed, but the T-lock lining system inside the digester needs to be repaired/replaced per the condition assessment. This issue will be addressed with the conclusion RP-2 Digester Rehab Maintenance Project.

Sludge Transfer System
No issues require special attention.

Hot Water System
No issues require special attention.

Gas Conveyance System
No issues require special attention.

RP-2 Lift Station
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
GT System	1971 1988 2009	
DAFT System	1988	
Digester System	1960 1971 1979 1988 2003 2009 2011 2014	Dig. 3 – 2011 Dig. 4 – 2013 Dig. 2 – 10/15
Sludge Transfer System	1979 1988 2003	
Hot Water System	1988 2003 2013	
Gas Conveyance System	1988 2003	
RP-2 Lift Station	2004	

* Appendix B – Condition Assessment Reports

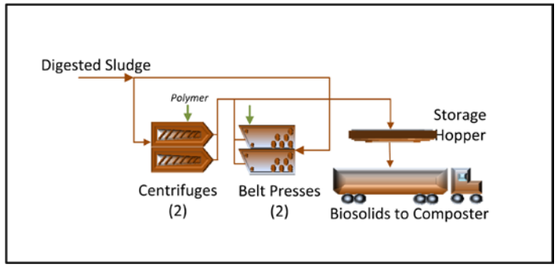
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RP-2

Dewatering Treatment Process

1. Asset Profile



Sludge Grinding System
Digested sludge from Digesters 3 and 4 pass through dedicated sludge grinders before the sludge enters the dewatering feed pumps. Three inline grinders ensure that large solid objects are broken up into small pieces to limit the possibility of plugging downstream piping or equipment.

Sludge Feed Pump System
Three sludge feed pumps pump sludge to the belt press system or the Centrifuge System, or both. The sludge pumps are variable speed with flow meters, instrumentation, and controls.

Polymer Blending System
The dewatering polymer system consists of three chemical metering pumps, three polymer blending units, and static mixers to mix the polymer with the sludge. Polymer is delivered in totes and pumped by the chemical metering pumps, mixed with dilution water, and dosed to the sludge flow.

Belt Press System
The RP-2 belt press system consists of two belt filter presses. A feed box receives sludge flow mixed with polymer and spreads flow across the width of a rotating porous belt. The sludge flow on the belt passes through a series of wedges that separate the sludge and allow collected filtrate to pass through the belt to a drip pan that is piped to the filtrate and centrate pumping system. The sludge flow then passes through the pressured zone, where sludge is pressed between two belts and allowed to drain. The compressed sludge then passes over a series of rollers that squeeze out remaining filtrate to drip pans. The belts then separate, and two scraper blades scrape the dewatered solids (cake) off of each belt, dropping the processed cake on to the conveyor system. Wash-water pumps supply water to spray each belt with high-pressure water to prevent the porous belts from clogging.

Centrifuge System
The sludge flow mixed with polymer enters the feed tube of the centrifuge and discharges into a spinning bowl. The centrifugal force of the spinning bowl forces the heavier solids to the edge of bowl and centrate to rest on top of the solids. A scroll spinning, slightly faster than the bowl, scraps the solids around the edge of the bowl to one end of the centrifuge, up a beach and into the discharge shoot to the conveyor. Dam plates near the center of the spinning bowl hold a depth of centrate until it overflows the opposite end of the centrifuge where it is piped to the centrate wet well.

Conveyor System
Two belt press conveyors transfer cake from the discharge of each belt press and then transfer the collected solids up to the top of the cake hopper. Six shaftless screw conveyors transfer cake from the discharge of each centrifuge to a common belt conveyor. The dewatered cake then travels up to the cake hopper, where it is distributed evenly on the trailer of a sludge hauling truck.

Cake Hopper
The cake hopper receives cake from the conveyor system and holds the cake until a loading sequence has been initiated to discharge the solid cake to a truck trailer for hauling to an offsite facility.

Filtrate and Centrate Pump System
Filtrate and centrate collected from the belt press and centrifuge processes are conveyed to a common wet well where they are pumped into the RP-2 lift station wet well and discharged to RP-5.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Dewatering Treatment Process	30 MGD 211K wet tons per year	
Sludge Grinding System	3 @ 210 gpm	
Sludge Feed System Pump	 3 @ 210 gpm 10 hp	
Polymer Blending System Polymer Pump Dilution	 3 @ 8.0 gph 3 @ 1200 gph	
Belt Press System Belt Press Wash-water pump	 2 @ 150 gpm 1,700 dry lbs/hr 3 @ 100 gpm 7.5 hp	
Centrifuge System Centrifuge Main Drive Back Drive	 2 @ 325 gpm 1,200 hp 40 hp	
Conveyor System Belt Conveyor Screw Conveyors	 2 @ 44,000 lbs/hr 1 @ 350 ft^3/hr 3 hp 3 @ 700 ft^3/hr 3 hp 2 @ 700 ft^3/hr 7.5 hp 1 @ 1600 ft^3/hr 15 hp	
Cake Hopper	1 @ 1,956 ft^3	
Filtrate and Centrate Pump Station Pumps	 2 @ 480 gpm, 7.5 hp	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Sludge Grinding System	3	3	3	3
Sludge Feed Pump System	3	3	3	3
Polymer Blending System	3	3	3	3
Belt Press System	3	3	3	3
Centrifuge System	3	3	3	3
Conveyor System	3	3	3	3
Cake Hopper	3	3	3	3
Filtrate and Drainage Pump Station	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Sludge Grinding System
No issues require special attention.

Sludge Feed Pump System
No issues require special attention.

Polymer Blending System
No issues require special attention.

Belt Press System
The belt presses were rehabilitated in 2013. Belt Press hoist system is corroded and needs to be evaluated for replacement. The issue should be addressed by Maintenance.

Centrifuge System
No issues require special attention.

Conveyor System
No issues require special attention.

Cake Hopper
No issues require special attention.

Filtrate and Centrate Pump System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Sludge Grinding System	1988	
Dewatering Sludge Feed Pump System	1988	
Polymer Blending System	1979 1988 2011	
Belt Press System	1979 1988 2013	
Centrifuge System	2001	
Conveyor System	1979 1988 2008	
Cake Hopper	1988 2008	
Filtrate and Centrate Pump Station	1979 1988	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RP-2

Auxiliary Systems

1. Asset Profile

Plant Drain
The plant drain collects surface storm runoff, excess irrigation, and wash-down water collected in submersible drains located throughout the facility. The drain system receives gravity flows throughout the facility and is pumped to the RP-2 lagoon, the RP-2 lift station and finally to RP-5 headworks.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE and Direct Access) and onsite co-generation. The electrical feed from the grid is composed of two 12 kV feeders to the power panel switchgear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-2 electrical system is shown in Appendix B.

A 300 kW diesel emergency generator is used in the event of a power failure to power the RP-2 lift station.

Utility Water System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by the pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a service on a potable line off El Prado Rd. from the City of Chino. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-2. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to three main control terminals at RP-2.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Plant Drain	2 @ 200 gpm	
Electrical System Utility Voltage Transformers Switchgear Distribution Co-Generator Generator	 2 @12 kV 2 @ 12 kV to 480 V 2 @12 kV 5 @ 480 V 1 @ 580 kW 1 @ 600 kW 1 @ 300 kW	
Utility Water System Pipelines Pump Station Valves	 Various sizes Fed from RP-5 PS >10 units	
Potable Water System Backflow Devices	 >10 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub Radio Transmitter		

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	3	3	3
Electrical System	3	3	3	3
Utility Water System	3	4	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Plant Drain
No issues require special attention.

Electrical System
No issues require special attention.

Utility Water (UW) System
Recycled water contains debris that causes issues with cooling systems. Evaluate installation of RW strainer systems. The issue should be addressed by Maintenance.

Potable Water System
No issues require special attention.

Instrumentation and Control System
No issues require special attention.

Yard Piping
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	1979	
Electrical System	1979 1988 2008	
Utility Water System	2004	
Potable Water System	1979	
Instrumentation and Control System	1979 1988 2008	
Yard Piping	1979 1988	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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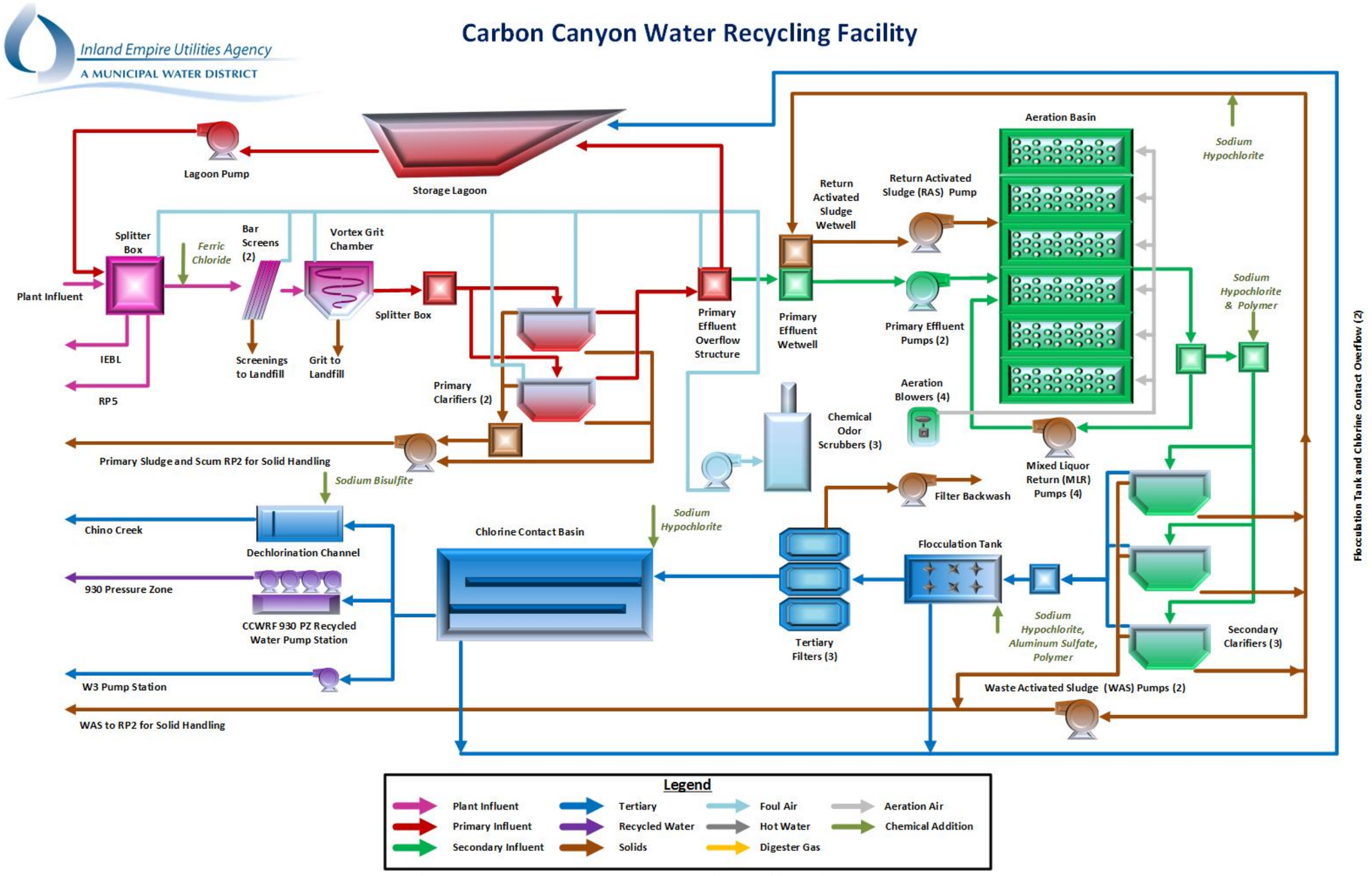

Figure 7-4: Carbon Canyon Water Recycling Facility (CCWRF) – Schematic

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Table 7-4: Carbon Canyon Water Recycling Facility – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN17006	CCWRF Headworks & Odor Control Replacement	Odor control equipment and others are at end of useful life - project necessitated by AMP	RC	CC	610,000	2,800,000	3,000,000	2,850,000	15,000	-	-	-	-	-	***9,275,000***
2	EN17051	CCWRF Valve Replacement	This project will replace Site preparation, remove and replace existing paving and or landscape, shoring, valve can replacement for: 1. Primary pump gallery- 16 Dezurik valves were purchased by Maintenance. Valves are in Maintenance' possession. 2. Recycled water system- Provide, install 10 each strategically located isolation valves to the existing recycled water system	WC	OM	250,000	-	-	-	-	-	-	-	-	-	***250,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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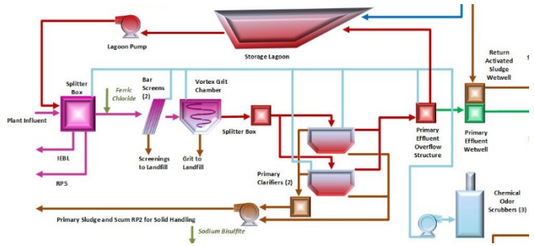
Asset Management System Summary – CCWRF
Preliminary Treatment Process

1. Asset Profile



Influent Channel
Raw wastewater enters Carbon Canyon Water Recycling Facility (CCWRF) through the influent diversion structure. The influent diversion structure enables CCWRF to operate as a skimming plant, taking the majority of raw wastewater and sending the remainder to RP-5. The amount of flow to RP5 is measured at the Parshall flume downstream of the diversion structure, and CCWRF influent is measured at the Parshall flume downstream of the vortex grit chamber.

Screening Equipment
Gates divert flow to three channels: two mechanical bar screens and one manual bar screen. The 5/8-inch bar screens remove rags and large debris that could damage the downstream process equipment or reduce the overall reliability and effectiveness of the treatment process. A manual bar screen provides standby capacity for the mechanical units.

Vortex Grit System
Flow from the bar screens structure is tangentially directed to a 16-foot-diameter circular vortex grit chamber. A paddle mixer pushes flow in a circular path; grit collects at the bottom, where it is pumped to the grit washing/disposal system.

Grit Washing/Disposal System
Grit pumped from the vortex grit chamber is routed to two grit classifiers, where organic matters are removed from the grit. The grit sinks to a submerged inclined screw and moves up the ramp while being washed. The organic rich liquid from the grit classifiers is directed back to the liquid handling stream.

Screening Conveyance/Disposal System
Screening collected by the bar screens is transported by a conveyor and dropped into a hydraulic washer/compactor. The collected rag is washed and organic rich rinsate is routed to liquid treatment. The hydraulic compact or squeezes out the excess water, reducing the moisture content. The compacted rags are pushed out to the roll-off bin for disposal.

Ferric Chloride System
Ferric chloride is added to the raw wastewater flow immediately after the influent diversion structure to enhance the solids capture during primary treatment and to control odors caused by hydrogen sulfides. The ferric station consists of a truck filling station, 7,000-gallon storage tank, two chemical metering pumps, and associated piping.

Polymer System
Polymer can be injected to the liquid flow after grit removal to enhance primary treatment. The polymer system includes a 500-gallon tote stand, chemical metering pump, mixing chamber, and associated piping. (the polymer system has been abandoned)

Headworks Splitter Box
The headworks splitter box receives flow from the vortex grit chamber. The flow is normally routed to primary clarifiers; however, it can also be routed to the primary effluent structure, bypassing the primary treatment.

Odor Control Chemical Scrubber
Foul air collected in the preliminary and primary treatment processes are forced through three chemical odor control scrubbers where bleach solution is atomized to chemically remove and oxidize hydrogen sulfide and odor causing gases. The system consists of co-current scrubbing vessel, bleach metering pumps, foul air blowers, air blowers and the associated conveyance pipes.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	20.3 MGD	
Influent Channel Sewer Parshall Flume Gates	 54-inch 1 @ 43.9 MGD 2 units	
Screening Equipment Mechanical Screen Manual Screen Gates	 2 @ 20 mgd 1 @ 40 mgd 3 units	Per Unit
Vortex Grit System Chamber Grit Pump Gates	 1 @ 20.3 mgd 2 @ 220 gpm 15 hp 2 units	Per Unit
Grit Washing & Disposal System Classifiers	 2 @ 200 gpm	Per Unit
Screening Conveyance & Disposal System Conveyor Compactor Grinder Auger	 1 hp 10 hp 3 hp	
Ferric Chloride System Tank Pumps	 7,000 gallons 2 @ 92 gph	Per Unit
Polymer System Pump	 1 @ 4.5 gph	
Headworks Splitter Box Gates	 3 units	
Odor Control Chemical Scrubbers Blower(1A) Blower(1B1,1B2) Valves	 1 @ 6,500 scfm 2 @ 4,400 scfm 3 units	 Per Unit > 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Channel	3	3	3	3
Screening Equipment	4	3	4	4
Vortex Grit System	3	3	3	3
Grit Washing & Disposal System	3	3	2	3
Screening Conveyance/Disposal System	3	3	3	4
Ferric Chloride System	4	3	4	3
Polymer System	NA	NA	NA	NA
Headworks Splitter Box	3	3	3	3
Odor Control Chemical Scrubber	4	4	4	4

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Influent Channel
CCWRF lagoon pump discharges to upstream of RP5 and CCWRF control gates in the influent diversion structure. The flow may go to RP5, CCWRF or both. There is no flow meter to quantify the amount of flow into the lagoon. Because of this efficiency, the lagoon flow may be double counted as CCWRF influent.

Screening Equipment
The bar spacing allows a large volume of rags to reach downstream processes.

The clearance between the bar screens and the enclosure of the structure is tight, making it difficult for maintenance or housekeeping.

Gate (FGBI-5002, GATE BS-2 Inlet) leading to the west mechanical bar screen has failed in the open position since September 2013.

Bar screen motors and gear box have failed multiple times in 2015 requiring immediate responses from both Operation and Maintenance.

Project EN17006 will address these issues.

Vortex Grit System
The performance of the vortex grit system is satisfactory. However, it has been 20 years since the original install, and the system is nearing the end of its service life. The downstream processes are vulnerable in the event of a mechanical failure. A condition assessment is needed to identify state of this asset.

Grit Washing/Disposal System
No issues require special attention.

Screening Conveyance/Disposal
The conveyor equipment is corroded and has limited accessibility for cleaning and repair. The screening conveyance system fails regularly (3 to 4 times per year). A potential project will address these issues.

A new rag washer and compaction unit was installed in 2014, reducing the moisture content of screening material

Ferric Chloride System
Ferric chloride system operates effectively, but the storage tank is 20 years old and is approaching the end of its useful life.

Polymer System
The polymer system has been abandoned.

Headworks Splitter Box
No issues require special attention.

Odor Control Chemical Scrubbers
The existing concurrent odor control system is in poor condition. The pH, H_2S, pressure transmitters, pumps, and control equipment are broken and inoperable. Sections of bleach conveyance system are frequently clogged with deposits, restricting the flow chemical and requiring additional manpower for upkeep. Bleach and caustic storage tanks are more than 20 years old, and there is evidence of leakages at the flanges. A viable alternative is immediately needed for compliance and reliability.

An in-house maintenance project was completed in 2015 to improve short to midterm reliability. The project installed a mist elimination at System A to prevent bleach emission and repaired System B and C fiberglass vessels to stop the leak.

Project EN17006 will address these issues.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Influent Channel	1993 2006	Planned 16/17
Screening Equipment	1993	Planned 16/17
Vortex Grit System	1993	Planned 16/17
Grit Washing/Disposal System	1993	
Screening Conveyance/Disposal System	1993 2014	
Ferric Chloride System	1993	
Polymer System	1993	
Headworks Splitter Box	1993	Planned 16/17
Odor Control Chemical Scrubber	1993 2011 2012	

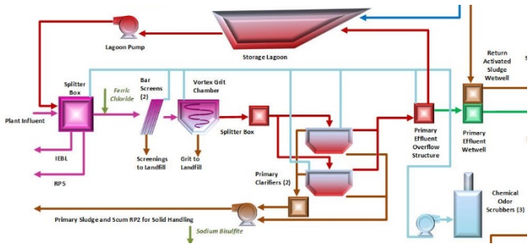
* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Primary Treatment Process

1. Asset Profile



Primary Splitter Box
The splitter box receives flow from the vortex grit chamber. By using a system of gates, the flow is routed to one or two clarifiers or is bypassed to Primary Effluent Overflow Structure. The splitter box has provisions for future expansions and points of connections are established. The splitter box shares a common wall with the primary effluent structure.

Primary Clarifiers
Two 95-foot diameter, center-feed, circular primary clarifiers provide sedimentation. Gear-driven flights direct settled solids to the center, and floatable scum to a system of pumps that discharge to an intermediate wet well for temporary storage. The primary effluent is routed by gravity to the primary effluent splitter box, where it is combined with the effluent from other primary clarifiers, and then flows by gravity to the primary effluent pump station.

Sludge Pumping System
Primary sludge is pumped out of the primary clarifiers continuously to RP2 for solid handling. A system of valves automatically alternates between the two clarifiers on operator selected timer.

Scum Pumping System
Scum collected in the primary clarifiers is directed to an intermediate wet well and is combined with spent bleach from System B and C. Depending on the level, a transfer pump will pull from the wet well and pump to RP2 for solids thickening. The scum collection system and intermediate wet well are covered, and the vapor space is connected to the odor control chemical scrubbers.

Primary Effluent Overflow Structure
Primary treated water is routed to the primary effluent overflow structure by gravity before it reaches the primary effluent pump station. By a system of pipes established at pre-set elevations, the primary treated water is routed to (1) the primary effluent pump station for secondary treatment or (2) the storage lagoon if there is a power failure or mechanical problem or if the system is hydraulically overloaded.

Storage Lagoon System
Storage lagoon features an onsite, short-term storage capacity of primary effluent, secondary effluent, or tertiary effluent. The primary effluent passively overflows into the storage lagoon in the event of primary effluent pump failure or power outage. Secondary effluent can overflow into the storage lagoon if the filter influent gate closes. In addition, if a noncompliant condition is reached at the tertiary section, tertiary effluent can be overflown into the storage lagoon. The floor of the lagoon is covered with concrete, and the side slope has vegetation to counter the effect of erosion. Stored water is pumped back into the influent diversion structure on an operator selected time and is retreated in the liquid treatment process.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Primary Treatment Process	13.2 MGD	
Primary Splitter Box Gates	 3 units	
Primary Clarifiers Drives Gates	2 @ 1,760 gpd/ft^2 7,088 ft^2 1 @ 0.5 hp 4 units	Per Unit Per Unit
Sludge Pumping System Pumps	 2 @ 220 gpm 30 hp	Per Unit
Scum Pumping System Pump	 2 @ 220 gpm 10.5 hp	Per Unit
Intermediate Wet Well Gates	 N/A units	
Storage Lagoon System Gates Pump	1 @ 9.0 MG N/A units 1 @ 1,500 gpm 30 hp	
Primary Effluent Overflow Structure Gates	 N/A Units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Primary Splitter Box	3	3	3	3
Primary Clarifier	4	3	3	3
Sludge Pumping System	3	3	3	3
Scum Pumping System	3	3	3	3
Intermediate Wet Well	3	3	3	2
Storage Lagoon System	4	3	4	4
Primary Effluent Overflow Structure	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Primary Splitter Box
Three gates are utilized to either route flow to or bypass primary clarifiers. Two gates that route flow to primary clarifier are normally opened but are typically not exercised. Conversely, the bypass gate is normally closed and is not typically exercised. The functionality of these gates is largely unknown. Gates operating in similar environment in the sister plants showed severe corrosion. The primary splitter box and three gates should be taken down and inspected.

Primary Clarifiers
Concrete sidewalks surrounding the primary clarifiers are detached from the sidewall and have settled more than five inches. In recent years, there have been numerous pipe line breakages: an 8-inch primary sludge line break and utility water line breakages (2012) was near this area. The breakages may be related to the differential settlement of the soil. This issue should be addressed by IEUA Maintenance.

Sludge Pumping System
No issues require special attention. Maintenance is removing/replacing the original piston pumps.

Scum Pump System
The scum wet well has limited controls and instrumentation. The floatables form a raft in the wet well, and the scum pump suction pulls from the bottom of the scum box. The floatables must be cleaned regularly.

Intermediate Wet Well
No issues require special attention.

Storage Lagoon System
It is unknown whether the storage lagoon system is intended as a containment system. A survey of historical record does not reveal whether compacted clay liner or geomembrane was used. The bottom of the storage lagoon is concrete, and the side slope is soil with shallow rooted vegetation.

Primary Effluent Overflow Structure
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Primary Splitter Box	1993	Planned 16/17
Primary Clarifiers	1993 2006	No.1 – 2014 No.2 – 2014
Sludge Pumping System	1993	
Scum Pumping System	1993 2006	
Intermediate Wet Well	1993	
Storage Lagoon System	1993	
Primary Effluent Overflow Structure	1993	Planned 16/17

* Appendix B – Condition Assessment Reports

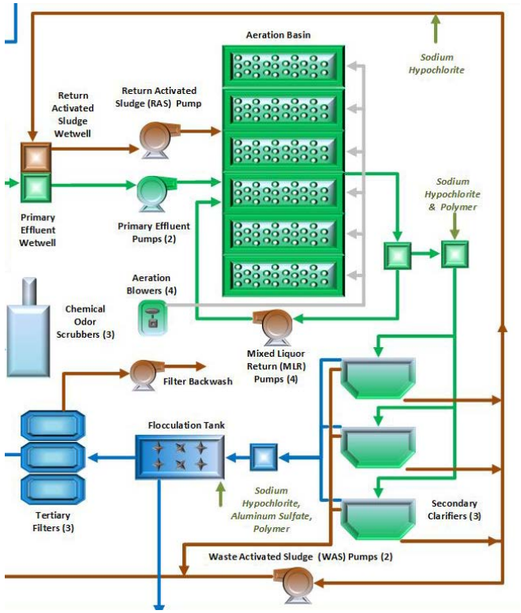
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – CCWRF

Secondary Treatment Process

1. Asset Profile



Primary Effluent Pump System
Primary effluent flows by gravity into the primary effluent pump station wet well. The wet well can be interconnected with return activated sludge (RAS) wet well and serve as a common wet well by opening a gate. The normal mode of operation is to operate the primary effluent wet well and RAS wet well independently. One of two vertical-turbine pumps lifts water to the aeration basin.

Activated Sludge System
There are two distribution channels for the aeration basins. By manipulating a system of gates, various combinations of primary effluent, RAS, and MLR can be introduced to the aeration basin. Normal mode of operation is to combine primary effluent, RAS, and MLR flows as one stream and distribute the stream equally to six different aeration basins. Propeller mixers are located at the distribution channel and aeration basin to promote mixing and prevent stratification of the mixed liquor.

The trains, with the exception of Train1, have baffled partitions. Each train operates in modified Ludzak-Ettinger configuration with an anoxic zone followed by three oxic zones to achieve the nitrate removal. A system of aeration sheaths, aeration control valves, and dissolved oxygen probes is used to limit or increase the volume of air introduction. The effluent from each aeration basin is combined in a common channel, a percentage of this mixed liquor is rerouted to the front of the aeration basin and the balance is routed to the secondary clarifiers.

Secondary Clarifiers
Mixed liquor from the aeration trains flows into the mixed liquor return pump station, and any unpumped mixed liquor passively flows into the secondary influent diversion structure. From the diversion structure, the flow is distributed evenly to three 120-feet-diameter, center-feed, circular secondary clarifiers. Each clarifier has a rotating sludge and skimmer arm. Solids settle to the bottom and are recycled to the aeration basin. The overflow of the secondary clarification is combined in the secondary effluent splitter box and is routed to the flocculation basin for further treatment.

Return Activated Sludge (RAS) Pumping System
The settled sludge in the secondary clarifiers is combined in the common header and routed by gravity into the RAS wet well located upstream of the aeration basin. The desired RAS flow rate at each clarifier is controlled by modulating a 16-inch flow-control valve on the RAS line. From the RAS wet well, RAS is pumped to the aeration basin distribution channel, and is mixed with primary effluent and mixed liquor return.

Waste Activated Sludge (WAS) Pumping System
To control the microorganism concentrations in the aeration system, a portion of the settled solids from the secondary clarifiers is wasted. The known volume of WAS is pumped out of the secondary system to RP2 for solid handling.

Scum Pumping System
Scum collected from the skimmer arm of the secondary clarifiers is routed to RP2 for solid handling in a common line along with WAS.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	12.0 MGD	
Primary Effluent Pump System	2 @ 17.6 MGD 125 hp	
Activated Sludge System Blowers	6 @ 2.02 MGD 3 @ 6000 scfm 400 hp 10.3 psig 1 @ 6400 scfm 400 hp 12.1 psig	Per Unit
Trains	6 @ 1.49 MG	Per Unit
Depth	21 ft	
Mixers	22_ @ 12 hp	
Gates	5 per train	
Valve	4 per system	
Valves (air)	1 (FCV), 3 (manual) per unit	> 12-inch > 12-inch
MLR Pumps	4 @ 7,425 gpm 50 hp	
Secondary Clarifiers	3 @ 360 gpd/ft^2 120 ft^2	
Gates	6 units	
RAS Pumping System	1 @ 17.6 MGD 125 hp	
Valves	2 units	> 18-inch
Gates	13 units	
WAS Pumping System	2 @ 350 gpm 7.5 hp	
Scum Pumping System	3 @ 450 gpm 5 hp	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Primary Effluent Pump System	3	2	3	2
Activated Sludge System	4	4	4	4
Secondary Clarifiers	3	3	3	3
RAS Pumping System	4	3	3	4
WAS Pumping System	3	2	2	3
Scum Pumping System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Primary Effluent Pump System
The primary effluent and RAS pump are reconditioned at a scheduled interval. Collectively, the pump system provides adequate pumping capacity and reliability. Two primary effluent pumps and the RAS pump were reconditioned in 2013 and 2015.

The concrete structure (primary effluent distribution channel) is showing some evidences of leakage on top, near the output side of the primary effluent pumps.

Activated Sludge System
An evidence of concrete deterioration exists on the distribution channel leading into Basin #1. The primary effluent gate to Basin #1 is reinforced externally to the concrete structure. The extent of the deterioration is appears to be superficial. However, this area shall be inspected thoroughly during the upcoming condition assessment in 2016.

The aeration flexible sheaths need to be replaced at regular (every five year) intervals because of solid build up or tears in the flexible sheath that reduce oxygen transfer efficiency . An in-house project is in progress to address this issue.

Blower #1 has high vibration issues and is out of service. Blower #3 has bad bearings and does not run. In addition, all four blowers at CCWRF are more than 22 years old and nearing the end of their service life. In addition, Blower #1, #2 and #3 do not have sufficient turn-down ratio. During the low flow condition, the activated sludge system is over-aerated, resulting in excessively high dissolved oxygen concentration. The over-aeration results in waste of energy and operational challenges. Project EN18018 will address these issues.

All the gates in the RAS distribution channel leading to the aeration basins are severely corroded and do not travel up and down. This area shall be inspected thoroughly during the upcoming condition assessment in 2016.

An 18 inch Solids Processing Recycle Pump and its associated piping is abandoned in place at Basin #1 and #2. The equipment shall be removed by the Maintenance Department.

Mixed Liquor Return Pump #1 is out of service due to defective bushing. The pump shall be refurbished by the Maintenance Department.

Secondary Clarifiers
There is a significant geotechnical settlement near secondary clarifiers that may be affecting the structural integrity of the buried pipes and electrical conduits. Secondary Clarifiers 1 and 2 have been rehabilitated, and Secondary Clarifier 3 is scheduled to be rehabilitated under Project EN14027.

RAS Pumping System
The RAS flow meters and RAS flow control valves are more than 20 years old and are nearing the end of their useful service life. The ability to flow desired volume of RAS is important for process control. A maintenance project is needed to replace this equipment.

WAS Pumping System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Primary Effluent Pump System	1993 1998 2013	Planned 16/17
Activated Sludge System	1993	Planned 16/17
Secondary Clarifiers	1993 2012 2013 2015	
RAS Pumping System	1993 2013	
WAS Pumping System	1993	Planned 16/17
Scum Pumping System	1993 2012 2013	

* Appendix B – Condition Assessment Reports

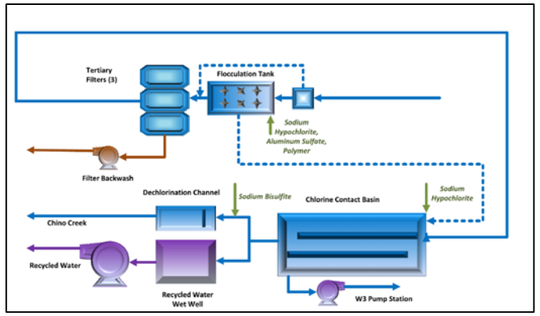
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – CCWRF

Tertiary Treatment Process

1. Asset Profile



Aluminum Sulfate (Alum) System
Secondary effluents from three secondary clarifiers are combined and travel to the rapid mix system, where aluminum sulfate, sodium hypochlorite, or polymer are introduced. The chemicals neutralize and destabilize the colloidal particles and enhance the solid/liquid separation. After the chemical addition and rapid mix, the water travels through a hydraulic flocculation basin in a baffled serpentine and ends up at three sand filters that are running in parallel.

Filters
The water passes through three automatic backwashing sand filters. The backwashes are initiated by either timer or the head loss across the sand filter. Backwash water is sent to the filter backwash pump station and pumped back into the aeration basin for treatment. The effluent from the filters flows by gravity to the chlorine contact basin for disinfection.

Filter Backwash Pump Station
The scum, backwash water, and drainage from the filter are collected by gravity in the filter backwash pump station. Upon reaching the pre-set level, the filter backwash water is pumped back into the aeration basin for treatment.

Chlorination System
Two 10,000-gallon bleach tanks housed indoor receive and hold 12.5 percent sodium hypochlorite (bleach) solution. Two chemical metering pumps inject bleach into the water champ located at the chlorine contact basin and provide disinfection. Two other pumps inject bleach into either filter influent or RAS for process control.

Chlorine Contact Basins
The chlorine contact basin is a dual-cell concrete structure that uses a serpentine flow path to achieve required contact time and disinfection of treated water. The bleach is introduced at the beginning of the serpentine, and free chlorine remains in the water while undergoing a plug flow. The influent flow rate is measured by a Parshall flume, and chlorine residual is measured at three different locations: influent, mid, and final.

Dechlorination System
The final 5137 cubic feet of last pass of the chlorine contact basin is used as a dechlorination structure, where sodium bisulfite solution (SBS) is introduced. The excess effluent that is not used in the recycled water system is discharged into Chino Creek. Before the discharge, chlorine residual present in the flow is neutralized with SBS by a chemical reaction. Two units of propeller mixers and under-flow baffle promote the mixing. SBS is stored in two 5,500-gallon chemical tanks and is metered into the system via five chemical metering pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	15.4 MGD	
Alum System		
Tank	1 @ 5000 gallons	
Pump	2 @ 3.7 gph	
Mechanical Mixer	1 @ 15 hp	
Filters	3 @ 1,600 ft^2	Per Unit
Travelling bridge	3 @ 0.5 hp	Per Unit
Backwash pump	3 @ 400 gpm 7.5 hp	Per Unit
Skimmer pump	6 @ 40 gpm 0.5 hp	Per Unit
Filter Loading	4 gpm/ft^2	
Gates	7 units	
Valves	6 units	> 18-inch
Filter Backwash Pump Station	3 @ 950 gpm 14.8 hp	Per Unit
Chlorination System		
Tanks	2 @ 10,000 gallons	Per Unit
Pumps	4 @ 77 gph	Per Unit
Mixers	1 water champ 2 propeller mixers	
Chlorine Contact Basins	1 @ 1.0 MG	
Gates	11 units	
Valves	N/A units	> 18-inch
Effluent Splitter Box		
Gates	2 units	
Dechlorination System		
Tanks	2 @ 5500 gallon	Per Unit
Pumps	2 @ 2.5 gph; 2 @ 20 gph; 1 @ 50 gph	Per Unit
Gates	2 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Alum System	4	3	3	3
Filters	3	3	3	3
Filter Backwash System	3	3	3	3
Chlorination System	2	2	2	2
Chlorine Contact Basins	3	3	3	3
Effluent Splitter Box	1	3	3	3
Dechlorination System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Alum System
The equipment is 20 years old and is approaching the end of its useful life. Two alum pumps should be replaced. This potential project should be manageable by IEUA Maintenance.

Filters
The performance of three shallow bed filters is adequate. CCWRF tertiary filter media was replaced and rehabilitated in 2012. However, most of the ancillary equipment, such as the influent gates, weir plates, and drain valves, has never been serviced since the original installation in 1993. As the service life of the ancillary equipment is nearing the end of its useful life, a provision to, at minimum, inspect the condition should be made. A condition assessment shall be performed to access the state of the assets.

Filter Backwash System
No issues require special attention, but the equipment is 20 years old and is approaching the end of its useful life.

Chlorination System
The chlorination system for the chlorine contact basin disinfection is adequate.

Chlorine Contact Basins
No issues require special attention.

Effluent Splitter Box
No issues require special attention.

Dechlorination System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Alum System	1993	Planned 16/17
Filters	1993 2012	Planned 16/17
Filter Backwash System	1993	Planned 16/17
Chlorination System	1993 2004	
Chlorine Contact Basin	1993	
Effluent Splitter Box	2014	
Dechlorination System	1993 2004 2013	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – CCWRF

Auxiliary Systems

1. Asset Profile

Plant Drain
The plant drain collects surface storm runoff, excess irrigation, and wash-down water collected in submersible drains located throughout the facility. The drain system receives gravity flows to a wet well, where it is then pumped and recycled toward the secondary clarifier influent, aeration basin, or head of the treatment process.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (solar and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the maintenance building, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the CCWRF electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. A 1500 kW generator is located in the maintenance building and supplies power to the preliminary, primary, secondary, and tertiary sections.

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water (UW) System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by either 930-foot pressure zone or the W3 pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a service on Telephone Avenue from the City of Chino. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at CCWRF. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to two main control terminals at the main control building and the chlorine building.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Plant Drain	10 @ 150 gpm 3 hp	
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 12 kV 12 kV to 480 V 12 kV to 4,160 V 12 kV 480 V 1 @ 1500 kW 2010 Bhp >26 units	
Utility Water System Pipelines W3 Pump Station Valves	 Various sizes 2 @ 780 gpm 40 hp 2 @ 270 gpm 20 hp 20 units	
Potable Water System Backflow Devices	 6 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub Radio Transmitter		

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	3	3	3
Electrical System	4	3	4	4
Utility Water System	3	4	4	3
Potable Water System	3	3	3	3
Instrumentation and Control System	4	3	4	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Plant Drain
No issues require special attention.

Electrical System
During 2012 wet seasons, a few components in the headworks electrical system were vulnerable to moisture. Automatic transfer control for the backup generator is nearing the end of its service life and should be upgraded with new technology.

6000 gallon steel underground diesel tank was installed in 1990 and is nearing the end of its useful life. A potential project shall replace the underground diesel with smaller above ground storage tank.

A potential project will address these issues.

Utility Water (UW) System
The pumping capacity and the efficiency of the W3 pumps have greatly decreased over time. The pumps are designed to pump 2,100 gpm total, but they pump only half of their combined designed capacity.

Potable Water System
No issues require special attention.

Instrumentation and Control System
CCWRF is first plant that will benefit from the SCADA migration project, EN13016.

Yard Piping
Many of the UW isolation valves do not hold, making it difficult to isolate flow during the shutdown events.

CCWRF mixed liquor line from MLR pump station to secondary clarifiers is inspected and repaired in 2015.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	1993	
Electrical System	1993	
Utility Water System	1993	
Potable Water System	1993	
Instrumentation and Control System	1993	
Yard Piping	1993	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Electrical System	CCWRF Backup Generator Control Upgrade	Automatic Transfer Control for the backup generator is nearing the end of its service life and should be upgraded with new technology
Electrical System	CCWRF Backup Generator Above Ground Diesel Storage Tank	Replace the existing 25 year old 6000 gallon diesel tank with smaller above ground storage tank

End of System Summary

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Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Regional Water Recycling Plant No. 4

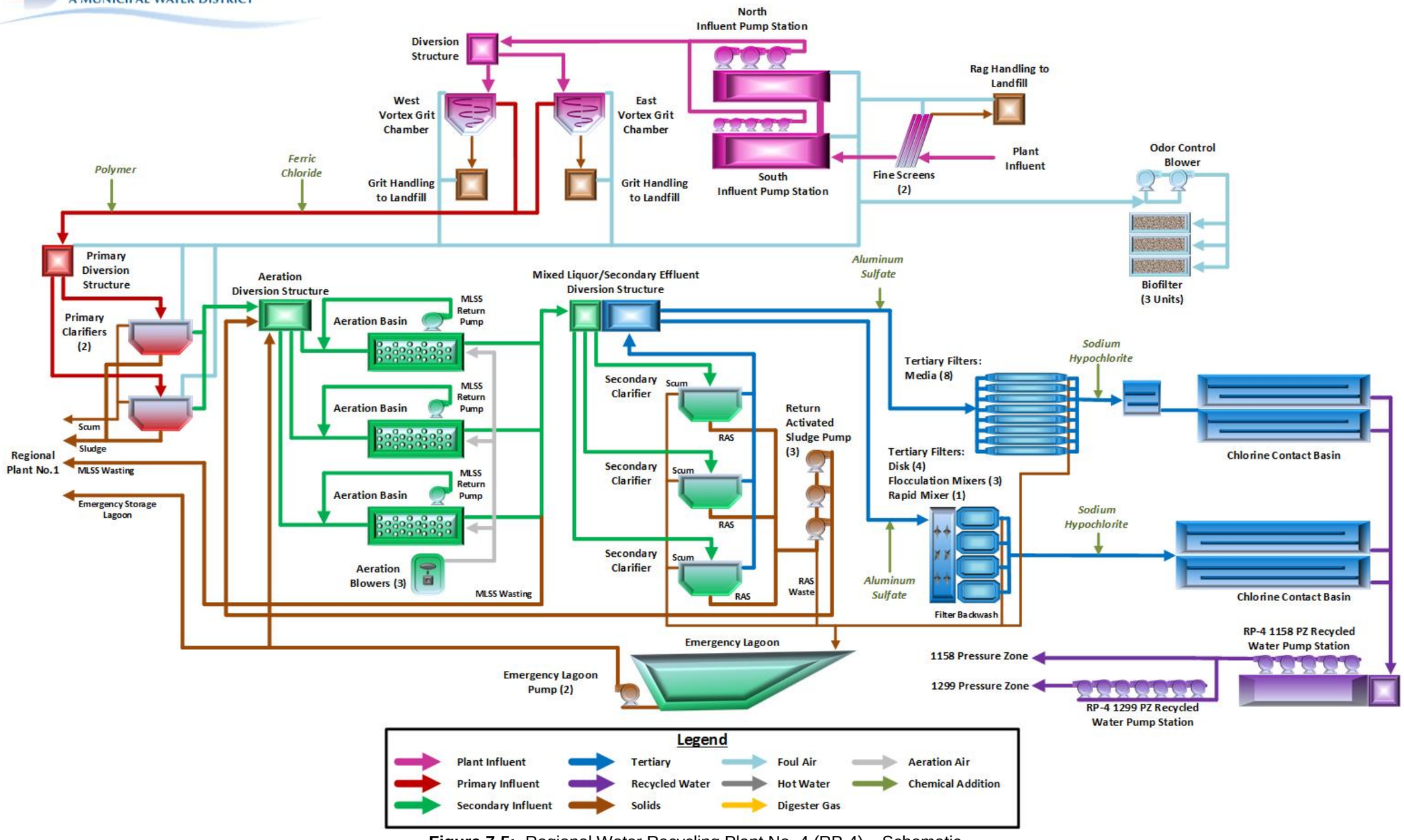

Figure 7-5: Regional Water Recycling Plant No. 4 (RP-4) – Schematic

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Table 7-5: Regional Water Recycling Plant No.4 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN14018	RP-4 Disinfection Facility Improvements	The project will replace the existing chlorination facility and associated equipment. Possible pipe gallery as an option.	RC	CC	1,000,000	1,200,000	15,000	-	-	-	-	-	-	-	***2,215,000***
2	EN17110	RP-4 Process Improvements	The project will include various process improvements (grit removal system, primary diversion structure, aeration blower replacement, RAS wasting station, MLSS wasting station, filtration system, secondary clarifier drain valves, lagoon recovery pump station, secondary clarifier weir washers, and recycled water distribution system).	RO	CC	180,000	1,400,000	3,000,000	585,000	15,000	-	-	-	-	-	***5,180,000***
3	EN17043	RP4 Primary Clarifier Rehab	Replace all steel components: fasteners, top beam, scum box, and skimmer arms. All concrete and carbon steel surfaces within both primary clarifiers should receive appropriate surface preparation and coating application following rehabilitation, retrofit the primary scum removal system, and address the primary sludge flow meter accuracy. After rehab and replacement, provide cathodic protection.	RO	CC	400,000	1,500,000	-	-	-	-	-	-	-	-	***1,900,000***
4	EN26022	RP-4 Tertiary Expansion		RC	CC	-	-	-	-	-	-	-	-	-	500,000	***500,000***
5	EN16013	RP-4 Lighting Improvements - Phase 1	Replace existing lighting with LED lights.	RO	CC	100,000	-	-	-	-	-	-	-	-	-	***100,000***
6	EN17030	RP-4 South Side Sight-Proof Safety Wall		RC	CC	380,000	-	-	-	-	-	-	-	-	-	***380,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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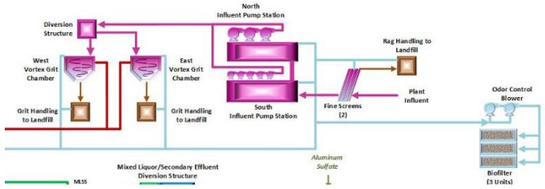
Asset Management System Summary – RP-4

Preliminary Treatment Process

1. Asset Profile



Influent Channel
Raw wastewater enters the plant through a 42-inch gravity sewer pipeline. A composite sample and other instrumentation are used to monitor the plant's influent flow, which establishes the official influent monitoring control point for the treatment plant.

Screening Equipment
Influent flow is diverted into two channels. Both channels are equipped with a mechanical rake and perforated fine screen. These units remove all solids before the solids enter the treatment plant. Screened solids are conveyed to a waste storage bin to await landfill disposal.

Influent Pump Station
The screened wastewater enters the south influent wet well and then flows into the north wet well. The southern influent pump station is equipped with five dry-mount pumps, and the north influent pump station is equipped with three submersible pumps. Both influent pump stations lift screened wastewater into a common pipeline, which enters the headworks flow diversion structure.

Influent Flow Metering
The lifted flow enters the common pipeline, equipped with a magnetic flow meter that records the daily flow through the plant. The common pipeline has a flow meter bypass for flow meter maintenance. Metered flow enters two diversion structures where gates regulate flow through the grit removal system.

Vortex Grit System
The metered flow is diverted into two separate grit-removal systems. Each grit-removal system is equipped with a vortex grit chamber and classifier. Grit and other inorganic material are removed before entering the primary treatment process. The material is conveyed to a waste storage bin to await landfill disposal.

Grit Washing/Disposal System
Grit pumped from the vortex grit chamber is routed to two grit classifiers, where organic matters are removed from the grit. The grit sinks to a submerged inclined screw and moves up the ramp while being washed. The organic rich liquid from the grit classifiers are directed back to the liquid handling stream.

Screening Conveyance/Disposal System
Screening collected by the fine screens is transported by a conveyor and dropped into a washer compactor. The washer compactor reduces the organics on the screens before discharging into a hauling bin.

Odor Control System
The foul air is extracted from the influent screening enclosure, influent pump stations, the grit-removal vortex chambers, the grit-waste storage bins, and the primary clarifiers and conveyed to the media biofilters to remove odorous compounds. The odor control system is equipped with two blowers and three biofilters.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	16.1 MGD	
Influent Channel		
Sewer	42-inch	
Screening Equipment		
Fine Screen	2 @ 36.0 mgd each	Peak
	3 hp each	
Gates	4 units	
Influent Pump Station		
Pumps	3 @ 6,000 gpm	Per Unit
	100 hp	
	5 @ 3,275 gpm	Per Unit
	50hp	
Valves	8 units	> 12-inch
Influent Flow Meter	1 @ 48.3 mgd	
Valves	3 units	
Vortex Grit System	2 @ 16.1 mgd	Per Unit
Paddle Drive	2 @ 1.5 hp	Per Unit
Pump	3 @ 250 gpm	Per Unit
	10 hp	
Gates	8 units	
Grit Washing & Disposal System		
Classifier	2 @ 50 gpm	
	5 hp	
Screening Conveyance & Disposal System		
Conveyor	1 hp	
Washer Compactor	150 ft^3/hr	
	2 @ 3 hp	
Odor Control System		
Foul Air Fan	2 @ 12,500 scfm	Per Unit
	30.8 hp	
Biofilter	3 @ 5,011 ft^3	Per Unit
Pump	2 @ 214 gpm	Per Unit
	3 hp	
Valves	10 units	> 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Channel	3	2	2	2
Screening Equipment	2	2	3	2
Influent Pump Station	4	3	3	4
Influent Flow Meter	3	3	3	3
Vortex Grit System	4	5	4	4
Grit Washing/Disposal System	3	5	3	3
Screening Conveyance/Disposal	2	4	3	3
Odor Control System	3	3	3	3

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Influent Channel
Piping into headworks showed signs of moderate deterioration, but does not require immediate attention, as noted in the March 2015 HDR Condition Assessment Report.

Screening Equipment
Cleaning of the fine screens requires a large amount of water. The Manufacturer is evaluating alternative washing methods.

Influent Pump Station
Large quantity of material was removed from both wet wells during Project EN09021. There was difficulty accessing the south pump station without the entire headworks being taken offline. A potential project is needed to add inspection manholes and add coarse bubble mixing to both influent wet wells.

The southern 5 pumps are difficult to maintain and are approaching the end of their useful life.

Both wet wells showed signs of moderate deterioration, but does not require immediate attention, as noted in the March 2015 HDR Condition Assessment Report.

A potential project is needed to address these issues.

Influent Flow Meter
No issues require special attention.

Vortex Grit System
Grit Chamber No.1 has been offline since 2013 and require major rehab and replacement. A project expectation memo was developed in 2014 to address multiple issues: no remote operation, grit chamber plugs, equipment out of date, and classifier needs to be replaced, and the east grit chamber isolation gates need to be replaced. Project EN17110 will rehab this system.

The chambers had moderate deterioration, but does not require immediate attention, as noted in the January 2015 HDR Condition Assessment Report.

Grit Washing/Disposal System
The screenings and grit are handled separately. Project EN09021, to be completed FY2015/16, will provide flexibility to add screenings and grit to a common dewatering bin.

Screening Conveyance/Disposal System
The additional water needed to clean the fine screens limits the ability for the washer compactor to clean the rags completely. In addition, the Manufacturer of the rag washer says the water supply pressure is not high enough for sufficient washing.

If the washer compactor were to fail and needed to be removed from operation, then the handling bins would not be adequate on their own: they are not designed to handle a large volume of water.

A potential project is needed to address these issues.

Project EN09021 will install a centralized handling bin for both rags and grit.

Odor Control System
An air balance was not performed on the new headworks handling building. In addition, the new air louvers need to be braced open to supply air exchange. Further evaluation of this system is needed to address these issues. A potential project may be needed.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Influent Channel	1997	March 2015
Screening Equipment	1997 2002	March 2015
Influent Pump Station	1997 2009	March 2015
Influent Flow Meter	2009	
Vortex Grit System	1997 2009	January 2015
Grit Washing/Disposal System	1997 2009	
Screening Conveyance & Disposal System	1997 2009	
Odor Control System	2009 2012	

* Appendix B – Condition Assessment Reports

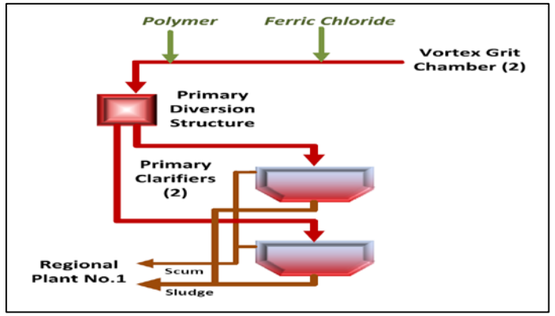
Table 4 Potential Projects

System	Project Name	Project Description
Influent Pump Station Screening Conveyance/ Disposal System	RP4 Headwork Improvements Phase II	This project is intended to replace the southern pumps, provide access to the southern wet well, install coarse bubble mixing on both wet wells, increase the pressure supply to the washer compactor, and troubleshoot redundancy issue of the washer compactor.

Asset Management System Summary – RP-4

Primary Treatment Process

1. Asset Profile



Primary Diversion Structure
The preliminary treated flow enters a common 54-inch pipeline and is conveyed to the primary diversion structure. The flow is equally distributed into two 36-inch pipelines, each feeding a circular primary clarifier.

Ferric Chloride System
Ferric chloride is dosed into the raw wastewater before screening. The chemical is used to remove phosphorous and to improve the settling/removal characteristics within the primary clarifiers.

Polymer System
Polymer can be added to the treated flow to improve the settling/removal characteristics within the primary clarifiers, but typically polymer is not used at the plant. Polymer can be injected at the primary diversion structure.

Primary Clarifiers
The facility is equipped with two covered primary clarifiers. The treatment process removes settable solids and floatable scum and grease. There is no solids-handling at RP-4; therefore, all the settled and floatable solids are introduced back into the trunk sewer downstream of RP-4, where they can be processed at RP-1. Solids are wasted out of the clarifier by gravity through actuated valves. Each clarifier is equipped with a flow meter to monitor all solids wasted from the primary treatment process. Primary effluent is conveyed through a 54-inch pipeline.

Sludge/Scum Wasting System
The solids which settle and thicken into sludge are gently mixed by the rotating rake arms on the bottom of the primary clarifiers; this process releases gas bubbles and allows the sludge to compact. A pipe conveys sludge by gravity into the trunk sewer to RP-1; all wasted sludge is recorded by flow meter and automatic control valves. The solids that float and thicken into scum are skimmed into scum beach and stored in a small wet well. A pipe conveys scum by gravity into the trunk sewer to RP-1.

2. Asset Profile

Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Primary Treatment Process	14 MGD	
Primary Diversion Structure Mixer Gates	 1 @ 4 hp 3 units	
Ferric Chloride System Pump Chemical Tank	 2 @ 53.1 gph 8,000 gallons	Per Unit
Polymer System Metering Pump	 2 @ 4.5 gph	Per Unit
Primary Clarifier Drive	2 @ 1,617 gpd/ft^2 8,660 ft^2 0.33 hp	Per Unit
Sludge/Scum Wasting System Scum Valves Sludge Valves	 2 units 8 units	 6-inch > 6-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Primary Diversion Structure	4	3	3	3
Ferric Chloride System	4	3	3	3
Polymer System	NA	NA	NA	NA
Primary Clarifiers	5	3	3	4
Sludge/Scum Wasting System	4	3	4	4

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Primary Diversion Structure
The top of the diversion structure is showing signs of concrete corrosion. The odor control covers are not properly aligned or secured to the structure anymore. The structure had significant deterioration of concrete and requires immediate attention, as noted in the January 2015 HDR Condition Assessment Report.

Project EN17110 will rehab the concrete, install larger inspection hatches for cleaning, replace influent gates, and address the concrete corrosion.

Ferric Chloride System
The ferric containment area needs to be recoated. The ferric chloride is being dosed through the original polymer injection pipeline because the original dosing point is upstream of the screening equipment; ferric should be dosed downstream of the grit removal system. Project EN17110 will rehab this system.

Polymer System
The chemical dosing pipeline is being used to inject ferric chloride, and the polymer system is out of service. To maximize the soluble BOD to the denitrification zone of the aeration basin, it is not recommended to for polymer addition in the future. The polymer system will be abandoned..

Primary Clarifiers
The clarifiers had significant deterioration and requires immediate attention, as noted in the January 2015 HDR Condition Assessment Report. All steel requires replacement of like material or 316 stainless: includes fasteners, top beam, scum box, and skimmer arm. After replacement, all concrete and carbon steel surfaces should receive appropriate surface preparation and coating application following rehabilitation, and install cathodic protection. A potential project is needed to address these issues.

Primary Sludge/Scum Wasting System
Scum-well effluent piping tends to get clogged, a problem which requires flushing the piping or removing the material with a vacuum truck. This system should be evaluated to determine the feasibility for installing a pumping system in place of the current gravity wasting system. In addition, the scum removal system is ineffective and large scum debris forms on the surface. Further evaluation is required to determine a solution to this problem. Refer to Primary Clarifier Key Issues for additional scum ancillary equipment condition.

The primary sludge flow meter is not accurate because the flow meter doesn't continuously operate with a full pipe. In addition, the air relief for the system continuously discharges solids, so a tote is used to capture the solids. An alternative method is preferred.

A potential project is needed to address these issues.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Primary Diversion Structure	2009	January 2015
Ferric Chloride System	2009	NA
Polymer System	2009	NA
Primary Clarifiers	2009	1: April 2015 2: April 2015
Sludge/Scum Wasting System	2009	Scum: April 2015 (No Piping)

* Appendix B – Condition Assessment Reports

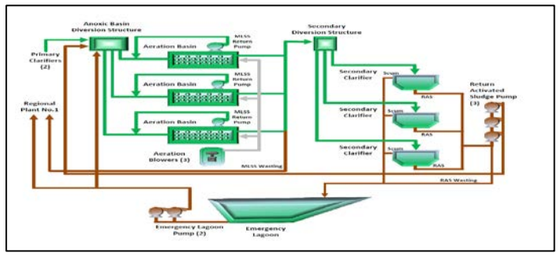
Table 4 Potential Projects

System	Project Name	Project Description
Primary Clarifiers Primary Sludge/Scum Wasting System	RP4 Primary Clarifier Rehab	Replace all steel components: fasteners, top beam, scum box, and skimmer arms. All concrete and carbon steel surfaces within both primary clarifiers should receive appropriate surface preparation and coating application following rehabilitation, retrofit the primary scum removal system, and address the primary sludge flow meter accuracy. After rehab and replacement, provide cathodic protection.

Asset Management System Summary – RP-4

Secondary Treatment Process

1. Asset Profile



Anoxic Basin Diversion Structure
Primary effluent enters the anoxic basin diversion structure and is mixed with return activated sludge, creating mixed liquor. Mixed liquor is diverted equally through three 42-inch pipelines, each feeding an activated sludge system.

Anoxic Basin
One anoxic basin is designated for each of the three activated sludge treatment systems. Each system is composed of an anoxic basin and an aeration basin. The basin is equipped with three mixers to keep solids in suspension throughout the basin. The anoxic basin effluent is diverted through launders into two 30-inch pipelines, which equally feed both aeration basin trains.

Activated Sludge System
An aeration basin is designated for each of the three activated sludge treatment systems. The basins are divided into two trains, and each train is further subdivided into four zones: an extended anoxic zone, oxic zone, another anoxic zone, and another oxic zone. Each zone provides the correct biological environment to consume carbonaceous waste, breakdown ammonia, and reduce pathogens in the mixed liquor. The anoxic zones are equipped with mixers to ensure the solids remain in suspension throughout the treatment process. The oxic zones are equipped with fine-bubble-air diffusers. The diffused air supports the biological process and also provides mixing within the zone. A submersible mixed-liquor return pump is strategically placed at the end of the first oxic zone to recycle flow to the anoxic basin for more efficient treatment. The treatment system is equipped with three blowers to provide pressurized air to the oxic zones. Typically only one or two blowers are needed during the day for the treatment process.

Mixed Liquor Diversion Structure
The mixed liquor enters a common 66-inch pipeline, which feeds the bottom of the mixed liquor diversion structure. The flow is then split equally through three launders, and each launder feeds a secondary clarifier through a 48-inch pipeline.

Secondary Clarifiers
The facility is equipped with three secondary clarifiers. The secondary treatment process provides an environment for the gravity separation of solids from the mixed liquor. The clarified secondary effluent exits the clarifier through a 48-inch pipeline. Scum accumulated on the surface of each of the secondary clarifiers is wasted to the emergency lagoon. The settled solids are referred to as activated sludge. The activated sludge is recycled to the anoxic basin diversion structure through the return activated sludge pump station. The pump station is equipped with three pumps and has a common 24-inch suction pipeline from each secondary clarifier. To control the population of biological species, activated sludge can be wasted from the common effluent pipeline from the aeration basin; wasted activated sludge is diverted to RP-1 for further treatment.

Return Activated Sludge (RAS) Pumping System
The RAS pumping system is designed to return the settled biomass in the secondary clarifier to the head of the activated sludge system. The system is designed to pump at a rate of 30 to 100 percent of the full average daily flow of the facility.

Waste Activated Sludge (WAS) Station
The WAS station is designed to remove the excess biomass from the activated sludge system. Biomass can be removed as mixed liquor suspended solids (MLSS) from the common aeration basin effluent pipeline or from the discharge of the RAS pumping system. MLSS is wasted directly to the trunk sewer, which is treated at RP-1. Wasted RAS is discharged to the emergency lagoon.

Emergency Lagoon
The emergency lagoon is located at the southern end of the plant. The primary function of the lagoon is to recycle the filter effluent backwash from the trident filters and aqua aerobics filters. Secondary scum and plant drainage are also diverted to the lagoon. The recycled flow is pumped into the anoxic basin diversion structure or can be diverted to Regional Plant No.1

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	14.0 MGD	
Anoxic Basin Diversion Structure Gates	 6 units	
Anoxic Basin Mixer Gates	3 @ 7.0 MGD 3 @ 6.2 hp 6 units	Per unit Per Unit
Activate Sludge System Blowers Blower Valves Trains Depth Mixers Air Panels Valve Valve (air) MLR Pump MLR Valve	3 @ 7.0 MGD 2 @ 8,000 scfm 500 hp 13.07 psig 1 @ 8,000 scfm 450 hp 9.00 psig 6 units 6 @ 1,54 MG 15.7 ft 6 @ 4 hp 463 per train 1 per train 6 units 6 @ 14,800 gpm 40 hp 6 units	Per Unit Per Unit >14-inch Per Unit Per Unit > 18-inch > 12-inch Per Unit >30-inch
Mixed Liquor Diversion Structure Gates	 3 units	
Secondary Clarifier	3 @ 848 gpd/ft^2 16,500 ft^2	
RAS Pumping System Pump Valves	 3 @ 6,076 gpm 75 hp 15 units	 Per unit > 18-inch
WAS Station Valves	 3 units	 6-inch
Emergency Lagoon Pump	1 @ 4.0 MG 2 @ - 3,155 gpm	 Per unit
Valves	75 hp 2 units	> 16-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Anoxic Basin Diversion Structure	3	3	3	3
Anoxic Basin	3	3	4	3
Activated Sludge System	5	5	5	5
Mixed Liquor Diversion Structure	3	3	3	3
Secondary Clarifiers	4	3	3	3
RAS Pumping System	3	4	4	4
WAS System	3	3	4	4
Emergency Lagoon	4	3	4	4

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Anoxic Basin Diversion Structure
No issues require special attention.

Anoxic Basin
A substantial amount of solids settle in this area. Alternative mixing needs to be provided to eliminate this condition; possibly coarse bubble mixing. A potential project will address this concern.

Activated Sludge System
There are multiple broken air diffuser panels throughout the aeration basin system, drastically reducing the oxygen transfer efficiency through the sytem, negatively effecting treatment. Maintenance will replace the panels throughout the system through FY 2016/17.

The drains on the aeration basins are not sufficient; it takes approximately a month to clean enough for entry. In addition, the MLR pumps cannot be isolated without taking the adjacent MLR pump out of service. Finally the air flow meters are inaccurate and need to be replaced (potentially Kurz type). A potential project is needed to address this issue.

The Kawasaki blower is rated for a higher pressure than the two Turblex blowers and cannot run with the lower-rated blowers without failing when in auto. Therefore the Kawasaki can only run as a standalone blower, eliminating the reliable redundancy of the aeration blowers. Project EN17110 will replace the Kawasaki blower.

Mixed Liquor Diversion Structure
No issues require special attention.

Secondary Clarifier
The secondary clarifier effluent launders and trough grow large amounts of algae, requiring manual removal. Clarifier No.1 valve has failed and has been replaced with a plug, and the other two clarifiers are assumed to be in the similar condition. Project EN17110 will address this issue.

RAS Pumping System
The RAS wasting valve can only waste to the lagoon; excess solids in the lagoon create a septic environment and increased odors. The wasted RAS flow should be discharged directly to the sewer. Project EN17110 will address this issue.

The RAS pumps have no redundancy. A potential project is needed to address this issue.

WAS Station
The existing control valve (plug valve) and programming does not provide the capability to set a constant flow rate. In addition, the air relief for the system continuously discharges solids, so a tote is used to capture the solids. Project EN17110 will address this issue.

Emergency Lagoon
The lagoon recovery pump station equipment is unreliable and has approached the end of its service life, due to the following reasons: the discharge Victaulic fittings leak, the air-reliefs plug, and pumps have difficulty priming. The flow meter is not connected to SCADA. The flow meter is dated and only reads as a percentage (i.e. 0 to 100%) on a local display. Project EN17110 will address the pump station issues.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Anoxic Basin Diversion Structure	2009	
Anoxic Basin	1997 2009	1: Dec 2014
Activated Sludge System	1997 2003 2009	1: Dec 2014 2: Jan 2015
Mixed Liquor Diversion Structure	2009	
Secondary Clarifiers	2009	Planned 15/16
RAS Pumping System	2009	
WAS Station	2009	
Emergency Lagoon	1997	

* Appendix B – Condition Assessment Reports

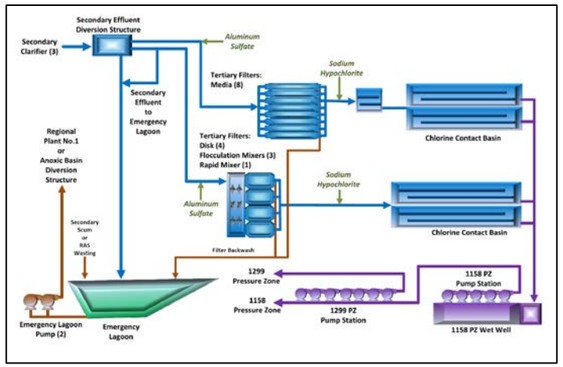
Table 4 Potential Projects

System	Project Name	Project Description
Activated Sludge System	RP4 Aeration Basin Improvements	Enlarge the drains on the aeration basins, retrofit the MLR pumps isolation, install coarse bubble mixing in the anoxic zones, and retrofit the air flow meters.
Return Activated Sludge	RP4 RAS Improvements	Retrofitting the RAS pump station to provide redundant pumping.

Asset Management System Summary – RP-4

Tertiary Treatment Process

1. Asset Profile



Secondary Effluent Diversion Structure
The secondary effluent structure is fed through the bottom by a 66-inch pipe. Flow can be diverted to three different locations: the Trident media filters, Aqua-Aerobics Disk filters, or the emergency lagoon. The media filters are fed by a 36-inch pipe, the cloth filters are fed by a 48-inch pipe, and a 48-inch pipe is used to bypass flow to the emergency lagoon. A 30-inch pipe connects the Aqua-Aerobics system to the 48-inch bypass pipe.

Aluminum Sulfate (Alum) System
Chemicals can be added to the secondary effluent that is feeding either filtration system for the purpose of coagulation or pre-filter disinfection. Alum is stored in the maintenance building in two bulk storage tanks and at the trident filter building in two smaller transfer tanks. Bleach is stored in three bulk storage tanks in the maintenance building and is typically applied to the chlorine contact basin

Filters (Trident and Aqua-Aerobics)
The filtration systems consist of two different technologies: the Trident Anthracite Media Filters and the Aqua-Aerobics Disk Filters. Both technologies filter solids from the secondary effluent before undergoing their separate disinfection systems. The Trident filter must not exceed a filter loading rate of five gallons per minute per square foot (gpm/ft^2), and the Aqua-Aerobics filter cannot exceed a filter loading rate of six gallons per minute per square foot (gpm/ft^2). The Trident-filtered effluent feeds Chlorine Contact Basin 1A through a 36-inch pipe, and the Aqua-Aerobics-filtered effluent feeds Chlorine Contact Basin 2 through a 48-inch pipe.

Chlorination System
Disinfectant chemical, in the form of 12.5 percent solution sodium hypochlorite (bleach), is dosed to the filtered effluent at both locations: Chlorine Contact Basin 1A and Chlorine Contact Basin 2. The chlorine dose typically ranges from 5 to 15 milligrams per liter. The bleach is intimately mixed into solution using a mixer at the influent of both chlorine contact basins. Bleach is stored in three bulk storage tanks in the maintenance building.

Chlorine Contact Basins (CCB)
The facility is equipped with two chlorine contact basin systems. The Trident-filtered effluent feeds into a coupled chlorine contact basin consisting of Chlorine Contact Basin 1A and 1B, and Aqua-Aerobics-filtered effluent feeds into Chlorine Contact Basin 2. The chlorine contact basin effluent is required to meet California Department of Public Health's Title 22-approved disinfection contact time of 450 milligrams-minutes per liter and a modal contact time of 90 minutes to discharge into the recycled water distribution system. The final effluent is pumped into the recycled water distribution system; therefore, the final effluent does not need to be dechlorinated at RP-4.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	14.0 MGD	
Secondary Effluent Diversion Structure		
Gates	3 units	
Alum System		
Tank	2 @ 2,200 gallons	Per unit
Transfer Tank	2 @ 400 gallons	Per unit
Transfer Pump	2 @ 90 gph	Per unit
	1 @ 124 gph	
Pump		
Trident Filters	2 @ 34.5 gph	Per unit
Aqua Filters	2 @ 12.5 gph	Per unit
Trident Filters		
Absorption Clarifier	8 @ 11 gpm/ft^2	Per unit
	140 ft^2	
Media Filter	8 @ 5 gpm/ft^2	Per unit
	313 ft^2	
Backwash Pump	2 @ 4,200 gpm	Per unit
	100 hp	
Backwash Blower	2 @ 1120 scfm	Per unit
	30 hp	
Valves	16 units	> 18-inch
Aqua Disk Filters	4 @ 5.8 gpm/ft^2	Per unit
	646 ft^2	
Rapid Mixer	1 @ 5 hp	
Flocculation Mixer	3 @ 1 hp	Per unit
Backwash Pump	8 @ 1,760 gpm	Per unit
	3 hp	
Helical Gear Drive	4 @ 15,597 lb.-inch	Per unit
	¾ hp	
Gates	3 units	
Valves	4 units	> 18-inch
Chlorination System		
Tank	3 @ 2,200 gallons	Per unit
Pump		
Trident Filters	1 @ 77 gph	
	1 @ 22.5 gph	
RAS Pipeline	1 @ 90 gph	
CCB1A	2 @ 180 gph	
CCB2	2 @ 124 gph	Per unit
SBS (O/S)	2 @ 46.9 gph	Per unit
Water champ Mixer	2 @ 30 gpm	Per unit
	7.5 hp	
Chlorine Contact Basin		
CCB1A & 1B	7.0 MGD	T22 Report
	1.15 MG	
CCB2	7.0 MGD	T22 Report
	1.01 MG	
Gates		
CCB1A	1 units	
CCB1B	2 units	
CCB2	2 units	
Valves		
CCB1B	1 units	> 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Secondary Effluent Diversion Structure	3	3	3	3
Alum System	3	3	4	4
Trident Filters	4	3	4	4
Aqua-Aerobics Disk Filters	3	3	3	3
Chlorination System	4	4	4	4
Chlorine Contact Basin	4	3	3	4
Effluent Diversion Structure	3	3	3	3

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Secondary Effluent Diversion Structure
A leak has been identified on the structure. A condition assessment should be performed to determine a course of action.

Alum System
Alum is transferred to day tanks, and it would be more efficient to directly from the bulk tank to the trident filters. It would be preferred that the alum is dosed from a central location to eliminate equipment, increase reliability, and function. In addition, OPS manually transfers from the bulk to day tank. A potential project is needed to address these issues.

Trident Filters
The absorption media and filter media are routinely replaced by maintenance staff. Multiple backwash, effluent, and waste valves do not isolate completely, flow is wasted to the lagoon and recirculated within the plant, many actuators leak air or are no longer utilized, and anthracite is found in the anoxic basin. A complete retrofit is required. Project EN17110 will address this issue.

Aqua-Aerobics Disk Filters
Backwash system is continuously operating, which is not a normal condition. A potential project is needed to rehab the entire backwash system.

Chlorination System
The bleach containment area is not coated, and the concrete tank pads, metal supports, and the containment walls are showing signs of corrosion. In addition, bleach has seeped past the containment area to damage a door and walls outside of the containment area. The leaking bleach wears the ancillary equipment prematurely.

The three bleach storage tanks are 2,200 gallons each, but due to the overflow penetration location on each tank, the storage capacity has been reduced to 2,000 gallons. The total storage capacity of 6,000 gallons leaves limited flexibility to receive full load deliveries of 4,800 gallons. In addition, the east alum tank and ancillary equipment located directly across from the bleach containment are abandoned.

The bleach metering pumps are diaphragm technology. These pumps lose suction prime when offline and require manual operation to degas the suction pipeline. Although all the pumps are diaphragm, there is no standardized pump manufacturer. In addition, the maintenance on the diaphragm is time consuming and expensive.

The chlorine dosing system is currently operating without backup injection pipelines. CCB1A does not have an operational backup bleach injection pipeline. Both CCB2 injection pipelines are offline due to leaks; the locations of the leaks are unknown due to the pipeline being buried under asphalt. Finally, the Aqua Disk Filters do not have a bleach injection pipeline for pre-filter chlorination. Algae will blind the filter media, resulting in more frequent backwashes.

Project EN14018 will address issues within the chlorination system.

Chlorine Contact Basin (CCB)
There are gaps on the chlorine contact basin covers, and sand and debris infiltrate the structure. The basins have not been inspected since construction.

The CCB1A effluent gate needs to be repaired, replaced, or removed from operation. Controls for the gate are outdated and approaching the end of its service life. Project EN17110 will address this issue.

Effluent Splitter Box
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Secondary Effluent Diversion Structure	2009	Propose Inspection 15/16
Alum System	1997 2009	
Trident Filters	1997	Propose Inspection 15/16
Aqua-Aerobics Disk Filters	2009	
Chlorination System	2003 2009	
Chlorine Contact Basin	2003 2009	Propose Inspection 15/16
Effluent Splitter Box	2003	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Alum System	RP4 Alum Centralization	Retrofit the alum system to eliminate the need for day tank systems.
Aqua-Aerobics Disk Filters	RP4 Aqua Disk Backwash System Improvements	Rehab the backwash system for the Aqua Disk Filters.

Asset Management System Summary – RP-4
Auxiliary Systems

1. Asset Profile

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (wind and emergency generators). The wind asset is owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switch gear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-4 electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. One outside generator is located in the northern portion of the facility and supplies power to the preliminary, primary, secondary, and tertiary sections.

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by the 1158-foot pressure zone pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied by three connections on 6th Street from the Cucamonga County Water Department. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-4. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to the main control centers.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Electrical System		
Utility Voltage	1 @ 12 kV	
Transformers	8 @ 12 kV to 480 V	
Switchgear	10 @ 12 kV	
Distribution	5 @ 480 V	MCCs
Generator	1 @ 2,000 kW 2,847 Bhp	
Wind Turbine	1 @ 1 MW	
Mounted Lighting	> 50 units	
Utility Water System		
Pipelines	Various sizes	
Pump Station	See *1158 Pressure Zone*	
Valves	2 units	6-inch
Potable Water System		
Backflow Devices	5 units	>2-inch
Valves	10 units	>2-inch
Instrumentation and Control System		
HMI Workstation	8 units	
PLC	7 units	
I/O Hub	5 units	
Radio Transmitter	1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Electrical System	3	3	3	3
Utility Water System	3	3	4	4
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	4	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Electrical System
No issues require special attention.

Utility Water System
The plant utility water is not monitored from the 1299 recycled water pump station.

There are very few recycled water connections greater than 1 ½" around the plant. The ½" recycled water connections throughout the plant do not provide sufficient pressure or flow for cleaning large tanks. Provide above ground piping when possible.

If the plant's tertiary treated wastewater does not meet recycled water compliance standards, the 1158 and 1299 recycled water pump stations are taken offline. Unfortunately, noncompliant water is left within the contact basins and has to be pumped to the lagoon through the 1158 recycled water pump station which requires manually manipulating three large valves. Manipulating large valves is time consuming and increases the amount of time to start producing compliant recycled water again through the plant.

Project EN17110 will address the system issues.

Potable Water System
No issues require special attention.

Instrumentation and Control System
Multiple control systems need to be optimized, including: DO control, activated sludge wasting, and influent pump control. The SCADA migration may address these concerns, or may need to address internally.

Yard Piping
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Electrical System	1993 1995 2001 2005	
Utility Water System	2002	
Potable Water System	1993 2003	
Instrumentation and Control System	1995 2001 2003 2005	
Yard Piping	1993 1995 2001 2005	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Regional Water Recycling Plant No. 5

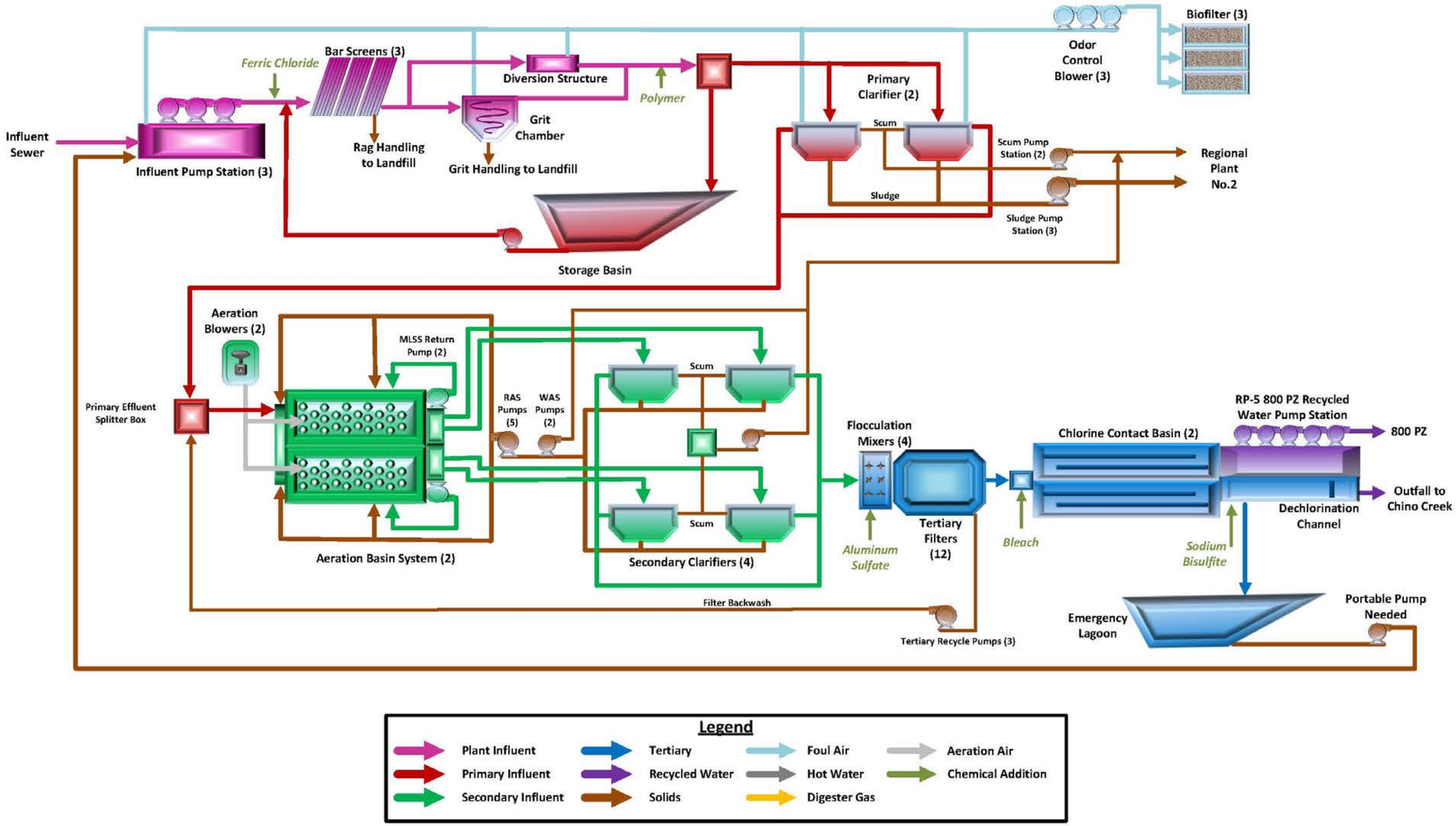

Figure 7-6: Regional Water Recycling Plant No. 5 (RP-5) – Schematic

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Table 7-6: Regional Water Recycling Plant No.5 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN11031	RP-5 Flow Equalization and Effluent Moni	Install automation and flow monitoring to the equalization and chemical processes.	RC	CC	1,465,000	1,500,000	10,000	-	-	-	-	-	-	-	***2,975,000***
2	EN13041	RP-5 RW PS Process Control Sys Migration	Upgrade RP-5 RW pump station SCADA controls. To be integrating into RP-5 facility SCADA migration project.	WC	CC	-	-	280,000	-	-	-	-	-	-	-	***280,000***
3	EN16028	RP-5 Expansion PDR	As defined by WWFMP, includes both solids and liquids facilities	RC	CC	1,850,000	-	-	-	-	-	-	-	-	-	***1,850,000***
4	EN19001	RP-5 Expansion to 30 MGD		RC	CC	1,250,000	1,875,000	12,500,000	28,875,000	28,875,000	40,075,000	11,550,000	-	-	-	***125,000,000***
5	EN19006	RP-5 SHF - RO		RC	CC	3,125,000	4,375,000	38,500,000	33,875,000	33,875,000	9,700,000	12,550,000	-	-	-	***136,000,000***
6	EN20007	RP-5 Process Improvements		RC	CC	-	-	-	300,000	3,500,000	2,500,000	-	-	-	-	***6,300,000***
7	EN21103	Regional Wastewater AMP	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	RP	-	-	-	-	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	***36,000,000***
8	IS17024	Invensys/ Foxboro RP-5 and RP-2 Upgrades		RO	RP	254,500	-	-	-	-	-	-	-	-	-	***254,500***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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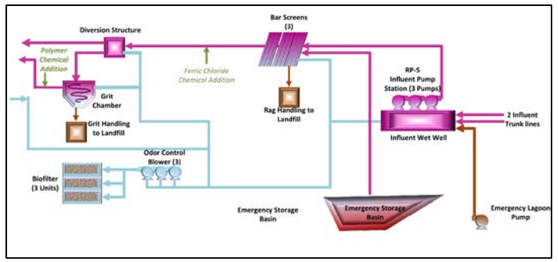
Asset Management System Summary – RP-5
Preliminary Treatment Process

1. Asset Profile



Influent Trunk Lines
Raw wastewater enters RP-5 through the 42-inch Chino interceptor diversion and 66-inch Kimball interceptor.

Influent Pump Station (IPS)
The influent pump station collects raw sewage from the 42-inch Chino interceptor diversion and 66-inch Kimball interceptor. The streams enter the influent junction box and flow through manually-operated isolation gates into two separate wet wells. The RP-5 influent pump station conveys plant influent flow to the headworks. Once lifted to the headworks, flow proceeds through the entire plant by gravity. Three VFD-controlled, wet-pit submersible, non-clogging, centrifugal pumps located in the IPS wet wells lift the combined flow and convey the raw sewage to the headworks through a 42-inch diameter discharge line. The west wet well holds two pumps, while the east wet well holds the third pump, with space for one future pump. A 36-inch-diameter magnetic flow meter in the combined discharge line measures the flow.

Screening Equipment
The headworks consist of bar screens with screenings washers and compactors and also grit basins with grit washers. Two mechanical climber-type bar screens are installed along with a screw conveyor and screenings washer/compactor. One manual bar screen is also installed as a standby unit.

Vortex Grit Chamber
When wastewater leaves the bar screen channels, it enters a mechanically induced vortex grit basin, which separates the heavier grit particles from the lighter organics. The heavier particles settle to the bottom of the chamber from where they are removed from the basin by the constant-speed recessed impeller grit pumps.

Grit Washing/Disposal System
The grit removal system separates grit, sand, and other heavy particles from lighter organics in the influent wastewater flow, removing this material to protect downstream equipment and processes. The fluidized grit is pumped to the grit washers, where it is dewatered before being discharged into disposal bins. The grit washers include a cyclone separator to remove additional water and concentrate the solids. They also contain a classifier mechanism that accepts the underflow from the cyclone unit. This classifier further separates the solids using a screw mechanism to transport the grit upward out of a settling tank.

The grit removal system includes manually operated gates and valves to allow for bypassing each component of the facility. The duty pump and duty grit washer are selected by opening the appropriate manually operated plug valves. There are provisions to accommodate the expansion of the grit removal system if needed. A second grit basin could replace the existing grit basin bypass pipeline, and a third pump can be added to the grit pumping station.

The excess liquid spills out of the grit classifiers and is directed back to the bar screen structure effluent channel.

Screening Conveyance/Disposal System
Screening collected by the bar screens is transported by a conveyor and dropped into a hydraulic washer-compactor. The compactor compresses the collected rags, squeezing out excess water, and pushes the rags to the roll-off bin.

Ferric Chloride System
Ferric chloride is added to the liquid flow after grit removal to increase solids capture during primary treatment and to control odors caused by hydrogen sulfides.

The ferric station consists of a truck filling station, 9,600-gallon storage tank, three chemical metering pumps and associated piping.

Polymer System
Polymer is added to the liquid flow before grit removal to enhance primary treatment. The polymer system includes two 500-gallon tote stands, chemical metering pumps, mixing chamber, and associated piping. The anionic polymer system is located in the same area as the ferric chloride system. The polymer system consists of two polymer storage totes and two polymer blenders. Anionic polymer is drawn from the storage totes, mixed and diluted with potable water, and delivered to the primary clarifier splitter box. Space and connections for future polymer blenders are provided to accommodate future plant flows.

Biofilter
Odors collected in the preliminary and primary treatment processes are forced through three biofilter media cells, where hydrogen sulfide gas is removed through biological processes.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	16.3 MGD	
Influent Trunk Sewer Kimball Interceptor Chino Interceptor	 66-inch 42-inch	
Influent Pump Station Valves	3 @ 8,333 gpm 200 hp 7 units	Per Unit > 18-inch
Screening Equipment Mechanical Screen Manual Screens	 2 @ 30 MGD each 1 @ 30 MGD	 Per Unit
Vortex Grit Basin Chamber Pump Gates	 1 unit @ 30 MGD 2 @ 250 gpm 25 hp 2 units	 Per Unit
Grit Washing/Disposal Classifiers	 2 @ 13 ft^3/hr	 Per Unit
Screening Conveyance & Disposal System Conveyor Washer Compactor	 1 @ 5.0 hp 1 @ 32 ft^3/hr	
Ferric Chloride System Tank Pumps	 9,600 gallons 2 @ 53 gph	 Per Unit
Polymer System Pump	 2 @ 4.5 gph	 Per Unit
Biofilter Cells	 3 @ 667 ft^3	
Blowers	3 @ 13,200 scfm 30 hp	Per Unit Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Trunk Sewer	3	3	3	3
Influent Pump Station	3	3	3	3
Screening Equipment	3	3	3	4
Vortex Grit System	3	3	3	3
Grit Washing/ Disposal System	3	3	3	3
Screening Conveyance/Disposal System	3	3	3	3
Ferric Chloride System	4	3	3	3
Polymer System	NA	NA	NA	NA
Headworks Splitter Box	3	3	3	3
Biofilter	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Influent Trunk Sewer
No issues require special attention.

Influent Pump Station
The influent pump station wet well accumulates floating debris which does not get pumped by the submersible pumps. The wet well needs routine Vactor cleaning, which is tedious and inefficient. Project EN11031 will address this issue.

Screening Equipment
Fine screens are being considered to replace the current bar screens. The new fine screens will screen out smaller unwanted inorganics to pass through into the system, allowing for better and more efficient process treatment. Project EN19001 will address this issue.

Operations report that no interlock exists between IPS and bar screens channel level. Level overflows when bar screens fail and cause overflow in sumps with potential overflow into curbs and to Kimball Ave. An enhancement request will address this issue.

Vortex Grit System
No issues require special attention

Grit Washing/Disposal System
No issues require special attention

Screening Conveyance/Disposal
No issues require special attention.

Ferric Chloride System
Ferric Tank is over 10 years old and needs inspection. This issue should be addressed by Maintenance.

Polymer System
To maximize the soluble BOD to the denitrification zone of the aeration basin, it is not recommended to for polymer addition in the future. The polymer system will be abandoned.

Biofilter
No issues require special attention, but routine media replacement is required to maintain facility air-quality compliance. A more efficient system should be installed to reduce frequent re-occurring media replacement.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Influent Trunk Sewer	2004	
Influent Pump Station	2004	Planned 2015
Screening Equipment	2004	Planned 2015
Vortex Grit Basin	2004	Planned 2015
Grit Washing/Disposal	2004	Maintenance Inspection 2014
Screening Conveyance & Disposal System	2014	Planned 2015
Ferric Chloride System	2004	
Polymer System	2004	
Biofilter	2004	Maintenance Inspection 2014

* Appendix B – Condition Assessment Reports

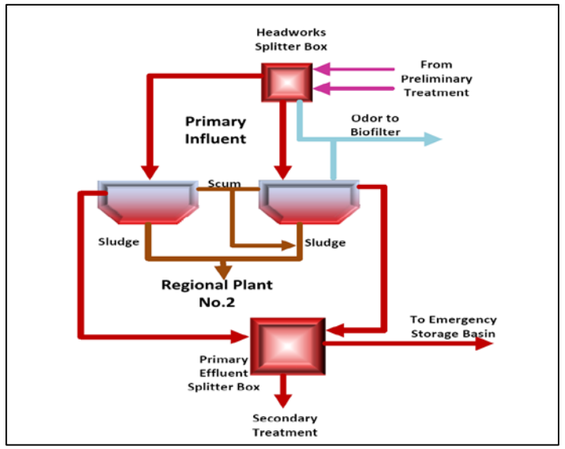
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RP-5

Primary Treatment Process

1. Asset Profile



Headworks Splitter Box
The headworks splitter box receives flow from the grit systems, bar screen channel, and the bar screens structure bypass. Distribution valves in this area direct the wastewater flow to Primary Clarifiers 3 and 4.

Primary Clarifiers
There are two circular primary clarifiers located north of the aeration basins at RP-5. Each covered clarifier is 100 feet in diameter, with a sidewall depth of 12 feet. The average surface overflow rate for each clarifier is 8.3 MGD, with a maximum of 15 MGD. The solids that settle out in the clarifiers are pumped to RP-2 for treatment. The clarified flow passes over a weir and into the aeration basins.

Primary Effluent Splitter Box
The primary effluent from the clarifiers flows into the primary effluent splitter box. The purpose of the splitter box is to allow diversion of the primary clarifier effluent to either the aeration basin or the emergency storage basin. The amount of flow directed to either structure can be adjusted from slide gates.

Sludge Pumping System
The primary sludge pump station pumps settled sludge from the primary clarifiers sludge hoppers to the solids handling facilities at RP-2. There are three primary sludge pumps: one dedicated to each primary clarifier and one that serves as a common standby. Each pump suction line contains a sludge grinder (Muffin Monster) to reduce the size of the pumped solids and help prevent plugging. Sludge withdrawal from each clarifier is controlled by adjustable pumping cycles to maintain a constant sludge blanket level within the clarifier.

Scum Pumping System
Scum arms with a skimmer mechanism remove scum from the clarifier water surface. Scum deposits into the scum beach and then flows by gravity into a main scum wet well that receives scum from both primary clarifiers. The scum well has a mixer to help ensure that the scum does not thicken and result in pumping difficulties.

Emergency Overflow Pond
The unlined 17 MG emergency storage basin (located downstream of the dechlorination basin at the end of the plant) can be used to store final plant effluent if the effluent does not meet the permit requirements. The basin does not have a permanent pumping facility, but it has the capability to return flow to the headworks through a 16-inch line with the use of temporary pumps. This same line can be used to divert flow (by gravity) from the influent pump station wet well to the emergency overflow pond in an emergency situation.

Emergency Storage Basin (ESB) System
Downstream of the primary clarifiers, there is a primary effluent box with an adjustable weir gate that can be used to divert flow to the 6.8 MG emergency storage pond. The weir gate is manually set such that primary effluent in excess of a selected flow rate goes over the weir gate into the lagoon. The effluent is then pumped back to the headworks when the influent rate is low enough to allow all flow to continue to downstream processes.

The Emergency Storage Basin Pump Station returns diverted primary effluent to the headworks-structure bar-screen influent channel. Three VFD-controlled, wet-pit submersible, non-clog, centrifugal pumps located in the wet well lift the diverted primary effluent and transmit it to the headworks through a 20-inch-diameter transmission line.

A variety of instruments is installed at the ESB pump station to collect data and control operation of the pumps. A 20-inch-diameter magnetic flow meter in the combined discharge line measures the combined discharge flow and transmits the information to the Supervisory Control and Data Acquisition (SCADA) control system. A level transmitter and high- and low-low level switches monitor the liquid level in the wet wells and provide information to control the pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Primary Treatment Process	16.3 MGD	
Headworks Splitter Box Gates	 3 units	
Primary Clarifiers Drive Gates	2 @ 2,075 gpd/ft^2 7,854 ft^2 1 @ ¾ hp 2 units	Per Unit
Primary Effluent Splitter Box Gates	 2 units	
Sludge Pumping System Pumps	 3 @ 230 gpm 30 hp	Per Unit
Scum Pumping System Pump	 2 @ 230 gpm 15 hp	Per Unit
Emergency Overflow Pond	1 @ 17 MG	Unlined
ESB System Basin VFD Pumps	 1 @ 6.8 MG 3 @ 3,000 gpm 60 hp	Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Headworks Splitter Box	3	3	3	3
Primary Clarifiers	4	3	3	3
Primary Effluent Splitter Box	3	3	4	3
Sludge Pumping System	3	3	3	3
Scum Pumping System	3	3	3	3
Emergency Overflow Pond	4	3	4	3
ESB System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Headworks Splitter Box
No issues require special attention.

Primary Clarifiers
Condition assessment of the East primary clarifier revealed significant coating failure of metallic surfaces. It is recommended to repair the severely corroded areas on the skimmer arms and steel in the vapor space as soon as possible or the next maintenance interval. Primary clarifier odor control tarps are nearing its useful life, which will require replacement in the near future. A potential project is needed to address this issue.

Primary Effluent Splitter Box
Modifications to the 12-foot weir gate and automation of the slide gate to allow flow to the aeration basin will better optimize the flow equalization of plant treatment process. Project EN11031 will address this issue.

Sludge Pumping System
No issues require special attention.

Scum Pumping System
No issues require special attention.

Emergency Overflow Pond
Temporary pumps must be used to pump flows from the pond to the headworks. There are no operational impacts at this time, and will likely be addressed when a new RP-5 solids handling facility is built.

It is unknown whether the pond is intended as a containment system. A survey of historical record does not reveal whether compacted clay liner or geomembrane was used. The pond has 6 feet of accumulated solids. There are no operational impacts at this time, and will likely be addressed in the RP-5 Expansion. Project EN11031 will address this issue.

ESB System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Headworks Splitter Box	2004	Planned 2015
Primary Clarifiers	2004	East 3A – 2013 West 4A – 2015 Planned
Primary Effluent Splitter Box	2004	Planned 2015
Sludge Pumping System	2004	
Scum Pumping System	2004	
Emergency Storage Basin	2004	
ESB System	2004	

* Appendix B – Condition Assessment Reports

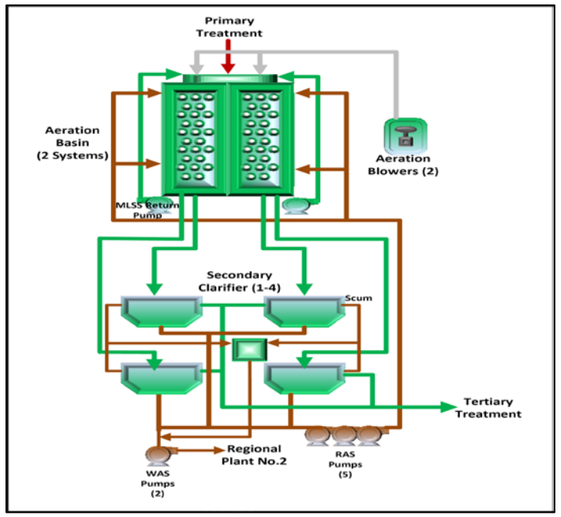
Table 4 Potential Projects

System	Project Name	Project Description
Primary Clarifier	Primary Clarifier Rehab	Rehab Primary Clarifier 3A per recommendations in condition assessment report.

Asset Management System Summary – RP-5

Secondary Treatment Process

1. Asset Profile



Activated Sludge System
The activated sludge system is two-stage biological-nutrient-removal suspended-growth system that provides biological treatment to convert soluble BOD to biomass able to settle. The activated sludge consists of biological processes that use dissolved oxygen to promote the growth of biological flocculation, which then removes organic material. The process converts ammonia to nitrites, nitrates, and ultimately nitrogen gas. There are two aeration basins (four trains) located south of the primary clarifiers. Each aeration basin contains eleven zones. Four zones in each basin are dedicated anoxic zones, and seven zones are available aeration zones.

The aeration zones are aerated via the Parkson air membrane system supplied by two single-stage centrifugal blowers with inlet/variable diffuser guide vanes and motorized butterfly control valves that control dissolved oxygen concentrations. Each aeration basin contains up to eight pairs of anoxic mixers to minimize solids settlement in anoxic zones. Influent gates divert a combined flow of primary effluent and return activated sludge available to feed three zones on each aeration basin. Each aeration basin contains a mixed liquor return pump in the effluent channel, which can be used to pump nitrate-rich mixed liquor back to the aeration basin, where denitrification can occur.

Secondary Clarifiers
Effluent flow from the aeration basins is transferred through 36-inch gravity pipelines into the secondary clarifiers (four in total) through the bottom of the center column. The flow then travels up into a feed well that contains a flocculation zone. The flow passes through diffusers in the side of the feed well and is directed toward the bottom of the clarifier by a baffle. Each clarifier has a rotating sludge and ducking skimmer arm to collect scum off the surface. The solids settle to the bottom of the clarifier and are either returned to the aeration basin or wasted to RP-2. The overflow effluent is directed through a 54-inch pipeline to the tertiary filters.

Return Activated Sludge (RAS) Pumping System
Some of the settled sludge in the secondary clarifiers is pumped back to the influent of the aeration system as return activated sludge (RAS) to mix with primary effluent, called mixed liquor suspended solids (MLSS). The RAS is returned to the aeration basin by the 5 RAS pumps to maintain the biological process.

Waste Activated Sludge (WAS) Pumping System
To control the excess biological concentrations in the aeration system, the settled solids from the secondary clarifiers are "wasted" and pumped out of the secondary system to solids processing as waste activated sludge (WAS). WAS is pumped to and treated at RP-2.

Scum Pumping System
Scum collected from the skimmer arm of the secondary clarifiers is routed to a scum well, where it is pumped out of the system to solids processing at RP-2.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	17.1 MGD	
Activated Sludge System		
Blowers	2 @ 17.1 MGD 2 @ 7,500 scfm 500 HP 11.5 psig	Per Unit
Trains	2 @ 5.16 MG	Per Unit
Panels	195	Per System
Depth	19 ft	
Mixers	20 @ 7.5 hp	
Gates	32 units	Per System
Valve	1 unit	Per System
MLR Pumps	2 @ 6,300 gpm	
Secondary Clarifiers	4 @ 356 gpd/ft^2 13,273 ft^2	Per Unit
Gates	4 units	
RAS Pumping System	5 @ 2,500 gpm	Per Unit
Valves	3 - 20-inch units	
WAS Pumping System	2 @ 100 gpm 7.5 hp	
Scum Pumping System	2 @ 600 gpm 15 hp	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Activated Sludge System	3	2	2	2
Secondary Clarifiers	3	3	3	3
RAS Pumping System	3	3	3	3
WAS Pumping System	3	3	3	3
Scum Pumping System	3	3	4	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Activated Sludge System
Mixers missing from original design. A potential project is needed to install mixers as needed for process improvements.

Secondary Clarifiers
Algae control in the launders is a challenge. Automated weir-washing systems may be installed during future clarifier rehab work. A conditions assessment is planned for FY 2015/16 for all four clarifiers. Project EN11031 will address this issue.

RAS Pumping System
No issues require special attention.

WAS Pumping System
No issues require special attention.

Scum Pumping System
Capacity of scum pump/line restriction may not be sufficient to handle flows from clarifier scums when simultaneous dumping happens. Evaluate sequential timing of individual clarifier emptying into scum pit. Internal investigation is needed before a project is recommended.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Activated Sludge System	2004	
Secondary Clarifiers	2004	Planned 15/16
RAS Pumping System	2004	
WAS Pumping System	2004	
Scum Pumping System	2004	

* Appendix B – Condition Assessment Reports

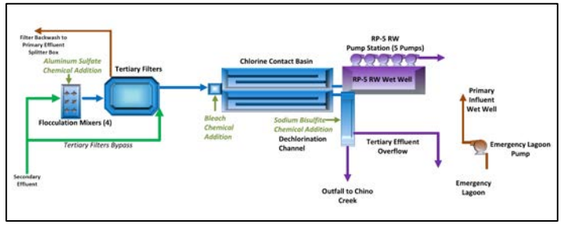
Table 4 Potential Projects

System	Project Name	Project Description
Activated Sludge System	RP-5 Anoxic Basin Mixing Improvements	Install mixers in the deficient areas of the Aeration basin

Asset Management System Summary – RP-5

Tertiary Treatment Process

1. Asset Profile



Aluminum Sulfate (Alum) System
Alum is used with cationic polymer to provide flocculation upstream of the tertiary filters. The addition of these two chemicals should result in an increase in floc size, which will increase particulate removal by the filters. The alum system consists of a storage tank and two chemical metering pumps in a duty/standby mode of operation. Alum is drawn from the storage tank and pumped to the influent channel to the tertiary filters. Space and connections for an additional future tank and chemical pumps are provided to accommodate future plant flows.

Flocculation Tank
To provide optimum removal of particulates during the filtration process, chemicals are added at the flocculation tank at the influent side of the filters. There is one rapid mixer and four VFD-controlled flocculators at this site.

Filters
The Parkson continuous backwash tertiary filters provide physical treatment to remove suspended solids and lower the turbidity of the secondary effluent. There are twelve tertiary filters and a filter recycle pump station with three submersible pumps that return filter backwash to the primary effluent splitter box. The tertiary filters are located south of the secondary clarifiers. Each tertiary filter contains six 50-square-foot modules. Flow that enters the tertiary filters comes from the secondary clarifiers. Secondary effluent is injected with chemicals to aid with filtration in the rapid mix and flocculation basin. The effluent travels through three pipes, each of which provides influent to a group of four filters. Filter influent then travels through the filter feed valves and into each filter influent manifold, where it is distributed to the bottom of each module.

Chlorination System
The sodium hypochlorite system has multiple applications throughout the plant. The main purpose of the system is to provide disinfection of the plant effluent before final discharge. Hypochlorite (bleach) may also be used for housekeeping purposes. It can be added to the return activated sludge (RAS) to prevent the growth of filamentous organisms, which inhibit good settling in the secondary clarifiers. It can also be added to the secondary clarifier weirs and to the tertiary filter influent channel to prevent the growth of algae in these areas.

The sodium hypochlorite system consists of four storage tanks and three sets of chemical metering pumps. One set, consisting of five pumps, is used for disinfection. This set pumps hypochlorite to the chlorine mixer at the beginning of the chlorine contact basin. The second set of two pumps is used for RAS dosing and sends hypochlorite to the RAS line before the aeration basin. The third set of two pumps is used for algae control. This set pumps hypochlorite into a dilution water line and the mixture is sent to the secondary clarifier weirs and filter influent channel. Space and connections for future RAS and algae control chemical pumps are provided to accommodate future plant flows.

The filter recycle pump station consists of three submersible pumps, which return tertiary filter backwash to the primary effluent splitter box.

Chlorine Contact Basins
After flow passes through the tertiary filters, it enters the chlorine contact channels, where the water is chlorinated and then mixed to improve disinfectant contact and obtain the necessary compliance concentration and detention times. The chlorinated water then travels through a serpentine pattern of channels to recycled water demand or the dechlorination channel, where the chlorine is removed from the water before discharge to the outfall.

Dechlorination System
Flow entering the dechlorination structure is injected with sodium bisulfite (SBS) and travels through a serpentine flow path, allowing SBS to neutralize any chlorine residual before flowing into Chino Creek through a 48-inch effluent flow meter and out through an outfall 60-inch pipeline. SBS is stored in two large chemical tanks and is metered into the system via four chemical metering pumps.

The dechlorination basin final effluent gate is used to stop plant effluent flow to the outfall, if the final effluent flow does not meet water quality standards. The dechlorination basin final effluent gate is a motorized sluice gate. When it is closed, flow is diverted over a 23-foot-long, fixed, broad-crested weir and through a pipeline into the adjacent emergency lagoon.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	16.3 MGD	
Alum System Tank Pumps	 560 gallons 2 @ 14 gph	 Per Unit
Flocculation Tank Rapid Mixer Mixer	 1@ 30 hp 1@ 3 hp 1@ 2 hp 1 @ 1.5 hp 1@ 1 hp	
Filters Filter Loading Recycle Pumps Gates	12 @ 300 ft^2 5 gpm/ft^2 3 @ 420 gpm 7.5 hp 1 units	Per Unit Per Unit
Chlorination System Tanks Pumps Water Champ Mixer	 4 @ 10,500 gallons 9 @ 77 gph 1 @ 20 hp 1 @ 30 hp	 Per Unit Per Unit
Chlorine Contact Basins Gates	2 @ 0.9 MG 4 units	Per Unit
Dechlorination System Tanks Pumps Gates	 2 @ 5,100 gallons 4 @ 53 gph 3 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Alum System	4	3	4	3
Flocculation Tank	3	3	3	3
Filters	4	3	4	4
Chlorination System	4	3	3	3
Chlorine Contact Basins	3	3	3	3
Dechlorination System	4	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Alum System
Existing alum tank needs to be upsized. Project EN11031 will address this issue.

Flocculation Tank
No issues require special attention.

Filters
The filters require significant maintenance. The continuous and abrasive sand-washing action damages OEM stainless-steel air-lift pumps, which need to be replaced routinely with PVC air-lift pumps. Sand gets carried to the backwash water-wet well and then is pumped to the primary effluent splitter box. The performance of the sand-washing system is difficult to maintain. These issues will be addressed in future rehab work. Project EN16028 will evaluate this system to determine further action.

Chlorination System
The current sodium hypochlorite (bleach) dosing system requires significant maintenance as a result of leaking pumps. The pumps are located outdoors and have no protection against the elements. Crystallization of the bleach at the discharge of the pipe has caused issues. Chemical flow metering is being considered for chlorine dosing. Project EN11031 is expected to address these issues.

Chlorine Contact Basins (CCB)
The chlorine contact basin does not have a flow meter at the influent. Flow into the CCB influent is back-calculated, which causes delayed bleach-dosing issues. The mixing of bleach at the CCB is not optimal. Project EN11031 is expected to address these issues.

Existing influent and effluent CCB gates do not hold flow and needs to be rehabbed. A potential project is needed to address this issue.

Dechlorination System
The sodium bisulfite (SBS) pumps are near the end of their useful life, and the pumps don't have the operating range to meet the variations in dechlorination needs resulting from variable recycled water demands. Project EN11031 is expected to address these issues.

Evaluate start-up protocols of low CT shutdown situations where SBS migrates upstream causing false readings in CCB effluent analyzers. An enhancement request will address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Filters	2004 2009	
Alum System	2004	
Flocculation Tank	2004	
Chlorination System	2004 2010	
Chlorine Contact Basins	2004	
Dechlorination System	2004 2010	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Chlorine Contact Basins	RP-5 CCB Gate Replacement	Replace existing influent and effluent CCB gates.

Asset Management System Summary – RP-5

Auxiliary Systems

1. Asset Profile

Plant Drain
The plant drain collects surface storm runoff, excess irrigation, and wash-down water collected in submersible drains located throughout the facility. The drain system receives gravity flows to a wet well, where the flow is then pumped and recycled toward the head of the treatment process.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (solar and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switchgear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-5 electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. Two generators are located at the south section and supply power to the preliminary, primary, secondary, tertiary sections, and headquarters

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by the RP-5 RW pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a 6-inch W1 line off Kimball Ave. from the City of Chino. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-5. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to the main control terminals.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely.
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2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Electrical System		
Utility Voltage	1 @ 12 kV	
Transformers	6 @ 12 kV to 480 V	
Switchgear	8 @ 12 kV	
Distribution	3 @ 480 V	MCCs
Generator	2 @ 1,000 kW	
Mounted Lighting	> 50 units	
Utility Water System		
Pipelines	Various sizes	
Pump Station	2 @ 1,925 gpm 3 @ 1,925 gpm	
Valves	30 units	
Potable Water System		
Backflow Devices	>25 units	
Valves	>25 units	
Instrumentation and Control System		
HMI Workstation		
RTU		
PLC		
I/O Hub		
Radio Transmitter	1	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	3	3	3
Electrical System	3	3	3	3
Utility Water System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	2	2	2	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Plant Drain
Plant drain west of headworks cannot keep up with overflow. Consider upsizing pump and tie-in of headworks influent channel to IPS for bar screens failure and flow back-up situations. An enhancement request will address this issue.

Electrical System
Existing circuitry between MCC3 and tertiary chemical facility causes induction issues with control input/output signals. Project EN11031 will address this issue.

Utility Water System
Some of the UW isolation valves do no seal and need to be replaced. Replaced valves should be exercised routinely. The IEUA RW valve exercise program will address this issue.

Potable Water System
RAS pumps and headworks compaction equipment require back-up seal water when RW is off. Project EN11031 will address this issue.

Instrumentation and Control System
Existing circuitry between MCC3 and tertiary chemical facility causes induction issues with control input/output signals. Project EN11031 will address this issue.

Yard Piping
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	2004	
Electrical System	2004	
Utility Water System	2004	
Potable Water System	2004	
Instrumentation and Control System	2004	
Yard Piping	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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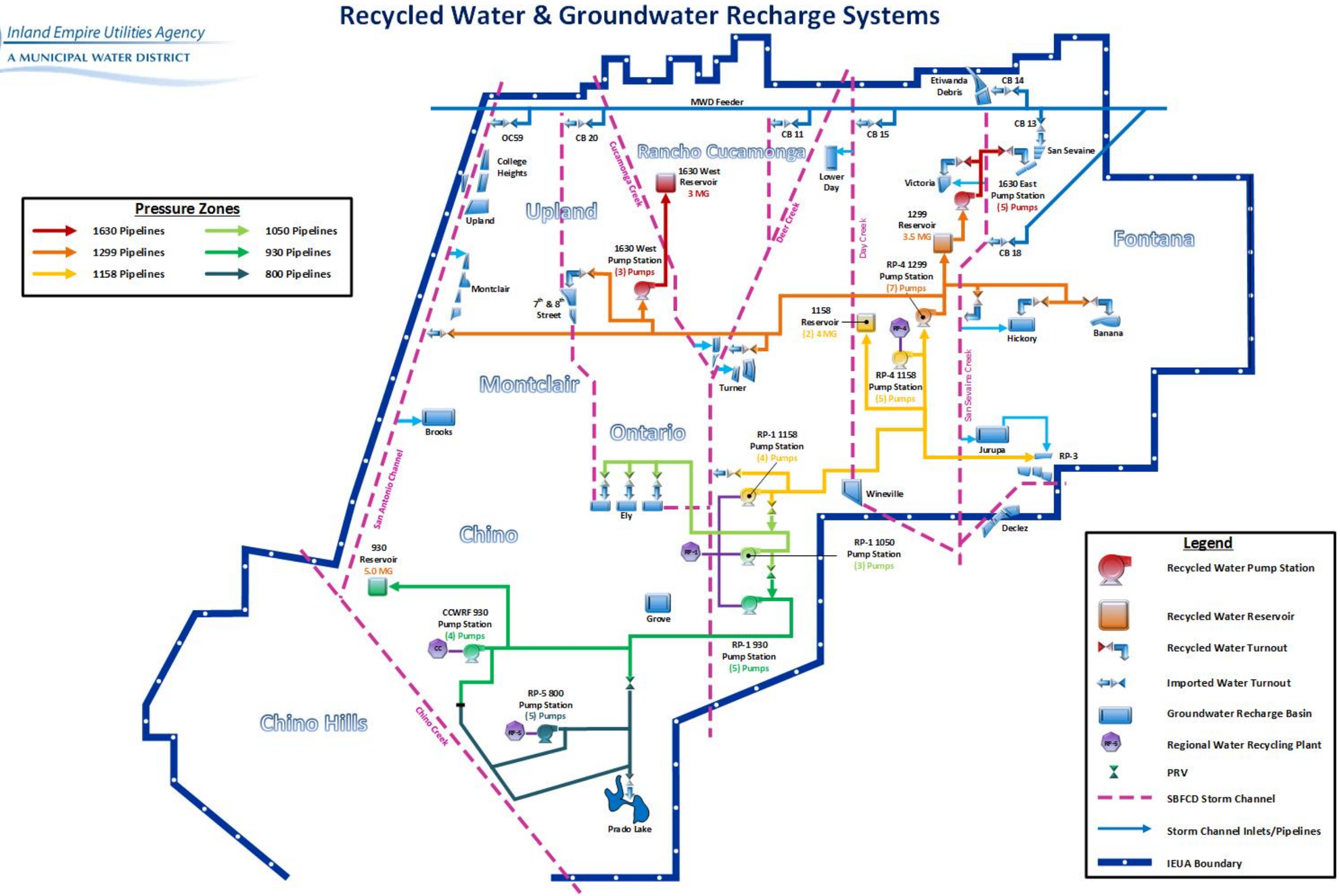

Figure 7-7: Recycled Water Distribution (RW) & Groundwater Recharge Systems (GWR) – Schematic

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Table 7-7: Recycled Water Distribution and Ground Water Recharge Systems – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN15002	1158 Reservoir Site Cleanup	SCE Edison site, north of RP-4.	WC	CC	650,000	650,000	-	-	-	-	-	-	-	-	***1,300,000***
2	EN15043	SBCFCD Recycled Water Easement	The project will fund the easement acquisitions for the regional RW pipelines located in San Bernardino Flood Control District right of way.	WC	CC	570,000	-	-	-	-	-	-	-	-	-	***570,000***
3	EN16021	Chino Basin Groundwater Supply Wells and	Install parallel pipeline to convey groundwater affected by South Archibald Plume to Desalter II for treatment. (The project scope will include three new groundwater supply wells and approximately 30,000 feet of raw water pipeline to distribute up to 6,000 acre-feet per year of groundwater supply to the Chino II Desalter)	RO	OM	3,000,000	7,940,000	-	-	-	-	-	-	-	-	***10,940,000***
4	EN17020	WC On-Call Operations & Maintenance Support	Funds special projects request from operations and maintenance departments and will have a value of less than $100,000.00	WC	OM	250,000	-	-	-	-	-	-	-	-	-	***250,000***
5	EN17025	WC Safety Projects Operations & Maintenance Support	Funds special projects request from operations and maintenance departments and will have a value of less than $100,000.00	WC	OM	250,000	-	-	-	-	-	-	-	-	-	***250,000***
6	CW17002	WC OE Projects FY 16/17	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	50,000	-	-	-	-	-	-	-	-	-	***50,000***
7	CW18002	WC OE Projects FY 17/18	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	50,000	-	-	-	-	-	-	-	-	***50,000***
8	CW19002	WC OE Projects FY 18/19	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and	WC	OM	-	-	50,000	-	-	-	-	-	-	-	***50,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			closeout for office engineering projects related to recycled water connections and modifications.													
9	CW20002	WC OE Projects FY 19/20	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	-	-	50,000	-	-	-	-	-	-	***50,000***
10	CW21002	WC OE Projects FY 20/21	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	-	-	-	50,000	-	-	-	-	-	***50,000***
11	CW22002	WC OE Projects FY 21/22	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	-	-	-	-	50,000	-	-	-	-	***50,000***
12	CW23002	WC OE Projects FY 22/23	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	-	-	-	-	-	50,000	-	-	-	***50,000***
13	CW24002	WC OE Projects FY 23/24	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	-	-	-	-	-	-	50,000	-	-	***50,000***
14	CW25002	WC OE Projects FY 24/25	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	-	-	-	-	-	-	-	50,000	-	***50,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
15	CW26002	WC OE Projects FY 25/26	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	-	-	-	-	-	-	-	-	-	50,000	***50,000***
16	EN12016	North CIM Lateral	Construct recycled water lateral to the north side of CIM.	WC	CC	450,000	-	-	-	-	-	-	-	-	-	***450,000***
17	EN13001	San Sevaine Basin Improvements	The scope of work is to contract engineering design, bid and construction administration assistance for the San Sevaine basin Improvements	WC	CC	3,250,000	2,493,195	-	-	-	-	-	-	-	-	***5,743,195***
18	EN13045	Wineville RW Extension Segment B	The project will install 2.8 miles of 36” RW pipeline in addition to the associated appurtenances and add the control facilities at RP-3.	WC	CC	15,000	-	-	-	-	-	-	-	-	-	***15,000***
19	EN14042	RP-1 1158 RWPS Upgrades	Pump station improvements to increase capacity.	WC	CC	475,000	1,610,000	1,900,000	-	-	-	-	-	-	-	***3,985,000***
20	EN14043	RP-5 RW Pipeline Bottleneck	Evaluation of additional recycled water pipeline leaving RP-5 to allow more recycled water to be delivered from this facility into the 800 Pressure Zone.	WC	CC	600,000	1,925,000	175,000	-	-	-	-	-	-	-	***2,700,000***
21	EN15055	1630 W. Recycled Water Pump Station - Surge Tank Installation	Project to improve surge protection systems at the 1630 East and West RW Pump Stations	WC	CC	1,340,000	-	-	-	-	-	-	-	-	-	***1,340,000***
22	EN16034	RW Pressure Sustaining Valve Installation	The project will install pressure sustaining valves on high volume users of recycled water in order to maintain system pressure in the regional recycled water system	WC	CC	341,300	500,000	-	-	-	-	-	-	-	-	***841,300***
23	EN16035	WC Planning Documents	Miscellaneous feasibility studies to validate new RW supplies, different reuse strategies (direct, recharge, injection, ect.) and treatment technologies. Ultimate goal of these project is to gather additional information to supplement the RWPS update performed in 2020.	WC	OM	500,000	-	500,000	-	500,000	-	500,000	-	500,000	-	***2,500,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
24	EN16038	Recycled Water Injection Pilot Study		WC	OM	250,000	750,000	-	-	-	-	-	-	-	-	***1,000,000***
25	EN16039	WRCWRA Intertie	RW intertie with Western Riverside County Regional Wastewater Authority (WRCRWA). Approx. location of intertie is near 930/800 pressure zone.	WC	OM	879,000	-	-	-	-	-	-	-	-	-	***879,000***
26	EN16065	RW Connections to JCSD	Collaborative three agency project to deliver 6000AFY of recycled water for recharge	WC	CC	1,000,000	7,000,000	7,000,000	-	-	-	-	-	-	-	***15,000,000***
27	EN16132	Magnolia Channel Spillway	Repair the Magnolia spillway Area 1 Berm and remove accumulated silt related to the channel and this detention area.	GG	OM	384,000	-	-	-	-	-	-	-	-	-	***384,000***
28	EN17007	930 To 800 West CCWRF PRV	Construct a PRV to send water from the 930 pressure zone to the 800 pressure zone for CCWRF	WC	CC	100,000	250,000	250,000	15,000	-	-	-	-	-	-	***615,000***
29	EN17011	RW Hydraulic Modeling FY 16/17	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	100,000	-	-	-	-	-	-	-	-	-	***100,000***
30	EN17017	WC Emergency O&M Projects FY 16/17	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	WC	OM	500,000	-	-	-	-	-	-	-	-	-	***500,000***
31	EN17049	Baseline RWPL Extension	Design and construct 6,800 lf of 24-inch recycled water pipe along Baseline Ave. to provide recycled	WC	CC	300,000	2,500,000	2,200,000	-	-	-	-	-	-	-	***5,000,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			water to CVWD and the City of Fontana													
32	EN18007	RMPU Construction Costs	Construction cost for the remaining RMPU projects.	RW	CC	-	8,300,000	22,022,500	13,727,000	-	-	-	-	-	-	***44,049,500***
33	EN18011	RW Hydraulic Modeling FY 17/18	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	100,000	-	-	-	-	-	-	-	-	***100,000***
34	EN18017	WC Emergency O&M Projects FY 17/18	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	WC	OM	-	500,000	-	-	-	-	-	-	-	-	***500,000***
35	EN19003	RP-1 Outfall Parallel Line FY13/14	Project to design and construct approx 11,800 ft of 30-36 inch parallel pipeline to meet future demands	WC	CC	200,000	400,000	2,750,000	15,000	-	-	-	-	-	-	***3,365,000***
36	EN19011	RW Hydraulic Modeling FY 18/19	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	-	100,000	-	-	-	-	-	-	-	***100,000***
37	EN19017	WC Emergency O&M Projects FY 18/19	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects	WC	OM	-	-	500,000	-	-	-	-	-	-	-	***500,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.												
38	EN20011	RW Hydraulic Modeling FY 19/20	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	-	-	100,000	-	-	-	-	-	-	***100,000***
39	EN20017	WC Emergency O&M Projects FY 19/20	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	WC	OM	-	-	-	500,000	-	-	-	-	-	-	***500,000***
40	EN20031	Recycled Water Program Strategy 2020	The intent of the RWPS (long-term planning document) is to develop a strategy for the RW program for current and ultimate direct use and groundwater recharge projects. The program strategy will develop and incorporate all available RW resources for the region to plan	WC	OM	-	-	-	250,000	-	-	-	-	-	-	***250,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			capital projects. Includes hydraulic modeling services.													
41	EN21011	RW Hydraulic Modeling FY 20/21	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	-	-	-	100,000	-	-	-	-	-	***100,000***
42	EN21017	WC Emergency O&M Projects FY 20/21	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	WC	OM	-	-	-	-	500,000	-	-	-	-	-	***500,000***
43	EN22011	RW Hydraulic Modeling FY 21/22	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	-	-	-	-	100,000	-	-	-	-	***100,000***
44	EN22017	WC Emergency O&M Projects FY 21/22	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues	WC	OM	-	-	-	-	-	500,000	-	-	-	-	***500,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.													
45	EN23011	RW Hydraulic Modeling FY 22/23	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	-	-	-	-	-	100,000	-	-	-	***100,000***
46	EN23017	WC Emergency O&M Projects FY 22/23	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	WC	OM	-	-	-	-	-	-	500,000	-	-	-	***500,000***
47	EN24003	Wineville Basin Pipeline	Project to provide RW pipeline to Wineville Basin	WC	CC	-	-	-	-	-	-	-	100,000	900,000	-	***1,000,000***
48	EN24011	RW Hydraulic Modeling FY 23/24	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	-	-	-	-	-	-	100,000	-	-	***100,000***
49	EN24017	WC Emergency O&M Projects FY 23/24	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency	WC	OM	-	-	-	-	-	-	-	500,000	-	-	***500,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.												
50	EN25011	RW Hydraulic Modeling FY 24/25	To perform hydraulic analyses of existing and proposed RW facilities, create scenarios, update the demands for existing and future conditions, analyze system deficiencies and make recommendations to maintain optimum system performance.	WC	OM	-	-	-	-	-	-	-	-	100,000	-	***100,000***
51	EN25017	WC Emergency O&M Projects FY 24/25	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	WC	OM	-	-	-	-	-	-	-	-	500,000	-	***500,000***
52	EN25031	Recycled Water Program Strategy 2025	The intent of the RWPS (long-term planning document) is to develop a strategy for the RW program for current and ultimate direct use and groundwater recharge projects. The program strategy will develop and incorporate all available RW resources for the region to plan capital projects. Includes hydraulic modeling services.	WC	OM	-	-	-	-	-	-	-	-	250,000	-	***250,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
53	EN26011	RW Hydraulic Modeling		WC	OM	-	-	-	-	-	-	-	-	-	100,000	***100,000***
54	EN26017	WC Emergency O&M Projects FY 25/26	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	WC	OM	-	-	-	-	-	-	-	-	-	500,000	***500,000***
55	IS17009	Replace VM Host Server - GWR		RW	RP	44,800	-	-	-	-	-	-	-	-	-	***44,800***
56	RW15003	Recharge Master Plan Update (Softcost)	Address the design for the RMPU	RW	CC	3,100,000	3,520,500	-	-	-	-	-	-	-	-	***6,620,500***
57	RW15004	Lower Day Basin RMPU Improvements	Address the design and construction of the lower day recharge master plan update	RW	CC	1,155,000	910,000	-	-	-	-	-	-	-	-	***2,065,000***
58	RW17001	Truck Purchase	Purchase a replacement vehicle for 0420.	RW	CC	40,000	-	-	-	-	-	-	-	-	-	***40,000***
59	RW17002	West Valley (Midge)	West Valley Mosquito and Vector Control District is needed to treat midge fly issues at groundwater recharge basins.	RW	OM	120,000	-	-	-	-	-	-	-	-	-	***120,000***
60	WR15019	RP-3 Basin Improvements	Groundwater Recharge Master Plan Update 2013 project #11. IEUA cost share= 50% total cost (committee approved 10/9/13; to board 10/16). Construction portion	WC	CC	-	650,000	1,650,000	1,000,000	-	-	-	-	-	-	***3,300,000***
61	WR15020	Victoria Basin Improvements	Groundwater Recharge Master Plan Update 2013 project #22a. IEUA cost share= 50% total cost (committee approved 10/9/13; to board 10/16). Construction portion.	WC	CC	-	65,000	65,000	-	-	-	-	-	-	-	***130,000***

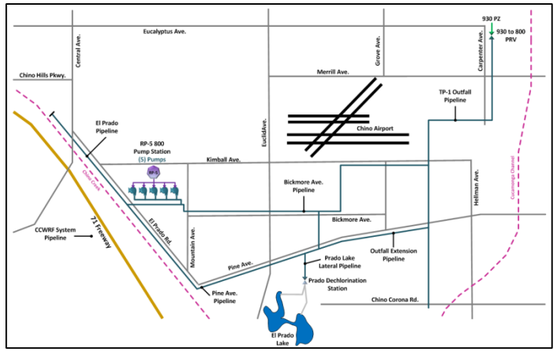
#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
62	WR15021	Napa Lateral	To increase water conservation, recycled water laterals will provide recycled water to the AutoClub Speedway, Prologis properties, and CSI to be used for landscape irrigation and cooling towers.	WC	CC	500,000	3,300,000	2,000,000	-	-	-	-	-	-	-	***5,800,000***
63	WR16024	SARCCUP Projects		WW	OM	1,500,000	3,000,000	6,000,000	8,000,000	1,000,000	-	-	-	-	-	***19,500,000***
64	WR16025	WW Planning Documents		WW	OM	500,000	200,000	500,000	500,000	-	-	-	500,000	500,000	-	***2,700,000***
65	RW15002	Upper Santa Ana River Habitat Conservation		RW	CC	280,000	-	-	-	-	-	-	-	-	-	***280,000***
66	EN09007	1630 East Reservoir & Segment B Pipeline	Construction of approximately 11,000 LF of 36" pipeline from the Segment A pipeline end to the new 1630 East Reservoir. Construction of an 8.0 MG recycled water reservoir at the Lloyd Michael's Water Treatment Plant.	WC	CC	-	-	-	-	-	-	-	-	-	1,000,000	***1,000,000***
67	EN12014	East Avenue 1630 E. RWP Relocation	Relocate about 200 LF of 1630 E. Recycled Water Pipeline on East Avenue in the City of Rancho Cucamonga	WC	CC	165,000	-	-	-	-	-	-	-	-	-	***165,000***
68	EN14047	GWR and RW SCADA Control Upgrades	Replace aged PLCs within the Rubber Dam Sites which are used by the GWR and RW systems. The improvements will also upgrade the system interface platform that allow staff to access all GWR and RW sites with a current system that meet the latest standards on system interfacing	WC	CC	455,263	455,263	-	-	-	-	-	-	-	-	***910,526***
69	EN16037	RW Asset Management (Cathodic Protection)	Project to monitor and assess the cathodic protection system on the RW piping"	WC	CC	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	***2,500,000***
70	EN16060	RW Connection Pomona		WC	CC	500,000	3,500,000	3,500,000	-	-	-	-	-	-	-	***7,500,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
71	EN17032	RP-4 Outfall Repair from Mission Blvd. to RP-1	The project will evaluate the reason for continued pipe failures and design a fix for it. This includes replacement of surge anticipator bladders at the RP-1 pump station, Blow-offs and Air-Vacuum release valves. If required, the line will be slip-lined in the area where the most breaks have occurred-generally south of Mission Blvd.	WC	CC	50,000	300,000	-	4,950,000	-	-	-	-	-	-	***5,300,000***
72	EN17038	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.	WC	OM	200,000	-	-	-	-	-	-	-	-	-	***200,000***
73	EN17039	8th St. Basin RW Turnout Discharge Retrofit	Retrofit the unlined portion of the West Cucamonga Creek at the discharge point of the RW Turnout (causing erosion).	WC	CC	25,000	250,000	-	-	-	-	-	-	-	-	***275,000***
74	EN17041	Orchard Recycled Water Turnout Improvements	Retrofit the discharge of the turnout into the channel to eliminate the noise and leak. The penetration should be made completely through the sidewall of the San Antonio Channel.	WC	CC	25,000	100,000	-	-	-	-	-	-	-	-	***125,000***
75	EN17046	1630 East Pump Station Upgrades	A set of smaller pumps are needed for low flow periods because there is no reservoir on this segment of pipeline.	WC	CC	100,000	200,000	-	-	-	-	-	-	-	-	***300,000***
76	EN26023	1299 Pressure Zone Pipeline Capacity Upgrades	Upgrade 7th & 8th street and Whittram avenue pipelines to provide sufficient capacity to not exceed the recommended velocity of the pipeline during peak demand.	WC	CC	-	-	-	-	-	-	-	-	-	500,000	***500,000***
77	EN26024	2025-2030 Recycled Water Projects	Includes 1158 to 1299 booster PS, 4MG reservoir and pipelines to PS, College Hts and Montclair basins	WC	CC	-	-	-	-	-	-	-	-	-	1,000,000	***1,000,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – RW
800 Pressure Zone

1. Asset Profile



RP-5 800 Pump Station
The RP-5 800 pump station provides recycled water to the 800 pressure zone for direct use by agricultural customers, the City of Chino, and San Bernardino County for feed water to El Prado Lake. The pump station is composed of five pumps:

- Two 150 hp vertical-turbine, VFD-driven, 1,925 gpm pumps
- Three 150 hp vertical-turbine, constant-speed, 1,925 gpm pumps

The RP5 800 pump station has two selectable automatic control philosophies:

- Wet Well Level Control – the pumps will be modulated to maintain an operator-adjustable wet-well level set point normally set at 14 feet.
- Pressure Control – the pumps will be modulated to maintain an operator-adjustable discharge-pressure set point normally set at 120 psi.

800 Pipelines

- *TP-1 Outfall Pipeline* – 15,700 linear feet (LF) of 30-inch pipeline from the 930 to 800 pressure reducing valve (PRV) to Chino Corona Rd.
- *Outfall Extension Pipeline* – 6,600 LF of 30-inch pipeline along Pine Ave. from the TP-1 outfall pipeline to the Prado Lake lateral, continuing with an additional 6,700 LF of 14-inch pipeline from the Prado Lake lateral to El Prado Golf Course.
- *Prado Lake Lateral Pipeline* – 535 LF of 30-inch pipeline from the outfall extension pipeline continuing with an additional 2,100 LF of 24-inch pipeline to the Prado Lake dechlorination station.
- *Pine Ave. Pipeline* – 2,200 LF of 16-inch pipeline from the El Prado Golf Course to RP-2.
- *El Prado Pipeline* – 12,800 LF of 10-inch pipeline from RP-2 to the Carbon Canyon Water Recycling Facility (CCWRF).
- *Bickmore Pipeline* – Consists of multiple pipeline segments including:
  - 5,500 LF of 18-inch pipeline along Kimball Ave. from the TP-1 outfall pipeline to Rincon Meadows Rd.
  - 5,600 LF of 18-inch pipeline along Rincon Meadows Rd. from Kimball Ave. to Bickmore Ave., continuing with an additional 1,550 LF of 12-inch pipeline from Bickmore Ave. to Pine Ave.
  - 6,300 LF of 30-inch pipeline along Bickmore Ave. from Rincon Meadows Rd. to San Antonio Ave.
  - 2,700 LF of 18-inch pipeline along Bickmore Ave. from San Antonio Ave. to Mountain Ave.
  - 2,500 LF of 18-inch pipeline from the intersection of Mountain Ave. and Bickmore Ave. to RP-5.
  - 1,000 LF of 10-inch pipeline from RP-5 to the El Prado pipeline.

Prado Dechlorination Station
The Prado dechlorination station provides dechlorinated recycled water to El Prado Lake. The station is composed of the following main components:

- A 12-inch flow-control sleeve valve with 14-inch magnetic flow meter and pressure transmitter.
- Two 5 gph sodium-bisulfite chemical metering pumps.
- Three 20 gph sodium-bisulfite chemical metering pumps.
- Two upstream chlorine analyzers.
- Two downstream chlorine analyzers biased to measure sodium bisulfite.

The flow control is automatically controlled to maintain either a flow control set point or an upstream pressure set point. The sodium-bisulfite chemical metering pumps are controlled to maintain a downstream sodium-bisulfite residual.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-5 800 Pumps	2 @ 1,925 gpm 3 @ 1,925 gpm	VFD Constant
TP-1 Outfall Pipeline	30-inch – 13,200 gpm	6.0 ft/s max velocity (mv)
Outfall Extension Pipeline	30-inch – 13,200 gpm 14-inch – 2,875 gpm	6.0 ft/s mv
Prado Lake Lateral Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
Pine Ave. Pipeline	16-inch – 3,755 gpm	6.0 ft/s mv
El Prado Pipeline	10-inch – 1,500 gpm	6.0 ft/s mv
Bickmore Pipeline	30-inch – 13,200 gpm 18-inch – 4,750 gpm 10-inch – 1,500 gpm	6.0 ft/s mv
Prado Sleeve Valve	300 – 14,000 gpm	
Prado DECH Station	2 @ 0.5 – 5 gph 3 @ 2 – 20 gph	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-5 800 Pumps	1	3	3	2
TP-1 Outfall Pipeline	3	3	3	2
Outfall Extension Pipeline	3	3	3	3
Prado Lake Lateral Pipeline	2	3	3	3
Pine Ave. Pipeline	3	3	3	3
El Prado Pipeline	2	3	3	3
Bickmore Pipeline	1	4	5	2
Prado Sleeve Valve	1	2	2	1
Prado Dechlorination Station	4	2	4	1

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-5 800 Pumps
No issues requiring immediate attention.

TP-1 Outfall Pipeline
No issues requiring immediate attention.

Outfall Extension Pipeline
No issues requiring immediate attention.

Prado Lake Lateral Pipeline
No issues requiring immediate attention.

Pine Ave. Pipeline
30" valve on west leg after lateral to old outfall and 14" valve on west side of lateral to Prado are out of service. Equipment should be replaced by the Maintenance Department.

El Prado Pipeline
No issues requiring immediate attention.

Bickmore Pipeline
At a maximum velocity of 6 ft/s, the 18-inch-diameter sections of the Bickmore pipeline have a capacity of 4,750 gpm. All recycled water supply from RP-5 is conveyed through the Bickmore pipeline; therefore, the current average daily RP-5 recycled water supply of 7,000 gpm exceeds the recommended capacity. In addition, when the RP-5 pump station is discharging 7,000 gpm, the discharge pressure at the pump station exceeds the pressure setting of the emergency pressure relief valve and discharges recycled water back into the RP-5 wet well. A potential project will address the system's issues. Project EN14043 will hydraulically model critical areas of the RW distribution system to prioritize capacity improvements.

The condition assessment concluded that the cathodic protection on this segment of pipeline was sufficient.

Prado Sleeve Valve
No issues requiring immediate attention.

Prado Dechlorination Station
Flow Meter is out of service and needs to be replaced. Equipment should be replaced by the Maintenance Department.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-5 800 Pumps	2011	
TP-1 Outfall Pipeline	1976	
Outfall Extension Pipeline	1977	
Prado Lake Lateral Pipeline	1977	
Pine Ave. Pipeline	2004	
El Prado Pipeline	1993	
Bickmore Pipeline	2006	Complete - 2014
Prado Sleeve Valve	2011	
Prado Dechlorination Station	2011 1996	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW

Auxiliary Systems – 800 Pressure Zone

1. Asset Profile

RP-5 800 Pump Station

- *Electrical System – The electrical energy to power the RP-5 800 pump station is obtained from the RP-5 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, biogas internal combustion engines, and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The biogas internal combustion engines are owned by the Agency, but leased to a private firm producing biogas at the RP-5 solids handling facility. The electrical feed from the grid is composed of two 12 kV feeders through the RP-5 treatment facility to Power Center 3, where transformers and switchgear are located to distribute electrical energy to the RP-5 800 pump station. A single line diagram of the RP-5 800 pump station electrical system is shown in Appendix B. Diesel emergency generators are used in the event of a power failure. Two 1.0 MW generators are located south of Power Center 3 and supply power to the RP-5 treatment facility including the RP-5 800 pump station.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-5 800 pump station. All the processes of the pump station are observed and controlled by the RP-5 treatment facility SCADA system. Local control wiring is fed from the individual pieces of equipment to MCCs and input/output (I/O) hubs in Power Center 3. The I/O hubs then transmit the control data by fiber optic cable to the Foxboro SCADA servers.*

Prado Dechlorination Station

- *Electrical System – The electrical energy to power the Prado dechlorination station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 480 V feeder, a main power switch, and an automatic transfer switch before terminating in MCC-1. A single line diagram of the Prado dechlorination station electrical system is shown in Appendix B. A recently upgraded 27 kW Kohler diesel generator is located in the Prado sodium bisulfite pump room for use in a power failure.*
- *Utility Water System – The utility water system is supplied using recycled water from upstream of the sleeve valve and is used mainly for wash-down water in the pump and analyzer buildings. The piping consists of several isolation valves and point-of-use connections.*
- *Potable Water System – The potable water system is used throughout the Prado dechlorination station for restrooms, sinks, and eye-wash stations. The system is supplied from a service on Johnson Ave. from the City of Chino. The utility water system is supplied using recycled water from upstream of the sleeve valve and is used mainly for wash-down water in the pump and analyzer buildings. The piping consists of several isolation valves and point-of-use connections.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the Prado dechlorination station. All the processes of the dechlorination station are observed and controlled by the local programmable logic controller (PLC) system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and local PLC located in Control Panel 3300. Control data is then sent to RP-5 and RP-1 through a radio transmitter for remote access to the control system.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-5 800 Pump Station		
Electrical System		
Utility Voltage	12 kV	2 Feeders
Transformers	2 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	2 @ 480 V	MCCs
Generator	2 @ 1,100 kW 1,490 Bhp	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	N/A	
I/O Hub	3 units	
Radio Transmitter	1 unit	RP-5
Prado Dechlorination Station		
Electrical System		
Utility Voltage	480 V	2 Feeders
Transformers	NA	
Switchgear	1 @ 480 V	ATS
Distribution	1 @ 480 V	MCCs
Generator	1 @ 27 kW 36 Bhp	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	CP 3300
I/O Hub	1 unit	CP 3300
Radio Transmitter	1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-5 800 Pump Station				
Electrical System	1	2	2	2
Instrumentation and Control System	2	3	2	3
Prado Dechlorination Station				
Electrical System	3	3	3	3
Utility Water System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	2	1	2	1

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-5 800 Pump Station:
No issues requiring immediate attention.

Prado Dechlorination Station:
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-5 800 Pump Station		
Electrical System	2004 2010	
Instrumentation and Control System	2004 2010	
Prado Dechlorination Station		
Electrical System	1990	
Utility Water System	1990	
Potable Water System	1990	
Instrumentation and Control System	1990 2011	

* Appendix B – Condition Assessment Reports

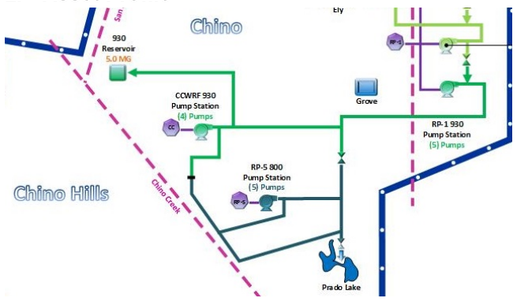
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW

930 Pressure Zone

1. Asset Profile



RP-1 930 Pump Station
The RP-1 930 pump station provides recycled water to the 930 pressure zone for direct use by agricultural customers, the City of Chino, and the City of Chino Hills. The pump station is composed of five pumps:

- Three 150 hp vertical-turbine, VFD-driven, 2,790 gpm pumps
- Two 500 hp vertical-turbine, VFD-driven, 9,330 gpm pumps

The RP-1 930 pump station is automatically controlled to maintain a discharge-pressure set point of about 55 psi.

CCWRF 930 Pump Station
The CCWRF 930 pump station provides recycled water to the 930 pressure zone for direct use by agricultural customers, the City of Chino, and the City of Chino Hills. The pump station is composed of (2) 300 hp vertical-turbine, VFD-driven, 2,585 gpm pumps, and (3) 300 hp vertical turbine, constant, 2,585 gpm pumps. The CCWRF 930 pump station is automatically controlled to cycle pumps on and off based on level set points of the RP-1 recycled water wet well.

930 Reservoir
The 930 reservoir provides recycled water supply to the 930 pressure zone. The 930 reservoir is located north of Galloping Hills Road in the City of Chino Hills. The reservoir has a design capacity of 5 million gallons (MG), a diameter of 170 feet, and a maximum water surface level of 30 feet, and it is equipped with a level transmitter, flow meter, and inlet/outlet check valves.

930 Pipelines

- *CCWRF System Pipeline* – 2,300 LF of 30-inch pipeline from CCWRF to the intersection of Monte Vista Ave. and Chino Hills Parkway, continuing with an additional 5,200 LF of 20-inch pipeline along Monte Vista Ave. between Chino Hills Parkway and Edison Ave.
- *Edison Segment A Pipeline* – 18,500 LF of 30-inch pipeline from the intersection of Chino Hills Parkway and Telephone Ave. to the intersection of Euclid Ave. and Eucalyptus Ave.
- *Edison Segment B Pipeline* – 15,900 LF of 30-inch from the intersection of Euclid Ave. and Eucalyptus Ave. to the TP-1 outfall pipeline.
- *TP-1 Outfall Pipeline* – 12,800 LF of 30-inch pipeline from RP-1 to the 930 to 800 pressure reducing valve (PRV).

930 to 800 Pressure Reducing Valve (PRV)
The 930 to 800 PRV is located at the intersection of Eucalyptus Ave. and Carpenter Ave. and is used to maintain the downstream pressure in the 800 pressure zone. The system includes a 16-inch Cla-Val PRV, flow meter, and pressure transmitter. The system has a design flow range of 200 gpm to 14,000 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 930 Pumps	3 @ 2,790 gpm 2 @ 9,330 gpm	VFD VFD
CCWRF 930 Pumps	2 @ 2,585 gpm 3 @ 2,585 gpm	VFD Constant
930 Reservoir	1 @ 5 MG	
CCWRF System Pipeline	30 -inch – 13,200 gpm 20-inch – 5,900 gpm	6.0 ft/s max velocity(mv)
Edison Segment A Pipeline	30-inch – 13,200 gpm	6.0 ft/s mv
Edison Segment B Pipeline	30-inch – 13,200 gpm	6.0 ft/s mv
TP-1 Outfall Pipeline	30-inch – 13,200 gpm	6.0 ft/s mv
930 to 800 PRV	200 – 14,000 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 930 Pumps	2	3	2	3
CCWRF 930 Pumps	1	2	2	3
930 Reservoir	2	2	2	2
CCWRF System Pipeline	3	3	4	3
Edison Segment A Pipeline	2	3	3	1
Edison Segment B Pipeline	2	3	3	1
TP-1 Outfall Pipeline	4	5	4	1
930 to 800 PRV	1	3	2	1

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-1 930 Pumps
No issues requiring immediate attention

CCWRF 930 Pumps
No issues requiring immediate attention

930 Reservoir
No issues requiring immediate attention

CCWRF System Pipeline
Flexibility is needed to supply recycled water from the 930-foot pressure zone to the 800-foot pressure zone. In addition, allow CCWRF 930 pumps to distribute more recycled water. Project EN17007 will address this issue.

Condition assessment performed in 2014 identified that the pipeline was not installed with either a corrosion monitoring or cathodic protection system. Therefore, the condition of the pipeline is unknown at this time. A potential project is needed to address this issue.

Edison Segment A Pipeline
No issues requiring immediate attention.

Condition assessment performed in 2014 identified that the pipeline is electrically shorted to a bare metallic casing installed below the stormwater channel and is unlikely to be receiving any cathodic protection. In addition, the pipeline is not electrically isolated at the point of connection with CCWRF System Pipeline or Edison Segment B Pipeline, which link both cathodic protection systems. A potential project is needed to address these issues.

Edison Segment B Pipeline
There is no valve at Eucalyptus Ave. and Central Ave to isolate the west side of the system.

Condition assessment performed in 2014 identified that there is no cathodic protection taking place on the pipeline and the inspection locations have been paved over. A potential project is needed to address these issues.

TP-1 Outfall Pipeline
During high recycled-water-demand periods, it has been common to flow more than 18,000 gpm through this pipeline to maintain system pressures. This equates to a flow velocity of more than 8 ft/s, which is not recommended for long-term operation. Because of the age of the pipeline and the operational requirements placed on the pipeline, condition assessment should be performed. A condition assessment should be scheduled in 2015 to assess any potential project requirements. Project EN19003 will provide for a parallel pipeline following the TP-1 Out fall Pipeline from RP-1 to Edison Ave. to address the existing pipeline capacity issues. In addition, a TBD project has been identified in the TYCIP to address the segment of pipeline from Chino to Schaeffer.

930 to 800 PRV
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 930 Pumps	2007 2012	
CCWRF 930 Pumps	2000	
930 Reservoir	2014	
CCWRF System Pipeline	2000	2014 Report
Edison Segment A Pipeline	2006	2014 Report
Edison Segment B Pipeline	2006	2014 Report
TP-1 Outfall Pipeline	1976	Scheduled 2015
930 to 800 PRV	2007 2013	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
CCWRF System Pipeline	930 Pressure Zone Pipeline Cathodic Protection	Install cathodic protection on the CCWRF RW pipeline and Edison Segment B pipeline, and repair cathodic protection on Edison Segment A Pipeline.

Asset Management System Summary – RW
Auxiliary Systems – 930 Pressure Zone

1. Asset Profile

RP-1 930 Pump Station

- *Electrical System – The electrical energy to power the RP-1 930 pump station is obtained from the RP-1 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 power reliability building (PRB), where transformers and switchgear are located to distribute electrical energy throughout the facility. TP-1 and the RP-1 930 pump station are powered through the H9 breaker. A single line diagram of the RP-1 930 pump station electrical system is shown in Appendix B. The RP-1 treatment facility has three 1.25 MW diesel generators located in the PRB, and TP-1 has one 670 kW diesel generator; however, these generators were not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-1 930 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to I/O hub and PLC in the RP-1 930 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

CCWRF 930 Pump Station

- *Electrical System – The electrical energy to power the CCWRF 930 pump station is obtained from the CCWRF treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the CCWRF electrical room, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the CCWRF 930 pump station electrical system is shown in Appendix B. The CCWRF treatment facility has one 1.50 MW diesel generator located in the main electrical room; however, this generator was not designed to maintain operation of the recycled water pump station during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the CCWRF 930 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the CCWRF recycled-water pump-station control room. Fiber optic cable is then used to connect the local PLC to the CCWRF radio transmitter to send the signal to the new recycled-water master server located at RP-1.*

930 to 800 Pressure Reducing Valve (PRV)

- *Electrical System – The electrical energy to power the 930 to 800 PRV station is obtained from onsite energy generation located in the PRV and stored in onsite 12 V batteries. There is no electrical feed from the grid. A single line diagram of the 930 to 800 PRV station electrical system is shown in Appendix B. There is no emergency generation for this site.*
- *Instrumentation and Control System – Control of the PRV is maintained hydraulically and does not require an automated control system. System flow and pressure are monitored at the 930 to 800 PRV. Local wiring is fed from the individual pieces of equipment to a local PLC. The PLC is connected to a remote telemetry unit, which transmits the signals back to RP-1 over a 4G data network to the GWR PLC*

930 Reservoir

- *Electrical System – The electrical energy to power the 930 reservoir is obtained from the local electrical grid (SCE), which is composed of a 120 V feeder to a local control panel along Galloping Hills Road. The 930 reservoir does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Level, flow, and valve position are monitored at the 930 reservoir. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 930 reservoir local control panel. A radio antenna is then used to connect the local PLC for remote access.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 930 Pump Station		
Electrical System		
Utility Voltage	12 kV	2 Feeders
Transformers	2 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1
CCWRF 930 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	1 @ 12 kV to 480 V	
Switchgear	N/A	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	LCP 1200
I/O Hub	1 unit	LCP 1200
Radio Transmitter	1 unit	CCWRF
930 to 800 PRV Station		
Electrical System		
Utility Voltage	12 V DC	Onsite Generation
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	1 unit	
I/O Hub	N/A	
Radio Transmitter	N/A	4G
930 Reservoirs		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	CCWRF

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 930 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
CCWRF 930 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
930 to 800 PRV Station				
Electrical System	1	3	3	3
Instrumentation and Control System	1	3	3	3
930 Reservoir				
Electrical System	2	2	2	2
Instrumentation and Control System	2	2	2	2

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-1 930 Pump Station:

- **Electrical System**
  RP-1 has three emergency diesel generators, and TP-1 has one emergency diesel generator to produce an effective electrical load of 3.5 MW. RP-1 has a varying electrical demand, ranging from 3.0 MW to as high as 4.8 MW depending on the amount of recycled water pumped. Therefore, RP-1 typically does not have the emergency generation capability to power the three recycled water pump stations located at the facility. The Agency would not be able to maintain the operation of the recycled water system if a sustained loss of utility power were to occur. Project EN22003 will address this issue.

CCWRF 930 Pump Station:

- **Electrical System**
  CCWRF has one emergency diesel generator rated to produce an electrical load of 1.5 MW. CCWRF has a base electrical demand, without recycled water pumping, ranging from 600 kW to 800 kW. The expansion of the CCWRF recycled water pump station will provide five 300 hp pumps for a total power demand of about 1,100 kW. Therefore, the CCWRF emergency diesel generator will not be able to provide the required electrical load for CCWRF and the maximum production of the recycled water pump station. Project EN22003 will address this issue.

930 to 800 PRV Station:
No issues requiring immediate attention.

930 Reservoir:
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 930 Pump Station		
Electrical System	2007	
Instrumentation and Control System	2007 2012	
CCWRF 930 Pump Station		
Electrical System	2000 2014	
Instrumentation and Control System	2000 2014	
930 to 800 PRV Station		
Electrical System	2013	
Instrumentation and Control System	2013	
930 Reservoir		
Electrical System	2014	
Instrumentation and Control System	2014	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW/GWR

1050 Pressure Zone

1. Asset Profile

RP-1 1050 Pump Station
The RP-1 1050 pump station provides recycled water to the RP-1 utility water system, the 1050 pressure zone for direct use by the City of Ontario, and to Ely Basin for groundwater recharge. The pump station is composed of three 350 hp vertical-turbine pumps, VFD-driven, 3,750 gpm pumps. The 1050 pump station is automatically controlled to maintain a discharge-pressure set point of about 115 psi.

1050 Pipelines
Philadelphia Street Pipeline – 2,650 LF of 30-inch pipeline from the 1050 pump station to the 60 freeway, continuing with an additional 6,950 LF of 24-inch pipeline to Ely Basin No. 1.

1050 to 930 Pressure Reducing Valve (PRV)
The 1050 to 930 PRV is located at RP-1 and is used to transfer excess recycled water from the 1050 pressure zone to the 930 pressure zone when low pressures are experienced in the 930 pressure zone. The system includes a 24-inch Cla-Val PRV and 24-inch magnetic flow meter. The system has an operating flow range from 700 gpm to 20,000 gpm.

Ely Basin Turnouts
This system is composed of three separate turnouts, each including a 12-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to Ely Basin Nos. 1, 2, and 3. Each turnout is designed for flow rates ranging from 700 gpm to 3,100 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 1050 Pumps	3 @ 3,750 gpm	VFD
Philadelphia St. Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
1050 to 930 PRV	700 – 20,000 gpm	
Ely Basin Turnouts	3 @ 700 – 3,100 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 1050 Pumps	3	3	3	4
Philadelphia St. Pipeline	2	2	2	1
1050 to 930 PRV	2	3	2	2
Ely Basin Turnouts	3	3	4	4

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-1 1050 Pumps
The VFD manufacturer no longer supports this equipment. Maintenance is running the VFD till end of useful life and then when will replace each VFD through Maintenance. No project needed to address this issue.

Philadelphia St. Pipeline
The utility water for RP-1 is supplied by the RP-1 1050 pumps, but the usage cannot be directly measured because there is no flow meter. Project EN16051 will address this issue.

Condition assessment performed in 2014 identified that the cathodic protection was functioning properly and the pipeline was installed in soil with "Negligible Corrosivity."

1050 to 930 PRV
No issues requiring special attention.

Ely Basin Turnouts
No issues requiring special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 1050 Pumps	2004	
Philadelphia St. Pipeline	2005	2014 Report
1050 to 930 PRV	2011	
Ely Basin Turnouts	2005	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW
Auxiliary Systems – 1050 Pressure Zone

1. Asset Profile

RP-1 1050 Pump Station

- *Electrical System – The electrical energy to power the RP-1 1050 pump station is obtained from the RP-1 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 power reliability building (PRB), where transformers and switchgear are located to distribute electrical energy throughout the facility. TP-1 and the RP-1 1050 pump station are powered through the H9 breaker. A single line diagram of the RP-1 1050 pump station electrical system is shown in Appendix B. The RP-1 treatment facility has three 1.25 MW diesel generators located in the PRB, and TP-1 has one 670 kW diesel generator; however, these generators were not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-1 1050 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the RP-1 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

1050 to 930 PRV

- *Electrical System – The electrical energy to power the 1050 to 930 PRV is looped powered through the RP-1 1158 and 1050 pump station PLC. A single line diagram of the 1050 to 930 PRV electrical system is shown in Appendix B. Since the power draw to operate this system is negligible, the 670 kW TP-1 diesel generator will power the 1158 and 1050 pump station PLC during a power failure.*
- *Instrumentation and Control System – The 1050 to 930 PRV consists of a 24-inch Cla-Val PRV with position indication and control and a 24-inch flow meter. All of the processes of the PRV are observed and controlled by the 1158 and 1050 pump station PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

Ely Basin Turnouts

- *Electrical System – The electrical energy to power the three Ely Basin recycled water turnouts is provided by three independent solar panels. A single line diagram of the Ely basin turnouts is shown in Appendix B. The turnouts do not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Each of the three Ely Basin recycled water turnouts has a 10dB yagi antenna that transmits control data to a PLC located at Ely Basin No. 1. The PLC at Ely Basin No. 1 then transmits control data back to the GWR workstation server located at RP-1 for remote access.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 1050 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	2 @ 12 kV to 480 V	
Switchgear	2 @ 480 V	MCCs
Distribution	1 @ 480 V	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1
1050 to 930 PRV		
Electrical System		
Utility Voltage	120 V	PLC Loop
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	1 @ 670 kW 896 Bhp	TP-1
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1
Ely Basin Turnouts		
Electrical System		
Utility Voltage	24 VDC	Solar
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	4 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 1050 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
1050 to 930 PRV				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
Ely Basin Turnouts				
Electrical System	3	4	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-1 1050 Pump Station:

- **Electrical System**
  RP-1 has three emergency diesel generators, and TP-1 has one emergency diesel generator to produce an effective electrical load of 3.5 MW. RP-1 has a varying electrical demand ranging from 3.0 MW to as high as 4.8 MW, depending on the amount of recycled water pumped. Therefore, RP-1 typically does not have the emergency generation capability to power the three recycled water pump stations located at the facility. Normally, the 1050 pump station supplies utility water for RP-1. Utility water is critical to maintain operation of the facility. Project EN22003 will address this issue.

1050 to 930 PRV Station:
No issues requiring immediate attention

Ely Basin Turnout:
No issues requiring immediate attention

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 1050 Pump Station		
Electrical System	2004	
Instrumentation and Control System	2004 2008	
1050 to 930 PRV		
Electrical System	2011	
Instrumentation and Control System	2011	
Ely Basin Turnouts		
Electrical System	2005	
Instrumentation and Control System	2005	

* Appendix B – Condition Assessment Reports

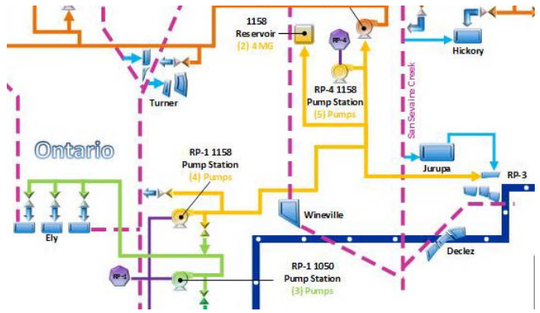
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW

1158 Pressure Zone

1. Asset Profile



1158 Reservoirs
The 1158 reservoirs provide recycled water supply to the 1299 pump station suction header and the 1158 pressure zone. The 1158 reservoirs are located at the intersection of Etiwanda Ave. and 6th St. in the City of Rancho Cucamonga within the GenON Power Generation Facility. Each 1158 reservoir has a design capacity of 4 million gallons (MG), a diameter of 145 feet, and a maximum water surface level of 34 feet, and each is equipped with a level transmitter, flow meter, and altitude valve. The 1158 reservoirs are normally operated between 4 feet and 32 feet, providing an operational capacity of 3.5 MG.

RP-4 1158 Pump Station
The RP-4 1158 pump station provides recycled water to the 1299 pump station suction header, to 1158 reservoirs, and to the 1158 pressure zone for direct use by the City of Fontana and the City of Ontario. The pump station is composed of five pumps:

- Three 200 hp vertical-turbine, VFD-driven, 2,500 gpm pumps
- Two 300 hp vertical-turbine, VFD-driven, 7,200 gpm pumps

The RP-4 1158 pump station is automatically controlled to maintain the level in the RP-4 effluent wet well structure.

RP-1 1158 Pump Station
The RP-1 1158 pump station provides recycled water to the 1299 pump station suction header, to 1158 reservoirs, and to the 1158 pressure zone for direct use by the City of Fontana and the City of Ontario. The pump station is composed of four 400 hp vertical-turbine, VFD-driven, 2,700 gpm pumps.

The RP-1 1158 pump station is automatically controlled to cycle pumps on and off to maintain a time-of-day level set point of the 1158 reservoirs. In addition, the pumps can automatically be switched to VFD control to maintain the RP-1 effluent wet well level when a low level setting is reached.

1158 Pipelines

- *RP-4 Outfall Pipeline* – 25,200 LF of 42-inch pipeline from RP-4 to the intersection of DuPont Ave. and Jurupa St., 15,000 LF of 36-inch pipeline from DuPont Ave. and Jurupa St. to the intersection of Archibald Ave. and Philadelphia Ave., and 4,200 LF of 42-inch pipeline from Archibald Ave. and Philadelphia Ave. to RP-1.
- *1158 Reservoir Pipeline* – 4,200 LF of 48-inch pipeline from RP-4 to the 1158 Reservoirs.
- *Wineville Pipeline* – 5,400 LF of 24-inch pipeline along Wineville Ave. from Airport Dr. to Jurupa St., 8,000 LF of 36-inch pipeline along Francis Street from Jurupa St. to Etiwanda Ave., 8,300 LF of 36-inch pipeline along Marlay Avenue from Etiwanda Ave. to Banana Ave., 2100 LF of 36-inch pipeline along Banana Avenue from Marlay Ave. to Chaparral Dr., and 7,400 LF of 36-inch pipeline along the south side of Chaparral Drive from Banana Ave. to Hemlock Ave.

1158 to 1050 Pressure Reducing Valve (PRV)
The 1158 to 1050 PRV is located at RP-1 and used to transfer excess recycled water from the 1158 pressure zone to the 1050 pressure zone when the 1158 reservoirs reach a high level set point. The system includes a 16-inch Cla-Val PRV and 24-inch magnetic flow meter. The system has an operating flow range from 300 gpm to 17,000 gpm.

RP-4 Energy Displacement Valves (EDV)
The RP-4 EDVs are located at RP-1 and used to discharge excess recycled water when the 1158 reservoirs reach a high level set point. The excess recycled water is treated through the RP-1 north dechlorinating structure before being discharged to the Cucamonga Channel. The turnout includes two 16-inch motor-operated globe-style EDVs, flow meter, and bypass pipeline. Each EDV has an operating flow range from 500 gpm to 11,000 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1158 Reservoirs	2 @ 4 MG	3.5 MG (Op. Cap.)
RP-4 1158 Pumps	3 @ 2,500 gpm 2 @ 7,200 gpm	VFD VFD
RP-1 1158 Pumps	4 @ 2,700 gpm	VFD
RP-4 Outfall Pipeline	42-inch – 25,900 gpm 36-inch – 19,000 gpm	6.0 ft/s mv
1158 Reservoir Pipeline	33,800 gpm	6.0 ft/s mv
Wineville Pipeline	8,500 gpm	6.0 ft/s mv
1158 to 1050 PRV	300 – 17,000 gpm	
RP-4 EDVs	2 @ 500–11,000 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1158 Reservoirs	1	3	3	1
RP-4 1158 Pumps	3	3	3	4
RP-1 1158 Pumps	3	5	5	4
RP-4 Outfall Pipeline	3	3	3	4
1158 Reservoir Pipeline	2	2	2	2
Wineville Pipeline	2	3	3	2
1158 to 1050 PRV	2	2	2	3
RP-4 EDVs	3	2	2	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

1158 Reservoirs
No issues requiring immediate attention.

It is recommended that the annual monitoring testing is performed at the reservoirs highest operating level.

RP-4 1158 Pumps
No issues requiring immediate attention.

RP-1 1158 Pumps
Limited capacity of 14.8 MGD, an expansion is needed to utilize all water treated at RP-1 and distribute into the recycled water system. Project EN14042 will address this issue.

The VFD manufacturer no longer supports this equipment. Maintenance is running the VFD till end of useful life and then when will replace each VFD through Maintenance. No project needed to address this issue.

RP-4 Outfall Pipeline
In 2004, the RP-4 outfall pipeline was converted from a gravity pipeline to a pressure pipeline to create the 1270 recycled water pressure zone. Pressure at RP-1 was normally in excess of 200 psi, which is within the pressure class of the pipeline; however, multiple joint failures of the 42-inch pipeline have occurred, requiring emergency repairs to the system. In late 2008, the pipeline was converted to the 1158 recycled water pressure zone.

A condition assessment may be warranted as a result of the number of pipeline failures. A condition assessment should be scheduled in 2016 to assess any potential project requirements.

1158 Reservoir Pipeline
A condition assessment in 2014 identified that one of the three test stations functioning and there was uncertainty determining if there were any signs of corrosion. It was also identified that soil is “Negligible Corrosivity.” A potential project is needed to repair these issues.

Wineville Pipeline
No issues requiring immediate attention.

1158 to 1050 PRV
No issues requiring immediate attention.

RP-4 EDVs
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1158 Reservoirs	2008	2014 Report
RP-4 1158 Pumps	2004 2008	
RP-1 1158 Pumps	2004 2006 2008	
RP-4 Outfall Pipeline	1998	Schedule for 2015
1158 Reservoir Pipeline	2004	2014 Report
Wineville Pipeline	2004	
1158 to 1050 PRV	2011	
RP-4 EDVs	1998 2005	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
1158 Reservoir Pipeline	1158 Reservoir Pipeline Cathodic Protection	Repair 1158 reservoir pipeline cathodic protection test stations.
RP-4 Outfall Pipeline	1158 Pipeline Surge Risk Analysis and Condition Assessment	Conduct a risk analysis and condition assessment to identify potential project requirements, and the project will repair the 1158 and 1050 surge tanks.

Asset Management System Summary – RW

Auxiliary Systems – 1158 Pressure Zone

1. Asset Profile

RP-4 1158 Pump Station

- *Electrical System – The electrical energy to power the RP-4 1158 pump station is obtained from the local electrical grid (SCE) and from onsite energy generation (wind and emergency generators). The solar and wind assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switch gear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-4 electrical system is shown in Appendix B. The RP-4 treatment facility has one 2.0 MW diesel generator located in the northern portion of the facility; however, the generator was not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-4 1158 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the RP-4 1158 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-4 server workstation for remote access.*

RP-1 1158 Pump Station

- *Electrical System – The electrical energy to power the RP-1 1158 pump station is obtained from the RP-1 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 power reliability building (PRB), where transformers and switchgear are located to distribute electrical energy throughout the facility. TP-1 and the RP-1 1158 pump station are powered through the H9 breaker. A single line diagram of the RP-1 1158 pump station electrical system is shown in Appendix B. The RP-1 treatment facility has three 1.25 MW diesel generators located in the PRB, and TP-1 has one 670 kW diesel generator; however, these generators were not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-1 1158 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

1158 Reservoirs

- *Electrical System – The electrical energy to power the 1158 reservoirs is obtained from the local electrical grid (SCE), which is composed of a 120 V feeder to a local control panel on 6th Street. A single line diagram of the RP-1 1158 pump station electrical system is shown in Appendix B. The 1158 reservoirs do not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Level, flow, and valve position are monitored at the 1158 reservoirs. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 reservoir local control panel. Fiber optic cable is then used to connect the local PLC to the RP-4 server workstation for remote access.*

1158 to 1050 PRV

- *Electrical System – The electrical energy to power the 1158 to 1050 PRV is looped powered through the 1158 and 1050 pump station PLC. A single line diagram of the 1158 to 1050 PRV electrical system is shown in Appendix B. The 670 kW TP-1 diesel generator will power the 1158 pump station and 1050 pump station PLC during a power failure, since the power draw to operate this system is negligible.*
- *Instrumentation and Control System – The 1158 to 1050 PRV consists of a 16-inch Cla-Val PRV with position indication and control and a 24-inch flow meter. All of the processes of the PRV are observed and controlled by the 1158 and 1050 pump station PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-4 1158 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	4 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	2 @ 480 V	MCCs
Generator	1 @ 2,000 kW 2,847 Bhp	Small Pumps
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	PLC 5
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-4
RP-1 1158 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	2 @ 12 kV to 480 V	
Switchgear	2 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1
1158 Reservoirs		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	PLC 5C
Radio Transmitter	1 unit	RP-4
1158 to 1050 PRV		
Electrical System		
Utility Voltage	120 V	PLC Loop
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	1 @ 670 kW 896 Bhp	TP-1
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-4 1158 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
RP-1 1158 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
1158 Reservoirs				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
1158 to 1050 PRV				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-4 1158 Pump Station:

- **Electrical System**

  RP-4 has one 2.0 MW emergency diesel generator. The generator can produce only enough power to reliably power the RP-4 1158 small pumps, reducing the overall capacity of the pump station. The RP-4 1158 pump station is the only discharge location for the facility; therefore, a utility power failure will reduce the discharge capacity for the facility. Project EN22003 will address this issue.

RP-1 1158 Pump Station

- **Electrical System**

  RP-1 has three emergency diesel generators, and TP-1 has one emergency diesel generator to produce an effective electrical load of 3.5 MW. RP-1 has a varying electrical demand, ranging from 3.0 MW to as high as 4.8 MW depending on the amount of recycled water pumped. Therefore, RP-1 typically does not have the emergency generation capability to power the three recycled water pump stations located at the facility. Project EN22003 will address this issue.

  Project EN13048 will provide a second 12kV feeder to TP-1 to support the RP-1 1158 pump station.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-4 1158 Pump Station		
Electrical System	2004 2008	
Instrumentation and Control System	2004 2008	
RP-1 1158 Pump Station		
Electrical System	2004 2006	
Instrumentation and Control System	2004 2008	
1158 Reservoirs		
Electrical System	2008	
Instrumentation and Control System	2008	
1158 to 1050 PRV		
Electrical System	2011	
Instrumentation and Control System	2011	

* Appendix B – Condition Assessment Reports

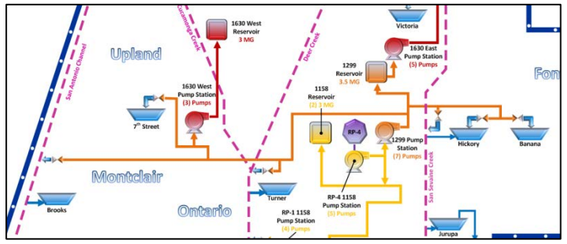
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW

1299 Pressure Zone

1. Asset Profile



1299 Reservoir
The 1299 reservoir provides recycled water supply to the 1630 east pump station suction header and the 1299 pressure zone. The 1299 reservoir is located at the intersection of East Ave. and Baseline Ave. in the City of Rancho Cucamonga on an existing Cucamonga Valley Water District (CVWD) potable water reservoir site. The 1299 reservoir has a design capacity of 3.5 million gallons (MG), a diameter of 165 feet, and a maximum water surface level of 22 feet, and is equipped with a level transmitter. The 1299 reservoir is normally operated between 4 feet and 20 feet, providing an operational capacity of 2.6 MG.

RP-4 1299 Pump Station
The RP-4 1299 pump station provides recycled water to the 1299 pressure zone for direct use by CVWD, Monte Vista Water District (MVWD), the City of Fontana, the City of Ontario, and the City of Upland, and for groundwater recharge at Brooks Basin, 8th St. Basin, Turner Basin, Hickory Basin, Banana Basin, Jurupa Basin, and RP-3 Basin. The pump station is composed of seven pumps:

- Two 350 hp horizontal-split case, VFD-driven, 4,185 gpm pumps
- Five 350 hp horizontal-split case, VFD-driven, 4,600 gpm pumps

The 1299 pump station is automatically controlled to cycle pumps on and off to maintain a time-of-day level set point of the 1299 reservoir.

1299 Pipelines

- *Etiwanda Pipeline* – 4,100 LF of 36-inch pipeline along Etiwanda Ave. from RP-4 to Whittram Ave.
- *North Etiwanda Pipeline* – 1,800 LF of 42-inch pipeline along Etiwanda Ave. from Whittram Ave. to Arrow Route.
- *Whittram Avenue Pipeline* – 7,500 LF of 16-inch along Whittram Ave. from Etiwanda Ave. to Banana Basin.
- *1299 Zone Recycled Water Pipeline* – 12,500 LF of 36-inch pipeline from the termination of the North Etiwanda Pipeline to the 1299 Reservoir.
- *RP-4 West Extension Phase I Pipeline* – 14,200 LF of 30-inch pipeline along 6th St. from Etiwanda Ave. to Cleveland Ave.
- *RP-4 West Extension Phase II Pipeline* – 10,400 LF of 30-inch pipeline from the termination of the RP-4 West Extension Phase I Pipeline at 6th St. and Cleveland Ave. to Archibald Ave. and 4th St., continuing with an additional 2,200 LF of 24-inch pipeline to 4th St. and Cucamonga Creek.
- *San Antonio Channel Segment A Pipeline* – 14,900 LF of 24-inch pipeline from the termination of the RP-4 West Extension Phase II pipeline at 4th St. and Cucamonga Creek to I St. and Sultana Ave.
- *San Antonio Channel Segment B Pipeline* – 12,200 LF of 30-inch pipeline from the termination of the San Antonio Channel Segment A Pipeline at I St. and Sultana Ave. to San Bernardino Ave. and Benson Ave., continuing with an additional 11,250 LF of 24-inch pipeline to Orchard St. Turnout.
- *7th and 8th St. Pipeline* – 10,500 LF of 16-inch pipeline from 4th St. and Corona Ave. to 8th St. Basin turnout.

Force Main Manifold (FMM) Turnout
The turnout includes two 12-inch motor-operated butterfly valves, a flow meter, and a pressure transmitter to provide recycled water to Hickory Basin and Banana Basin. The turnout is designed for flow rates ranging from 200 gpm to 6,000 gpm.

San Sevaine Channel Turnout
The turnout includes a 10-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to San Sevaine Channel. Recycled water discharged in the channel can then be conveyed to Hickory Basin or to Jurupa Basin for groundwater recharge. The turnout is designed for flow rates ranging from 200 gpm to 2,200 gpm.

Turner Basin Turnout
The turnout includes a 10-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to Deer Creek. Recycled water discharged in the lined creek can then be conveyed to Turner Basin Nos. 3 and 4 for groundwater recharge. The turnout is designed for flow rates ranging from 300 gpm to 3,500 gpm.

8th St. Basin Turnout
The turnout includes a 12-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to 8th St. Basin. The turnout is designed for flow rates ranging from 200 gpm to 3,000 gpm.

Orchard Turnout
The turnout includes a 16-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to San Antonio Channel. Recycled water discharged in the channel can then be conveyed to Brooks Basin for groundwater recharge. The turnout is designed for flow rates ranging from 1,000 gpm to 10,000 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1299 Reservoir	3.5 MG	2.6 MG
RP-4 1299 Pumps	2 @ 4,185 gpm 5 @ 4,600 gpm	
Etiwanda Pipeline	19,000 gpm	6.0 ft/s mv
North Etiwanda Pipeline	25,900 gpm	6.0 ft/s mv
Whittram Ave. Pipeline	3,750 gpm	6.0 ft/s mv
1299 Zone Recycled Water Pipeline	19,000 gpm	6.0 ft/s mv
RP-4 West Extension Phase I Pipeline	13,200 gpm	6.0 ft/s mv
RP-4 West Extension Phase II Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
San Antonio Channel Segment A Pipeline	8,500 gpm	6.0 ft/s mv
San Antonio Channel Segment B Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
7th & 8th St. Pipeline	3,750 gpm	6.0 ft/s mv
FMM Turnout	200 – 6,000 gpm	Hist. Data
San Sevaine Channel Turnout	200 – 2,200 gpm	Hist. Data
Turner Basin Turnout	300 – 3,500 gpm	Hist. Data
8th St. Basin Turnout	200 – 3,000 gpm	Des. Spec.
Orchard Turnout	1,000 – 10,000 gpm	Des. Spec.

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1299 Reservoir	1	2	3	2
RP-4 1299 Pumps	4	3	3	3
Etiwanda Pipeline	2	3	2	2
North Etiwanda Pipeline	2	2	2	2
Whittram Ave. Pipeline	2	4	2	2
1299 Zone Recycled Water Pipeline	2	2	2	2
RP-4 West Ext. Phase I Pipeline	2	3	2	2
RP-4 West Ext. Phase II Pipeline	2	3	2	2
San Antonio Channel Segment A	2	3	2	2
San Antonio Channel Segment B	3	3	2	2
7th & 8th St. Pipeline	3	4	3	3
FMM Turnout	3	3	2	3
San Sevaine Channel Turnout	1	1	1	3
Turner Basin Turnout	1	3	3	3
8th St. Basin Turnout	3	3	3	3
Orchard Turnout	1	2	2	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

1299 Reservoir
There is only one level transmitter for the reservoir. If the level transmitter fails, it shuts down the entire system. A redundant level transmitter should be installed on the reservoir. These issues should be addressed by the Maintenance Department.

RP-4 1299 Pumps
Impellers wear due to cavitation. Early investigation shows that cast iron material wears prematurely in highly chlorinated water. Further evaluation is needed to determine if a potential project is needed.

Whittram Ave. Pipeline Capacity
At a max velocity of 6 ft/s, the Whittram Ave. pipeline has a capacity of 3,750 gpm. The San Sevaine Channel turnout has a max flow of 2,200 gpm, and the FMM turnout has a maximum flow of 6,000 gpm, which exceeds the Whittram Ave. pipeline max recommended velocity. A project was identified on the FY 2015/16 TYCIP to address this issue, but not project number has been assigned.

7th and 8th St. Pipeline Capacity
At a maximum velocity of 6 ft/s, the 7th and 8th St. pipeline has a capacity of 3,750 gpm. The 8th St. basin turnout has a maximum flow of 3,000 gpm, and the 1630 west recycled water pump station has a maximum flow of 4,000 gpm. Therefore, the 1630 west recycled water pump station and 8th St. basin turnout cannot be operated simultaneously without exceeding the maximum recommended velocity of the pipeline. A project was identified on the FY 2015/16 TYCIP to address this issue, but not project number has been assigned.

San Sevaine Channel Turnout
Condition assessment in 2014 identified the force main, extending from the Jurupa Basin along Mulberry Ave to the RP-3 Basin near Hemlock Ave, has at least two electrical discontinuities between stations 06050 and 07060, and between 10090 and 12120. This needs to be addressed by a potential project to ensure adequate cathodic protection.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1299 Reservoir	2011	
RP-4 1299 Pumps	2008	
Etiwanda Pipeline	2003	2014 Report
North Etiwanda Pipeline	2008	2014 Report
Whittram Ave. Pipeline	2004	2014 Report
1299 Zone RW Pipeline	2011	2014 Report
RP-4 West Ext. Phase I	2005	2014 Report
RP-4 West Ext. Phase II	C2006	2014 Report
San Antonio Channel Segment A Pipeline	2007	2014 Report
San Antonio Channel Segment B Pipeline	2007	
7th & 8th St. Pipeline	2007	
FMM Turnout	2006	
San Sevaine Channel	2006	2014 Report
Turner Basin Turnout	2006	
8th St. Basin Turnout	2007	
Orchard Turnout	2007	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
1299 Pressure Zone	1299 Pressure Zone Cathodic Protection	Per 2014 Corrpro Report: Repair electrical discontinuities on Jurupa force main, and repair test stations on the North Etiwanda pipeline, Antonio Channel Seg A, RP4 Western Extension Phase 1 and Phase 2.
7th & 8th St. Pipeline and Whittram Ave. Pipeline Capacities	1299 Pressure Zone Pipeline Capacity Upgrades	Upgrade 7th & 8th street pipeline and Whittram Ave pipeline to provide sufficient capacity to not exceed the recommended velocity of the pipeline during peak demand.

Asset Management System Summary – RW/GWR

Auxiliary Systems – 1299 Pressure Zone

1. Asset Profile

RP-4 1299 Pump Station

- *Electrical System* – The electrical energy to power the RP-4 1299 pump station is obtained from the RP-4 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (wind and emergency generators). The wind assets are owned and operated by a private firm as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switch gear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-4 electrical system is shown in Appendix B. The RP-4 treatment facility has one 2.0 MW diesel generator located in the northern portion of the facility; however, the generator was not designed to maintain operation of the recycled water pump stations during a power failure.
- *Instrumentation and Control System* – An extensive array of instruments is used to monitor and control the processes for the RP-4 1299 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the RP-4 1299 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-4 server workstation for remote access.

1299 Reservoir

See 1630 East Auxiliary System Summary Sheet.

FMM Turnout

- *Electrical System* – The electrical energy to power the FMM Turnout is obtained from the local electrical grid (SCE). A single line diagram of the FMM Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position for the both Hickory and Banana basins is fed back to the remote telemetry unit. The turnout has a 10dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.

San Sevaine Channel Turnout

- *Electrical System – The electrical energy to power the San Sevaine Turnout is obtained from the Hickory Basin Rubber Dam Control House, which receives power from the local electrical grid (SCE). A single line diagram of the San Sevaine Channel Turnout and Hickory Basin Rubber Dam Control House is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for flow and valve position is fed back to the local valve control panel, which then directs the information to a local control panel in the Hickory Basin Rubber Dam Control House. The Control House has a 10dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.*

Turner Basin Turnout

- *Electrical System* – The electrical energy to power the Turner Basin Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Turner Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position is fed back to a local control panel and PLC. The turnout has a 9dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.

8th Street Basin Turnout

- *Electrical System* – The electrical energy to power the 8th Street Basin Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Turner Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position is fed back to a local PLC. The turnout has a 9dB yagi antenna that transmits control data to an additional local PLC panel for 8th Street Basin before being transmitted by radio to RP-1 to the GWR workstation server for control and remote access.

Orchard Turnout

- *Electrical System* – The electrical energy to power the Orchard Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Orchard Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position as well as pressure are fed back to a local control panel and PLC. The data is transmitted by phone line to the GWR workstation server at RP-1 for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-4 1299 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	2 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	MCCs
Distribution	1 @ 480 V	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	PLC 5B
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-4
FMM Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	N/A	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
San Sevaine Turnout		
Electrical System		
Utility Voltage	480 V	
Transformers	1 @ 480 V to 120 V	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	N/A	
PLC	N/A	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
Turner Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
8th Street Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	2 units	
RTU	N/A	
PLC	2 units	
I/O Hub	1 unit	
Radio Transmitter	3 units	
Orchard Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	N/A	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-4 1299 Pump Station				
Electrical System	2	3	3	4
Instrumentation and Control System	2	3	3	3
FMM Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
San Sevaine Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Turner Basin Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
8th Street Basin Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Orchard Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-4 1299 Pump Station Emergency Generation

RP-4 has one 2.0 MW emergency diesel generator. The generator can produce only enough power to reliably power the RP-4 1158 small pumps; therefore, it cannot maintain the operation of the 1299 pump station during a power failure. Project EN22003 will address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-4 1299 Pump Station		
Electrical and I&C	2008	
FMM Turnout		
Electrical and I&C	2006	
San Sevaine Turnout		
Electrical and I&C	2006	
Turner Basin Turnout		
Electrical and I&C	2006	
8th Street Basin Turnout		
Electrical and I&C	2007	
Orchard Turnout		
Electrical and I&C	2007	

* Appendix B – Condition Assessment Reports

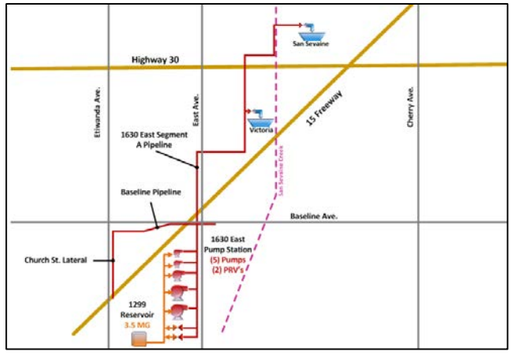
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW/GWR

1630 East Pressure Zone

1. Asset Profile



1630 East Pump Station
The 1630 east pump station provides recycled water to the 1630 east pressure zone for direct use by CVWD and the City of Fontana and for groundwater recharge at Victoria and San Sevaine basins. The pump station is composed of five pumps:

- Two 100 hp vertical-turbine, VFD-driven, 750 gpm pumps
- One 200 hp vertical-turbine, constant speed, 1,500 gpm pump
- Two 400 hp vertical-turbine, constant speed, 3,000 gpm pumps

The 1630 east pump station is automatically controlled using a proportional-integral-derivative controller (PID) to maintain a discharge-pressure set point of 150 psi. In addition, the pump station has two 12-inch pressure-reducing valves (PRV) to transfer recycled water from the 1630 east pressure zone back to the 1299 pressure zone to be used with the future 1630 east reservoir.

1630 East Pipelines

- *Segment A Pipeline* – 11,300 LF of 36-inch pipeline from the 1630 East Pump Station to San Sevaine Turnout.
- *Baseline Pipeline* – 1,650 LF of 24-inch and 30-inch pipeline along Baseline Ave. from Etiwanda Ave. to Heritage Circle.
- *Church Street Lateral* – 2,350 LF of 12-inch pipeline along Etiwanda Ave. from Baseline Ave. to Church St.

Victoria Basin Turnout
The turnout includes an 8-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to the groundwater recharge basin. The turnout is designed for flow rates ranging from 200 gpm to 3,000 gpm.

San Sevaine Basin Turnout
The turnout includes a 12-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to the groundwater recharge basin. The turnout is designed for flow rates ranging from 400 gpm to 6,700 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 East Pumps	2 @ 750 gpm 1 @ 1,500 gpm 2 @ 3,000 gpm	VFD Constant Constant
1630 East PRVs	2 @ 10,000 gpm	Need to verify in field
Segment A Pipeline	19,000 gpm	6.0 ft/s max velocity
Baseline Pipeline	13,000 gpm	6.0 ft/s max velocity
Church Street Lateral	2,000 gpm	6.0 ft/s max velocity
Victoria Basin Turnout	200 – 3,000 gpm	
San Sevaine Basin Turnout	400 – 6,700 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 East Pumps	2	2	3	2
1630 East PRVs	1	1	2	2
Segment A Pipeline	1	2	1	1
Baseline Pipeline	1	2	2	1
Church Street Lateral	1	2	2	1
Victoria Basin Turnout	1	2	2	2
San Sevaine Basin Turnout	1	1	2	2

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

1630 East Pumps
When both Victoria and San Sevaine basins are not receiving recycled water, the minimum 1630 east pressure zone flow is causing the small 100 hp pumps to operate continuously at minimum speed with zero measurable flow. Further investigation is needed to determine whether programming changes can resolve the issue or whether a small jockey pump may be required. A potential project is needed.

The existing surge tank compressor does not have the capacity to effectively displace the water in the tank after surge events. Multiple failures of the surge tank compressor have been documented and reported to Engineering. Project EN13051 will address these issues.

1630 East PRVs
No issues requiring immediate attention

Segment A Pipeline
No issues requiring immediate attention

A condition assessment in 2014 that the test stations were functioning as intended, but an electrical discontinuity was detected between stations 07010 and 09020, but the soil has “Negligible Corrosivity.”

Baseline Pipeline
No issues requiring immediate attention

Church Street Lateral
No issues requiring immediate attention

Victoria Basin Turnout
No issues requiring immediate attention

San Sevaine Basin Turnout
No issues requiring immediate attention

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 East Pumps	2011	
1630 East PRVs	2011	
Segment A Pipeline	2011	2014 Report
Baseline Pipeline	2011	
Church Street Lateral	2011	
Victoria Basin Turnout	2011	
San Sevaine Basin Turnout	2011	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
1630 East Pumps	1630 East Pump Station Upgrades	A set of smaller pumps are needed for low flow periods because there is no reservoir on this segment of pipeline.

Asset Management System Summary – RW/GWR

Auxiliary Systems – 1630 East Pressure Zone

1. Asset Profile

1630 East Pump Station and 1299 Reservoir

- *Electrical System – The electrical energy to power the 1630 east pump station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 12 kV feeder to the 1630 east pump station electrical room, where transformers and switchgear are located to distribute electrical energy throughout the pump station. A single line diagram of the 1630 east pump station electrical system is shown in Appendix B. The 1630 east pump station does not have emergency power generation in case of power failure; however, it does have a generator termination cabinet to allow for quick connection of a portable generator.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the 1630 east pump station and 1299 reservoir. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1630 east pump station electrical room. Radio is then used to connect the local PLC to the RP-4 server workstation for remote access.*

Victoria Basin Turnout

- *Electrical System – The electrical energy to power the Victoria Basin Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Victoria Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for flow and valve position is fed back to a local control panel and PLC, which transmits control data to the Victoria Basin Main remote terminal unit (RTU). The Victoria Basin Main RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.*

San Sevaine Basin Turnout

- *Electrical System* – The electrical energy to power the Victoria Basin *Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Victoria Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for flow and valve position is fed back to a remote I/O hub, which radios control data to the San Sevaine Basin No. 3 RTU. The San Sevaine Basin No. 3 RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access. In addition, there is a San Sevaine Basin Turnout Main RTU that radios information back to RP-4.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 East Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	1 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	1 unit	
PLC	2 units	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
Victoria Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	1 unit	
PLC	1 unit	
I/O Hub	2 units	
Radio Transmitter	3 units	
San Sevaine Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	2 units	
PLC	2 units	
I/O Hub	3 units	
Radio Transmitter	4 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 East Pump Station				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
Victoria Basin Turnout				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
San Sevaine Basin Turnout				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Electrical System
No issues require specific attention.

Instrumentation and Control System
No issues require specific attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 East Pump Station		
Electrical System	2011	
Instrumentation and Control System	2011	
Victoria Basin Turnout		
Electrical System	2011	
Instrumentation and Control System	2011	
San Sevaine Channel Turnout		
Electrical System	2011	
Instrumentation and Control System	2011	

* Appendix B – Condition Assessment Reports

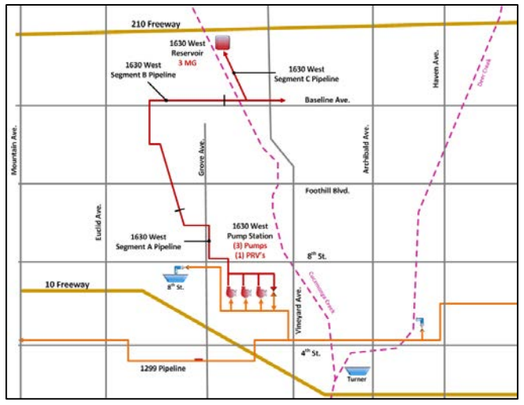
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RW/GWR

1630 West Pressure Zone

1. Asset Profile



1630 West Reservoir
The 1630 west reservoir provides recycled water storage for the 1630 west pressure zone. The 1630 west reservoir is located at the intersection of 19th St. and Cucamonga Creek in the City of Rancho Cucamonga on an existing Cucamonga Valley Water District (CVWD) pump station site. The 1630 east reservoir has a design capacity of 3 million gallons (MG), a diameter of 130 feet, and a maximum water surface level of 32 feet, and is equipped with a level transmitter. The 1630 west reservoir is normally operated between 4 feet and 28 feet, providing an operational capacity of 2.4 MG.

1630 West Pump Station
The 1630 west pump station provides recycled water to the 1630 west pressure zone for direct use by CVWD and the City of Upland. The pump station is composed of three 250 hp vertical-turbine, constant-speed, and 2,000 gpm pumps. The 1630 east pump station is automatically controlled to cycle pumps on and off to maintain a time-of-day level set point of the 1630 west reservoir. In addition, the pump station has one 10-inch pressure reducing valve (PRV) to transfer recycled water from the 1630 west pressure zone back to the 1299 pressure zone.

1630 West Pipelines
- *Segment A Pipeline* – 10,500 LF of 24-inch pipeline from the 1630 West Pump Station to Upland Memorial Park.
- *Segment B Pipeline* – 13,000 LF of 24-inch pipeline from Upland Memorial Park to the intersection of 16th St. (Baseline Rd.) and Tanglewood Ave.
- *Segment C Pipeline* – 800 LF of 24-inch pipeline and 3,100 LF of 30-inch pipeline along Baseline Rd. from Tanglewood Ave. to Vineyard Ave. Segment C Pipeline includes an additional 4,400 LF of 30-inch pipeline along Cucamonga Creek from Baseline Rd. to the 1630 west reservoir.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 West Reservoir	3 MG	2.4 MG (Op. Cap.)
1630 West Pumps	3 @ 2,000 gpm	Constant
1630 West PRV	300 – 3,000 gpm	Need to verify in field
Segment A Pipeline	8,500 gpm	6.0 ft/s max velocity
Segment B Pipeline	8,500 gpm	6.0 ft/s max velocity
Segment C Pipeline	24-inch – 8,500 gpm 30-inch – 13,200 gpm	6.0 ft/s max velocity

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 West Reservoir	1	1	1	1
1630 West Pumps	1	1	4	4
1630 West PRV	1	3	3	2
Segment A Pipeline	1	1	1	1
Segment B Pipeline	1	1	1	1
Segment C Pipeline	1	1	1	1

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

1630 West Reservoir
The 1630 West Reservoir site uses city water (`$6k annually) for irrigation purposes. A potential project is needed to install a small RW booster pump station at the reservoir site, so we could use RW for irrigation and not city water.

1630 West Pumps
Operations has noticed surge in both the 1299 and 1630 pressure zones when the 1630 west pumps are started or stopped. The surge can be in excess of 40 psi from standard operating conditions. The 1630 west surge tank and pump start controls are being reviewed to see if this condition can be eliminated with existing equipment. Project EN15055 will address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 West Reservoir	2012	
1630 West Pumps	2012	
1630 West PRV	2012	
Segment A Pipeline	2012	
Segment B Pipeline	2012	
Segment C Pipeline	2012	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
1630 West Reservoir	1630 West Reservoir RW irrigation Booster Pump Station	Install a RW booster pump station at the 1630 west reservoir site to supply irrigation water.

Asset Management System Summary – RW/GWR

Auxiliary Systems – 1630 West Pressure Zone

1. Asset Profile

1630 West Pump Station

- *Electrical System* – The electrical energy to power the 1630 west pump station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 12 kV feeder to the 1630 east pump station electrical room, where transformers and switchgear are located to distribute electrical energy throughout the pump station. A single line diagram of the 1630 west pump station electrical system is shown in Appendix B. The 1630 west pump station does not have emergency power generation in case of power failure; however, it does have a generator termination location in the MCC to allow for quick connection of a portable generator.
- *Instrumentation and Control System* – An extensive array of instruments is used to monitor and control the processes for the 1630 west pump station. All of the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1630 west pump station electrical room. Radio is then used to connect the local PLC to the RP-4 server workstation for remote access.

1630 West Reservoir

- *Electrical System – The electrical energy to power the 1630 west reservoir is obtained from the local electrical grid (SCE). A single line diagram of the 1630 west reservoir is shown in Appendix B. The reservoir does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for level and valve position are fed back to a local control panel and PLC. The RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 for control and remote access.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 West Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	1 @ 12 kV to 480 V 1 @ 12 kV to 120 V	
Switchgear	1 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
1630 West Reservoir		
Electrical System		
Utility Voltage	480	
Transformers	1 @ 480 V to 120 V	
Switchgear	N/A	
Distribution	N/A	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 West Pump Station				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
1630 West Reservoir				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Electrical System
No issues require specific attention.

Instrumentation and Control System
No issues require specific attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 West Pump Station		
Electrical System	2012	
Instrumentation and Control System	2012	
1630 West Reservoir		
Electrical System	2012	
Instrumentation and Control System	2012	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

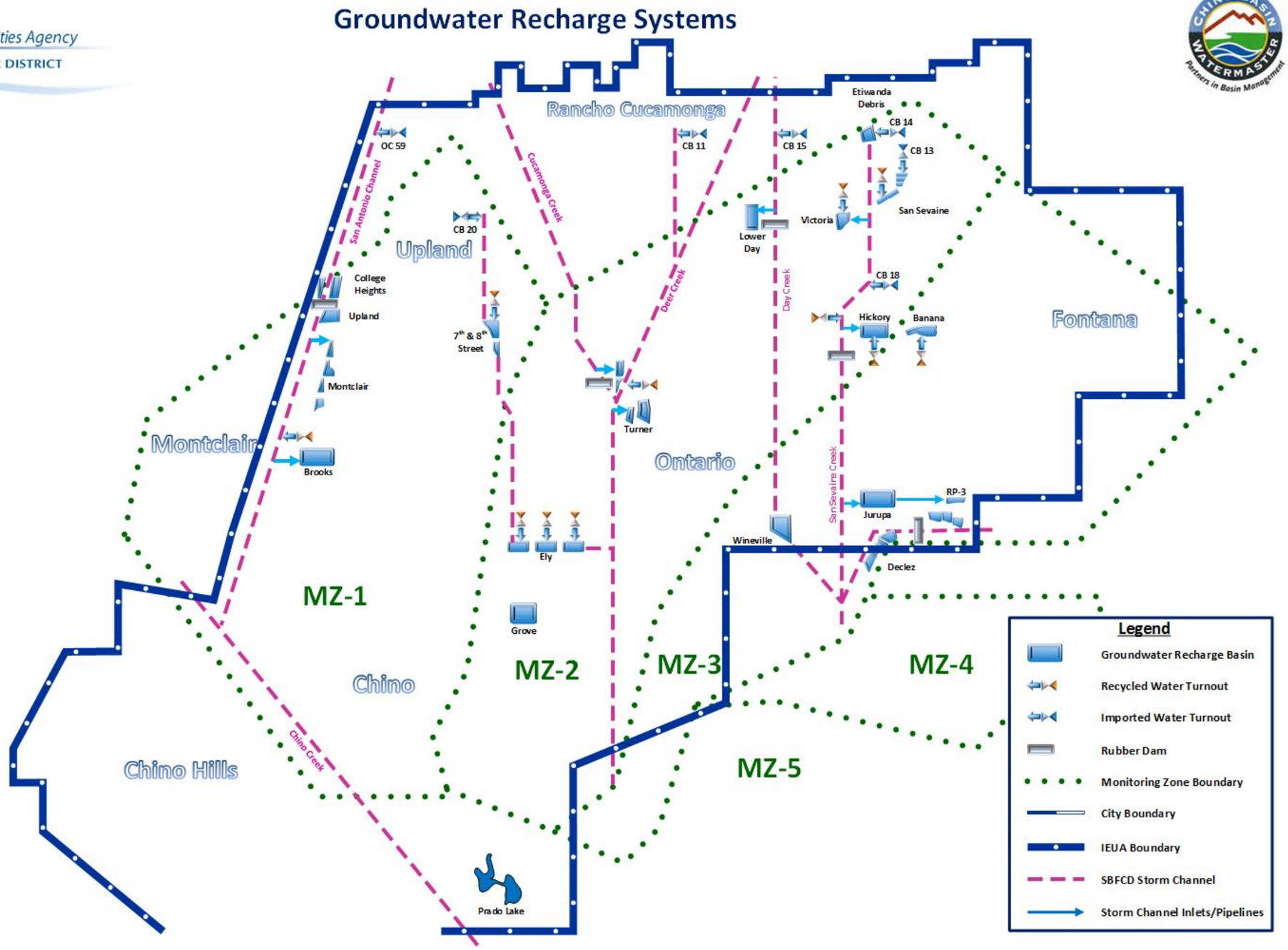


Figure 7-8: Groundwater Recharge Systems (GWR) – Schematic

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Asset Management System Summary – GWR
7th Street & 8th Street Basin (MZ-1)

1. Asset Profile

PROCESS FLOW SCHEMATIC
7th Street & 8th Street Basins

7th Street Basin
The 7th Street Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located on the border of the City of Ontario and the City of Upland in Management Zone 1, near the intersection of 7th Street and Grove Avenue. The 7th Street Basin receives flow from the 8th Street Basin and has the ability to discharge flow to the West Cucamonga Creek. The 7th Street Basin has an approximate size of 6.5 acres and an approximate sidewall depth of 11 feet from a floor elevation of 1123' to an outfall pipe invert elevation of 1134' equating to 54.6 AF of storage. The 7th Street Basin includes a 36" automated sluice gate for discharge to the West Cucamonga Creek and a level transmitter.

8th Street Basin
The 8th Street Basin is owned by the SBCFCD and is located on the border of the City of Ontario and the City of Upland in Management Zone 1, near the intersection of 8th Street and Grove Avenue. The 8th Street Basin is comprised of two cells: the North Cell and the South Cell.

- *8th Street Basin North Cell* – The 8th Street Basin North Cell receives storm water and imported water from the West Cucamonga Creek, storm water from a local storm drain system, and recycled water from the 8th Street Basin Recycled Water Turnout. The 8th Street Basin North Cell has an approximate size of 8.3 acres and an approximate sidewall depth of 7 feet from a floor elevation of 1134' to an 8th Street Basin South Cell overflow structure at an elevation of 1141' equating to 52.6 AF of storage. The 8th Street Basin North Cell includes a 54" manual sluice gate for discharge to the 8th Street Basin South Cell and a level transmitter.
- *8th Street Basin South Cell* – The 8th Street Basin South Cell receives flow from the 8th Street Basin North Cell. The 8th Street Basin South Cell has an approximate size of 6.3 acres and an approximate sidewall depth of 8 feet from a floor elevation of 1133' to a 7th Street Basin overflow structure at an elevation of 1141' equating to 38.0 AF of storage. The 8th Street Basin South Cell includes a 48" automated sluice gate for discharge to the 7th Street Basin and a level transmitter.

8th Street Basin Recycled Water Turnout
The 8th Street Basin Recycled Water Turnout is located to the north of the 8th Street Basin. The turnout includes a 12" Cla-Val flow control valve, flow meter, and pressure transmitter to provided recycled water to 8th St. Basin. The turnout is designed for flow rates ranging from 200 gpm to 3,000 gpm.

CB 20 MWD Imported Water Turnout
The CB 20 MWD Imported Water Turnout is located near the intersection of Winston Street and 18th Street in the City of Upland. The turnout includes a 24" Cla-Val flow control valve with flow measurement and a pressure transmitter to provided imported water to a local storm drain system that connects to the West Cucamonga Creek. The turnout is designed for flow rates ranging from 1,000 gpm to 9,000 gpm.

Electrical System

- *Basin* – The electrical energy to power the 7th Street Basin and the 8th Street Basin is obtained from the local electrical grid (SCE) through a meter on 7th Street. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Recycled Water Turnout* – The electrical energy to power the 8th Street Basin Recycled Water Turnout is obtained from the local electrical grid (SCE) through a meter on 8th Street. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Imported Water Turnout* – The electrical energy to power the CB 20 MWD Imported Water Turnout is obtained from the local electrical grid (SCE) through a meter on 18th Street. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System

- *Basin* – Local control wiring for valve position and basin levels are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.
- *Recycled Water Turnout* – Local control wiring for flow and valve position are fed back to a local PLC. The turnout PLC has a 9dB yagi antenna that transmits control data the local PLC panel for the 8th Street Basin to be further transmitted to the GWR workstation.
- *Imported Water Turnout* – Local control wiring for flow and valve position are fed back to a local PLC. The turnout PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
7th Street Basin	*Basin* Area: 6.5 acres Depth: 11 ft Volume: 54.6 AF *Gates* 36" sluice gate	Automated
8th Street Basin North Cell	*Basin* Area: 8.3 acres Depth: 7 ft Volume: 52.6 AF *Gates* 54" sluice gate	Manual
8th Street Basin South Cell	*Basin* Area: 6.3 acres Depth: 8 ft Volume: 38.0 AF *Gates* 48" sluice gate	Automated
8th Street Basin Recycled Water Turnout	*Flow Control Valve* 12" @ 200–3,000 gpm 12" Flow Meter *Valves* 16" butterfly	Manual
CB 20 MWD Imported Water Turnout	*Flow Control Valve* 24" @ 1,000-9,000 gpm	
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 2 unit RTU: 1 unit PLC: 2 unit I/O Hub: 1 unit	
	Radio: 3 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
7th St. Basin				
Basin	2	NA	2	NA
Gates	2	NA	2	NA
8th St. Basin				
North Cell Basin	2	NA	2	NA
North Cell Gates	4	NA	3	NA
South Cell Basin	2	NA	2	NA
South Cell Gates	2	NA	2	NA
Recycled Water Turnout Flow Control Valve	4	NA	4	NA
Recycled Water Turnout Valves	3	NA	3	NA
CB 20 MWD Imported Water Turnout Flow Control Valve	3	NA	4	NA
Electrical & Instrumentation	4	NA	4	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

8th St. Basin North Cell Gates
The two gates were not installed with stainless steel hardware, so the hardware is failing prematurely and needs to be replaced. The bolts are imbedded in concrete. Maintenance will address this issue and a potential project is not needed at this time.

8th Street Basin Recycled Water Turnout
The 8th St. Basin Recycled Water Turnout discharges into an unlined portion of the West Cucamonga Creek causing erosion of the embankments, unwanted vegetation growth, and has provided a location for a homeless encampment. The discharge piping should be extended further into the 8th Street Basin North Cell to prevent these issues. A potential project will address these issues.

Electrical & Instrumentation
The level transmitters for the 8th St. Basin North Cell, 8th St. Basin South Cell, and 7th St. Basin do not extend to the bottom of the basin floor; and therefore, do not provide an accurate measurement of the level. The wiring and conduit should be extended to allow for relocation of the pressure transmitter to the bottom of the basin floor. A potential project will address these issues.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
7th St. Basin	2004	
8th St. Basin North Cell	2004	
8th St. Basin South Cell	2004	
8th St. Basin Recycled Water Turnout	2007	
CB 20 MWD Imported Water Turnout	2009	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.
8th St. Basin RW Water Turnout	8th St. Basin RW Turnout Discharge Retrofit	Retrofit the unlined portion of the West Cucamonga Creek at the discharge point of the RW Turnout (causing erosion).

Asset Management System Summary – GWR

Banana Basin (MZ-4)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Banana Basin

Banana Basin
Banana Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in unincorporated San Bernardino County in Management Zone 3, near the intersection of Whittram Avenue and Banana Avenue. Banana Basin receives storm water from the West Fontana Channel, storm water from a local storm drain system, and recycled water from the Force Main Manifold (FMM) Recycled Water Turnout. Banana Basin has an approximate size of 7.4 acres and an approximate sidewall depth of 7 feet from a floor elevation of 1136' to the West Fontana Channel overflow structure at an elevation of 1143' equating to 42.4 AF of storage. The Banana Basin includes a 36" automated sluice gate for discharge to the West Fontana Channel, which feeds Hickory Basin, and a level transmitter.

Force Main Manifold (FMM) Recycled Water Turnout
The FMM Recycled Water Turnout is located south of the intersection of Whittram Avenue and Mulberry Ave, approximately 0.5 miles west of Banana Basin. The turnout includes two 12" motor operated butterfly valves, flow meter, and pressure transmitter to provided recycled water to Hickory Basin and to Banana Basin. The turnout is designed for flow rates ranging from 200 gpm to 6,000 gpm.

Electrical System
- *Basin* – The electrical energy to power Banana Basin is obtained from the local electrical grid (SCE) through a meter on Whittram Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Recycled Water Turnout* – The electrical energy to power the FMM Recycled Water Turnout is obtained from the local electrical grid (SCE) through a meter on Whittram Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
- *Basin* – Local control wiring for valve position and basin level are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.
- *Recycled Water Turnout* – Local control wiring for flow and valve position for the both Hickory and Banana Basins are fed back to the remote telemetry unit. The turnout has a 10dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Banana Basin	*Basin* Area: 7.4 acres Depth: 7 ft Volume: 42.4 AF *Gates* 36" sluice gate	Automated
FMM Recycled Water Turnout	*Flow Control Valve* 12" @ 200–6,000 gpm 12" Flow Meter *Valves* 10" gate 10" backflow preventer	2 Valves 2 - Manual
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 1 unit RTU: 1 unit PLC: 1 unit I/O Hub: 1 unit Radio: 2 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Banana Basin				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
FMM Recycled Water Turnout				
Flow Control Valve	3	NA	3	NA
Valves	4	NA	4	NA
Electrical & Instrumentation	4	NA	4	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Instrumentation
The level transmitter for Banana Basin does not extend to the bottom of the basin floor; and therefore, does not provide an accurate measurement of the level. The wiring and conduit should be extended to allow for relocation of the pressure transmitter to the bottom of the basin floor. A potential project will address these issues.

During high wind events, the radio tower sways in the wind and causes a loss of communication to RP-4. Improvement to the radio should be investigated as part of the GWR Communication System Upgrades Project – EN12019.

FMM Recycled Water Turnout Manual Isolation Valves
The manual isolation valves at the FMM Recycled Water Turnout do not seat when closed; and therefore, prevent isolation of the system. These valves will be replaced under the reoccurring GWR Asset Management project. Valves have been received and waiting on installation.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Banana Basin	2004	
FMM Recycled Water Turnout	2006	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR

Brooks Basin (MZ-1)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Brooks Basin

Brooks Basin

Brooks Basin is owned by the Chino Basin Water Conservation District (CBWCD) and is located in the City of Montclair in Management Zone 1, near the intersection of Ramona Ave and Brooks Street. Brooks Basin receives storm water and imported water from the San Antonio Channel, storm water from a local storm drain system, and recycled water from the Orchard Recycled Water Turnout. Brooks Basin has an approximate size of 9.9 acres and an approximate sidewall depth of 33 feet from a floor elevation of 860' to a State Street Storm Drain inlet pipe invert elevation of 893' equating to 192.0 AF of storage. Banana Basin includes a 48" automated sluice gate for inlet flow from the San Antonio Channel, a 42" automated sluice gate for flow inlet from the State Street storm drain, and multiple level transmitters.

Orchard Recycled Water Turnout

The Orchard Recycled Water Turnout is located at the intersection of the San Antonio Channel and Orchard Street approximately 0.5 miles north of Brooks Basin. The turnout includes a 16" Cla-Val flow control valve, flow meter, and pressure transmitter to provided recycled water to San Antonio Channel. Recycled Water discharged in the channel can then be conveyed to Brooks Basin for groundwater recharge. The turnout is designed for flow rates ranging from 1,000 gpm to 10,000 gpm.

Electrical System

- *Basin* – The electrical energy to power Brooks Basin is obtained from the local electrical grid (SCE) through a meter on Silicon Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Recycled Water Turnout* – The electrical energy to power the Orchard Recycled Water Turnout is obtained from the local electrical grid (SCE) through a meter on Orchard Street. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System

- *Basin* – Local control wiring for valve position and basin levels are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.
- *Recycled Water Turnout* – Local control wiring for flow and valve position, and pressure are fed back to a local control panel and PLC. The data is transmitted by phone line to the GWR workstation server at RP-1 for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Brooks Basin	*Basin* Area: 9.9 acres Depth: 33 ft Volume: 192.0 AF *Gates* 48" sluice gate 42" sluice gate	 Automated Automated
Orchard Recycled Water Turnout	*Flow Control Valve* 16" @ 1,000–10,000 16" Flow Meter	gpm
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 2 unit RTU: N/A PLC: 2 unit I/O Hub: 2 unit Radio: 1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Brooks Basin				
Basin	3	NA	3	NA
Gates	2	NA	2	NA
Orchard Recycled Water Turnout				
Flow Control Valve	4	NA	4	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Brooks Basin

The eastern access road to the basin floor was never completed when the basin was filled in to allow for the construction of commercial property on the eastern side of the basin. Currently, access to the eastern side of Brooks Basin cannot be obtained from the western access road. The eastern access road should be extended to the basin floor. A maintenance project will address this issue. No projected needed at this time.

Orchard Recycled Water Turnout

The discharge pipe of the Orchard Recycled Water Turnout does not penetrate completely through the sidewall of the San Antonio Channel and has begun leaking between the soil and sidewall of the channel causing possible erosion. The penetration should be appropriately sealed to prevent the leak behind the sidewall of the channel. In addition, the pipe discharges at the top of the sidewall of the San Antonio Channel allowing for water to cascade to the bottom of the channel creating a load noise issue. The discharge into the channel should be redesign to eliminate the noise issue. A potential project is needed to address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Brooks Basin	2004	
Orchard Recycled Water Turnout	2007	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Basin	GWR Security Improvements	GWR sites are frequently vandalized and equipment is stolen from the site. Jurupa, San Sevaine, Brooks, and Turner basins should be evaluated for security improvements.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.
Orchard Recycled Water Turnout	Orchard Recycled Water Turnout Improvements	Retrofit the discharge of the turnout into the channel to eliminate the noise and leak. The penetration should be made completely through the sidewall of the San Antonio Channel.

Asset Management System Summary – GWR

College Heights Basin (MZ-1)

1. Asset Profile

PROCESS FLOW SCHEMATIC
College Heights Basin

College Heights Basin
College Heights Basin is owned by the Chino Basin Water Conservation District (CBWCD) and is located the City of Upland in Management Zone 1, near the intersection of Monte Vista Avenue and Arrow Route. College Height Basin is comprised of two cells: the West Cell and the East Cell.

- *College Heights Basin West Cell* – College Heights Basin West Cell receives storm water and imported water from the San Antonio Channel. The West Cell has an approximate size of 6.0 acres and an approximate sidewall depth of 21 feet from a floor elevation of 1223' to the San Antonio Rubber Dam inflated elevation 1244' equating to 93.8 AF of storage. The College Heights Basin West Cell includes a 48" automated sluice gate for inlet flow from the San Antonio Channel and a level transmitter.
- *College Heights Basin East Cell* – College Heights Basin East Cell receives storm water and imported water from the San Antonio Channel. The East Cell has an approximate size of 7.0 acres and an approximate sidewall depth of 21 feet from a floor elevation of 1223' to the San Antonio Rubber Dam inflated elevation 1244' equating to 89.8 AF of storage. The College Heights Basin East Cell includes a 48" automated sluice gate for inlet flow from the San Antonio Channel and a level transmitter.

San Antonio Channel Rubber Dam
A 4' tall rubber dam has been installed into the San Antonio Channel to increase the water surface elevation in the College Heights Basin from 1240' to 1244'. The San Antonio Channel Rubber Dam also includes a control house including a stilling well, 2.5 hp/154scfm air blower, and a 2" motor controlled vent valve.

Electrical System
The College Heights Basin, Upland Basin, and the San Antonio Channel Rubber Dam share a common electrical system housed in the San Antonio Channel Rubber Dam control house. The electrical energy to power College Heights Basin, Upland Basin, and the San Antonio Channel Rubber Dam is obtained from the local electrical grid (SCE) through a meter on Arrow Route. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
The College Heights Basin, Upland Basin, and the San Antonio Channel Rubber Dam share a common instrumentation and control system housed in the San Antonio Channel Rubber Dam control house. Local control wiring for gate positions, basin levels, flows, rubber dam pressures, stilling well levels, and vent valve position are fed back to a local PLC. The PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
College Heights Basin West Cell	*Basin* Area: 6.0 acres Depth: 21 ft Volume: 93.8 AF *Gates* 48" sluice gate	Automated
College Heights Basin East Cell	*Basin* Area: 7.0 acres Depth: 21 ft Volume: 89.8 AF *Gates* 48" sluice gate	Automated
San Antonio Channel Rubber Dam	*Rubber Dam* 4 ft tall rubber dam *Blower* 2.5 hp 154 scfm *Vent Valve* 2" ball valve	
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 1 unit RTU: N/A PLC: 1 unit I/O Hub: 2 units Radio: 1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
College Heights Basin West Cell				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
College Heights Basin East Cell				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
San Antonio Channel Rubber Dam				
Rubber Dam	3	NA	3	NA
Blower	3	NA	3	NA
Vent Valve	3	NA	3	NA
Electrical & Instrumentation	4	NA	4	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

San Antonio Channel Rubber Dam
The rubber dams were inspected in January 2015 and were determined to have a remaining lifespan of 5 years remaining. A potential project is needed within the next 5 years to replace the rubber dams.

Instrumentation
The level transmitters for College Heights Basin West Cell and East Cell do not extend to the bottom of the basin floor; and therefore, do not provide an accurate measurement of the level. The wiring and conduit should be extended to allow for relocation of the pressure transmitter to the bottom of the basin floor.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
College Heights Basin West Cell	2004	
College Heights Basin East Cell	2004	
San Antonio Channel Rubber Dam	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Rubber Dam	GWR Rubber Dam Replacement Project	Replace the GWR rubber dams by 2020. Locations include: San Sevaine Channel, Day Creek, Declez Channel, Cucamonga Creek, and San Antonio Channel
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR

Declez Basin (MZ-3)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Declez Basin

Declez Basin
Declez Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in an unincorporated area of Riverside County in Management Zone 3, near the intersection of Philadelphia Avenue and Mulberry Avenue Declez Basin is comprised of three cells: Cell 1, Cell 2, and Cell 3

- *Declez Basin Cell 1* – Declez Basin Cell 1 receives storm water from the Declez Channel and storm water from a local storm drain system. Cell 1 has an approximate size of 6.7 acres and an approximate sidewall depth of 7 feet from a floor elevation of 825' to the Declez Basin Cell 2 overflow structure at an elevation 832' equating to 42.7 AF of storage. Declez Basin Cell 1 includes a 36" automated sluice gate to discharge flow to Declez Basin Cell 2 and a level transmitter.
- *Declez Basin Cell 2* – Declez Basin Cell 2 receives flow from Declez Basin Cell 1. Cell 2 has an approximate size of 4.6 acres and an approximate sidewall depth of 7 feet from a floor elevation of 823' to the Declez Basin Cell 3 overflow structure at an elevation 830' equating to 29.1 AF of storage. Declez Basin Cell 2 includes a dual 36" automated sluice gate system (one motor actuator, two gates, and two pipelines) to discharge flow to Declez Basin Cell 3 and a level transmitter.
- *Declez Basin Cell 3* – Declez Basin Cell 3 receives flow from Declez Basin Cell 2. Cell 3 has an approximate size of 4.2 acres and an approximate sidewall depth of 8 feet from a floor elevation of 821' to the Declez Channel overflow structure at an elevation 829' equating to 30.0 AF of storage. Declez Basin Cell 3 includes a dual 36" automated sluice gate system (one motor actuator, two gates, and two pipelines) to discharge flow to Declez Channel and a level transmitter.

Electrical System
The electrical energy to power Declez Basin is obtained from the local electrical grid (SCE) through a meter on Philadelphia Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
Local control wiring for valve position and basin levels are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Declez Basin Cell 1	*Basin* Area: 6.7 acres Depth: 7 ft Volume: 42.7 AF *Gates* 36" sluice gate	Automated
Declez Basin Cell 2	*Basin* Area: 4.6 acres Depth: 7 ft Volume: 29.1 AF *Gates* 2 - 36" sluice gates	Automated
Declez Basin Cell 3	*Basin* Area: 4.2 acres Depth: 8 ft Volume: 30.0 AF *Gates* 2 - 36" sluice gates	Automated
Electrical Instrumentation	Utility Voltage: 240 v Transformers: 1 HMI: 1 unit RTU: N/A PLC: 1 unit I/O Hub: 1 unit Radio: 1 unit	240v/120v

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Declez Basin Cell 1				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
Declez Basin Cell 2				
Basin	3	NA	3	NA
Gates	3	NA	4	NA
Declez Basin Cell 3				
Basin	3	NA	3	NA
Gates	3	NA	4	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Declez Basin Cell 2 & 3 Gates
The Declez Basin Cell 2 & 3 discharge gates have control feedback and electrical issues that result in them not functioning. The gates only have power when the PLC calls the gate to operate. When there is no power, feedback is not sent back to SCADA. Entering a SCADA enhancement request to address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Declez Basin Cell 1	2004	
Declez Basin Cell 2	2004	
Declez Basin Cell 3	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR
Ely Basin (MZ-2)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Ely Basin

Ely Basin
Ely Basin is comprised of three basins: Basin 1, Basin 2, and Basin 3. Ely Basin 1 and Ely Basin 2 are owned by the San Bernardino County Flood Control District (SBCFCD) and Ely Basin 3 is owned by the Chino Basin Water Conservation District (CBWCD). Ely Basin is located in City of Ontario in Management Zone 2, near the intersection of Philadelphia Avenue and Vineyard Avenue

- *Ely Basin 1* – Ely Basin 1 receives storm water from the West Cucamonga Creek and recycled water from the Ely Basin 1 Recycled Water Turnout. Ely Basin 1 has an approximate size of 9.9 acres and an approximate sidewall depth of 12 feet from a floor elevation of 823' to the Ely Basin 2 overflow structure at an elevation 835' equating to 85.2 AF of storage. Ely Basin 1 includes four 24" manual sluice gates to route flows within the basin and a level transmitter.
- *Ely Basin 2* – Ely Basin 2 receives flows from Ely Basin 1, storm water from a local storm drain system, and recycled water from the Ely Basin 2 Recycled Water Turnout. Ely Basin 2 has an approximate size of 11.1 acres and an approximate sidewall depth of 10 feet from a floor elevation of 825' to the Ely Basin 3 overflow structure at an elevation 835' equating to 95.6 AF of storage. Ely Basin 2 includes two 24" manual sluice gates to route flows within the basin and a level transmitter.
- *Ely Basin 3* – Ely Basin 3 receives flows from Ely Basin 2, storm water from a local storm drain system, and recycled water from the Ely Basin 3 Recycled Water Turnout. Ely Basin 3 has an approximate size of 11.1 acres and an approximate sidewall depth of 15 feet from a floor elevation of 820' to the West Cucamonga Creek overflow structure at an elevation 835' equating to 135.8 AF of storage. Ely Basin 3 includes three 24" manual sluice gates to route flows within the basin, a 24" automated gate to discharge flows to the West Cucamonga Creek, and a level transmitter.

Ely Basin Turnouts
This system is comprised of three separate turnouts each including a 12" Cla-Val flow control valve, flow meter, and pressure transmitter to provided recycled water to Ely Basin Nos. 1, 2, & 3. Each turnout is designed for flow rates ranging from 700 gpm to 3,100 gpm.

Electrical System
- *Basin* – The electrical energy to power Ely Basin is obtained from the local electrical grid (SCE) through a meter on Philadelphia Avenue near Ely Basin 3. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Recycled Water Turnout* – The electrical energy to power the three Ely Basin Recycled Water Turnouts is provided by three independent solar panels. The system utilizes 24v DC power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
- *Basin* – Local control wiring for gate position and basin levels are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to RP-1 to the GWR workstation server for control and remote access.
- *Recycled Water Turnout* – Local control wiring for flow and valve position, and pressure are fed back to an I/O hub. Each of the three Ely Basin recycled water turnouts has a 10dB yagi antenna that transmits control data to a PLC located at Ely Basin No. 3. The PLC at Ely Basin No. 3 then transmits control data back to the GWR workstation server located at RP-1 for remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Ely Basin 1	*Basin* Area: 9.9 acres Depth: 12 ft Volume: 85.2 AF *Gates* 4 - 24" sluice gate	Manual
Ely Basin 2	*Basin* Area: 11.1 acres Depth: 10 ft Volume: 95.6 AF *Gates* 2 - 24" sluice gate	Manual
Ely Basin 3	*Basin* Area: 11.1 acres Depth: 15 ft Volume: 135.8 AF *Gates* 3 - 24" sluice gate 1 – 24" sluice gate	Manual Automated
Ely Basin Recycled Water Turnout	*Flow Control Valve* 3 - 12" @ 700–3,100 gpm	
Electrical Instrumentation	Utility Voltage: 120v 24v DC Transformers: N/A HMI: N/A RTU: 1 unit PLC: 1 unit I/O Hub: 4 units Radio: 4 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Ely Basin 1				
Basin	4	NA	3	NA
Gates	4	NA	4	NA
Ely Basin 2				
Basin	3	NA	3	NA
Gates	4	NA	3	NA
Ely Basin 3				
Basin	3	NA	3	NA
Gates	4	NA	3	NA
Ely Basin Recycled Water Turnout				
Flow Control Valve	3	NA	3	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Ely Basin 1
The Ely Basin 1 Fore-bay berm has cracks in the concrete structure, which allows water to leak from the fore-bay area into Ely Basin 1. The cracks in the berm structure should be sealed to eliminate the water leaks between the fore-bay and the basin.

Ely Basin 2
The Ely Basin 2 Bypass channel is too shallow and cannot maintain the required flow. Under high flow conditions, water spills over the berm into Ely Basin 2 causing erosion to the berm. Further evaluation is needed before a project is recommended; these are low priority issues.

Ely Basin Manual Gates
The Ely Basin manual gates are designed to be submerged when the basins are full of water. The gates are constructed of aluminum; and therefore, have begun to degrade. The gates should be replaced and the design of the gate operators should be reviewed to prevent submergence when the basins are full. Hand wheels are broken off and are non-operational. Typically these gates are not needed, so further evaluation is needed to determine if this system needs to be rehabbed or removed. There would be a benefit of having a control structure to transfer flows between basins, rather than overflowing from basin to basin, which requires an upgrade to the transfer pipes.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Ely Basin 1	2004	
Ely Basin 2	2004	
Ely Basin 3	2004	
Ely Basin Recycled Water Turnout	2005	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.
Ely Basin 1	Ely Basin 1 Fore-bay Berm	Rehab the fore-bay berm concrete structure.

Asset Management System Summary – GWR

Etiwanda Debris Basin (MZ-2)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Etiwanda Debris Basin

Etiwanda Debris Basin

The Etiwanda Debris Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in an unincorporated area of San Bernardino County in Management Zone 2, near the intersection of Wilson Avenue and East Avenue. The Etiwanda Debris Basin receives storm water from the San Gabriel Mountains, storm water from a local storm drain system, and imported water from the CB 14 MWD Imported Water Turnout. The Etiwanda Debris Basin has an approximate size of 15.5 acres and an approximate sidewall depth of 6 feet from a floor elevation of 1599' to the conservation berm elevation of 1605' equating to 72.7 AF of storage. The Etiwanda Debris Basin includes a 24" manual sluice gate for discharge to the East Etiwanda Creek.

CB 14 MWD Imported Water Turnout

The CB 14 MWD Imported Water Turnout is located south of the Etiwanda Debris Basin. The turnout includes a 24" Cla-Val flow control valve with an 18" mag-meter to discharge flow to the Etiwanda Debris Basin, another 24" Cla-Val flow control valve to discharge flow to the East Etiwanda Creek, a main manifold 18" mag-meter, and a pressure transmitter. The turnout is designed for flow rates ranging from 1,000 gpm to 18,000 gpm.

Electrical System

The Etiwanda Debris Basin has no electrical service. The electrical energy to power the CB 14 MWD Imported Water Turnout is obtained from the local electrical grid (SCE) through a meter on East Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System

The Etiwanda Debris Basin has no instrumentation or controls. The CB 14 MWD Imported Water Turnout has local control wiring for valve position and flows that are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Etiwanda Debris Basin	*Basin* Area: 15.5 acres Depth: 6 ft Volume: 72.7 AF *Gates* 24" sluice gate	Manual
CB 14 MWD Imported Water Turnout	*Flow Control Valve* 24" @ 500-9,000 gpm	2 valves
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: N/A RTU: 1 unit PLC: 1 unit I/O Hub: N/A Radio: 1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Etiwanda Debris Basin				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
CB 14 MWD Imported Water Turnout				
Flow Control Valve	3	NA	3	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Etiwanda Debris Basin

The Chino Basin Water Conversation District Berm can be heightened to provide increased capacity in the Etiwanda Debris Basin.

CB 14 MWD Imported Water Turnout

CB 14 MWD Imported Water Turnout has a similar design as the CB 20 MWD Imported Water Turnout, which creates high noise when in operation. Residential home construction is occurring around the turnout and it is probable that sound proofing will be required in the future. The facility is in a remote location, so no project needed at this time to address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Etiwanda Debris Basin	2007 2009	
CB 14 MWD Imported Water Turnout	2009	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR

Grove Basin (MZ-2)

1. Asset Profile

Grove Basin
Grove Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in the City of Ontario in Management Zone 2, near the intersection of Riverside Avenue and Grove Avenue. Grove Basin receives storm water from a local storm drain system. Grove Basin has an approximate size of 13.8 acres and an approximate sidewall depth of 25 feet from a floor elevation of 743' to a storm drain exit elevation of 768' equating to 305.5 AF of storage. Grove Basin includes a 42" automated sluice gate for discharge to the storm drain, a 66" automated sluice gate operated by SBFCD, and two level transmitters.

Electrical System
The electrical energy to power Grove Basin is obtained from the local electrical grid (SCE) through a meter on Grove Avenue The system utilizes 480v power and has one 480v to 120v transformer. In addition, Grove Basin has an onsite 50kW, 480v generator.

Instrumentation and Control System
Local control wiring for gate position and basin levels are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Grove Basin	*Basin* Area: 13.8 acres Depth: 25 ft Volume: 305.5 AF *Gates* 42" sluice gate 66" sluice gate	Automated SBFCD
Electrical Instrumentation	Utility Voltage: 480v Transformers: 1 unit Generator: 480v HMI: 1 unit RTU: N/A PLC: 1 unit I/O Hub: 1 unit Radio: 1 unit	480v/120v

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Grove Basin				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
Electrical and Instrumentation	4	NA	4	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Electrical & Instrumentation
Grove Basin is an old station. A generator powers the gates. A potential project is needed to upgrade the station and provide line power to the electrical equipment. The station is not typically operated, so priority is low to address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Grove Basin	2002	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.
Electrical	Grove Basin Electrical Upgrades	Upgrade the station and provide line power to the electrical equipment.

Asset Management System Summary – GWR
Hickory Basin (MZ-2)

1. Asset Profile

Hickory Basin
Hickory Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in an unincorporated area of San Bernardino County in Management Zone 2, immediately northwest of the California Speedway. Hickory Basin is comprised of two cells: the West Cell and the East Cell.

- *Hickory Basin West Cell* – The Hickory Basin West Cell receives storm water, imported water, and recycled water from the San Sevaine Channel and flows from the Hickory Basin East Cell. The Hickory Basin West Cell has an approximate size of 6.8 acres and an approximate sidewall depth of 14 feet from a floor elevation of 1101' to the San Sevaine Channel drain outlet pipe at an elevation of 1115' equating to 43.3 AF of storage. The Hickory Basin West Cell includes two 36" manual sluice gates for discharge to San Sevaine Channel, a 1,800 gpm pump to move flows to Hickory Basin East Cell, and two level transmitters.
- *Hickory Basin East Cell* – The Hickory Basin East Cell receives flows from Banana Basin by way of the West Fontana Channel, pumped flows from the Hickory Basin West Cell, and recycled water from the Force Main Manifold (FMM) Recycled Water Turnout. The Hickory Basin East Cell has an approximate size of 4.2 acres and an approximate sidewall depth of 5 feet from a floor elevation of 1110' to the San Sevaine Channel drain outlet pipe at an elevation of 1115' equating to 18.0 AF of storage. The Hickory Basin East Cell includes a 36" automated sluice gate for discharge to the Hickory Basin West Cell and a level transmitter.

Force Main Manifold (FMM) Recycled Water Turnout
The FMM Recycled Water Turnout is located south of the intersection of Whittram Avenue and Mulberry Ave, approximately 0.5 miles west of Banana Basin. The turnout includes two 12" motor operated butterfly valves, flow meter, and pressure transmitter to provided recycled water to Hickory Basin and to Banana Basin. The turnout is designed for flow rates ranging from 200 gpm to 6,000 gpm.

San Sevaine Channel Recycled Water Turnout
The turnout is located south of Whittram Avenue at the San Sevaine Channel. The turnout includes a 10" Cla-Val flow control valve, flow meter, and pressure transmitter to provided recycled water to San Sevaine Channel. Recycled Water discharged in the channel can then be conveyed to Hickory Basin or to Jurupa Basin for groundwater recharge. The turnout is designed for flow rates ranging from 200 gpm to 2,200 gpm.

CB 18 MWD Imported Water Turnout
The CB 18 MWD Imported Water Turnout is located near the intersection of West Liberty Street and the San Sevaine Channel in the City of Fontana. The turnout includes a 24" vertical sleeve type, motor operated control valve, an 18" mag-meter, and a pressure transmitter to provided imported water to San Sevaine Channel. The turnout is designed for flow rates ranging from 1,500 gpm to 13,500 gpm.

San Sevaine Channel Rubber Dam
Flow released from the CB 18 MWD Imported Water Turnout or the San Sevaine Channel Recycled Water Turnout can be dammed behind an inflatable rubber dam located ¼ mile north of intersection of the San Sevaine and West Fontana Channels and diverted into the Hickory Basin East Cell. If the rubber dam is not inflated, flow continues south down the San Sevaine Channel towards Jurupa Basin. The San Sevaine Channel Rubber Dam also includes a control house including a stilling well, 2.5 hp/154scfm air blower, and a 2" motor controlled vent valve.

Electrical System
- *Basin, San Sevaine Channel Recycled Water Turnout, and Rubber Dam* – Hickory Basin, the San Sevaine Channel Recycled Water Turnout, and the San Sevaine Channel Rubber Dam share a common electrical system housed in the San Sevaine Channel Rubber Dam control house. The electrical energy to power these systems is obtained from the local electrical grid (SCE) through a meter on Whittram Avenue The system utilizes 480v power, has one 480v to 120v transformer, and does not have emergency power generation.
- *FMM Recycled Water Turnout* – The electrical energy to power the FMM Recycled Water Turnout is obtained from the local electrical grid (SCE) through a meter on Whittram Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Imported Water Turnout* – The electrical energy to power the CB 18 MWD Imported Water Turnout is obtained from the local electrical grid (SCE) through a meter on East Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
- *Basin, San Sevaine Channel Recycled Water Turnout, and Rubber Dam* – Hickory Basin, the San Sevaine Channel Recycled Water Turnout, and the San Sevaine Channel Rubber Dam share a common instrumentation system housed in the San Sevaine Channel Rubber Dam control house. Local control wiring for gate positions, basin levels, flows, rubber dam pressures, stilling well levels, and vent valve position are fed back to a local PLC. This PLC has a radio antenna that transmits control data to RP-4 and then to RP-1 to the GWR workstation server for control and remote access.
- *FMM Recycled Water Turnout* – Local control wiring for flow and valve position for the both Hickory and Banana Basins are fed back to the remote telemetry unit. The turnout has a 10dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.
- *Imported Water Turnout* – Local control wiring for flow and valve position are fed back to a local PLC. The turnout PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Hickory Basin West Cell		
Basin	Area: 6.8 acres Depth: 14 ft Volume: 43.3 AF	
Gates	2 - 36" sluice gate	Manual
Pumps	8" @ 1,800 gpm	
Hickory Basin East Cell		
Basin	Area: 4.2 acres Depth: 5 ft Volume: 18.0 AF	
Gates	36" sluice gate	Automated
FMM Recycled Water Turnout		
Flow Control Valve	12" @ 200–6,000 gpm	2 Valves
	12" Flow Meter	
Valves	10" gate	2 – Manual
	10" backflow preventer	
San Sevaine Channel Recycled Water Turnout		
Flow Control Valve	10" @ 200–2,200 gpm	w/ FM
CB 18 MWD Imported Water Turnout		
Flow Control Valve	24" @ 1,500-13,500gpm	
San Sevaine Channel		
Rubber Dam	4 ft tall rubber dam	
Blower	2.5 hp 54 scfm	
Vent Valve	2" ball valve	
Electrical	Utility Voltage: 120v & 480 v	
	Transformers: 1 unit	480v/120v
Instrumentation	MI: 1 unit RTU: 1 unit PLC: 2 unit I/O Hub: 3 units Radio: 3 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Hickory Basin				
West Cell Basin	3	NA	3	NA
West Cell Gates	4	NA	4	NA
West Cell Pump	3	NA	3	NA
East Cell Basin	3	NA	3	NA
East Cell Gates	3	NA	3	NA
FMM Recycled Water Turnout				
Flow Control Valve	3	NA	3	NA
Valves	5	NA	5	NA
San Sevaine Recycled Water Turnout				
Flow Control Valve	3	NA	3	NA
CB 18 MWD Imported Water Turnout				
Flow Control Valve	3	NA	3	NA
San Sevaine Channel Rubber Dam				
Rubber Dam	3	NA	3	NA
Blower	3	NA	3	NA
Vent Valve	3		3	
Electrical & Instrumentation	3		4	

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Hickory Basin West Cell Gates
One of the manual gates is missing a lift stem and cannot be operated. The gate is used to drain back to the San Sevaine Channel; this can only be done when the operating level is below the conservation berm. This issue will be addressed as a maintenance item, and potential project is not needed at this time.

FMM Recycled Water Turnout
The manual isolation valves at the FMM Recycled Water Turnout do not seat when closed; and therefore, prevent isolation of the system. These valves should be replaced under the reoccurring GWR Asset Management project. Valves have been received and waiting on installation.

San Sevaine Channel Rubber Dam
The rubber dams were inspected in January 2015 and were determined to have a remaining lifespan of 5 years remaining. A potential project is needed within the next 5 years to replace the rubber dams.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Hickory Basin West Cell	2004	
Hickory Basin East Cell	2004	
FMM Recycled Water Turnout	2006	
San Sevaine Recycled Water Turnout	2006	
CB 18 MWD Imported Water Turnout	2005	
San Sevaine Channel Rubber Dam	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Rubber Dam	GWR Rubber Dam Replacement Project	Replace the GWR rubber dams by 2020. Locations include: San Sevaine Channel, Day Creek, Declez Channel, Cucamonga Creek, and San Antonio Channel
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR

Jurupa Basin (MZ-3)

1. Asset Profile

Jurupa Basin

Jurupa Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in the City of Fontana in Management Zone 3, at the intersection of Mulberry Avenue and Jurupa Avenue. Jurupa Basin receives storm water, imported water, and recycled water from the San Sevaine Channel and storm water from a local storm drain system. Jurupa Basin is used for flood control purposes; however, it is not used for groundwater recharge. Jurupa Basin has an approximate size of 55.9 acres and an approximate sidewall depth of 42 feet from a floor elevation of 885' to the San Sevaine Channel overflow structure at an elevation of 927' equating to 1,538.7 AF of storage. Jurupa Basin includes a 48" automated sluice gate for the inlet to Jurupa Basin from the San Sevaine Channel, a 72" manual sluice gate for the inlet to the Jurupa Pump Station Wet Well, two 36" manual sluice gates for discharge to San Sevaine Channel, two 300 hp 9,000 gpm VFD driven pumps to send flow to RP-3 Basin, and two level transmitters.

Electrical System

The electrical energy to power these systems is obtained from the local electrical grid (SCE) through a meter on Jurupa Avenue The system utilizes 480v power, has one 480v to 120v transformer, and does not have emergency power generation.

Instrumentation and Control System

Local control wiring for gate positions, basin levels, and flows are fed back to a local PLC. This PLC has a radio antenna that transmits control data to the Almond repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Jurupa Basin	*Basin* Area: 55.9 acres Depth: 42 ft Volume: 1,538.7 AF *Gates* 48" sluice gate 72" sluice gate 2 - 36" sluice gate *Pumps* 2- 300 hp & 3,000 gpm	 Automated Manual Manual VFD
Electrical Instrumentation	Utility Voltage: 480 v Transformers: 1 unit HMI: 1 unit RTU: N/A PLC: 1 unit I/O Hub: 1 unit Radio: 1 unit	480v/120v

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Jurupa Basin				
Basin	3	NA	4	NA
Gates	3	NA	4	NA
Pumps	3	NA	4	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Jurupa Basin

The Jurupa Basin berm is not a permanent structure and overflows during large storm events. This has led to the erosion of the berm. The berm should be improved, an overflow structure constructed, and a flow through gate provided. A project is needed to convert the basin from recycled water to a storm water catch basin. Recycled water will provided directly from the Wineville Ave extension.

Jurupa Basin Gates

The Jurupa Basin inlet structure from San Sevaine Channel does not have capacity to receive large storm flows or imported water flows. The capacity of the structure should be increased to allow more flow into the basin. A potential project is needed to address this issue.

Jurupa Basin Pumps

Storm debris can be pushed toward the inlet of the Jurupa Pump Station and clog the inlet of the pumps. An inlet screening structure should be installed to maintain function of the pump station. A potential project is needed to address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Jurupa Basin	2004 2009	

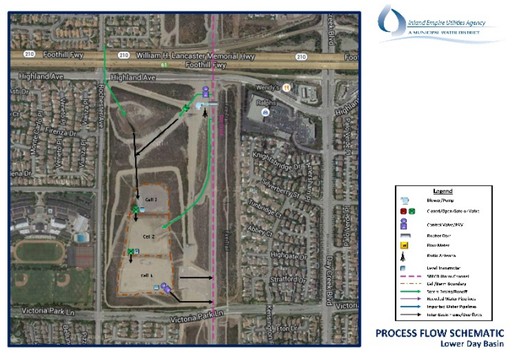
* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Basin	GWR Security Improvements	GWR sites are frequently vandalized and equipment is stolen from the site. Jurupa, San Sevaine, Brooks, and Turner basins should be evaluated for security improvements.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.
Jurupa Basin	Jurupa Basin Retrofit	Convert the basin from recycled water to a storm water catch basin.
Jurupa Basin Gates	Jurupa Basin Influent Structure Improvements	Increase the capacity of the influent structure to bring in large storm and imported water flows.
Jurupa Basin Pumps	Jurupa Basin Pump Station Improvements	Modify the pump station influent to climate debris from clogging suction of the pumps.

Asset Management System Summary – GWR
Lower Day Basin (MZ-2)

1. Asset Profile



PROCESS FLOW SCHEMATIC
Lower Day Basin

Lower Day Basin
Lower Day Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in the City of Rancho Cucamonga in Management Zone 2, at the intersection of Rochester Avenue and Highland Avenue Lower Day Basin is comprised of three cells: Cell 1, Cell2, and Cell 3.

- *Lower Day Basin Cell 1* – Lower Day Basin Cell 1 receives storm water and imported water from Day Creek and storm water from a local storm drain system. Lower Day Basin Cell 1 has an approximate size of 3.7 acres and an approximate sidewall depth of 8 feet from a floor elevation of 1370' to the Lower Day Basin Cell 2 overflow structure at an elevation of 1378' equating to 26.2 AF of storage. Lower Day Basin Cell 1 includes a 36" automated sluice gate with flow meter for the inlet to Lower Day Basin Cell 1 from Day Creek, a 36" manual sluice gate for discharge to Lower Day Basin Cell 2, and a level transmitter.
- *Lower Day Basin Cell 2* – Lower Day Basin Cell 2 receives storm water and imported water from Day Creek and flows from Lower Day Basin Cell 1. Lower Day Basin Cell 2 has an approximate size of 5.1 acres and an approximate sidewall depth of 8 feet from a floor elevation of 1365' to the Lower Day Basin Cell 3 overflow structure at an elevation of 1373' equating to 31.4 AF of storage. Lower Day Basin Cell 2 includes a 36" manual sluice gate for discharge to Lower Day Basin Cell 3 and a level transmitter.
- *Lower Day Basin Cell 3* – Lower Day Basin Cell 3 receives flows from Lower Day Basin Cell 2. Lower Day Basin Cell 3 has an approximate size of 6.3 acres and an approximate sidewall depth of 10 feet from a floor elevation of 1363' to the Day Creek overflow structure at an elevation of 1373' equating to 55.4 AF of storage. Lower Day Basin Cell 3 includes a 72" automated sluice gate for discharge to Day Creek and a level transmitter.

CB 15 MWD Imported Water Turnout
The CB 15 MWD Imported Water Turnout is located near the intersection of Banyan Street and Day Creek in the City of Rancho Cucamonga. The turnout includes a 20" horizontal sleeve type, motor operated control valve, a 20" mag-meter, and a pressure transmitter to provided imported water to Day Creek. The turnout is designed for flow rates ranging from 1,500 gpm to 13,500 gpm.

Day Creek Rubber Dam
Flow released from the CB 15 MWD Imported Water Turnout can be dammed behind an inflatable rubber dam located Lower Day Basin. The Day Creek Rubber Dam also includes a control house including a stilling well, 2.5 hp/154scfm air blower, and a 2" motor controlled vent valve.

Electrical System
- *Basin and Rubber Dam* – Lower Day Basin and the Day Creek Rubber Dam share a common electrical system housed in the Day Creek Rubber Dam control house. The electrical energy to power these systems is obtained from the local electrical grid (SCE) through a meter on Whittram Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Imported Water Turnout* – The electrical energy to power the CB 15 MWD Imported Water Turnout is obtained from the local electrical grid (SCE) through a meter on East Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
- *Basin and Rubber Dam* – – Lower Day Basin and the Day Creek Rubber Dam share a common instrumentation system housed in the Day Creek Rubber Dam control house. Local control wiring for gate positions, basin levels, flows, rubber dam pressures, stilling well levels, and vent valve position are fed back to a local PLC. This PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.
- *Imported Water Turnout* – Local control wiring for flow and valve position are fed back to a local PLC. The turnout PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Lower Day Basin Cell 1	*Basin* Area: 3.7 acres Depth: 8 ft Volume: 26.2 AF *Gates* 36" sluice gate 36" sluice gate	 Automated Manual
Lower Day Basin Cell 2	*Basin* Area: 5.1 acres Depth: 8 ft Volume: 31.4 AF *Gates* 36" sluice gate	 Manual
Lower Day Basin Cell 3	*Basin* Area: 6.3 acres Depth: 10 ft Volume: 55.4 AF *Gates* 72" sluice gate	 Automated
CB 15 MWD Imported Water Turnout	*Flow Control Valve* 20" @ 1,500-13,500 20" mag-meter	 gpm
Day Creek Rubber Dam	*Rubber Dam* 4 ft tall rubber dam *Blower* 2.5 hp 154 scfm *Vent Valve* 2" ball valve	
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 1 unit RTU: 1 unit PLC: 2 unit I/O Hub: 2 units Radio: 2 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Lower Day Basin Cell 1				
Basin	3	NA	3	NA
Gates	3	NA	4	NA
Lower Day Basin Cell 2				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
Lower Day Basin Cell 3				
Basin	3	NA	3	NA
Gates	4	NA	4	NA
CB 15 MWD Imported Water Turnout				
Flow Control Valve	3	NA	3	NA
Day Creek Rubber Dam				
Rubber Dam	3	NA	3	NA
Blower	3	NA	3	NA
Vent Valve	3	NA	3	NA
Electrical and Instrumentation	4	NA	4	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Lower Day Basin Gate
The Lower Day Basin inlet gate from Day Creek cannot open to 100 % due to an incorrectly positioned stem coupling. The stem coupling cannot move through the opening in the gate structure vault; and therefore, the gate can only be opened to a maximum of 75%. The stem should be replaced to allow for full motion of the gate. The gate should be repaired under the reoccurring GWR Asset Management project. Further investigation is needed prior to recommending a project to address this issue.

Day Creek Rubber Dam
The rubber dams were inspected in January 2015 and were determined to have a remaining lifespan of 5 years remaining. A potential project is needed within the next 5 years to replace the rubber dams.

Electrical & Instrumentation
Wires stolen from Lower Basin Cell 3. The gate is not operational, lost control and level transmitter feedback. A potential project is needed to address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Lower Day Basin Cell 1	2004	
Lower Day Basin Cell 2	2004	
Lower Day Basin Cell 3	2004	
CB 15 MWD Imported Water Turnout	2004	
Day Creek Rubber Dam	2004	
Electrical and Instrumentation	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Rubber Dam	GWR Rubber Dam Replacement Project	Replace the GWR rubber dams by 2020. Locations include: San Sevaine Channel, Day Creek, Declez Channel, Cucamonga Creek, and San Antonio Channel
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.
Electrical & Instrumentation	Repair Lower Day Basin Electrical & Instrumentation	Repair the damage caused by the stolen electrical and instrumentation from Lower Day Basin Cell 3.

Asset Management System Summary – GWR

Montclair Basin (MZ-1)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Montclair Basin

Montclair Basins

Montclair Basins are owned by the Chino Basin Water Conservation District (CBWCD) and are located in City of Montclair in Management Zone 1, near the intersection of Philadelphia Avenue and Vineyard Avenue. Montclair Basins are comprised of four basins: Basin 1, Basin 2, Basin 3, and Basin 4.

- *Montclair Basin 1* – Montclair Basin 1 is located at the intersection of Arrow Hwy. and the San Antonio Channel. Montclair Basin 1 receives storm water and imported water from the San Antonio Channel and storm water from a local storm drain system. Montclair Basin 1 has an approximate size of 8.3 acres and an approximate sidewall depth of 30 feet from a floor elevation of 1099' to the Montclair Basin 2 overflow structure at an elevation 1129' equating to 150.0 AF of storage. Montclair Basin 1 includes a 36" automated sluice gate with Parshall flume flow meter from the San Antonio Channel, a 24" manual sluice gate to discharge flows to Montclair Basin 2 and a level transmitter.
- *Montclair Basin 2* – Montclair Basin 2 is located at the intersection of Moreno Street and the San Antonio Channel. Montclair Basin 2 receives flow from Montclair Basin 1 and storm water from a local storm drain system. Montclair Basin 2 has an approximate size of 12.6 acres and an approximate sidewall depth of 36 feet from a floor elevation of 1065' to the San Antonio Channel overflow structure at an elevation 1101' equating to 295.4 AF of storage. Montclair Basin 2 includes two 24" manual sluice gates to discharge flows to Montclair Basin 3 and a level transmitter.
- *Montclair Basin 3* – Montclair Basin 3 is located at the intersection of San Jose Street and the San Antonio Channel. Montclair Basin 3 receives flow from Montclair Basin 2. Montclair Basin 3 has an approximate size of 4.6 acres and an approximate sidewall depth of 23 feet from a floor elevation of 1034' to the Montclair Basin 4 overflow structure at an elevation 1057' equating to 63.8 AF of storage. Montclair Basin 3 includes a level transmitter.
- *Montclair Basin 4* – Montclair Basin 4 is located at the intersection of the 10 Freeway and the San Antonio Channel. Montclair Basin 4 receives flow from Montclair Basin 3 and storm water from a local storm drain system. Montclair Basin 4 has an approximate size of 6.2 acres and an approximate sidewall depth of 27 feet from a floor elevation of 1010' to the San Antonio Channel overflow structure at an elevation 1037' equating to 111.0 AF of storage. Montclair Basin 4 includes a level transmitter.

Electrical System

The electrical energy to power Montclair Basins is obtained from the local electrical grid (SCE) through a meter on San Jose Street near Montclair Basin 2. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System

Local control wiring for gate position, flows, and basin levels are fed back to a local PLC. The basin PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Montclair Basin 1	*Basin* Area: 8.3 acres Depth: 30 ft Volume: 150.0 AF *Gates* 36" sluice gate 24" sluice gate	 Motorized Manual
Montclair Basin 2	*Basin* Area: 12.6 acres Depth: 36 ft Volume: 295.4 AF *Gates* 2 - 24" sluice gate	 Abandoned
Montclair Basin 3	*Basin* Area: 4.6 acres Depth: 23 ft Volume: 63.8 AF	
Montclair Basin 4	*Basin* Area: 6.2 acres Depth: 27 ft Volume: 111.0 AF	
Electrical Instrumentation	Utility Voltage: 120v Transformers: N/A HMI: N/A RTU: N/A PLC: 1 unit I/O Hub: 1 unit Radio: 1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Montclair Basin 1				
Basin	3	NA	3	NA
Gates	5	NA	5	NA
Montclair Basin 2				
Basin	3	NA	3	NA
Gates	5	NA	5	NA
Montclair Basin 3				
Basin	3	NA	3	NA
Montclair Basin 4				
Basin	3	NA	3	NA
Electrical and Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Montclair Basin 1

The Montclair Basin 1 motor operated gate is over 30 years old and is not connected to SCADA. The gate should be replaced and connected to SCADA. Replacement of the gate is the responsibility of Chino Basin Conversation District.

Montclair Basin 2

The Montclair Basin 2 discharge gates are not operational and stuck in the open position. This gate will be abandoned. In addition, electrical conduit has been run through the Basin 2 discharge piping. A potential project is needed, but the priority is low.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Montclair Basin 1	2004	
Montclair Basin 2	2004	
Montclair Basin 3	2004	
Montclair Basin 4	2004	
Electrical and Instrumentation	2004	

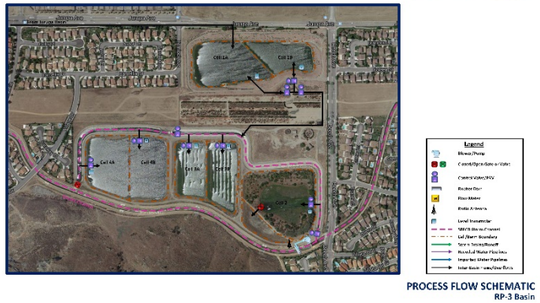
* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.
Montclair Basin 1	Montclair Basin 1 Gate Rehab	Rehab the basin 1 gate that has reached the end of its useful life. In addition, tie the system into SCADA.
Montclair Basin 2	Montclair Basin 2 Gate Rehab	Rehab the basin 2 gates which are currently not operational. In addition, address the conduit that is routed through the basin's discharge.

Asset Management System Summary – GWR
RP-3 Basin (MZ-3)

1. Asset Profile



PROCESS FLOW SCHEMATIC
RP-3 Basin

RP-3 Basin
RP-3 Basin is owned by Inland Empire Utilities Agency (IEUA) and is located in the City of Fontana in Management Zone 3, near the intersection of Jurupa Avenue and Beech Avenue RP-3 Basin is comprised of four cells: Cell1, Cell2, Cell 3, and Cell 4.

- *RP-3 Basin Cell 1* – RP-3 Basin Cell 1 receives flows from the Jurupa Basin. RP-3 Basin Cell 1 has an approximate size of 9.0 acres and an approximate sidewall depth of 5 feet from a floor elevation of 947' to the Declez Channel Rubber Dam at an inflated elevation of 952' equating to 37.7 AF of storage. RP-3 Basin Cell 1 includes a 36" automated sluice gate, two 30" automated sluice gates, and two level transmitters.
- *RP-3 Basin Cell 2* – RP-3 Basin Cell 2 receives storm water from the Declez Channel and flows from RP-3 Basin 1. RP-3 Basin Cell 2 has an approximate size of 8.4 acres and an approximate sidewall depth of 8 feet from a floor elevation of 944' to the Declez Channel Rubber Dam at an inflated elevation of 952' equating to 44.3 AF of storage. RP-3 Basin Cell 2 includes a 30" automated sluice gate, a 24" manual sluice gate to the after bay, and a level transmitter.
- *RP-3 Basin Cell 3* – RP-3 Basin Cell 3 receives storm water from the Declez Channel and flows from RP-3 Basin 1. RP-3 Basin Cell 3 has an approximate size of 7.6 acres and an approximate sidewall depth of 12 feet from a floor elevation of 940' to the Declez Channel Rubber Dam at an inflated elevation of 952' equating to 76.4 AF of storage. RP-3 Basin Cell 3 includes two 30" automated sluice gates and two level transmitters.
- *RP-3 Basin Cell 4* – RP-3 Basin Cell 4 receives storm water from the Declez Channel and flows from RP-3 Basin 1. RP-3 Basin Cell 4 has an approximate size of 8.9 acres and an approximate sidewall depth of 14 feet from a floor elevation of 938' to the Declez Channel Rubber Dam at an inflated elevation of 952' equating to 91.7 AF of storage. RP-3 Basin Cell 4 includes two 30" automated sluice gates and two level transmitters.

Declez Channel Rubber Dam
A 4' tall rubber dam has been installed into Declez Channel to increase the water surface elevation in the RP-3 Basin. The Declez Channel Rubber Dam also includes a control house including a stilling well, 2.5 hp/154scfm air blower, and a 2" motor controlled vent valve. The Declez Channel Rubber Dam diverts flow into the RP-3 Channel, which distributes storm water to the RP-3 Basins. The RP-3 Channel includes three 30" automated inlet sluice gates with Parshall flume flow meter and an 18" automated sluice gate with Parshall flume flow meter.

Electrical System
The electrical energy to power these systems is obtained from the local electrical grid (SCE) through a meter on Beech Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
Local control wiring for gate positions, basin levels, flows, rubber dam pressures, stilling well levels, and vent valve position are fed back to a local PLC. This PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-3 Basin Cell 1	Basin Area: 9.0 acres Depth: 5 ft Volume: 37.7 AF Gates 36" sluice gate 2 - 30" sluice gate	 Automated Automated
RP-3 Basin Cell 2	Basin Area: 8.4 acres Depth: 8 ft Volume: 44.3 AF Gates 30" sluice gate 24" sluice gate	 Motorized Manual
RP-3 Basin Cell 3	Basin Area: 7.6 acres Depth: 12 ft Volume: 76.4 AF Gates 2 - 30" sluice gates	 Motorized
RP-3 Basin Cell 4	Basin Area: 8.9 acres Depth: 14 ft Volume: 91.7 AF Gates 2 - 30" sluice gates	 Motorized
Declez Channel Rubber Dam	Rubber Dam 4 ft tall rubber dam Blower 2.5 hp 154 scfm Vent Valve 2" ball valve RP-3 Channel Gates 3 – 30" sluice gates 24" sluice gate 18" sluice gate 2-flume flow meters	 Automated Motorized Manual Abandoned
Electrical Instrumentation	Utility Voltage: 120v Transformers: N/A HMI: 1 unit RTU: N/A PLC: 1 unit I/O Hub: 1 unit Radio: 1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-3 Basin Cell 1				
Basin	3	NA	3	NA
Gates	3	NA	4	NA
RP-3 Basin Cell 2				
Basin	3	NA	3	NA
Gates	3	NA	4	NA
RP-3 Basin Cell 3				
Basin	3	NA	3	NA
Gates	3	NA	4	NA
RP-3 Basin Cell 4				
Basin	3	NA	3	NA
Gates	3	NA	4	NA
Declez Channel Rubber Dam				
Rubber Dam	3	NA	3	NA
Blower	3	NA	3	NA
Vent Valve	3	NA	3	NA
RP-3 Channel Gates	3	NA	3	NA
Electrical and Instrumentation	3	NA	4	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

RP-3 Basin Inlet Gates
The inlet gates for Cell 2, Cell 3, and Cell 4 are all motorized but do not have any SCADA connection. These gates should be connected to allow for remote control of the recharge basin. Cell 1 to the distribution channel and the inlet from Declez are the only gates that are motorized in the system. A project is addressing this issue.

Declez Channel Rubber Dam
The rubber dams were inspected in January 2015 and were determined to have a remaining lifespan of 5 years remaining. A potential project is needed within the next 5 years to replace the rubber dams.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-3 Basin Cell 1	2004	
RP-3 Basin Cell 2	2004	
RP-3 Basin Cell 3	2004	
RP-3 Basin Cell 4	2004	
Declez Channel Rubber Dam	2004	
Electrical and Instrumentation	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Rubber Dam	GWR Rubber Dam Replacement Project	Replace the GWR rubber dams by 2020. Locations include: San Sevaine Channel, Day Creek, Declez Channel, Cucamonga Creek, and San Antonio Channel
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR
San Sevaine Basin (MZ-2)

1. Asset Profile

PROCESS FLOW SCHEMATIC
San Sevaine Basin

San Sevaine Basin
San Sevaine Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in the City of Rancho Cucamonga in Management Zone 2, near the intersection of Wilson Avenue and Cherry Avenue San Sevaine Basin is comprised of five cells: Cell 1, Cell 2, Cell 3, Cell 4, and Cell 5.

- *San Sevaine Basin Cell 1* – San Sevaine Basin Cell 1 receives storm water and imported water from the San Sevaine flood plain and storm water from a local storm drain system. San Sevaine Basin Cell 1 has an approximate size of 15.9 acres and an approximate sidewall depth of 9 feet from a floor elevation of 1484' to the San Sevaine Basin Cell 2 overflow structure at an elevation of 1493' equating to 76.7 AF of storage. San Sevaine Basin Cell 1 includes a level transmitter.
- *San Sevaine Basin Cell 2* – San Sevaine Basin Cell 2 receives flow from San Sevaine Basin Cell 1. San Sevaine Basin Cell 2 has an approximate size of 11.8 acres and an approximate sidewall depth of 9 feet from a floor elevation of 1467' to the San Sevaine Basin Cell 3 overflow structure at an elevation of 1476' equating to 58.5 AF of storage. San Sevaine Basin Cell 2 includes a level transmitter.
- *San Sevaine Basin Cell 3* – San Sevaine Basin Cell 3 receives flow from San Sevaine Basin Cell 2 and storm water from a local storm drain system. San Sevaine Basin Cell 3 has an approximate size of 9.9 acres and an approximate sidewall depth of 8 feet from a floor elevation of 1453' to the San Sevaine Basin Cell 4 overflow structure at an elevation of 1461' equating to 34.5 AF of storage. San Sevaine Basin Cell 3 includes a level transmitter.
- *San Sevaine Basin Cell 4* – San Sevaine Basin Cell 4 receives flow from San Sevaine Basin Cell 3and is a flow through basin.
- *San Sevaine Basin Cell 5* – San Sevaine Basin Cell 5 receives storm water, imported water, and recycled water from the East Etiwanda Creek, flows from San Sevaine Basin Cell 4, and storm water from a local storm drain system. San Sevaine Basin Cell 5 has an approximate size of 73.5 acres and an approximate sidewall depth of 17 feet from a floor elevation of 1382' to the San Sevaine Channel overflow structure at an elevation of 1399' equating to 798.7 AF of storage. San Sevaine Basin Cell 5 includes a 48" sluice gate inlet from the East Etiwanda Creek, 96" manual sluice gates for discharge to the San Sevaine Channel, a 42" manual sluice gate, and a level transmitter.

San Sevaine Basin Recycled Water Turnout
The turnout includes a 12" Cla-Val flow control valve, flow meter, and pressure transmitter to provided recycled water to the groundwater recharge basin. The turnout is designed for flow rates ranging from 400 gpm to 6,700 gpm.

CB 13 MWD Imported Water Turnout
The CB 13 MWD Imported Water Turnout is located north of San Sevaine Basin in the San Sevaine flood plain. The turnout includes a 24" vertical sleeve type, motor operated control valve, a 24" mag-meter, and a pressure transmitter to provided imported water to San Sevaine Channel. The turnout is designed for flow rates ranging from 500 gpm to 9,000 gpm.

Electrical System
- *Basins* – The electrical energy to power the basin is provided by independent solar panels. The system utilizes 24v DC power, does not have any transformers, and does not have emergency power generation.
- *Recycled Water Turnout* – The electrical energy to power the San Sevaine Basin Recycled Water Turnout is obtained from the local electrical grid (SCE) through a meter on Cherry Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Imported Water Turnout* – The turnout is not operated by IEUA.

Instrumentation and Control System
- *Basins* – Local control wiring for basin levels are fed back to a local PLC. This PLC has a radio antenna that transmits control data to RP-4 and then to RP-1 to the GWR workstation server for control and remote access.
- *Recycled Water Turnout* – Local control wiring for flow and valve position are fed back to a remote I/O hub, which radios control data to the San Sevaine Basin No. 3 RTU. The San Sevaine Basin No. 3 RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access. In addition, there is a San Sevaine Basin Turnout Main RTU that radios information back to RP-4.
- *Imported Water Turnout* – No control data is returned to the GWR workstation.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
System Sub System(s)	**Design Capacity (Dry Weather Average)**	**Notes**
San Sevaine Basin Cell 1	Area: 15.9 acres Depth: 9 ft Volume: 76.7 AF	
San Sevaine Basin Cell 2	Area: 11.8 acres Depth: 9 ft Volume: 58.5 AF	
San Sevaine Basin Cell 3	Area: 9.9 acres Depth: 8 ft Volume: 34.5 AF	
San Sevaine Basin Cell 5 Gates	Area: 73.5 acres Depth: 17 ft Volume: 798.7 AF 48" sluice gate 96" sluice gate 42" sluice gate	 Manual Manual Manual
San Sevaine Basin Recycled Water Turnout Flow Control Valve	12" @ 400–6,700 gpm 12" Flow Meter	
Electrical Instrumentation	Utility Voltage: 120v 24v DC Transformers: N/A HMI: 1 unit RTU: 2 unit PLC: 2 unit I/O Hub: 2 unit Radio: 3 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
San Sevaine Basin Cell 1				
Basin	3	NA	3	NA
San Sevaine Basin Cell 2				
Basin	3	NA	3	NA
San Sevaine Basin Cell 3				
Basin	3	NA	3	NA
San Sevaine Basin Cell 4				
Basin	3	NA	3	NA
San Sevaine Basin Cell 5				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
San Sevaine Basin Recycled Water Turnout				
Flow Control Valve	3	NA	3	NA
Electrical & Instrumentation	3	NA	4	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Instrumentation
During high wind events, the radio tower at San Sevaine Basin cell 3 sways in the wind and causes a loss of communication to RP-4. Improvement to the radio should be investigated as part of the GWR Communication System Upgrades Project – EN12019.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
San Sevaine Basin Cell 1	1959 1969	
San Sevaine Basin Cell 2	1969	
San Sevaine Basin Cell 3	1969	
San Sevaine Basin Cell 4	1969	
San Sevaine Basin Cell 5	2003	
San Sevaine Basin Recycled Water Turnout	2011	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Basin	GWR Security Improvements	GWR sites are frequently vandalized and equipment is stolen from the site. Jurupa, San Sevaine, Brooks, and Turner basins should be evaluated for security improvements.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR
Turner Basin 1 & 2 (MZ-2)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Turner Basins 1 & 2

Turner Basins 1 & 2
Tuner Basin is comprised of multiple basins numbered Basins 1-8. The north 350' of Turner Basin 1 is owned by the Chino Basin Water Conservation District, while the remaining portions of Turner Basin 1 and the other basins are owned by the San Bernardino County Flood Control District (SBCFCD). Turner Basin is located in the City of Ontario in Management Zone 2, near the intersection of 4th Street and Archibald Avenue

- *Turner Basin 1* – Turner Basin 1 receives storm water from Cucamonga creek, storm water, imported water, and recycled water from Deer Creek, and recycled water from the Turner Basin 1 Recycled Water Turnout. Turner Basin 1 has an approximate size of 13.9 acres and an approximate sidewall depth of 38 feet from a floor elevation of 965' to the Turner Basin 2 overflow structure at an elevation of 1003' equating to 314.0 AF of storage. Turner Basin 1 includes a 96" automated sluice gates with Parshall flume flow meter for the basin inlet from Cucamonga Creek, a 48" automated sluice gate with flow meter for the basin inlet from Deer Creek, a 42" automated sluice gate for discharge to Turner Basin 2 and a level transmitter.
- *Turner Basin 2* – Turner Basin 2 receives flows from Turner Basin 1. Turner Basin 2 has an approximate size of 4.0 acres and an approximate sidewall depth of 22 feet from a floor elevation of 968' to the Cucamonga Creek overflow structure at an elevation of 990' equating to 51.7 AF of storage. Turner Basin 2 includes a level transmitter.

Tuner Basin 1 Recycled Water Turnout
The Turner Basin 1 Recycled Water Turnout is located on the north side of Turner Basin 1. The turnout includes a 12" flow control valve, a 12" mag-meter, and pressure transmitter to provided recycled water to Turner Basin 1. The turnout is designed for flow rates ranging from 500 gpm to 6,000 gpm.

Cucamonga Creek Rubber Dam
Storm water can be dammed behind an inflatable rubber dam located south of 4th Street in Cucamonga Creek and diverted into Turner Basin 1. The Cucamonga Creek Rubber Dam also includes a control house including a stilling well, 2.5 hp/154scfm air blower, and a 2" motor controlled vent valve.

Electrical System
Turner Basins 1&2, the Turner Basin 1 Recycled Water Turnout, and the Cucamonga Creek Rubber Dam share a common electrical system housed in the Cucamonga Creek Rubber Dam control house. The electrical energy to power these systems is obtained from the local electrical grid (SCE) through a meter on 4th Street. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
Turner Basins 1&2, the Turner Basin 1 Recycled Water Turnout, and the Cucamonga Creek Rubber Dam share a common instrumentation system housed in the Cucamonga Creek Rubber Dam control house. Local control wiring for gate positions, basin levels, flows, rubber dam pressures, stilling well levels, and vent valve position are fed back to a local PLC. This PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Turner Basin 1	*Basin* Area: 13.9 acres Depth: 38 ft Volume: 314.0 AF *Gates* 96" sluice gate 48" sluice gate 42" sluice gate	 Automated Automated Automated
Turner Basin 2	*Basin* Area: 4.0 acres Depth: 22 ft Volume: 51.7 AF	
Turner Basin 1 Recycled Water Turnout	*Flow Control Valve* 10" @ 500–6,000 gpm 12" mag-meter	
Cucamonga Creek Rubber Dam	*Rubber Dam* 4 ft tall rubber dam *Blower* 2.5 hp 154 scfm *Vent Valve* 2" ball valve	
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 1 unit RTU: N/A PLC: 1 unit I/O Hub: 3 units Radio: 1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Turner Basin 1				
Basin	2	NA	2	NA
Gates	3	NA	3	NA
Turner Basin 2				
Basin	3	NA	3	NA
Turner Basin Recycled Water Turnout				
Flow Control Valve	3	NA	3	NA
Cucamonga Creek Rubber Dam				
Rubber Dam	3	NA	3	NA
Blower	3	NA	3	NA
Vent Valve	3	NA	3	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Cucamonga Creek Rubber Dam
The rubber dams were inspected in January 2015 and were determined to have a remaining lifespan of 5 years remaining. A potential project is needed within the next 5 years to replace the rubber dams.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Turner Basins 1	2004	
Turner Basins 2	2004	
Turner Basin 1 Recycled Water Turnout	2014	
Cucamonga Creek Rubber Dam	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Basin	GWR Security Improvements	GWR sites are frequently vandalized and equipment is stolen from the site. Jurupa, San Sevaine, Brooks, and Turner basins should be evaluated for security improvements.
Rubber Dam	GWR Rubber Dam Replacement Project	Replace the GWR rubber dams by 2020. Locations include: San Sevaine Channel, Day Creek, Declez Channel, Cucamonga Creek, and San Antonio Channel
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR
Turner Basin 3 & 4C (MZ-2)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Turner Basins 2 – 4C

Turner Basins 3 – 4C
Tuner Basin is comprised of multiple basins numbered Basins 1-8. The north 350' of Turner Basin 1 is owned by the Chino Basin Water Conservation District, while the remaining portions of Turner Basin 1 and the other basins are owned by the San Bernardino County Flood Control District (SBCFCD). Turner Basin is located in the City of Ontario in Management Zone 2, near the intersection of 4th Street and Archibald Avenue

- *Turner Basin 3* – Turner Basin 3 receives flows from Turner Basin 4. Turner Basin 3 has an approximate size of 3.6 acres and an approximate sidewall depth of 25 feet from a floor elevation of 961' to the Deer Creek overflow structure at an elevation of 986' equating to 50.3 AF of storage. Turner Basin 3 includes a level transmitter.
- *Turner Basin 4* – Turner Basin 4 receives storm water, imported water, and recycled water from Deer Creek and flows from Turner Basins 5-8. Turner Basin 4 has an approximate size of 8.9 acres and an approximate sidewall depth of 28 feet from a floor elevation of 962' to the Turner Basin 3 overflow structure at an elevation of 990' equating to 154.4 AF of storage. Turner Basin 4 includes a 30" automated sluice gate with flow meter for the basin inlet from Deer Creek, a 30" automated sluice gate for discharge to Turner Basin 3, a 30" automated sluice gate for discharge to Turner Basin 4B & 4C, and two level transmitters.
- *Turner Basins 4B&C* – Turner Basins 4B&C receive flows from Turner Basin 4. Turner Basins 4B&C are currently being graded and final size dimensions will be provided at a later date. Turner Basins 4B&C include a 30" automated sluice gate for the basin inlet from Turner Basin 4 and a level transmitter. Turner Basin 4C also has a 24" manual gate for inlet from Turner Basins 5-8.

Deer Creek Recycled Water Turnout
The Deer Creek Recycled Water Turnout is located at the intersection of 4th Street and Turner Avenue. The turnout includes a 10" Cla-Val flow control valve, flow meter, and pressure transmitter to provided recycled water to Deer Creek. Recycled Water discharged in the lined creek can then be conveyed to Turner Basin Nos. 3 & 4 for groundwater recharge. The turnout is designed for flow rates ranging from 300 gpm to 3,500 gpm.

CB 11 MWD Imported Water Turnout
The CB 11 MWD Imported Water Turnout is located near the intersection of Banyan Street and Haven Avenue in the City of Rancho Cucamonga. The turnout includes a 24" vertical sleeve type, motor operated control valve, a 24" Venturi meter, and a pressure transmitter to provided imported water to the Haven Avenue storm drain, which leads to Deer Creek. The turnout is designed for flow rates ranging from 1,500 gpm to 18,000 gpm.

Electrical System
- *Turner Basins 3&4* – The electrical energy to Turner Basins 3&4 is obtained from the local electrical grid (SCE) through a meter on Archibald Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Deer Creek Recycled Water Turnout* – The electrical energy to power the Deer Creek Recycled Water Turnout is obtained from the local electrical grid (SCE) through a meter on Turner Avenue The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.
- *Imported Water Turnout* – The electrical energy to power the CB 11 MWD Imported Water Turnout is obtained from the local electrical grid (SCE) through a meter on Bayan Street. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
- *Turner Basins 3&4* – Local control wiring for flow, valve position, and basin levels for Turner Basins 3&4 are fed back local PLC. The local PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.
- *Deer Creek Recycled Water Turnout* – Local control wiring for flow and valve position are fed back to a local control panel and PLC. The turnout has a 9dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.
- *Imported Water Turnout* – Local control wiring for flow and valve position are fed back to a local PLC. The turnout PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Turner Basin 3	*Basin* Area: 3.6 acres Depth: 25 ft Volume: 50.3 AF	
Turner Basin 4	*Basin* Area: 8.9 acres Depth: 28 ft Volume: 154.4 AF *Gates* 3 - 30" sluice gates	Automated
Turner Basin 4B&C	*Gates* 2 - 30" sluice gates 24" sluice gate	Automated Manual
Deer Creek Recycled Water Turnout	*Flow Control Valve* 10" @ 300–3,500 gpm	w/ flow meter
CB 11 MWD Imported Water Turnout	*Flow Control Valve* 24" @ 1,500-18,000 24" Venturi Flow Meter	gpm
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: N/A RTU: 2 unit PLC: 2 unit I/O Hub: 2 unit Radio: 2 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Turner Basin 3				
Basin	3	NA	3	NA
Turner Basin 4				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
Turner Basin 4 B & C				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
Deer Creek Recycled Water Turnout				
Flow Control Valve	3	NA	3	NA
CB 11 MWD Imported Water Turnout				
Flow Control Valve	3	NA	3	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

NA
No issues that require immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Turner Basin 3	2004	
Turner Basin 4	2004	
Turner Basins 4 B& C	2014	
Deer Creek Recycled Water Turnout	2006	
CB 11 MWD Imported Water Turnout	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Basin	GWR Security Improvements	GWR sites are frequently vandalized and equipment is stolen from the site. Jurupa, San Sevaine, Brooks, and Turner basins should be evaluated for security improvements.
Instrumentation	GWR Level Transmitter Upgrades	Improve the accuracy and the correlation between the staff gages and level transmitters at the basins. Many of the level indicators do not represent the actual basin level.

Asset Management System Summary – GWR
Upland Basin (MZ-1)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Upland Basin

Upland Basin
Upland Basin is owned by the City of Upland and is located in Management Zone 1, near the intersection of Monte Vista Avenue and Arrow Route. Upland Basin receives storm water and imported water from the San Antonio Channel and storm water from a local storm drain system. Upland Basin has an approximate size of 24.8 acres and an approximate sidewall depth of 59 feet from a floor elevation of 1156' to the San Antonio Channel overflow structure elevation of 1215' equating to 694.9 AF of storage. Upland Basin includes a 48" automated sluice gate with associated flow meter for inlet flow from the San Antonio Channel and a level transmitter.

San Antonio Channel Rubber Dam
A 4' tall rubber dam has been installed into the San Antonio Channel to increase the water surface elevation in the Upland Basin from 1240' to 1244'. The San Antonio Channel Rubber Dam also includes a control house including a stilling well, 2.5 hp/154scfm air blower, and a 2" motor controlled vent valve.

Electrical System
The College Heights Basin, Upland Basin, and the San Antonio Channel Rubber Dam share a common electrical system housed in the San Antonio Channel Rubber Dam control house. The electrical energy to power College Heights Basin, Upland Basin, and the San Antonio Channel Rubber Dam is obtained from the local electrical grid (SCE) through a meter on Arrow Route. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
The College Heights Basin, Upland Basin, and the San Antonio Channel Rubber Dam share a common instrumentation and control system housed in the San Antonio Channel Rubber Dam control house. Local control wiring for gate positions, basin levels, flows, rubber dam pressures, stilling well levels, and vent valve position are fed back to a local PLC. The PLC has a radio antenna that transmits control data to the Almond Repeater and then to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Upland Basin	*Basin* Area: 24.8 acres Depth: 59 ft Volume: 694.9 AF *Gates* 48" sluice gate	Automated
San Antonio Channel Rubber Dam	*Rubber Dam* 4 ft tall rubber dam *Blower* 2.5 hp 154 scfm *Vent Valve* 2" ball valve	
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 1 unit RTU: N/A PLC: 1 unit I/O Hub: 2 units Radio: 1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Upland Basin				
Basin	3	NA	3	NA
Gates	3	NA	3	NA
San Antonio Channel Rubber Dam				
Rubber Dam	3	NA	3	NA
Blower	3	NA	3	NA
Vent Valve	3	NA	3	NA
Electrical & Instrumentation	3	NA	3	NA

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

San Antonio Channel Rubber Dam
The rubber dams were inspected in January 2015 and were determined to have a remaining lifespan of 5 years remaining. A potential project is needed within the next 5 years to replace the rubber dams.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Upland Basin	2004	
San Antonio Channel Rubber Dam	2004	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.
Rubber Dam	GWR Rubber Dam Replacement Project	Replace the GWR rubber dams by 2020. Locations include: San Sevaine Channel, Day Creek, Declez Channel, Cucamonga Creek, and San Antonio Channel

Asset Management System Summary – GWR
Victoria Basin (MZ-2)

1. Asset Profile

PROCESS FLOW SCHEMATIC
Victoria Basin

Victoria Basin
Victoria Basin is owned by the San Bernardino County Flood Control District (SBCFCD) and is located in the City of Rancho Cucamonga in Management Zone 2, near the intersection of Victoria Avenue and the 15 Freeway. Victoria Basin is comprised of two cells: Cell 1 and Cell 2:

- *Victoria Basin Cell 1* – Victoria Basin Cell 1 receives storm water and imported water from the San Sevaine Channel and East Etiwanda Creek, recycled water from the Victoria Basin Recycled Water Turnout, and storm water from a local storm drain system. Victoria Basin Cell 1 has an approximate size of 9.6 acres and an approximate sidewall depth of 4 feet from a floor elevation of 1314' to the Victoria Basin Cell 2 overflow structure at an elevation of 1318' equating to 28.5 AF of storage. Victoria Basin Cell 1 includes two 48" automated sluice gates for inlet into the basin from the San Sevaine Channel and East Etiwanda Creek, a 36" automated sluice gate for discharge to Victoria Basin Cell 2, and a level transmitter.
- *Victoria Basin Cell 2* – Victoria Basin Cell 2 receives flow from Victoria Basin Cell 1. Victoria Basin Cell 2 has an approximate size of 7.8 acres and an approximate sidewall depth of 9 feet from a floor elevation of 1309' to the San Sevaine Channel overflow structure at an elevation of 1318' equating to 47.1 AF of storage. Victoria Basin Cell 2 includes a 36" automated sluice gate for discharge to the San Sevaine Channel and a level transmitter.

Victoria Basin Recycled Water Turnout
The Victoria Basin Recycled Water Turnout is located on the west side of Victoria Basin Cell 1. The turnout includes an 8" Cla-Val flow control valve, flow meter, and pressure transmitter to provided recycled water to the groundwater recharge basin. The turnout is designed for flow rates ranging from 200 gpm to 3,000 gpm.

Electrical System
The electrical energy to power Victoria Basin and the Victoria Basin Recycled Water Turnout is obtained from the local electrical grid (SCE) through a meter on Victoria Street. The system utilizes 120v power, does not have any transformers, and does not have emergency power generation.

Instrumentation and Control System
Local control wiring for flow, valve position, gate positions, and basin levels are fed back to a local control panel and PLC, which transmits control data to the Victoria Basin Main RTU. The Victoria Basin Main RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Victoria Basin Cell 1	*Basin* Area: 9.6 acres Depth: 4 ft Volume: 28.5 AF *Gates* 2 - 48" sluice gate 36" sluice gate	 Automated Automated
Victoria Basin Cell 2	*Basin* Area: 7.8 acres Depth: 9 ft Volume: 47.1 AF *Gates* 36" sluice gate	 Automated
Victoria Basin Recycled Water Turnout	*Flow Control Valve* 8" @ 200–3,000 gpm 8" mag-meter	
Electrical Instrumentation	Utility Voltage: 120 v Transformers: N/A HMI: 1 unit RTU: 1 unit PLC: 1 unit I/O Hub: 2 units Radio: 3 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Victoria Basin Cell 1				
Basin	3		3	
Gates	3		3	
Victoria Basin Cell 2				
Basin	3		3	
Gates	3		3	
Victoria Basin Recycled Water Turnout				
Flow Control Valve	3		3	
Electrical & Instrumentation	3		3	

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

NA
No issues that require immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Victoria Basin Cell 1	2004	
Victoria Basin Cell 2	2004	
Victoria Basin Recycled Water Turnout	2011	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Basin	GWR Basin Surveying	After basin cleaning events, the basins should be surveyed to verify dimensions.

End of System Summary

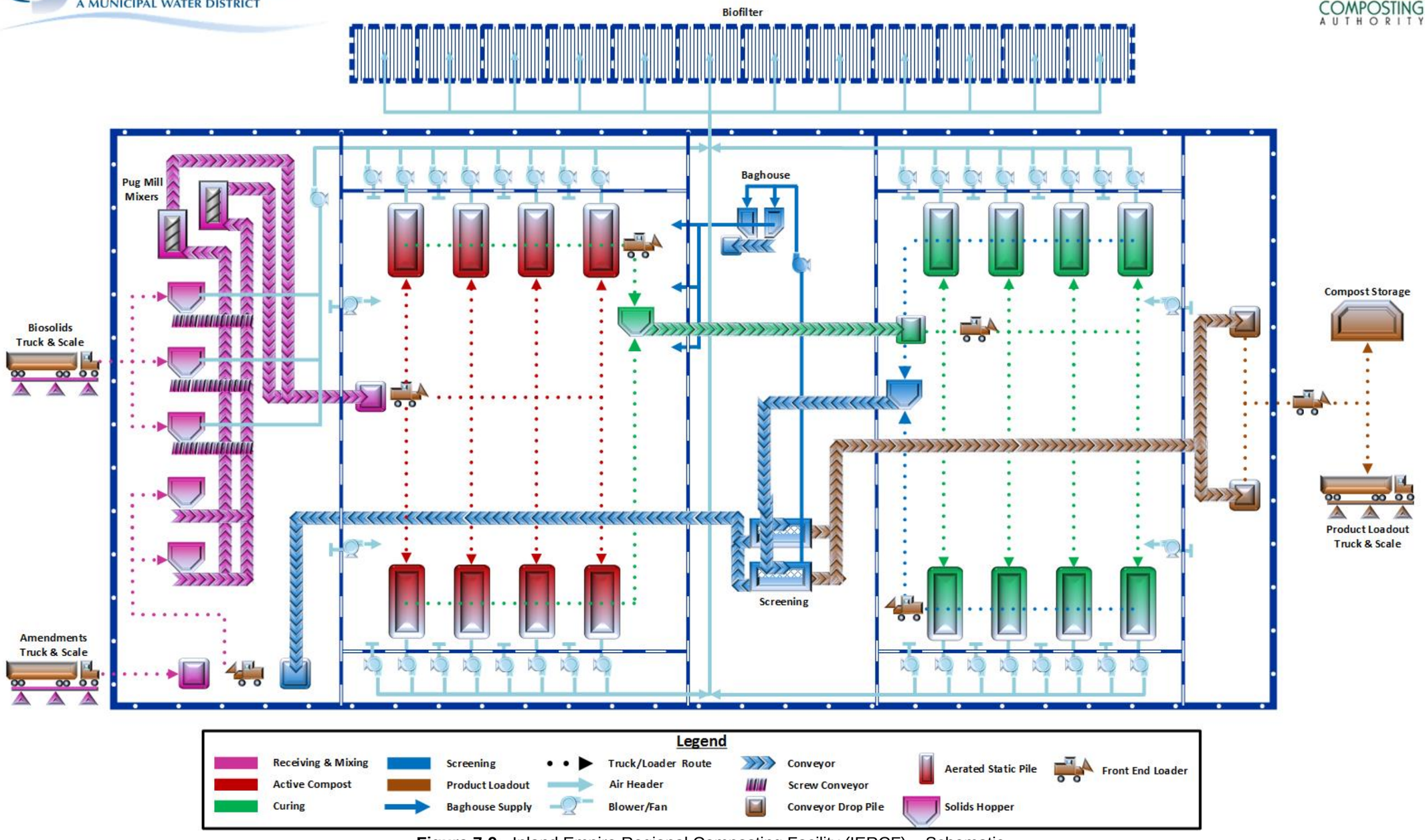


Figure 7-9: Inland Empire Regional Composting Facility (IERCF) – Schematic

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Table 7-8: Inland Empire Regional Composting Facility – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	RA11001	IERCF Capital Replacement	General project for facility/equipment repair and replacement.	RM	RP	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	***5,000,000***
2	RA15001	IERCF Baghouse Improvements	Based upon system evaluation, this project is to improve the existing Baghouse, install new blowers downstream of the Baghouse structure, and install a foam fire suppression system.	RM	RP	350,000	-	-	-	-	-	-	-	-	-	***350,000***
3	RA16001	IERCF Fire Sprinkler Improvements	Retrofit the fire sprinkler pipelines and Victaulic fittings. Replace black pipe fire lines with stainless steel.	RM	RP	200,000	-	-	-	-	-	-	-	-	-	***200,000***
4	RA17001	IERCF Transition Air Duct Improvements	Upgrade the foul-air rectangular transition air duct running north/south through the active curing screening.	RM	CC	75,000	75,000	750,000	-	-	-	-	-	-	-	***900,000***
5	RA17002	IERCF Replace Printers	Replace printers	RM	RP	4,700	-	-	-	-	-	-	-	-	-	***4,700***
6	RA17003	IERCF Replace VM Host Servers	Replace VM host servers	RM	RP	44,800	-	-	-	-	-	-	-	-	-	***44,800***
7	RA17004	IERCF Replace Network Switches	Replace network switches	RM	RP	25,000	-	-	-	-	-	-	-	-	-	***25,000***
8	RA17005	IERCF UPS Replacement	Replace weighmaster database server	RM	RP	14,000	-	-	-	-	-	-	-	-	-	***14,000***
9	RA17006	IERCF Electrical Room HVAC Upgrades	HVAC improvements in the motor control center to protect electrical equipment from overheating	RM	CC	400,000	-	-	-	-	-	-	-	-	-	***400,000***
10	RA17007	IERCF Building Improvements	Additional warehouse storage, office space, and an expanded conference room are needed at IERCF	RM	TBD	100,000	100,000	-	-	-	-	-	-	-	-	***200,000***
11	RA17008	IERCF Solar Photovoltaic Power Plant Phase II	IERCF Rooftop Solar - Direct Purchase	RM	CC	4,000,000	150,000	-	-	-	-	-	-	-	-	***4,150,000***
12	RA19001	IERCF Pugmill Improvements	Replacements or major overhaul of pugmills	RM	RP	-	-	100,000	-	-	-	-	-	-	-	***100,000***
13	RA19002	IERCF Trommel Screen Improvements	Retrofit existing trommel screen equipment	RM	CC	-	-	300,000	-	-	-	-	-	600,000	-	***900,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
14	RA19003	IERCF Front End Loader Replacement	Replace the two John Deere Model 744 front end loaders, which are reaching the end of their useful life.	RM	TBD	-	-	600,000	-	-	-	-	-	-	-	***600,000***
15	RA20003	IERCF Belt Conveyor Improvements	Replacement of misc. belt conveyors	RM	RP	-	-	-	300,000	300,000	-	-	-	-	-	***600,000***
16	RA20004	IERCF Misc Fan Improvements	Replacement of ventilation and process fans and ducts	RM	RP	-	-	-	300,000	300,000	-	-	-	300,000	-	***900,000***
17	RA23001	IERCF Inner Roof Lining Repair	Repair the inner roof lining of the process building. This will include new coating and rehab/repair existing foam barrier.	RM	TBD	-	-	-	-	-	-	300,000	-	-	-	***300,000***
18	RA26XXX	IERCF Projects AMP	Annual partial replacement of biofilter media ($250k per year) with complete replacement every 5 years ($1.5 mill)	RM	OM	-	-	-	-	-	-	-	-	-	500,000	***500,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – IERCF

Treatment Process

1. Asset Profile

Biosolids Hoppers
Biosolids from Los Angeles County Sanitation District (LACSD), Inland Empire Utilities Agency, and third-party sources are transported by trucks to the Inland Empire Regional Composting Facility (IERCF). After being weighed, the trucks offload the biosolids into three biosolids hoppers. Each biosolids hopper has a capacity of 55 cubic yards, five 3 hp live-bottom screws, and one 25 hp screw conveyor.

Amendment Hoppers
Amendments from outside sources are transported to IERCF by truck and stored along the western wall of the active compost process area. These amendments are mixed with recycled screening material (overs) to produce specific amendment blends. Front end loaders mix the material and load it into two amendment hoppers. Each amendment hopper has a 200-ton capacity, five 3 hp live-bottom screws, and one 33-foot, 110-ton-per-hour belt conveyor powered by a 15 hp motor.

Pug Mill Mixers
Material from the biosolids hoppers and the amendment hoppers is conveyed by belt conveyors to two redundant pug mill mixers. The pug mill mixers blend the biosolids and amendments together to create an appropriate blend of material to begin the active compost process. Each pug mill mixer has a capacity of 225 tons per hour and is powered by a 75 hp motor.

Belt Conveyors
Belt conveyors are used to move material throughout IERCF. Nine belt conveyors allow material to be moved from receiving and mixing to active compost. Seven belt conveyors allow material to be moved from active compost through screening to curing. An additional four belt conveyors return the overs from screening to receiving and mixing. Two belt conveyors allow material to be moved from curing to product loadout.

Active Compost HVAC
Supply air into the active compost process area is provided by seven 20 hp fans dedicated to receiving and mixing, nine 20 hp roof fans, and five 75 hp dedicated to the screening/baghouse. Air is exhausted from the active compost area to the biofilter by four 125 hp exhaust fans, twelve 125 hp exhaust fans, and twenty-two 30 hp process fans.

Curing HVAC
Supply air into the curing process area is provided by four 25 hp fans pulling from product loadout, five 10 hp roof fans, and fourteen 20 hp process fans. Air is exhausted from the active compost area to the biofilter by four 150 hp exhaust fans and two 125 hp exhaust fans.

Trommel Screens
After the material has been treated in the active compost and curing processes, it is placed into a hopper and conveyed to two Trommel screens to remove the overs. The fine material is conveyed to product loadout as the final compost product and the overs are conveyed back to receiving and mixing to be recycled back into the amendments. Each Trommel screen has 3/8-inch spacing and a 400-cubic-yard-per-hour production capacity and is powered by a 150 hp motor.

Baghouse
The Baghouse filters the air from the Trommel screens and the screenings process area and returns filtered air back to the active compost process area. The Baghouse is supplied by five 75 hp, 25,650 cfm fans and removes particulate matter from the air and conveys it to a storage area located in the screenings process area.

Biofilter
The biofilter is required to treat all air leaving IERCF to remove ammonia and VOCs. The biofilter is sized to treat 813,200 cfm of air, consists of twelve 135' x 87' cells, an irrigation system, and an inlet air humidification system. Full replacement of the biofilter media in all 12 cells, recurring every 5 years. Turnover of existing biofilter media and replenishment of material as necessary, annually (not done on years of a full media replacement).

Rolling Stock and Storage Tent
Front end loaders move material to the amendment hoppers, and then are used as the primary equipment to transfer material throughout the composting process: active composting, curing, screening, product loadout, cleanup, and for biofilter media turnover and replacement activity. Product compost is stored in a 30,000 cubic yard storage tent.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Facility Biosolids Amendment	 600 wet tons per day 160 wet tons per day	
Biosolids Hoppers	3 @ 55 cy 5 @ 3 hp live bottom 1 @ 25 hp sc. conv.	 ea. hop. ea. hop.
Amendment Hoppers	2 @ 200 tons 5 @ 3 hp live bottom 1 @ 15 hp belt conv.	 ea. hop. ea. hop.
Pug Mill Mixers	2 @ 75 hp, 225 tph	
Receiving & Mixing Belt Conveyors	1 @ 20 hp, 162 ft 1 @ 20 hp, 144 ft 1 @ 25 hp, 70 ft 1 @ 25 hp, 91 ft 1 @ 25 hp, 80 ft 1 @ 25 hp, 75 ft 1 @ 30 hp, 215 ft 1 @ 30 hp, 219 ft 1 @ 30 hp, 258 ft	All units are 225 tons per hour (tph)
Belt Conveyors Screening Product Loadout	 2 @ 20 hp, 91', 150tph 1 @ 15 hp, 133', 150tph 2 @ 15 hp, 27', 150tph 1 @ 25 hp,157', 190tph 1 @ 25 hp, 136', 190tph 1 @ 15 hp, 32', 110tph 1 @ 15 hp, 77', 110tph 1 @ 20 hp, 172', 110tph 1 @ 30 hp, 537', 110tph 1 @ 20 hp, 135', 145tph 1 @ 15 hp, 113', 145tph	
Active Compost HVAC	7 @ 20 hp, 18,250cfm 9 @ 20 hp, 23,000cfm 5 @ 75 hp, 25,650cfm 4 @ 125 hp, 35,500cfm 12 @ 125 hp, 28400cfm 22 @ 30 hp, 4,500 cfm	R&M Fan Roof Fan BH Fan Ex. Fan Ex. Fan Pr. Fan
Curing HVAC	4 @ 25 hp, 20,500 cfm 5 @ 10 hp, 18,000 cfm 14 @ 20 hp, 2,850 cfm 4 @ 150 hp, 42,250 cfm 2 @ 125 hp, 35,000 cfm	PL Fan Roof Fan Pr. Fan Ex. Fan Ex. Fan
Trommel Screens	2 @ 3/8-inch, 150 hp, 400 cyh	
Baghouse	2 @ 65,000 cfm	Filters
	5 @ 75 hp, 25,650 cfm	Fans
Biofilter Humidification System	813,200 cfm 1,000 nozzles	
Rolling Stock Composting Loader Product Loader Storage Tent	 4 @ Model 744 3 @ Model 644 30,000 cu.yd.	 John Deere John Deere Capacity

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Biosolids Hoppers	2	3	2	2
Amendment Hoppers	3	3	2	2
Pug Mill Mixers	4	3	2	3
Receiving & Mixing Belt Conveyors	2	3	2	3
Screening Belt Conveyors	2	3	2	3
Active Compost HVAC	4	4	3	3
Curing HVAC	4	4	3	3
Trommel Screens	4	3	3	4
Baghouse	3	2	2	2
Biofilter	2	2	2	2
Rolling Stock & Storage Tent	4	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Amendment Hoppers
Modified the hardened steel floor so material does not bridge, but wearing frequently. No project needed at this time.

Pug Mill Mixer
Only one redundant paddle mixer and has been operating since ~2007. A replacement may be needed in the near future. Floor of trough is repaired frequently. Installing ceramic coating on floor to reduce repair frequency. No project needed at this time.

Receiving & Mixing Belt Conveyors
Belt #11 has no redundancy. Spare parts are stored onsite to make repairs when needed. No project needed at this time.

Screening Belt Conveyors
Spare parts are stored onsite to make repairs when needed. Impractical to build a fully redundant system. No project needed at this time.

Active Compost HVAC
Roof supply fans (4) have poor access and the supports are corroding. A potential project is needed to address this issue. In addition, the process fans (4) have no redundancy. Spare parts are stored onsite for Maintenance to make repairs when needed. Impractical to build a fully redundant system. No project needed at this time.

Curing HVAC
A temporary fix in place for leaks along the screening's air duct. Loadout axial fan is in poor condition, and in-house repairs are being made to improve reliability. Project RA17001 will modify the foul-air-rectangular-transition air duct running north/south through screenings

Trommel Screens
Converted both screes to move the same size product. Redundancy will be lost if the process returning to two different sized products. Screen No.1 was rebuilt in 2014/15, but there is uncertainty of the cost in a future rebuild. No project needed at this time.

Baghouse
North of the building's centerline was retrofitted in 2014/15. The southern portion needs to be modified from rectangular duct to round duct. A project has been approved to upgrade this section of duct, but is not in the TYCIP.

Rolling Stock & Storage Tent
Two of the Model 744 units have 13,000 hours of operation. Replacement is recommended after 15,000 hours. In addition, the tent was installed in 2010 and has a ten year warranty. A potential project is needed to replace the front end loaders, but a project is not needed at this time for tent replacement.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Biosolids Hoppers	2007	
Amendment Hoppers	2007	
Pug Mill Mixers	2007	
Receiving & Mixing Belt Conveyors	2007	
Belt Conveyors	2007 2015	
Active Compost HVAC	2007	
Curing HVAC	2007	
Trommel Screens	2007 2013	
Baghouse	2007	
Biofilter	2007	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Biofilter	IERCF Biofilter Media Replacement	Full replacement of the biofilter media in all 12 cells, recurring every 5 years.
Rolling Stock	IERCF Front End Loader Replacement	Replace the two John Deere Model 744 front end loaders, which are reaching the end of their useful life.

Asset Management System Summary – IERCF
Auxiliary Systems

1. Asset Profile

Plant Drain
The plant drain collects sewer from the truck scale house and administration building, wash-down water from the truck cleaning area and process areas, and excess irrigation and condensate from the biofilter system. The plant drain system consists of five submersible pump stations: north process area, south process area, biofilter west, biofilter east, and center aisle duct. These five pump stations pump to the plant drain pump station. The plant drain pump station pumps to either the inlet of RP-4 or to the Non-Reclaimable Waste System (NRWS). Currently, the system is being pumped to the NRWS.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (solar and an emergency generator). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of dual 12 kV feeders from RP-4 to the IERCF north and south electrical rooms, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the IERCF electrical system is shown in Appendix B.

A diesel emergency generator is used in the event of a power failure. A 2.0 MW generator is located on the southeast corner of the IERCF property and can supply power to meet maximum daytime production of the facility.

An extensive lighting system is needed to illuminate the indoor facility. Lighting units are located in each of the process areas, on equipment walls, and on the building support columns.

Utility Water System
Utility water is used throughout the facility for irrigation, biofilter irrigation and humidification, truck wash-down, and general cleaning purposes. The system is supplied by the 1299 pressure zone from a connection on 6th Street. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, and more. The system is supplied from two service connections on 6th Street from the City of Rancho Cucamonga. IERCF also has an independent fire suppression system with two connections on 6th Street.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at IERCF. Nearly all of the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to a redundant PLC system located in the main control building. Fiber optic cable is then run to RP-4 for remote access.

Yard Piping
A substantial network of pipes exists mainly for the auxiliary systems. The material, sizes, and service conditions of these pipes vary widely.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Plant Drain	3 @ 620 gpm 20 hp	VFD
Electrical System		
Utility Voltage	12 kV	
Transformers	4 @ 12 kV to 480 V 5 @ 480 V to 120 V	
Switchgear	4 @ 12 kV 2 @ 12 kV	
Distribution	8 @ 480 V	MCCs
Generator	1 @ 2,000 kW 2,937 Bhp	
Mounted Lighting	345 units	Process
Utility Water System		
Pipelines	8-inch PVC @ 3,750 gpm	
Valves	6-inch PVC @ 2,100 gpm	
	5 units	Main Line
Potable Water System		
Pipelines	2 @ 2.5-inch DI @ 350 gpm	Potable
	10-inch DI @ 5,800 gpm	Fire
Instrumentation and Control System		
HMI Workstation	4 units	
RTU	N/A	
PLC	4 units	
I/O Hub	6 units	
Radio Transmitter	1 unit	RP-4
Structure		
Administration	30.0 ft X 62.5 ft	
Warehouse	67.7 ft X 60.0 ft	
Operations	52.9 ft X 59.6 ft	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	2	2	2
Electrical System	2	2	3	3
Utility Water System	3	3	3	3
Potable Water System	4	3	3	3
Instrumentation and Control System	3	2	3	3
Yard Piping	3	3	3	3
Structure	4	4	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Plant Drain
No issues require specific attention.

Electrical System
No issues require specific attention.

Utility Water System
No issues require specific attention.

Potable Water System
A potential project will retrofit the fire sprinkler system pipelines and Victaulic fittings.

Instrumentation and Control System
No issues require specific attention.

Yard Piping
No issues require specific attention.

Structures
Additional warehouse storage space for critical equipment, office space is needed, and the conference room needs to be retrofitted and expanded to service large meetings. 3,000 sqft of additional space is needed for the warehouse and office space, but an estimate has not been established for the conference room. A potential project is needed to address these issues.

In addition, the process building's protective coating for the inner roof lining is deteriorating; the epoxy has failed and the foam barrier is retaining moisture. The coating protects the infrastructure in the drop ceiling. A potential project is needed to address this issue.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	2007	
Electrical System	2007 2011	
Utility Water System	2007	
Potable Water System	2007	
Instrumentation and Control System	2007	
Yard Piping	2007	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Potable Water System	IERCF Fire Sprinkler Improvements	Retrofit the fire sprinkler system pipelines and Victaulic fittings.
Structures	IERCF Building Improvements	Additional warehouse storage, office space, and an expanded conference room are needed at IERCF
Structures	IERCF Inner Roof Lining Repair	Repair the inner roof lining of the process building. This will include new coating and rehab/repair existing foam barrier.

End of System Summary

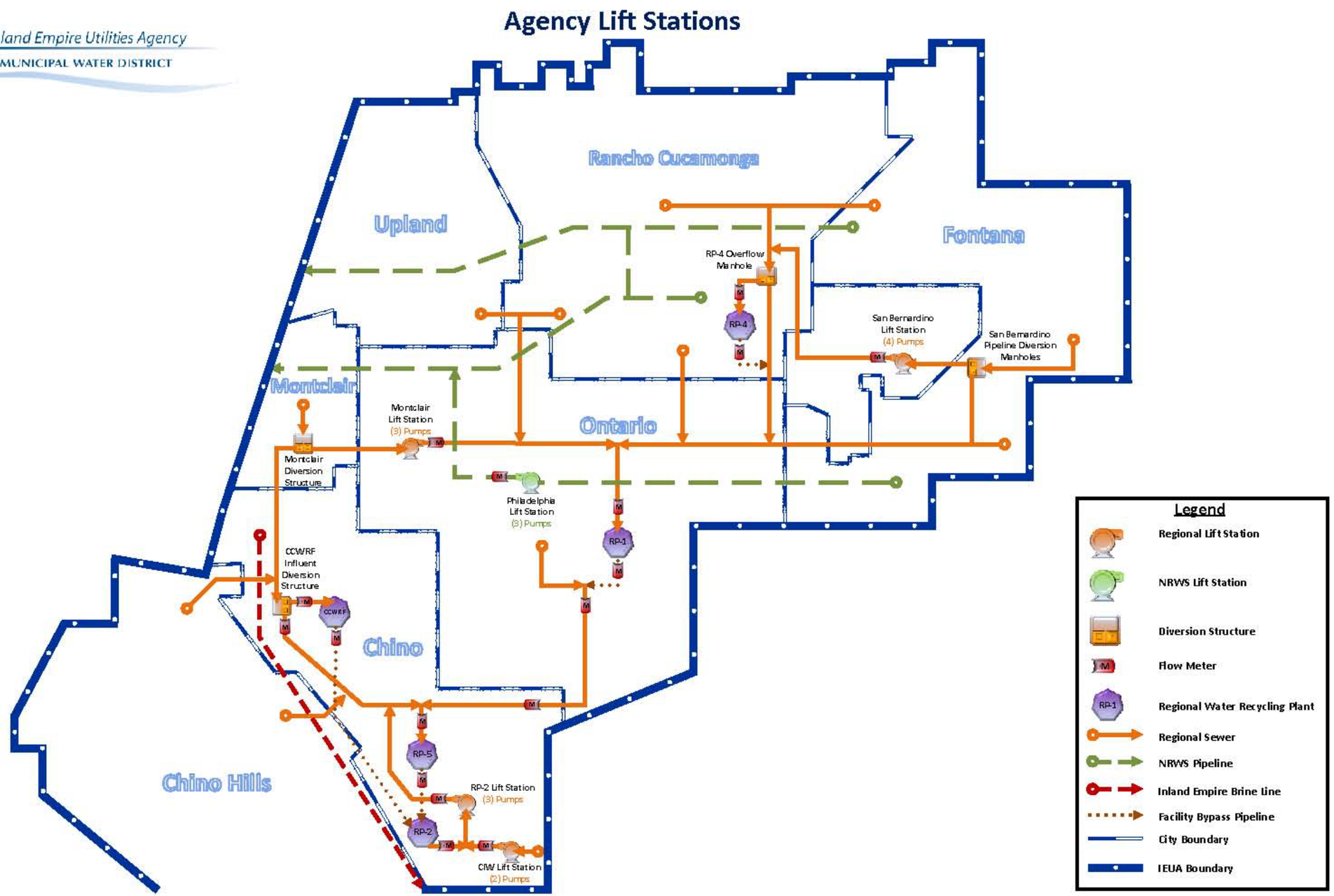

Figure 7-10: Agency Lift Stations (LS) – Schematic

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Table 7-9: Agency Lift Stations – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN13016	SCADA Enterprise System	SCADA Enterprise System. Replacing the DCS over the next five years.	RO	CC	1,200,000	3,800,000	3,060,000	2,900,000	250,000	10,000	-	-	-	-	***11,220,000***
2	EN13028	Preserve Lift Station	A sewer lift station design prepared by the City of Chino will be reviewed by IEUA. The SCADA system will be connected to IEUA's system; therefore, the lift station SCADA components will be reviewed for conformance to our system.	RC	OM	100,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	***2,800,000***
3	EN16011	Whispering Lakes Pump Station Rehab	Purchase and complete rehab of lift station. Replacement of all equipment, replacement of all electrical systems, replacement of control system, and rehab of gates and structures.	RC	CC	-	150,000	-	-	-	-	500,000	2,500,000	2,000,000	-	***5,150,000***
4	EN19005	Haven LS Improvements		RC	CC	-	-	-	-	-	-	-	750,000	750,000	-	***1,500,000***
5	EN23002	Philadelphia Lift Station Force Main Imp	This project will refurbish the force line due to capacity loses	NC	RP	-	-	-	-	-	-	500,000	2,500,000	3,000,000	-	***6,000,000***
6	EN26020	Lift Station AMP Projects	Replace the force mains, as well as provide inspection manholes for future condition assessment	NC	RP	-	-	-	-	-	-	-	-	-	200,000	***200,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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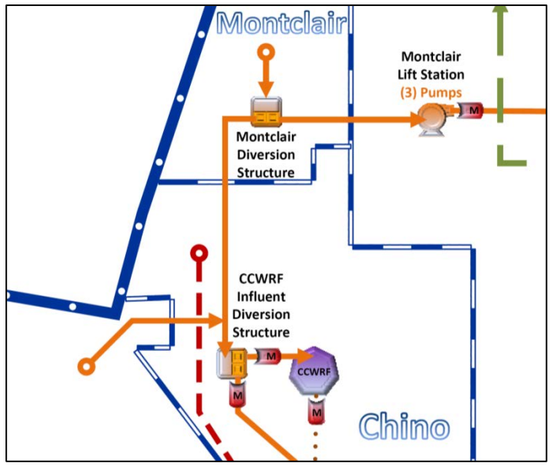
Asset Management System Summary – LS

Montclair Lift Station

1. Asset Profile



Pump System
The Montclair lift station conveys flows collected from the Montclair service area as well as a portion of Ontario. The pump station consists of a small circular wet well and three lift pumps.

Electrical System
The electrical energy to power the lift station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 12 kV feeder to the transformer and switchgear. A single line diagram of the Montclair lift station electrical system is shown in Appendix B.

A diesel emergency generator is used in the event of a power failure. One generator is located inside the pump station and supplies power to the facility in the event of a utility outage.

Potable Water System
Potable water is supplied to the station for supply at several hose bibs. The water system formerly supplied seal water to the old pumps.

Instrumentation and Control System
All aspects of the pump station operations are monitored and controlled by the instrumentation and control system. The control system includes a redundant PLC and communication modules for maximum reliability.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Montclair Lift Station	5.69 MGD	
Pump System Pipelines Pump Station Valves	 18-inch 3,950 gpm 3 @ 2,990 gpm 85 hp 7 units	
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 12 kV 12 kV to 480 V 480 V 480 V 1 @ 250 kW 398 Bhp 17 units	
Potable Water System Backflow Devices Valves	 1 units 2 units @ 2-inch	
Instrumentation and Control System HMI Workstation PLC I/O Hub Radio Transmitter	 1 Ea. 2 Ea. (Redundant Pair) 1 Ea. 1 Ea.	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	2	2	2	2
Electrical System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	2	2	2	2

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

NA
No issues that require immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	1978 2014	
Electrical System	1978 2014	
Potable Water System	1978	
Instrumentation and Control System	1978 2014	

* Appendix B – Condition Assessment Reports

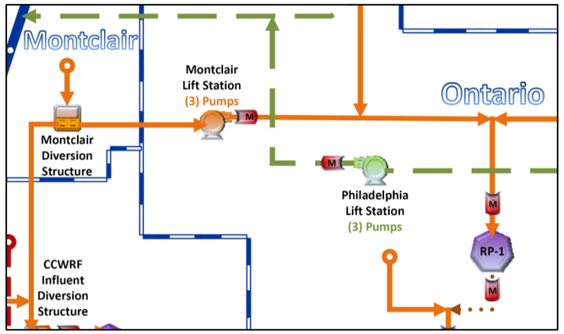
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – LS

Philadelphia Lift Station

1. Asset Profile



Pump System
The Philadelphia lift station conveys non-reclaimable waste (NRW) That is collected from the northern half of the Agency service area to Los Angeles County. The lift station includes three pumps: two of which are variable speed and one that is constant speed. Flows are conveyed through two parallel force mains that are about 2.6 miles long, with a total head increase of about 110 feet.

In case of emergency and to accommodate maintenance and construction activity, an engine-driven pump is also available. The pump connections are located outdoors, and the pump can be trailered away off-site when it is not needed.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE). The electrical feed from the grid is 480 V. A single line diagram of the electrical system is shown in Appendix B.

A diesel emergency generator is used in a power failure. The generator is located in the pump station and supplies power to all the pump station systems.

Utility Water System
Utility water is used for pump seal water. The water is delivered by the 1050 zone recycled water pipeline in Philadelphia Avenue.

Potable Water System
Potable water is supplied to the lift station for the restroom. Potable water can also be used as a backup for pump seal water in a recycled-water outage. The potable and recycled water is isolated by use of a removable pipe spool to prevent cross connections.

Instrumentation and Control System
The lift station is fully automated and monitored. Wet well level, force main discharge pressures, force main flows, and pump speeds are all controlled and monitored by a PLC. The lift station can also be monitored and controlled remotely.

Chemical Injection System
The lift station includes storage and injection systems for ferric chloride. The chemical can be injected to both force mains. Ferric chloride is used to control sulfides in the sewer system, reducing the effects of corrosion and odors. The injection pumps are started and stopped automatically.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Philadelphia Lift Station	5.2 MGD	
Pump System		
Pipelines	12-inch 1,150 gpm 18-inch 2,800 gpm	
Pump Station	3 @ 1,800 gpm 100 hp	
Wet Well	80,000 Gallons	
Emergency Lagoon	1 @ 5 MG unlined	
Valves	13 units	
Electrical System		
Utility Voltage	480 V	
Switchgear	480 V	
Distribution	480 V	
Generator	1 @ 250 kW 335 Bhp	
Mounted Lighting	19 units	
Utility Water System		
Pipelines	< 2 in. diameter	
Valves	1 units	
Potable Water System		
Backflow Devices	1 units	
Valves	3 units	
Instrumentation and Control System		
HMI Workstation	1 units	
PLC	1 units	
I/O Hub	1 units	
Radio Transmitter	1 units	
Chemical Injection		
Chemical Pumps	2 units	Diaphragm
Storage Tank	1 @ 13,000 Gallons	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	3	3	3	3
Force Mains	4	4	4	4
Electrical System	3	3	3	3
Utility Water System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Chemical Injection	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Pump System
No issues require special attention.

Force Mains
The condition of the 12-inch and 18-inch force mains has not been inspected for the entire length of pipe. Both force mains are approaching 50 years in age and approaching the end of its service life. Project EN23002 will address the force main issues, as well as provide inspection manholes for future condition assessment.

Electrical System
No issues require special attention.

Utility Water System
No issues require special attention.

Instrumentation and Control System
No issues require special attention.

Chemical Injection
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	1968	2013
Electrical System	1968 2007	
Utility Water System	2011	
Potable Water System	1968	
Instrumentation and Control System	2007	
Chemical Injection	1993	

* Appendix B – Condition Assessment Reports

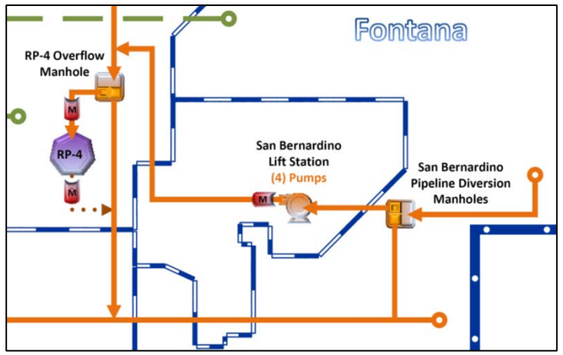
Table 4 Potential Projects

System	Project Name	Project Description
Force Mains	Philadelphia Lift Station Force Main improvements	Replace the force mains, as well as provide inspection manholes for future condition assessment

Asset Management System Summary – LS

San Bernardino Avenue Lift Station

1. Asset Profile



Pump System
The San Bernardino Avenue lift station conveys flows from the Fontana area to Regional Plant No. 4. The flows are lifted about 60 feet through about 1.4 miles of force main. To maintain acceptable flow velocities, two force mains of different diameters were provided. Four vertical-turbine pumps are provided with provisions for a future pump to be added to the wet well.

Electrical System
The electrical energy to power the lift station is obtained from the local electrical grid (SCE) and from onsite energy generation (emergency generator). The electrical feed from the grid is composed of a 12 kV feeder to a transformer and switchgear to distribute electrical energy throughout the facility. A single line diagram of the electrical system is shown in Appendix B.

A diesel emergency generator is used in a power failure. The generator is located adjacent to the electrical room for the lift station.

Potable Water System
Potable water is supplied to the site to be used as seal water for the lift pumps. The water is supplied to a storage tank by an air gap, and the tank in turn supplies the seal-water pump system.

Instrumentation and Control System
The lift station includes enough instrumentation and a PLC to allow for full control of the lift station remotely. The PLC and I/O include full redundancy for added reliability.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
San Bernardino Lift Station	7 MGD	
Pump System		
Pipelines	30-inch 5,902 gpm 24-inch 13,890 gpm	
Pump Station	2 @ 3,300 gpm 50 hp 2 @ 6,945 gpm 125 hp	
Valves	7 units	
Seal Water Tank	1 @ 2,900 Gal. 1 @ 50 Gal.	Secondary Primary
Seal Water Pumps	2 Ea.	
Electrical System		
Utility Voltage	12 kV	
Transformers	12 kV to 480 V	
Switchgear	480 V	
Distribution	480 V	
Generator	1 @ 500 kW 757 Bhp	
Mounted Lighting	19 units	
Potable Water System		
Backflow Devices	1 units	
Valves	2 units	
Instrumentation and Control System		
HMI Workstation	1 Ea.	
RTU	2 Ea.	
PLC	2 Ea.	
I/O Hub	2 Ea.	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	3	3	3	3
Electrical System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Pump System
Currently no issues require special attention.

Electrical System
Currently no issues require special attention.

Potable Water System
Currently no issues require special attention.

Instrumentation and Control System
Currently no issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	2007	
Electrical System	2007	
Potable Water System	2007 2013	
Instrumentation and Control System	2007 2012	

* Appendix B – Condition Assessment Reports

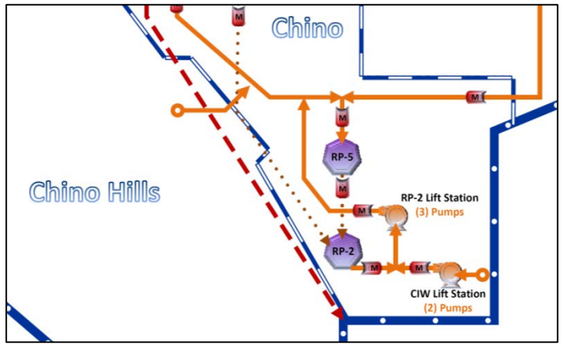
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – LS

Regional Plant No.2 (RP-2) Lift Station

1. Asset Profile



Pump System
The RP-2 lift station collects raw sewage from the Mountain Avenue interceptor, CIW sewer, Butterfield force main, and the recycle flows from the solids treatment facilities at RP-2, and discharges through a 24-inch pipeline to the RP-5 headworks. The lift station is located on the RP-2 treatment plant site.

Electrical System
The electrical energy to power the lift station is fed from the RP-2 treatment plant distribution system. A separate backup generator for the lift station has been provided if utility power or the RP-2 distribution systems fail.

Instrumentation and Control System
The lift station includes instrumentation and automation to allow full remote control of the facility.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-2 Lift Station	9.5 MGD	
Pump System Pipelines Pump Station Valves	 24-inch 6,600 gpm 3 @ 3,300 gpm 100 hp 6 units	
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 12 kV 12 kV to 480 V 480 V 480 V 1 @ 300 kW 443 Bhp > 2 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub	 1 Ea. 1 Ea. 1 Ea. 1 Ea.	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	3	3	3	3
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Pump System
Due to the location and elevation of the RP-2 Lift Station, it will need to be relocated when the RP-5 Solids Treatment Facility is constructed to replace the RP-2 Solids Treatment Facility. The new lift station will be addressed by project EN19006.

Electrical System
Currently no issues require special attention.

Instrumentation and Control System
Currently no issues require investigation.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	2000	
Electrical System	2000	
Instrumentation and Control System	2000	

* Appendix B – Condition Assessment Reports

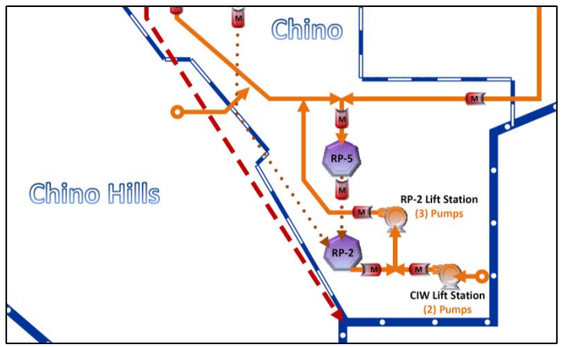
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – LS

Chino Institute for Woman (CIW)

1. Asset Profile



Pump System
The CIW (or Prado) lift station serves the Chino Institute for Women Correctional Facility as well as Prado Park. The lift station consists of a small circular wet well with two submersible chopper pumps and a sewage grinder.

The area surrounding the CIW lift station has recently undergone development. The area, known as the Preserve, is currently bypassing sewage to the Inland Empire Brine Line and conveying it to Orange County. The City of Chino is designing and will construct a new lift station to convey the Preserve area flows to RP-5. The new lift station will also handle the flows lifted by the CIW, and the CIW lift station will be abandoned. The City of Chino will own the new lift station and reimburse the Agency for the operation and maintenance of the facility.

Instrumentation and Control System
The lift station is provided with local controls only. A control panel is tied to float switches and a sonic level transmitter to locally start and stop the pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
CIW Lift Station	1 MGD	
Pump System Pipelines Pump Station Sewage Grinder	 8-inch 1,300 gpm 2 @ 650gpm 30 hp 1 Ea.	
Electrical System Utility Voltage Transformers Distribution	 4,160 V 4,160 V to 480 V 480 V	
Instrumentation and Control System Control Panel	 1 Ea.	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	4	4	3	4
Electrical System	4	4	3	4
Instrumentation and Control System	4	4	4	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Pump System
The pump system is undersized and is out of date. The City of Chino plans to replace the pump station to accommodate flows from the recently developed area known as the Preserve. This lift station would be abandoned upon completion of the new lift station and would be operated by IEUA. Project EN13028 will address these issues.

Electrical System
Currently no issues require special attention.

Instrumentation and Control System
The control system allows for only local control and has no alarm capabilities.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	1976 1993	
Electrical System	1976 1993	
Instrumentation and Control System	1976 1993	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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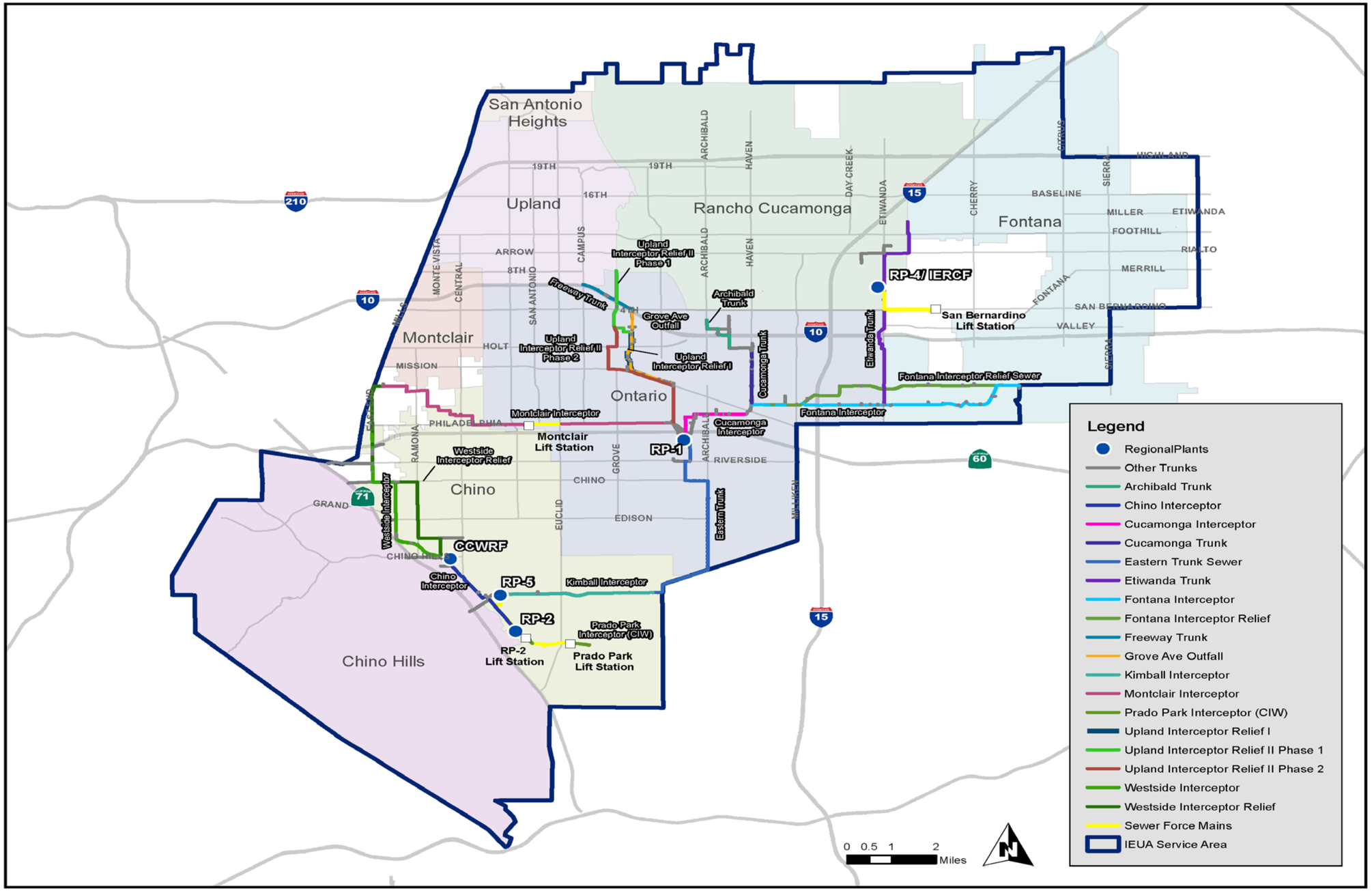

Figure 7-11: Regional Sewer System (RS) – Schematic

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Table 7-10: Regional Sewer System – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN15042	SBCFCD Sewer Easement	The project will fund the easement acquisitions for the regional sewer pipelines located in San Bernardino Flood Control District right of way.	RC	CC	275,000	-	-	-	-	-	-	-	-	-	***275,000***
2	EN13018	Montclair Diversion Structure Improvement	Replace existing cast iron gates with automated S.S. gates, replace access covers and update the metering instruments and provide redundancy	RC	CC	80,000	-	-	-	-	-	-	-	-	-	***80,000***
3	EN16036	RC Planning Documents	Pre and final design for construction, projects to include new WW connections (septic or other), treatment technologies, ect..	RC	OM	1,000,000	-	500,000	-	500,000	-	500,000	-	500,000	-	***3,000,000***
4	EN16071	San Bernardino Avenue Gravity Sewer	Design and construct a gravity sewer to deliver flows from Prologis, CSI and AutoClub Speedway to the San Bernardino Lift Station.	RC	CC	1,300,000	-	-	-	-	-	-	-	-	-	***1,300,000***
5	EN17015	Collection System Upgrades 16/17	Repair and replace sewer collection system manhole frames and covers.	RC	RP	500,000	-	-	-	-	-	-	-	-	-	***500,000***
6	EN18015	Collection System Upgrades 17/18	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	500,000	-	-	-	-	-	-	-	-	***500,000***
7	EN19015	Collection System Upgrades 18/19	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	-	500,000	-	-	-	-	-	-	-	***500,000***
8	EN20015	Collection System Upgrades 19/20	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	-	-	500,000	-	-	-	-	-	-	***500,000***
9	EN21015	Collection System Upgrades 20/21	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	-	-	-	500,000	-	-	-	-	-	***500,000***
10	EN22015	Collection System Upgrades 21/22	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	-	-	-	-	500,000	-	-	-	-	***500,000***
11	EN23015	Collection System Upgrades 22/23	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	-	-	-	-	-	500,000	-	-	-	***500,000***
12	EN24015	Collection System Upgrades 23/24	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	-	-	-	-	-	-	500,000	-	-	***500,000***
13	EN25015	Collection System Upgrades 24/25	Repair and replace sewer collection system manhole frames and covers.	RC	RP	-	-	-	-	-	-	-	-	500,000	-	***500,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
14	EN26021	Regional Conveyance AMP		RO	CC	-	-	-	-	-	-	-	-	-	500,000	***500,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – RS
Northern Regional Sewer System

1. Asset Profile

The Agency's regional wastewater treatment provides domestic and industrial disposal systems across a 242-square-mile service area to eight contracting agencies. These contracting agencies include the City of Chino, Chino Hills, Cucamonga Valley Water District, Fontana, Montclair, Ontario, Upland, and Monte Vista Water District.

The Regional Sewer System (RSS) conveys primarily domestic wastewater to IEUA's four regional water recycling facilities. The RSS has been separated into two systems and will be referred to in the system summary sheets as the Northern Regional Sewer System and Southern Regional Sewer System. The operation and maintenance of the RSS systems are the responsibility of the IEUA's Pretreatment and Source Control (PT&SC) Department's Collections System Group.

Northern Regional Sewer System

The Northern Regional Sewer System consists of sewer pipelines north of the 60 freeway terminating into RP-1.

Gravity Sewer System:

- Archibald Trunk – 18,776 LF of pipeline from Archibald Ave. and Inland Empire Blvd. to Haven Ave. and Francis St, consisting of 742 LF of 54-inch piping, 2,549 LF of 36-inch piping, 5,000 LF of 30-inch piping, 1,707 LF of 24-inch piping, 917 LF of 20-inch piping, and 7,860 LF of 18-inch piping.
- Cucamonga Interceptor Relief – 10,043 LF of RCP pipeline from Haven Ave. to RP-1 on Cedar Ave, consisting of 786 LF of 81-inch piping, 7,203 LF of 72-inch piping, 843 LF of 60-inch piping, and 1,210 LF of 54-inch piping.
- Cucamonga Interceptor – 11,382 LF of RCP pipeline from Haven Ave. to RP-1 on Cedar Ave, consisting of 208 LF of 84-inch piping, 1,310 LF of 72-inch piping, 8,255 LF of 42-inch piping, and 1,609 LF of 27-inch piping.
- Cucamonga Trunk Relief - 12,398 LF of RCP pipeline from 10 Fwy. to Francis St. on Hermosa Ave and Haven Ave.
- Etiwanda Trunk – 29,542 LF of VCP pipeline from Eastend Ave. to Jurupa Ave. on Etiwanda Ave, consisting of 3,596 LF of 42-inch piping, 4,882 LF of 36-inch piping, 2,056 LF of 30-inch piping, 3,049 LF of 27-inch piping, 12,157 LF of 24-inch piping, 1,761 LF of 21-inch piping, 968 LF of 15-inch piping, and 2042 LF of 12-inch piping.
- Fontana Interceptor – 40,691 LF: 33,128 LF of pipeline from Live Oak Ave. to Haven Ave. on Marlay St. and Francis St., consisting of 5,396 LF of 39-inch piping, 7,657 LF of 36-inch piping, 13,138 LF of 33-inch piping, 4,915 LF of 21-inch piping, and 393 LF of 18-inch piping.
- Fontana Interceptor Relief – 36,119 LF of pipeline from Beech Ave. to Milliken Ave on Jurupa Ave, consisting of 5,187 LF of 78-inch piping, 508 LF of 72-inch piping, 12,105 LF of 66-inch piping, 3,925 LF of 54-inch piping, 1,804 LF of 48-inch piping, 977 LF of 42-inch piping, 260 LF of 36-inch piping, 5,595 LF of 30-inch piping, 2,415 LF of 27-inch piping, 260 LF of 24-inch piping, and 3,080 LF of 21-inch piping.
- Freeway Trunk – 6,076 LF of VCP pipeline along 10 Fwy. from 6th St. to 4th St., consisting of 74 LF of 39-inch piping, 208 LF of 33-inch piping, 2,219 LF of 27-inch piping, 3,169 LF of 18-inch piping, 166 LF of 15-inch piping, and 166 LF of 12-inch piping.
- Grove Avenue Outfall – 22,888 LF of VCP piping from Grove Ave. and 8th St. to Cucamonga Ave. and Mission Ave. to Carlos Ave., consisting of 270 LF of 42-inch piping, 8,917 LF of 36-inch piping, 8,060 LF of 30-inch piping, 1,395 LF of 27-inch piping, 236 LF of 24-inch, 689 LF of 21-inch, and 3,318 LF of 18-inch piping.
- Grove Interceptor – 4,042 LF: 3,964 LF of VCP pipeline from 8th St. to 5th St. on Grove Ave, consisting of 465 LF of 36-inch piping and 3,508 LF of 30-inch piping.
- Montclair Interceptor – 41,197 LF: 37,432 LF of VCP pipeline from Roswell Ave. and Grand Ave. to RP-1 on Philadelphia St., consisting of 720 LF of 67-inch piping, 1,510 LF of 60-inch piping, 31,349 LF of 30-inch piping, 494 LF of 27-inch, 392 LF of 24-inch, 2,658 LF of 21-inch and 308 LF of 12-inch piping.
- Turner Trunk – 2,562 LF of 24-inch VCP pipeline from 4th St. to 10 Fwy. on Turner St.
- Upland Interceptor – 10,870 LF of 30-inch VCP pipeline from Imperial Ave. and Mission Ave. to Carlos Ave. and Philadelphia Ave.
- Upland Interceptor Relief – 19,623 LF of VCP pipeline from 4th St. to Mission Ave. on Imperial St, consisting of 2,525 Lf of 36-inch piping, 2,325 LF of 30-inch, 1,205 LF of 27-inch, 749 LF of 24-inch, 7,422 LF of 21-inch, 3,295 LF of 18-inch, and 2,044 LF of 15-inch piping.

Force Main System:

- Montclair Lift Force Main – 4,366 LF of ductile iron pipeline from Montclair Lift Station to Euclid Ave.
- San Bernardino Lift Force Main

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Archibald Trunk	54-inch – 62 MGD 36-inch – 18.1 MGD 30-inch – 21.5 MGD 24-inch – 11.9 MGD 20-inch – 8.3 MGD 18-inch – 7.4 MGD	3.1 ft/s 2.9 ft/s 2.0 ft/s 2.3 ft/s 6.0 ft/s 6.0 ft/s
Cucamonga Interceptor Relief	81-inch – 254 MGD 72-inch – 105 MGD 60-inch – 214 MGD 54-inch – 71.8 MGD	6.2 ft/s 4.0 ft/s 6.0 ft/s 5.6 ft/s
Cucamonga Interceptor	84-inch – 238 MGD 72-inch – 158 MGD 42-inch – 21.2 MGD 27-inch – 15.3 MGD	6.0 ft/s 5.6 ft/s 2.0 ft/s 6.0 ft/s
Cucamonga Trunk Relief	39-inch – 29.5 MGD 36-inch – 34.6 MGD 33-inch – 34.0 MGD 30-inch – 29.9 MGD 27-inch – 30.4 MGD 24-inch – 23.4 MGD	4.4 ft/s 5.8 ft/s 6.0 ft/s 5.6 ft/s 6.0 ft/s 5.2 ft/s
Etiwanda Trunk	42-inch – 41 MGD 36-inch – 45 MGD 30-inch – 28 MGD 27-inch – 14 MGD 24-inch – 18 MGD 21-inch – 14 MGD 18-inch – 6 MGD	3.0 ft/s 7.0 ft/s 5.0 ft/s 5.0 ft/s 7.0 ft/s 6.0 ft/s 6.0 ft/s
Fontana Interceptor	39-inch – 15.9 MGD 36-inch – 19.4 MGD 33-inch – 11.1 MGD 21-inch – 10.8 MGD 18-inch – 12.7 MGD	1.7 ft/s 2.1 ft/s
Fontana Interceptor Relief	78-inch – 98.4 MGD 72-inch – 79.8 MGD 66-inch – 83.5 MGD 54-inch – 67.4 MGD 48-inch – 79.5 MGD 42-inch – 18.6 MGD 36-inch – 17.6 MGD 30-inch – 18.3 MGD 27-inch – 23.2 MGD 21-inch – 12.3 MGD	
Freeway Trunk	39-inch – 20.6 MGD 33-inch – 18.4 MGD	
Grove Avenue Outfall	27-inch – 23.6 MGD 18-inch – 8.0 MGD 15-inch – 14.7 MGD 12-inch – 8 MGD	
Grove Interceptor	42-inch – 21 MGD 36-inch – 34 MGD 30-inch – 31.8 MGD 27-inch – 29 MGD 24-inch – 23.6 MGD 21-inch – 9.7 MGD 18-inch – 10.4 MGD	
Montclair Interceptor	36-inch – 36.9 MGD 30-inch – 42.1 MGD	
Turner Trunk	67-inch – 149 MGD 60-inch – 58 MGD 30-inch – 7 MGD 27-inch – 6.7 MGD 24-inch – 9 MGD 21-inch – 8.5 MGD	5.8 ft/s 3.6 ft/s 1.2 ft/s 1.2 ft/s 2.0 ft/s 2.5 ft/s
Upland Interceptor	24-inch – 16 MGD	6 ft/s
Upland Interceptor Relief	30-inch – 25.9 MGD	5.5 ft/s
Montclair Lift Force Main	36-inch – 31.6 MGD 30-inch – 31.5 MGD 27-inch – 16.1 MGD 24-inch – 13.1 MGD 21-inch – 15.9 MGD 18-inch – 7.4 MGD 15-inch – 5.2 MGD	5.4 ft/s 7.8 ft/s 5.9 ft/s 5.7 ft/s 7.0 ft/s 3.6 ft/s 4.3 ft/s
San Bernardino Lift Force Main	18-inch	

3. Asset Ratings

Table 2 Asset Ratings - Pipeline Segments (PS) Manhole (MH)

System	Total Assets (GIS)		Rating Scale* 1 = Excellent; 5 = Failing 1	2	3	4	5
Archibald Trunk	PS						
	MH						
Cucamonga Int. Relief	PS						
	MH						
Cucamonga Interceptor	PS						
	MH						
Cucamonga Relief	PS						
	MH						
Etiwanda Trunk	PS						
	MH						
Fontana Interceptor	PS						
	MH						
Fontana Int. Relief	PS						
	MH						
Freeway Trunk	PS						
	MH						
Grove Avenue Outfall	PS						
	MH						
Montclair Interceptor	PS						
	MH						
Turner Trunk	PS						
	MH						
Upland Interceptor	PS						
	MH						
Upland Int. Relief	PS						
	MH						
Montclair Lift Force Main	PS						
	MH						
San Bern. Lift Force Main	PS						
	MH						

* Ratings as defined in Appendix A; Collection Systems Assets

4. Asset History & Potential Projects

Table 4 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report*
Archibald Trunk	1963	
Cucamonga Interceptor	1973	
Cucamonga Inter. Relief	1987	
Cucamonga Trunk Relief	1983	
Etiwanda Trunk	1986	
Fontana Interceptor		
Fontana Interceptor Relief		
Freeway Trunk	1961	
Grove Avenue Outfall	1961, 2006, 2010	
Grove Interceptor	1961, 2006	
Montclair Interceptor	1975	
Turner Trunk	1969	
Upland Interceptor	1956	
Upland Interceptor Relief	1956, 1991	
Montclair Lift Force Main	1978	
San Bern. Lift Force Main		

* Refer to GIS Database – Condition Assessment Reports

Table 5 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – RS

Southern Regional Sewer System

1. Asset Profile

The Agency's regional wastewater treatment provides domestic and industrial disposal systems across a 242-square-mile service area to eight contracting agencies. These contracting agencies include the City of Chino, Chino Hills, Cucamonga Valley Water District, Fontana, Montclair, Ontario, Upland, and Monte Vista Water District.

The Regional Sewer System (RSS) conveys primarily domestic wastewater to IEUA's four regional water recycling facilities. The RSS has been separated into two systems and will be referred to in the system summary sheets as the Northern Regional Sewer System and Southern Regional Sewer System. The operation and maintenance of the RSS systems are the responsibility of the IEUA's Pretreatment and Source Control (PT&SC) Department's Collections System Group.

Southern Regional Sewer System

The Southern Regional Sewer System consists of sewer pipelines south of the 60 freeway and RP-1.

Gravity Sewer System:

- Chino Interceptor – 16,059 LF of pipeline from CCWRF to RP-5 and RP-2, consisting of 150 LF of 54-inch piping, 1,933 LF of 42-inch piping, 6,212 LF of 30-inch piping, 1,645 LF of 27-inch piping, and 6,118 LF of 24 piping.
- Eastern Trunk Sewer – 29,321 LF of pipeline from RP-1 connecting to the Kimball Interceptor at Hellman Ave., consisting of 41 LF of 81-inch piping, 30 LF of 67-inch piping, 4,964 LF of 48-inch piping, 10,766 LF of 42-inch piping, 2,246 LF of 39-inch piping, 6,387 LF of 36-inch piping, 4,783 LF of 33-inch piping, and 100 LF of 27-inch piping.
- Kimball Interceptor – 18,923 LF of pipeline from RP-5 east to Hellman Ave., consisting of 2,137 LF of 66-inch piping, 4,809 LF of 60-inch piping, 10,889 of 54-inch piping, and 1,087 LF of 48" piping.
- Los Serranos Trunk – 2,807 LF of pipeline from Pomona Rincon Rd. to El Prado Rd. There are 52 LF of 36" piping and 2,755 LF of 30" piping.
- Westside Interceptor – 23,806 LF of pipeline from Walnut Ave. and Eastend Ave. to Chino Ave. along Pipeline and ending in CCWRF, consisting of 1,297 LF of 24" piping, 10,473 LF of 21" piping, 7,391 LF of 18" piping, 2,719 LF of 15" piping, 1358 LF of 12" piping, and 565 LF of 10" piping.
- Westside Interceptor Relief Sewer – 40,715 LF of pipeline from Montclair diversion structure along Eastend Ave. to Chino Ave, Ramona Ave., Eucalyptus Ave., and Monte Vista Ave. to CCWRF, consisting of 2,575 LF of 54" piping, 4,948 LF of 42" piping, 1,623 LF of 36" piping, 8,803 LF of 33" piping, 1,358 LF of 30" piping, 18,300 of 27" piping, 866 LF of 24" piping, 1,773 LF of 21" piping, and 445 LF of 15" piping.
- CIW/Prado Park Lift Force Main
- RP-2 Lift Station Force Main

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Chino Interceptor	54" – 67.0 MGD 42" – 21.0 MGD 30" – 13.0 MGD 27" – 14.3 MGD 24" – 12.0 MGD	6.0 ft/s 1.8 ft/s 2.3 ft/s 3.3 ft/s 4.0 ft/s
Eastern Trunk Sewer	81" – 194 MGD 67" – X MGD 48" – 47 MGD 42" – 60.3 MGD 39" – 18.4 MGD 36" – 61.7 MGD 33" – 28.8 MGD 27" – 78.4 MGD	6.0 ft/s 6.3 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s
Kimball Interceptor	66" – 70.5 MGD 60" – 83.8 MGD 54" – 52.1 MGD 48" – 39.7 MGD	4.7 ft/s 6.3 ft/s 5.2 ft/s 5.6 ft/s
Los Serranos Trunk	36" – 17.9 MGD 30" – 28 MGD	
estside Interceptor	24" – 7.2 MGD 21" – 7.7 MGD 18" – 5.8 MGD 15" – 4.9 MGD 12" – 1.8 MGD 10" – 2.0 MGD	2.3 ft/s 3.1 ft/s 3.8 ft/s
Westside Interceptor Relief Sewer	54" – 31.9 MGD 42" – 21.7 MGD 36" – 26.6 MGD 33" – 30.2 MGD 30" – 13.6 MGD 27" – 21.0 MGD 24" – 28.2 MGD 21" – 31.6 MGD	2.3 ft/s 2.4 ft/s 3.2 ft/s 4.8 ft/s 2.0 ft/s 3.5 ft/s 6.2 ft/s 2.2 ft/s
CIW/Prado Park Lift		
RP-2 Lift Station Force Main		

3. Asset Ratings *(to be developed in future updates)*

Table 2 Asset Ratings - Pipeline Segments (PS) Manhole (MH)

System	Total Assets (GIS)		Rating Scale* 1 = Excellent; 5 = Failing				
			1	2	3	4	5
Chino Interceptor	PS						
	MH						
Eastern Trunk Sewer	PS						
	MH						
Kimball Interceptor	PS						
	MH						
Los Serranos Trunk	PS						
	MH						
Westside Interceptor	PS						
	MH						
Westside Inter. Relief Sewer	PS						
	MH						
CIW/Prado Park Lift	PS						
	MH						
RP-2 Lift Station Force Main	PS						
	MH						

* Ratings as defined in Appendix A; Collection Systems Assets

4. Asset History & Potential Projects

Table 4 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report*
Chino Interceptor		
Eastern Trunk Sewer		
Kimball Interceptor	1999	
Los Serranos Trunk		
Westside Interceptor		
Westside Interceptor Relief Sewer		
CIW/Prado Park Lift	1964, 1976, 1991, 1998, 2010	
RP-2 Lift Station Force Main		

* Refer to GIS Database – Condition Assessment Reports

Table 5 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

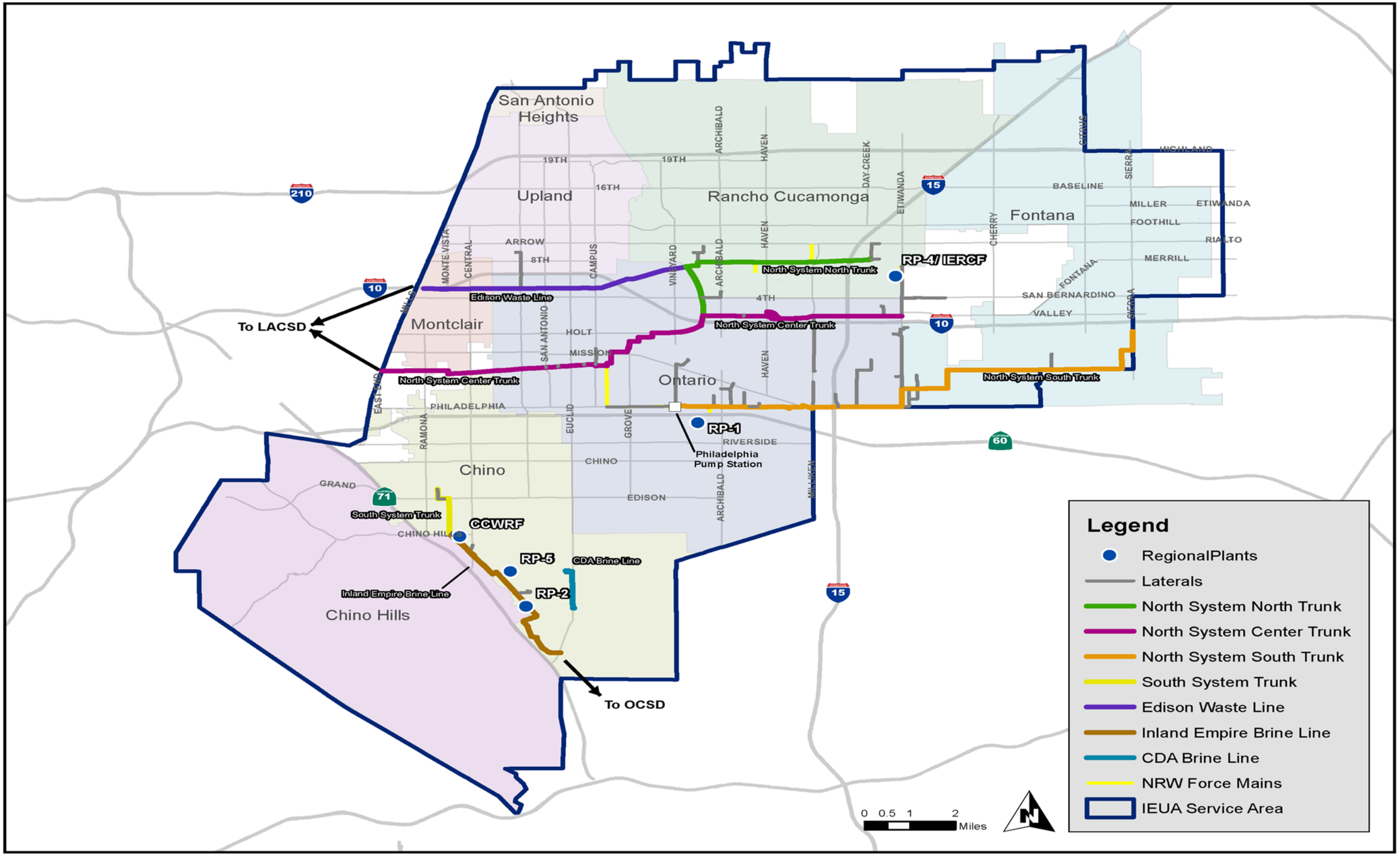

Figure 7-12: Non-Reclaimable Wastewater System (NRW) – Schematic

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Table 7-11: Non-Reclaimable Wastewater System – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	CW17101	NRW OE Projects FY16/17	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	10,000	-	-	-	-	-	-	-	-	-	***10,000***
2	CW18101	NRW OE Projects FY 17/18	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	10,000	-	-	-	-	-	-	-	-	***10,000***
3	CW19101	NRW OE Projects FY 18/19	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	10,000	-	-	-	-	-	-	-	***10,000***
4	CW20101	NRW OE Projects FY 19/20	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	-	10,000	-	-	-	-	-	-	***10,000***
5	CW21101	NRW OE Projects FY 20/21	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	-	-	10,000	-	-	-	-	-	***10,000***
6	CW22101	NRW OE Projects FY 21/22	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	-	-	-	10,000	-	-	-	-	***10,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
7	CW23101	NRW OE Projects FY 22/23	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	-	-	-	-	10,000	-	-	-	***10,000***
8	CW24101	NRW OE Projects FY 23/24	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	-	-	-	-	-	10,000	-	-	***10,000***
9	CW25101	NRW OE Projects FY 24/25	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	-	-	-	-	-	-	10,000	-	***10,000***
10	CW26101	NRW OE Projects FY 25/26	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	-	-	-	-	-	-	-	-	-	10,000	***10,000***
11	EN15044	SBCFCD NRW Easement	The project will fund the easement acquisitions for the regional NRW pipelines located in San Bernardino Flood Control District right of way.	NC	CC	515,000	-	-	-	-	-	-	-	-	-	***515,000***
12	EN17016	NRWS Emergency O&M Projects FY 16/17	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to	NC	OM	200,000	-	-	-	-	-	-	-	-	-	***200,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			be able to handle these issues each fiscal year.													
13	EN18016	NRWS Emergency O&M Projects FY 17/18	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	NC	OM	-	200,000	-	-	-	-	-	-	-	-	***200,000***
14	EN19016	NRWS Emergency O&M Projects FY 18/19	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	NC	OM	-	-	200,000	-	-	-	-	-	-	-	***200,000***
15	EN20016	NRWS Emergency O&M Projects FY 19/20	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues	NC	OM	-	-	-	200,000	-	-	-	-	-	-	***200,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.													
16	EN21016	NRWS Emergency O&M Projects FY 20/21	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	NC	OM	-	-	-	-	200,000	-	-	-	-	-	***200,000***
17	EN22016	NRWS Emergency O&M Projects FY 21/22	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	NC	OM	-	-	-	-	-	200,000	-	-	-	-	***200,000***
18	EN23016	NRWS Emergency O&M Projects FY 22/23	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline	NC	OM	-	-	-	-	-	-	200,000	-	-	-	***200,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.													
19	EN24016	NRWS Emergency O&M Projects FY 23/24	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	NC	OM	-	-	-	-	-	-	-	200,000	-	-	***200,000***
20	EN25016	NRWS Emergency O&M Projects FY 24/25	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	NC	OM	-	-	-	-	-	-	-	-	200,000	-	***200,000***
21	EN26016	NRWS Emergency O&M Projects FY 25/26	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency	NC	OM	-	-	-	-	-	-	-	-	-	200,000	***200,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
			funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.													
22	EN17014	NRWS Manhole Upgrades - 16/17	Project to repair/rehab NRWS manholes and pipelines	NC	RP	350,000	-	-	-	-	-	-	-	-	-	***350,000***
23	EN18014	NRWS Manhole Upgrades - 17/18	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	200,000	-	-	-	-	-	-	-	-	***200,000***
24	EN19014	NRWS Manhole Upgrades - 18/19	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	-	200,000	-	-	-	-	-	-	-	***200,000***
25	EN20014	NRWS Manhole Upgrades - 19/20	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	-	-	200,000	-	-	-	-	-	-	***200,000***
26	EN21014	NRWS Manhole Upgrades - 20/21	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	-	-	-	200,000	-	-	-	-	-	***200,000***
27	EN22002	NRW East End Flowmeter Replacement	This project will replacement flowmeter required by NRWS Agreement	NC	CC	175,000	200,000	-	-	-	-	-	-	-	-	***375,000***
28	EN22014	NRWS Manhole Upgrades - 21/22	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	-	-	-	-	200,000	-	-	-	-	***200,000***
29	EN23014	NRWS Manhole Upgrades - 22/23	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	-	-	-	-	-	200,000	-	-	-	***200,000***
30	EN24014	NRWS Manhole Upgrades - 23/24	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	-	-	-	-	-	-	200,000	-	-	***200,000***
31	EN25014	NRWS Manhole Upgrades - 24/25	Project to repair/rehab NRWS manholes and pipelines	NC	RP	-	-	-	-	-	-	-	-	200,000	-	***200,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – **Non-Reclaimable Wastewater System**

1. Asset Profile

The Agency operates the Non-Reclaimable Wastewater System (NRWS), which provides the disposal means for discharges of high-salt-content industrial wastewater. This wastewater is not suitable to be treated at the Agency's treatment plants. The NRWS transports non-reclaimable, salt-laden, industrial wastewater out of the Agency's service area to other treatment facilities in Los Angeles and Orange counties and to eventual discharge to the Pacific Ocean.

Northern Non-Reclaimable Waste System

- The North NRWS consists of five major trunk lines: the North, Central, and South trunk lines, the Edison Waste Line, and the Cucamonga Creek Trunk. The trunk lines collect industrial waste and convey the combined discharge to the County sanitation districts of Los Angeles County's sewer system.
- North System North Trunk – 22,887 LF of VCP pipeline in Rancho Cucamonga from Day Creek St. and Arrow St. along 8th St. to Hellman Ave.
- North System Center Trunk – 71,343 LF of VCP pipeline starting on Etiwanda Ave. and RP-4 in the City of Ontario running south to Ontario Mills Pkwy., west to Hellman Ave., southwest to Phillips Ave., and west to LACSD.
- North System South Trunk – 65,720 LF of VCP pipeline from Sierra Ave. and Slover Ave. in the City of Fontana to Jurupa Ave., west to Mulberry Ave, south on to Francis St., south on to Etiwanda Ave., and west to Philadelphia Ave to the Philadelphia pump station, where it is connected to the North System Center Trunk by the Philadelphia lift station force main.
- Edison Waste Line – 33,757 LF VCP of pipeline starting from Helms Ave. and 9th St. in Rancho Cucamonga, running south on Hellman Ave., and turning southwest to 5th Ave. in the City of Ontario, and running west along 5th St. to LACSD pipelines.
- Cucamonga Creek Trunk – 8,659 LF VCP of pipeline connecting the Edison Waste Line to the North System Center Trunk along Hellman Ave.
- Philadelphia Lift Force Main – 26,452 LF of two parallel force mains 12-inch and 18-inch VCP pipeline from the Philadelphia Pump Station west on Philadelphia Ave. and north on Bon View Ave. to the North System Center Trunk.

Southern Non-Reclaimable Waste System

The South NRWS serves industries in the south service area of the Agency, and the combined discharge is conveyed to Inland Empire Brine Line (IEBL) and ultimately to the sewer system of the Orange County Sanitation District.

Inland Empire Brine Line – 25,948 LF VCP and RCP of pipeline from Yorba Ave. and Edison Ave. to Monte Vista Ave., with a connection at CCWRF along Chino Creek to El Prado Rd. at Kimball Ave., extending southeast to Euclid Ave. and ultimately to OCSD. There are 15-inch VCP pipelines on Edison Ave., 15-inch VCP on Yorba Ave., 12-inch VCP on Monte Vista St., 27-inch RCP Central Ave/Easement, and 27-inch RCP along El Prado Rd.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	
North System North Trunk		
North System Center Trunk		
North System South Trunk	24-inch VCP 8-inch VCP	
Edison Waste Line		
Cucamonga Creek Trunk		
Philadelphia Lift Force Main	18-inch 12-inch	
Inland Empire Brine Line		

3. Asset Ratings

Table 2 Asset Ratings – Pipeline Segments (PS) Manhole (MH)

System	Total Assets (GIS)		Rating Scale* 1 = Excellent; 5 = Failing				
			1	2	3	4	5
North System North Trunk	PS						
	MH						
North System Center Trunk	PS						
	MH						
North System South Trunk	PS						
	MH						
Edison Waste Line	PS						
	MH						
Cucamonga Creek Trunk	PS						
	MH						
Philadelphia Lift Force Main	PS						
	MH						
Inland Empire Brine Line	PS						
	MH						

* Ratings as defined in Appendix A; Collection Systems Assets

4. Asset History & Potential Projects

Inland Empire Brine Line

According to the 2006 PBS&J condition assessment report of the IEBL line, 1/3 of the entire pipeline required rehabilitation/replacement, and 1/3 required re-inspection because of inaccessibility. The segments recommended for attention require considerable cleaning to remove debris, which has accumulated within the pipes and may contain hazardous constituents. Inspections were severely hampered by the debris accumulation. Additional inspection for many of the segments is recommended after the cleaning is complete.

Several manholes were found to be surcharged, while the manholes located at the southern-most end of the trunk sewer were inaccessible because of pressure lids.

Table 4 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report*
North System North Trunk		2006
North System Center Trunk		2006
North System South Trunk		2006
Edison Waste Line		2006
Cucamonga Creek Trunk		2006
Philadelphia Lift Force Main		2006
Inland Empire Brine Line		2006

*Refer to GIS Database – Condition Assessment Reports

Table 5 Potential Projects

System	Project Name	Project Description
NA	NA	NA

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Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Agency Laboratory

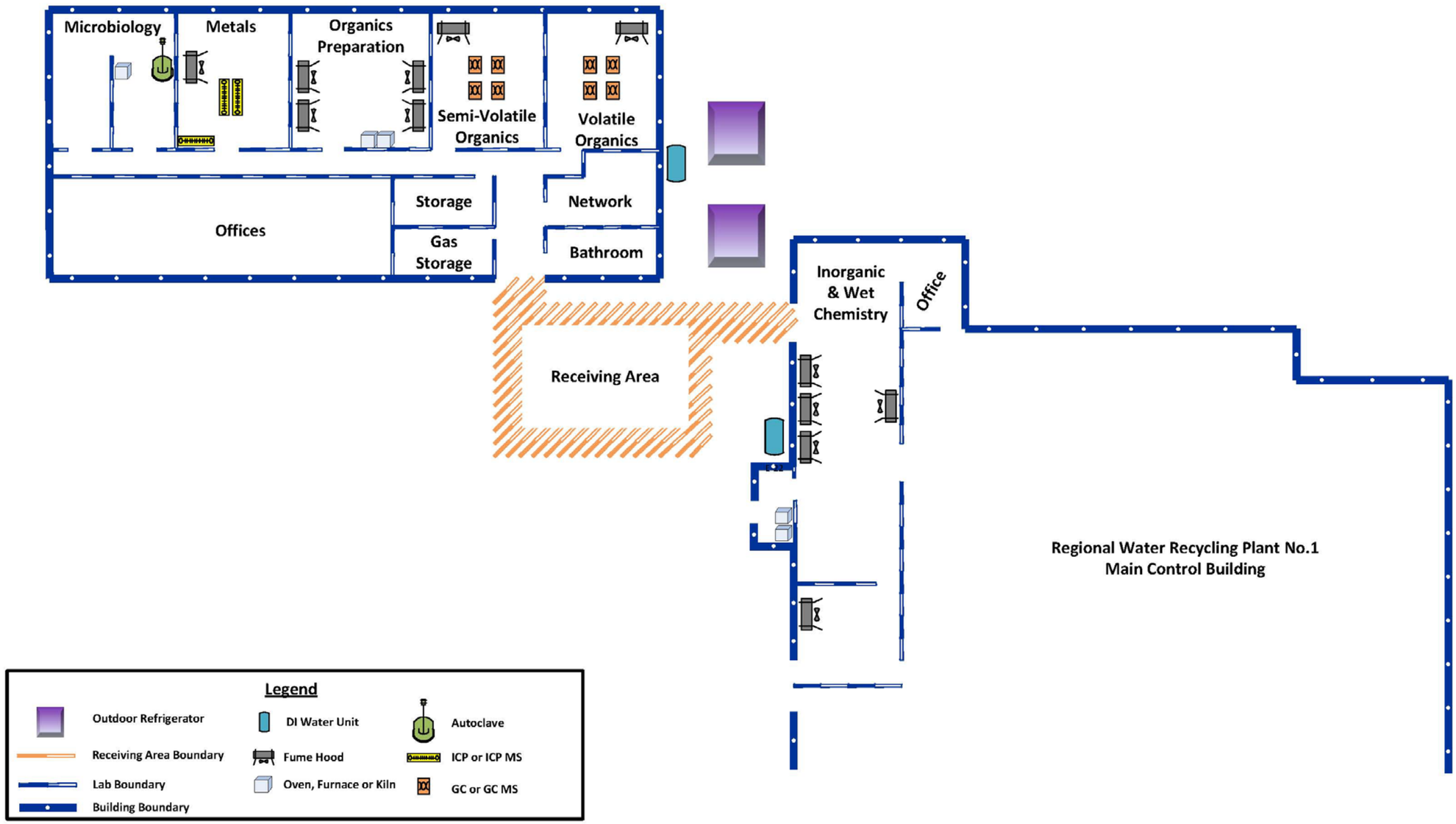

Figure 7-13: Agency Laboratory (Lab) – Schematic

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Table 7-12: Agency Laboratory – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	EN15008	Water Quality Laboratory	This project will replace the existing operation laboratory at RP-1. A possible site location will be south of Headquarters at RP-5.	RO	CC	7,000,000	10,000,000	8,000,000	-	-	-	-	-	-	-	***25,000,000***
2	LB17001	TKN Block Digester	Digestion Block for TKN analyses	GG	EQ	11,000	-	-	-	-	-	-	-	-	-	***11,000***
3	LB17002	Integrion HPIC		GG	EQ	41,000	-	-	-	-	-	-	-	-	-	***41,000***
4	LB17003	Dionex Integrion HPIC	IC analyzer	GG	EQ	41,000	-	-	-	-	-	-	-	-	-	***41,000***
5	LB20001	ICP instrument	Replacement ICP for Metals analysis	GG	EQ	-	-	-	200,000	-	-	-	-	-	-	***200,000***
6	LB20002	TOC instrument	Replacement TOC for Wastewater samples analyses	GG	EQ	-	-	-	35,000	-	-	-	-	-	-	***35,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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Asset Management System Summary – Lab

Agency Laboratory

1. Asset Profile

Agency Laboratory (Lab)
The Agency Laboratory (Lab) is located at Regional Water Recycling Plant No.1 in Ontario. The Lab is certified by the California Department of Public Health Environmental Laboratory Accreditation Program (ELAP) to perform 12 fields of testing and 35 specific approved methods. The lab was constructed in two phases: Phase 1 included a 1,900-square-foot laboratory space, and Phase 2 included a 4,300 square-foot-building. The Lab performs more than 80,000 analyses annually and sends out another 5,000 samples for analysis by a contracted laboratory. The Lab is broken into three groups: Wet Chemistry, Metals & Organic Chemistry, and Bioassay & Microbiology. The Lab analyzes samples from the Agency's wastewater plants, pretreatment and source control programs, desalination facility, and ground water recharge basins.

Metals & Organic Chemistry
The Metals & Organic Chemistry section is located in the expanded Phase 2 building. This type of chemistry uses specialized equipment to analyze a sample extract's makeup. Organic Chemistry specifically analyzes substances containing a carbon molecule. Metals/Inorganic Chemistry specifically analyzes substances that don't contain a carbon molecule. Some common analyses include mercury, metal salts, heavy metals, pesticides, and volatile and semi-volatile organics. Key pieces of equipment used are the Inductively Coupled Plasma Spectrometer (ICP), the ICP Mass Spectrometer (ICP MS), the Gas Chromatograph (GC), and GC Mass Spectrometer (GC MS).

Inorganic & Wet Chemistry
The Inorganic and Wet Chemistry section is located in the original Phase 1 building. This type of chemistry includes analyses performed in a liquid phase with beakers, test tubes and solvents. Some common analyses include TOC, BOC, COD, solids (total, dissolved, suspended, and volatile), ammonia, alkalinity, cyanide, and anions.

Microbiology
Microbiology is located in the expanded Phase 2 building. Microbiology is the study of microscopic organisms. Some common analyses include total and fecal coliform and bioassay. Bioassay is a specific scientific experiment that measures the effects of a substance on a living organism (Ceriodaphnia dubia; specie of water flea).

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Average)	Notes
Metals & Organic Chemistry		
Metals:		
Fume Hood	1 @ 100 fpm	Min
ICP	2 @ 157 sample batch	Max
ICP MS	1 unit	
Mercury Analyzer	1 @ 62 sample batch	Max
Auto Block Digester	1 @ 54 sample batch	Max
Peristaltic Pump	2 units	
Organics Preparation:		
Fume Hood	4 @ 100 fpm	Min
Extractor System	3 units; 1 controller	
Kiln	1 @ 450°C	
Oven	1 @ 300°C	
Evaporator	3 @ 300 ml	
	2 @ 50 or 200 ml	
Dishwasher	2 units	
Semi-Volatile Organics:		
Fume Hood	1 @ 100 fpm	Min
GC	2 @ 25 min per sample	Max
GC MS	2 @ 25 min per sample	Max
Volatile Organics:		
Fume Hood	2 @ 100 fpm	Min
GC	2 units	
Concentrator	2 @ 51 sample batch	Max
Auto Sampler	2 units	
Refrigerator	1 unit	
Gas System:		
Argon	160 liters	
Helium	300 ft^3	
Nitrogen	200 ft^3	
DI Purification	1 unit	
Refrigerator	1 @ 960 ft^3 13 to 41°F	
Inorganic & Wet Chemistry		
Fume Hood	6 @ 100 fpm	Min
Oven	2 @ 180°C	
	2 @ 104°C	
Furnace	2 @ 550°C	
Incubator	2 @ 20°C	
TOC Analyzer	1 @ 70 sample batch	Max
	1 @ 75 sample batch	Max
Ion Chromatograph	2 @ 49 sample batch	Max
Colorimeter	1 @ 120 sample batch	Max
Auto Colorimeter	2 unit	
Auto Sampler	2 @ 120 sample batch	Max
Auto Titrator	1 @ 36 sample batch	Max
Nano Pure Filter	1 unit	
Dishwasher	2 units	
Gas System:		
Helium	2 @ 200 ft^3	
	2 @ 300 ft^3	
Nitrogen	2 @ 300 ft^3	
DI Purification	1 unit	
Refrigerator	1 @ 960 ft^3 13 to 41°F	
Microbiology	1 @ 35°C	
Autoclave	1 @ 120°C	
	2 @ 35°C	
Incubator	1 @ 44.5°C	
Water Bath	2 @ 180°C	
Oven	1 unit	
Temp. Control	1 unit	
Nano Pure Filter		

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Metals & Organic Chemistry	4	4	3	4
Inorganic & Wet Chemistry	4	4	3	4
Microbiology	4	4	3	4

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Metals & Organic Chemistry
The building has ventilation problems and roof leaks. A black dusty and gritty substance covers the counters and expensive lab equipment through all areas. The temperature controls for the building, which are crucial for sensitive lab equipment, fail regularly. The outdoor refrigerator requires routine spare parts, but the structure is sound. Because of constant upgrades of equipment, spare parts become unavailable through the manufacturers. The GC is currently being operated until failure.

The Lab Department will budget for routine replacement of equipment.

Project EN15008 will replace the existing laboratory at RP-1 and replace new lab equipment once the new lab is constructed.

Inorganic & Wet Chemistry
The building has a lack of storage space and problems with roof leaks, and a portion is inadequately protected from weather elements. In addition, there is concern about the effectiveness of the fume hoods. The outdoor refrigerator requires routine spare parts, but the structure is sound (same equipment as above). Because of constant upgrades of equipment, spare parts become unavailable through the manufacturers.

The Lab Department will budget for routine replacement of equipment.

The current Ion Chromatograph machine has fulfilled its need and is at the end of its useful life. A potential project will replace this machine and provide analysis for additional constituents.

Project EN15008 will replace the existing operation laboratory at RP-1.

Microbiology
Please refer to the Metals & Organic Chemistry discussion under Key Issues related to the building, as Microbiology shares the same building. The autoclave should be replaced every five to ten years; spare parts are used between replacements to ensure continuous operation.

The Lab Department will budget for routine replacement of equipment.

Project EN15008 will replace the existing operation laboratory at RP-1.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Metals & Organic Chemistry	1997	2005
Inorganic & Wet Chemistry	1979	2005
Microbiology	1997	2005

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
Wet Chemistry	Ion Chromatograph Machine Replacement	Replace and upgrade the current Ion Chromatograph machine

End of System Summary

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Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Agency Headquarters

Figure 7-14: Agency Headquarters – Schematic

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Table 7-13: Agency Headquarters – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	CP16003	Headquarters Roofing Replacement	HQ roof replacement for both buildings	GG	OM	450,000	-	-	-	-	-	-	-	-	-	***450,000***
2	CP16004	Headquarters LEED OM Certification	Performance period of the certification.	GG	OM	40,000	25,000	-	-	-	-	-	-	-	-	***65,000***
3	CP16006	Headquarters Chair Replacement	Replacement of all task and office chairs for staff at HQ and some admin areas at the treatment plants.	GG	CC	150,000	-	-	-	-	-	-	-	-	-	***150,000***
4	EN13012	Magnolia Channel Monitoring & Maintenance	The Mag Channel will need to be weeded of invasive plant species, and maintain natural native habitat per the Habitat Mitigation and Monitoring Plan (HMMP) for the project. A certified biologist needs to oversee the work, monitor the progress and complete quarterly reports which are then submitted to the regulatory agencies for compliance. Water quality monitoring will also be performed to demonstrate project effectiveness and meet conditions of the grant.	RO	OM	10,000	10,000	-	-	-	-	-	-	-	-	***20,000***
5	EN16047	HQ Parking Lot FY15/16	FY15/16-Remove and Replace 33 concrete stalls, remove and replace trees, and install root barriers.	GG	OM	415,000	-	-	-	-	-	-	-	-	-	***415,000***
6	EN16048	As-Built Database Upgrades	Provide a tool to facilitate the search capability of as-builts.	GG	OM	150,000	-	-	-	-	-	-	-	-	-	***150,000***
7	EN16055	Headquarters Back Up Generator	Provide Back-up Power to HQ and Water Quality Laboratory	RO	CC	400,000	-	-	-	-	-	-	-	-	-	***400,000***
8	EN16068	Main Office Permit Office	Turn reproduction center into a Permit Office.	GG	CC	293,000	-	-	-	-	-	-	-	-	-	***293,000***
9	EN17012	Capital Project's Document Management Program	Construction Management tracking software upgrades.	GG	OM	-	50,000	-	-	-	-	-	-	-	-	***50,000***
10	EN17023	HQ Drainage Investigations	This project will evaluate potential drainage issues on the HQ and recommendations will be prepared.	GG	OM	50,000	-	-	-	-	-	-	-	-	-	***50,000***

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
11	EN20008	HQ Parking Lot FY19/20	Make repair to Agency Main Headquarters' Parking lot and stalls.	GG	OM	-	-	-	250,000	-	-	-	-	-	-	***250,000***
12	EN21002	Chino Creek Wetlands and Educational Park Upgrades	Grant dependent project to facilitate the education program and increase community involvement the Park needs three ramadas (pavilions) with educational signage, a restroom/storage facility and the construction of a pervious parking lot with additional signage.	RO	CC	-	-	-	-	900,000	958,000	-	-	-	-	***1,858,000***
13	EN21020	Primavera Enhancements	Implementation of P6 ERP Portfolio: Which will include a Management Plan, a step by step procedure to implement the EPS Portfolio, assist agency in EPS Portfolio Implementation, train staff in building project schedules, review schedules against baseline; Train Analyst and Supervisor Staff in maintaining ERP system including EPS security levels, and monthly updates of rolled up individual portfolios into a master portfolio and report writing. Create training materials including step by step contractor schedule review procedures. Project will also include 1 x/month 1 hour training sessions for 12 months and a 2 hour claims management workshop.	GG	CC	-	-	-	-	100,000	-	-	-	-	100,000	***200,000***
14	EN24004	HQ Parking Lot FY23/24	(0) Make repair to Agency Main Headquarters' Parking lot and stalls.	GG	OM	-	-	-	-	-	-	-	250,000	-	-	***250,000***
15	PK11001	Water Discovery Field Trip & Bus Grant	Agency's Educational Program facility through the Chino Creek Wetlands and Educational Park partially funded through a grant from CA Parks & Recs Department. Grant funding has been expanded through 2020	RO	RE	50,000	40,000	40,000	2,000	-	-	-	-	-	-	***132,000***
16	PL17002	Headquarters Solar Photovoltaic Power Plants Phase II	HQ Rooftop and Carports Solar - Direct Purchase	RC	CC	1,300,000	100,000	-	-	-	-	-	-	-	-	***1,400,000***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – HQ
Agency Headquarters and Park

1. Asset Profile

Headquarters
Structures
Two 33,000-square-foot tilt-up-construction single stores contain office space, conference rooms, a board room, and key information system equipment used for agency business functions. Most of the non-wastewater treatment staff uses these two buildings for day-to-day business. The buildings were built to LEED Platinum 2004 certifications by incorporating several eco-friendly sustainable components.

Heating Ventilation and Air Conditioning (HVAC)
The Central Energy Plant serves headquarters buildings A, B, and the RP-5 REEP control room. Each building is air conditioned with a single variable air volume (VAV) air handler with chilled and heated water coils. VAV and VAV with reheat (VAV/R) terminals are pressure independent. Heating is provided by hot water preheat coils in the air handlers and hot water reheat coils in the VAV/R terminals. The REEP control and electrical rooms are air conditioned with constant-volume chilled-water fan coils. There are a total of four chilled water nodes with a connected cooling load of 144.5 tons cooling. Space heating connected load is 590,000 btuh. Hot water is also used for radiant floor heating in the main entrances and locker rooms.

Plumbing
The headquarters facility has traditional plumbing to bathroom fixtures including sinks, showers, toilets, and flushless urinals. Other fixtures include custodian closets and various outdoor hose bibs. Main lines feed hot water from the central plant to the building, where the hot water is used in various heating and cooling aspects of the building. The building is also equipped with a fire suppression system.

Chino Creek Wetlands and Educational Park
The 22-acre park was designed to restore native habitat and natural drainage that feeds into Chino Creek Reach I, showcasing the environmental values of this ecologically rich region of Southern California.

Water Ponds
An aesthetic water feature receives flow from a recycled water service. The ponds hold water and can recirculate for a waterfall feature between the two ponds. The overflow of the ponds flows down a stream to the extended detention basin.

Extended Detention Basin
The detention pond provides initial storage and detention for storm flows. It also serves as a preliminary settling pond for sediments, potentially reducing total suspended solids, and provides the primary storage pool, where flows are conveyed to one of three flow paths: the Surface Flow Wetlands and the Subsurface Flow Wetlands via two stop-log structures. A concrete/rip rap spillway is provided for the 100-year-storm event that would overflow the stop-log structures. The spillway feeds the surface bioswale system.

Surface Wetlands
The Surface Wetlands is a series of several deep water ponds that provide traditional natural system nutrient removal. A combination of emergent vegetation bands and deep and shallow zones provides higher retention time and less hydraulic short-circuiting and supports the microbial processes that result in water quality improvement. The final pond/habitat lake includes dense patches of emergent marsh and open water to provide suitable foraging habitat for water birds. Flow from the habitat lake exits a stop-log structure and flows to the effluent structure.

Subsurface Wetlands
Flow from the detention basin stop-log structure enters three engineered wetland cells. Each cell has a loose pea-gravel soil mixture that supports the root structure of nutrient-removal plant species. The configuration provides high surface area of water flows to the plant root structure for nutrient removal, low potential for hydraulic short-circuiting, and the most potential for highly efficient nutrient removal. Each cell controls the water level via a stop-log structure.

Bioswale
The bioswale system receives overflow from the extended detention basin and directs flow to the effluent structure. The bioswale has several energy-dissipation and soil-stabilization components, including planted willows, mulefat, geotextile soil fabric, rip rap, and a large stabilized tree root bole.

Intermittent Stream
The intermittent stream on the west side of the site conveys infrequent storm flows, providing preliminary water quality treatment, and consists of drier riparian habitats. Upland woodland and grassland areas provide aesthetically pleasing areas for visitors to walk through and picnic, while demonstrating upland habitats historically common in many hillsides and valleys. The effluent flow from this system flows into the effluent structure.

Effluent Structure
The concrete effluent structure receives surface flow from the intermittent-stream and swale system and bioswale system and receives piped flow from the Habitat Lake. The combined flow then flows south to the RP-5 Santa Ana River Outfall, where it follows the existing waterways.

Education
The purposes of the wetlands are to demonstrate natural-water treatment and upland habitats. The Agency encourages educational awareness through interactive trails with informational signage throughout the park, an information center, scheduled tours, the distribution of educational pamphlets and materials, and presentations to local/regional schools The education and informational stations focus on different water and wetlands themes. Station examples include water testing, microscopic pond life viewing, and bird watching. Some stations consist of large obsolete wastewater treatment plant equipment that has been modified and placed in the park to serve as an elevated lookout platform; visual volume references; and shade structure. There is appropriate signage for each station. The Park also has a small portable building used for storage and office space to facility educational opportunities in the Park.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Headquarters	14 acres	
Structures	2 at 33,000 sq ft ea. 194 Office spaces 11 Conference Rooms 7 kitchens	
HVAC	144.5 cooling tons 590,000 btuh space heating	
Plumbing	35 toilets 12 urinals 33 sinks 9 showers	
Chino Creek Park	22 acres	
Water Ponds	2 pumps @ 350 gpm	
Extended Detention Basin	3.1 acre-ft	Volume
Surface Wetlands	7.3 acre-ft	Volume
Subsurface Wetlands Pea Gravel	3 cells Approx. 170 ft by 40 ft 2.5 ft depth	Each
Bio swale	700 LF	
Intermittent Stream	1300LF	
Effluent Structure	20 ft x 8 ft x 6 ft	Vault
Education Stations Trails	 11 stations 1.7 miles	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Headquarters				
Structures	4	3	3	3
HVAC	4	3	3	4
Plumbing	2	3	2	3
Chino Creek Park				
Water Ponds	3	3	3	3
Extended Detention Basin	4	3	3	4
Surface Wetlands	3	3	3	3
Subsurface Wetlands	4	3	3	3
Bioswale	2	3	3	3
Intermittent Stream	3	3	3	3
Effluent Structure	2	3	3	3
Education	3	3	4	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

Headquarters
Structures
Cracks have been observed on the walls and parking spaces, indicating differential settling of the ground under the headquarters complex. A potential project will evaluate the extent of the settling to address its impacts. Roofing leaks have been observed during wet weather periods. A potential project will repair/replace the roof diaphragm.

Heating Ventilation and Air Conditioning (HVAC)
The Central Energy Plant has limited backup equipment and is undersized for future expected uses, specifically the future Central Lab project. Since the recent rehab, the Central Plant is still having issues, so a condition assessment is needed to identify potential solutions.

A potential project is needed upgrade controls, add backup equipment and expand process required for future uses.

Plumbing
Last year the fire-suppression-system piping broke, flooding a large portion of the headquarters office space. The failure was caused by excessive corrosion. Maintenance has a project to evaluate the condition of all the piping at the headquarters complex. Recent vandalism and theft has resulted in equipment being stolen from the Agency property.

Chino Creek Wetlands and Educational Park
Extended Detention Basin
Soil erosion has been observed on several slopes of the extended detention basin from storm water runoff. Engineering is working on projects to protect the slopes from further erosion.

Education
The park currently has limited use for school field trips and outreach because of the lack of shaded areas and permanent restroom facilities.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Headquarters		
Structures	2003	2013/2014
HVAC	2003	Planned 2015
Plumbing	2003	
Chino Creek Park		
Water Ponds	2003	
Extended Detention Basin	2007	
Surface Wetlands	2007	
Subsurface Wetlands	2007	
Bioswale	2007	
Intermittent Stream	2007	
Effluent Structure	2007	
Education	2007	

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
HQ Structures	HQ Parking Lot	Remove and Replace concrete stalls, remove and replace trees, and install root barriers.
HQ HVAC	Central Energy Plant HVAC	Upgrade controls, add backup equipment and expand process required for future uses
HQ Structures	HQ Roofing Repairs	Repair or Replace roof diaphragm to reduce leakage during wet weather.

End of System Summary

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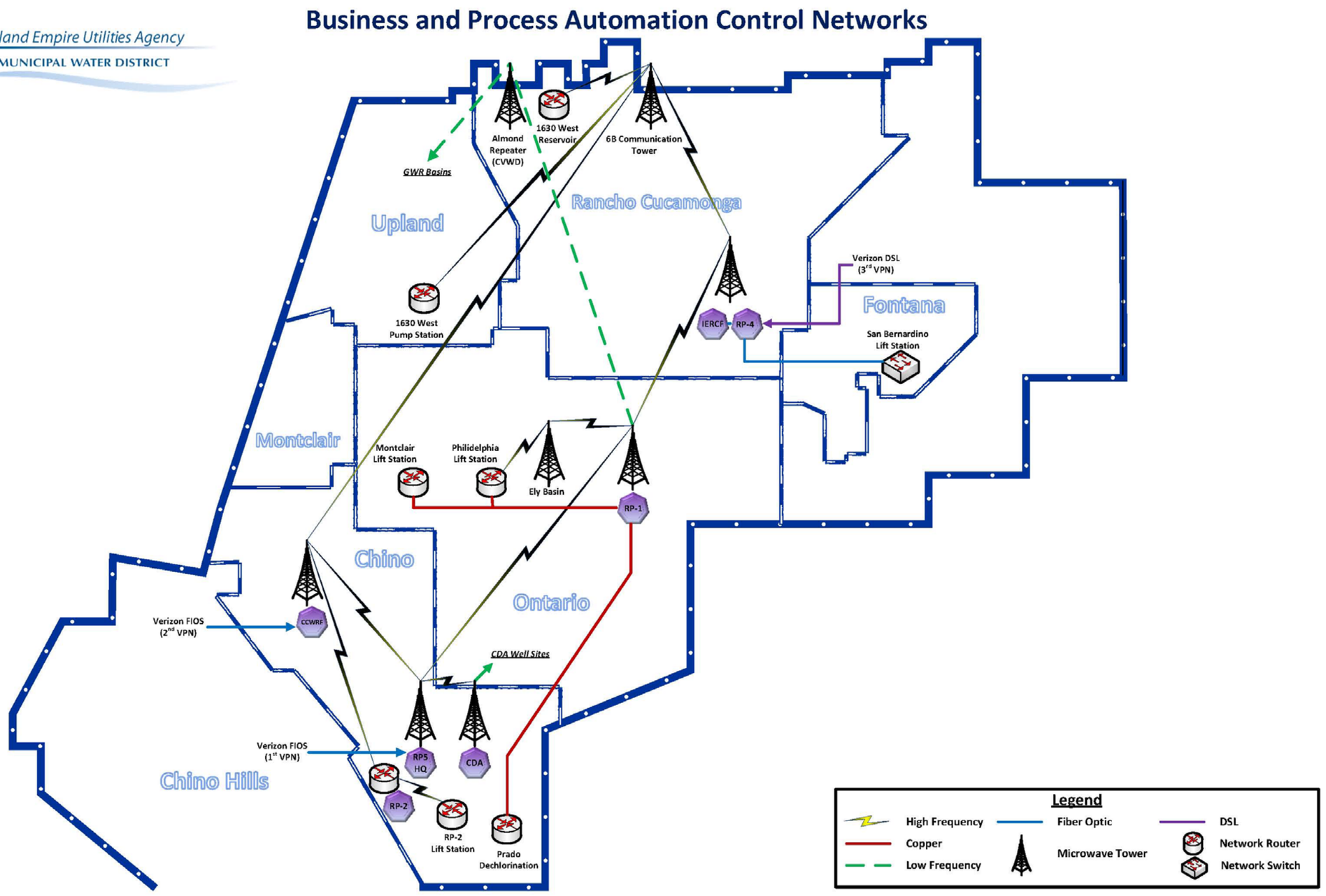

Figure 7-15: Business (BIZ) & Process Automation Control (PAC) Networks – Schematic

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Table 7-14: Business Network and Process Automation Control Network – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
1	IS17014	Philadelphia Lift Station Licensed Radio Upgrade		RO	RP	51,500	-	-	-	-	-	-	-	-	-	***51,500***
2	EN16049	Conference Rooms Audio Visual Upgrades	Upgrade the Audio/Video equipment in the conference rooms.	GG	RP	400,000	640,000	10,000	-	-	-	-	-	-	-	***1,050,000***
3	IS14025	FINANCE PROCESS/SAP FUNCTIONAL ANALYSIS	Needs assessment on SAP financial and grants management modules.	GG	EQ	40,000	-	-	-	-	-	-	-	-	-	***40,000***
4	IS15001	HCM PHASE 2-SELF SERVICE/HR PROCESS AUTO	HCM Phase 2 HR Process & Automation & ESS/MSS Enhancements	GG	EQ	50,000	100,000	-	-	-	-	-	-	-	-	***150,000***
5	IS15003	DOCUMENT/RECORDS MANAGEMENT SYSTEM	Document Management System - Implementation	GG	EQ	414,000	-	-	-	-	-	-	-	-	-	***414,000***
6	IS15020	Process Automation Controls IT Improvement	Annual PAC network improvements.	RO	RP	500,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	***3,200,000***
7	IS16001	HCM PHASE2 - POSITION BUDGETING & CONTRO	HCM Phase 2 Position Budgeting & Control	GG	EQ	-	206,000	-	-	-	-	-	-	-	-	***206,000***
8	IS16003	SAP Archiving	SAP Archiving	GG	EQ	-	50,000	-	-	-	-	-	-	-	-	***50,000***
9	IS16020	SAP User Interface Improvement	Assess UI improvement needs and implementation	GG	EQ	102,535	-	-	-	-	-	-	-	-	-	***102,535***
10	IS16021	SAP Roadmap & Strategy (change name to "SAP enhancements"	For various enterprise systems improvements (SAP HANA in FY19, SAP Cloud in FY18) From TMP	GG	EQ	150,000	150,000	300,000	400,000	250,000	250,000	250,000	250,000	250,000	200,000	***2,450,000***
11	IS17004	Business Network Equipment Replacement and Improvements	Annual BIZ network improvements. Includes printer replacement project (formerly IS17008)	GG	RP	93,792	155,000	155,000	155,000	150,000	150,000	150,000	150,000	150,000	150,000	***1,458,792***
12	IS17007	GIS Master Plan	Assess GIS needs and develop master plan.	GG	OM	50,000	-	-	-	-	-	-	-	-	-	***50,000***

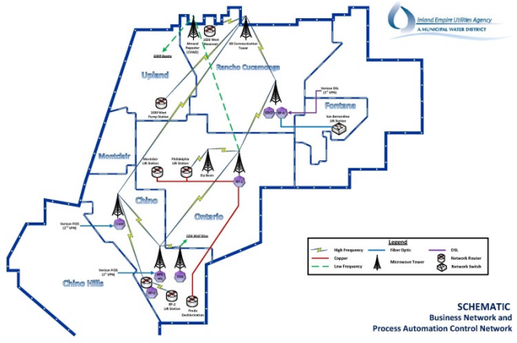
#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Ten-Year Total
13	IS17013	Exchange (Email) Software Upgrade	Annual BIZ network improvements.	GG	RP	54,500	-	-	-	-	-	-	-	-	-	***54,500***
14	IS17015	Replace VM Host Server - RP-4		RO	RP	44,800	-	-	-	-	-	-	-	-	-	***44,800***
15	IS17016	Host Servers for Test Environment		RC	RP	44,400	-	-	-	-	-	-	-	-	-	***44,400***
16	IS17017	1630 East Licensed Radio Upgrade	Project to replace equipment that is at end of useful life	WC	RP	30,500	-	-	-	-	-	-	-	-	-	***30,500***
17	IS17018	HyperV Host Server	New Test Environment	GG	RP	23,500	-	-	-	-	-	-	-	-	-	***23,500***
18	IS17020	VantagePoint Connectors		RO	RP	15,000	-	-	-	-	-	-	-	-	-	***15,000***
19	IS17021	Keyboard/ Video/ Monitor Console Replacement	Annual BIZ network improvements.	GG	RP	6,485	-	-	-	-	-	-	-	-	-	***6,485***
20	IS17022	VersaView Replacement Project	Project to replace equipment that is at end of useful life	WC	RP	47,000	-	-	-	-	-	-	-	-	-	***47,000***
21	IS17023	RP-4 Replace OITS		RO	RP	58,720	-	-	-	-	-	-	-	-	-	***58,720***
22	IS17025	New PC Workstation	2 new fellows from Civic Spark and one new Associate Engineer for Planning Department	GG	EQ	9,000	-	-	-	-	-	-	-	-	-	***9,000***
23	IS17106	Virtualization Host Server Replacement		RO	RP	100,000	-	-	-	-	-	-	-	-	-	***100,000***
24	IS17012	RP-1 Centrifuge Plant Ethernet Upgrade		RO	RP	59,000	-	-	-	-	-	-	-	-	-	***59,000***
25	IS17019	Replace VM Host Server - RP-1		RO	RP	22,400	-	-	-	-	-	-	-	-	-	***22,400***
26	IS16019	RP-1 Filter PLC Upgrade Project		RO	RP	52,500	-	-	-	-	-	-	-	-	-	***52,500***

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – BIZ/PAC

Business Networks

1. Asset Profile



Business Network
The Business Network (BIZ) is an Agency network that connects local area business networks throughout the Agency together through the use of a wireless Wide Area Network (WAN) and provides access to the internet. Communication within the network is transmitted through cable media and wireless media. The wireless media communication supports the BIZ and Process Automation & Control (PAC) systems. BIZ provides the shared use of business-related resources, such as storage servers, printers, email, and interpersonal communications. The BIZ is composed of servers located at the Headquarters Buildings, RP-1, and RP-5. Network switches connect each networked asset to the BIZ network. There are two sets of assets included in the BIZ: productivity tools and fixed assets.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Average)	Notes
BIZ – Productivity Tools		
A/V Equipment	14 units	
Cell Phone	76 units	
Camera	18 units	
Mobile Hot Spot	55 units	
Monitor	660 units	
Printer	125 units	
Scanner	21 units	
Tablet	23 units	
Workstation	300 units	
BIZ – Fixed Assets		
Server		
HyperV	12 units	
Server	50 units	
VMware	11 units	
UPS	4 units	
Network Switch	90 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
BIZ – Productivity Tools	3	3	3	3
BIZ – Fixed Assets	3	3	3	3

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

BIZ and PAC Networks
Assets are replaced based on product lifecycle. A technology consultant is evaluating the BIZ and PAC networks to analyze potential hardware and software upgrades; Project IS15012.

Equipment replacement lifecycle: PLC (12 years), UPS (10 years), Workstation (4 years), OIT (10 years), server (5 years), I/O (15 years), Printer (10 years), network switches (10 years), and software licenses are typically renewed annually.

BIZ – Productivity Tools
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets.

BIZ – Fixed Assets
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
BIZ – Productivity Tools		
BIZ – Fixed Assets		

* Appendix B – Condition Assessment Reports

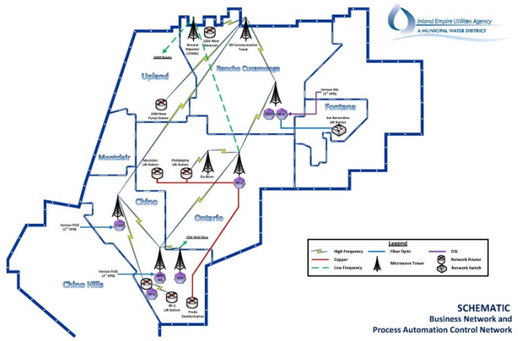
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

Asset Management System Summary – BIZ/PAC

Process Automation Control Networks

1. Asset Profile



Process Automation & Control (PAC)
The Process Automation & Control System (PAC) is an Agency network that connects local area process automation networks together through a wireless Wide Area Network (WAN). The communications within the networks are transmitted through cable media and wireless media. A series of microwave transmitting towers creates a loop of wireless communication linking all the facilities. The primary communication towers are located at RP-1, CCWRF, RP-4, RP-5, and the Northwest 6B Tower. Cucamonga Valley Water District's Almond Street Repeater provides communication and control of the ground water recharge basins. Network switches connect PLCs, operator work stations, and other network devices connected to the PAC network. An operator is able to log on the PAC network to control and monitor a facility using the Supervisory Control and Data Acquisition (SCADA) system or Distributed Control System (DCS) system.

The SCADA systems are composed of Rockwell Automation software and Allen Bradley PLCs. The DCS systems use the Foxboro DCS system from Invensys and a combination of Invensys Control Processors and Allen Bradley PLCs. Field output data is transmitted to either a PLC or a centralized control processor, and the SCADA/DCS systems provide a single platform to monitor all the field data, make set point changes, establish/monitor alarm conditions, and control equipment within an entire facility. Field data is also transmitted to a historian, that is, a storage server, to allow trending or analytical analysis in the future.

There are two sets of assets included in the PAC: productivity tools and other fixed assets.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Average)	Notes
Productivity Tools		
Tablet	25 units	
Workstation	50 units	
Fixed Assets		
Microwave		
IEUA	5 units	
CVWD	1 unit	
DCS System	4 units	
SCADA System	4 units	
Server		
HyperV	3 units	
Server	49 units	
VMware	15 units	
UPS	88 units	
Network Switch	120 units	
PLC	250 units	
OIT	140 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Productivity Tools	3	3	3	3
Fixed Assets	4	4	3	4

* Ratings as defined in Appendix A; General System Assets

4. Key Issues for Further Investigation

PAC Networks
Assets are replaced based on product lifecycle. A technology consultant is evaluating the BIZ and PAC networks to analyze potential hardware and software upgrades; Project IS15012.

Equipment replacement lifecycle: PLC (12 years), UPS (10 years), Workstation (4 years), OIT (10 years), server (5 years), I/O (15 years), Printer (10 years), network switches (10 years), and software licenses are typically renewed annually.

BIZ – Productivity Tools
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets.

BIZ – Fixed Assets
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets.

PAC – Productivity Tools
Maintenance will be budgeted in the Department's budget for routine replacement and rehab of assets.

PAC – Fixed Assets
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets. Project IS15020 will improve the network annually.

To improve communication new monopoles, radios, and microwaves are being installed under Project EN13040, EN13042, and EN13043.

DCS software and associated hardware need to be updated. Currently the Agency operates two different SCADA systems; it is the Agency's goal to transition to Allen Bradley PLC driven control. Project EN13016 will replace the current DCS system.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Microwave Towers		
Fixed Assets		

* Appendix B – Condition Assessment Reports

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

Appendix A: Asset Ratings

Definitions of the ratings for each of the Failure Modes

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ASSET RATINGS DEFINITIONS

A. GENERAL SYSTEM ASSETS:

Table A-1 Condition Rating

Rating	Definition
1	New or Excellent Condition
2	Minor Defects Only
3	Moderate Deterioration (Does not require immediate action)
4	Significant Deterioration
5	Virtually Unserviceable

The rating is intended to show the degree of deterioration to structures and equipment.

Table A-2 Redundancy Rating

Rating	Definition
1	High level of redundancy – treatment process is not impacted by multiple units being out of service
2	Significant level of redundancy – treatment process is not impacted by one unit being out of service for an extended period of time
3	Adequate level of redundancy – treatment process is not impacted by one unit being out of service
4	Inadequate level of redundancy – treatment process is negatively impacted by one unit being out of service
5	No redundancy – intended process function cannot be achieved when asset is out of service

The rating is intended to show the impact to the treatment process when the asset in question is out of service.

Table A-3 Function Rating

Rating	Description
1	Exceeds all Functional Requirements
2	Exceeds some Functional Requirements
3	Meets all Functional Requirements
4	Fails some Functional Requirements
5	Fails all Functional Requirements

The rating is the ability for the asset to meet the functional requirements that allow performance targets to be met.

Table A-4 Reliability Rating

Rating	Definition
1	Frequency of failure is significantly lower than expected
2	Frequency of failure is lower than expected
3	Frequency of failure is consistent with design expectations
4	Frequency of failure is higher than expected
5	Frequency of failure is significantly higher than expected

The rating is intended to show the tendency for the asset to experience a failure.

B. COLLECTION SYSTEM ASSETS

Table B-1 Condition Rating

Rating	Definition
1	New Condition (Excellent)
2	Minor Defects Only (Good)
3	Moderate Deterioration (Does not require immediate action)
4	Significant Deterioration (Poor)
5	Virtually Unserviceable (Failing)

- *If the inspector feels that corrective measures are needed within 6 months, then the rating would be 5 (immediate/emergency work to be done).*
- *If the inspector feels that corrective measures are needed within 2 years, then the rating would be 4 (request rehab/repair work to be designed and executed by Engineering). Note: need to discuss whether 2 years is the right number or maybe 3 years.*
- *If the inspector feels that corrective measures are not needed but the asset should be re-inspected within 3 years, then the rating would be 3.*
- *If the inspector feels that corrective measures are not needed and the asset can be re-inspected in 5 years, then the rating would be 2.*
- *If the inspector feels that corrective measures are not needed and the asset can be considered for re-inspection beyond 5 years, then the rating would be 1.*

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Appendix B: Condition Assessment Reports

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www.hdrinc.com/schiff
Corrosion Control and Condition Assessment (C3A) Department

June 20, 2014 via email: fconcemino@ieua.org

INLAND EMPIRE UTILITIES AGENCY
6075 Kimball Ave
Chino, California 91708

Attention: Mr. Francis Concemino

Re: Inspection Report of the Internal Corrosion Condition Assessment
RP-1, IPS Wet Well & Splitter Box
Ontario, California
HDR #232992

INTRODUCTION

HDR Engineering, Inc. (HDR) performed a site visit and corrosion condition assessment on the influent pump station (IPS) wet well and the influent splitter box at the Inland Empire Utilities Agency (IEUA) Regional Plant No. 1 (RP-1) in Ontario, California on Wednesday, May 21, 2014 in accordance with Contract Number 4600001622. Confined space entry inspection was performed by HDR field personnel at the IPS wet well as part of the condition assessment. Non-entry inspection was performed at the influent splitter box as the structure was still in service during the site visit.

The IPS wet well is a concrete structure approximately 30 feet by 54 feet by 26 feet tall. The wet well is divided into System A and System B, which are separated by a concrete wall in the center of the structure. Influent wastewater enters each side through a 48-inch pipe and passes through a steel bar screen with bars spaced 12 inches on center. Effluent is drawn up out of the wet well by pumps located on the surface. There are four pump risers in each system.

The influent splitter box is a single, non-partitioned concrete structure approximately 14 feet by 17 feet by 25 feet tall. The splitter box contains slide gates that allow flows to be directed to either System A or System B (or both) of the IPS wet well. The splitter box is covered by a grating system supported by recessed ledges along the side walls, orthogonal concrete beams across the box, and a central concrete column located where the beams cross.

The scope of this study is limited to conducting a corrosion condition assessment of the IPS wet well and influent splitter box and providing conclusions and recommendations for rehabilitation.

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

ASSESSMENT METHODS

Both System A and System B of the IPS wet well were bypassed and out of service for construction during the site visit. A new vitrified clay influent pipe had recently been installed in System A at the time of inspection. The assessment methods used are described in the following sections. Entry inspection was performed on the south (effluent) side of the bar screens in System A, and on the north (influent) side of the bar screens in System B.

Visual Inspection

Inspection of the concrete and steel components for visible signs of degradation was performed from inside the IPS wet well using a two-person confined space entry team from HDR and an entry attendant provided by IEUA. Visual inspection of the wet well floor was not possible as it was covered with approximately 12 inches of sludge, standing water, and debris. Lighting was provided both by natural light through the manhole opening and by a work light suspended through the east pump riser hole, the riser having been removed prior to entry. Photo documentation of the IPS wet well can be found in Appendix A.

Visual and photographic examination of the splitter box was performed from the surface. No entry was attempted. Only the top half of the splitter box structure was visible above the water at the time of inspection. Sections of the grating had been removed prior to inspection. Photo documentation of the splitter box can be found in Appendix B.

Evaluation of Concrete in Service

The concrete was examined for signs of acid attack, mechanical abrasion, cracking, spalling, staining, and other forms of damage. Evaluation of the visual condition of the concrete was performed in accordance with American Concrete Institute Publication ACI 201.1R-08, *"Guide for Conducting a Visual Inspection of Concrete in Service."*

Concrete pH Testing

Phenolphthalein solution was used to test the pH of the concrete structure to determine the extent of carbonation. Phenolphthalein is a pH indicator that appears colorless below pH 8 and bright fuchsia or purple at pH greater than 10. Sound concrete has a pH of 11 or higher. At selected locations inside the wet well, a small amount of concrete was chipped away and the newly exposed surface was sprayed with phenolphthalein solution. This process was repeated until a color change was observed. The approximate depth of degradation was then measured.

Aural Testing

Aural testing was performed at accessible locations within the IPS wet well to determine the location of voids and delamination. Testing was performed by tapping the concrete with a ball-peen hammer in multiple locations across its surface. The pitch and character of the resulting sound indicated whether the concrete was sound or was delaminated from the reinforcement or substrate. The area of testing was from approximately three to six feet above the floor around the walls of the wet well structure. Additional sounding was performed near the wet well roof below the rim of the manhole.

Degree of Rusting of Steel

Degree of rusting evaluation was performed on coated steel surfaces such as the influent debris screens. Evaluation of the corrosion on steel members was performed in accordance with ASTM standard D610, *"Standard Method for Evaluating Degree of Rusting on Painted Steel Surfaces."* Any visible bare steel was examined for signs of corrosion and metal loss. Visual evidence of corrosion was noted and photographed.

Ultrasonic Thickness Measurement

Steel member thicknesses on the bar screen structures were measured using an Olympus ultrasonic thickness gage. A small area of bare steel on each bar tested was located and scraped clean with a putty knife and wire brush. A small amount of ultrasonic couplant was applied to the steel, and the UT probe was placed flat on the surface. The thickness was measured at 5–6 locations within the bare area for each part.

RESULTS & DISCUSSION

IPS Wet Well

Both systems A and B were observed to be in similar condition. Coating failure was observed on the steel bar screen structure, as shown in Figure 1. Surface rusting was classified as spot rusting per ASTM D610. Individual members varied from rust grades 4-S (3-10% spot rusting) to 1-S (33-50% spot rusting). The steel components in System B, however, appeared to be in satisfactory condition under the coating with no visible section loss and relatively minor corrosion. Some pitting was observed on the vertical steel bars in System A near the inlet pipe.

Ultrasonic thickness values of the vertical steel bars ranged from 0.470 inches to 0.529 inches; the average thickness of the steel for each bar measured was between 0.483 inches and 0.507 inches. Given a nominal bar thickness of 0.5 inches listed on the as-built drawings, the bars were not significantly deteriorated from their original condition.

The horizontal channel at the lower part of the bar screen was measured to be 0.308 inches. According to the record drawings, the installed member was a C10x15.3 channel with a nominal web thickness of 0.240 inches. The source of the discrepancy was not apparent; it is possible that a C10x20 channel with a nominal web thickness of 0.379 in was installed instead of a C10x15.3 during construction of the bar screen. However, no significant section loss was observed.

Ultrasonic thickness data from both systems A and B are presented in Table 1. Measurement locations in System A were labeled A1, A2, and A3. Measurement locations in System B were labeled as B1, B2, B3, etc.

Table 1 – Steel Bar Screen Ultrasonic Thickness Data

Point Name	Member Type	t1 (in)	t2 (in)	t3 (in)	t4 (in)	t5 (in)	t6 (in)	Avg. t (in)	Wall Loss (%)
B1	Channel	0.303	0.312	--	--	--	--	0.308	--
B2	Vert. bar	0.485	0.528	0.508	0.477	0.529	--	0.505	0
B3	Vert. bar	0.508	0.529	0.485	0.483	0.516	--	0.504	0
B4	Vert. bar	0.470	0.503	0.516	0.477	0.487	--	0.491	2
B5	Vert. bar	0.479	0.479	0.483	0.495	0.478	--	0.483	3
A1	Vert. bar	0.482	0.476	0.474	0.498	0.477	0.500	0.485	3
A2	Vert. bar	0.486	0.516	0.474	0.471	0.478	--	0.485	3
A3	Vert. bar	0.488	0.519	0.535	0.485	0.496	0.517	0.507	0

Percent wall losses were calculated by dividing the measured average thickness by the nominal thickness of 0.500 inches, subtracting this quantity from 1.0, and expressing the result as a percent. Where the measured average thickness exceeded the nominal thickness, the percent wall loss was listed as zero. Due to the discrepancy between the nominal thickness of the channel section and the measured values, percent wall loss was not calculated for B1.

The concrete walls and center column in the submerged zone of System A and System B appeared to be in satisfactory condition; no voids or locations of soft concrete were observed or located via sounding in the bottom two thirds of the structure, as shown in Figure 2. Hard, intact concrete was found less than 1/16-inch below the wall surface in the submerged zone. Form marks visible in the concrete walls below the water line indicated that no roughening or material loss had taken place.

Concrete in the vapor space of System A and System B showed signs of roughening and acid attack, with exposed aggregate and weakened concrete across large portions of the upper walls and ceiling, as shown in Figure 3. Hard, intact concrete was found approximately 1/4-inch below the exposed surface in these areas during pH testing from the ladder. No significant cracking or spalling was observed inside the wet well.

The steel inlet pipe risers were found to be in excellent condition with no visible corrosion or coating loss on the exterior surfaces. Interior surfaces of the risers were not accessible at the time of inspection. Slide gates and valve structures were found to be in good condition with minor surficial corrosion, as shown in Figure 4.

Influent Splitter Box

The splitter box was found to be in a distressed condition with evidence of severe acid attack on concrete and steel components. Weakened concrete, exposed aggregate, and section loss were observed on the concrete walls, center column, and grating concrete support beams, as shown in Figure 5. Exposed steel reinforcing bars were visible in the walls, column, and beams, as shown in Figure 6.

Based on an assumed cover depth of at least 3 inches, the concrete loss was estimated to be in excess of 4 inches at the worst locations, as shown in Figure 7. Site operations staff reported that

the grating over the splitter box was unsafe to walk on, as the weight of a single person walking over the structure produced vibration and noticeable deflection of the grating system.

Steel valve stems and brackets were found to be in very poor condition with severe section loss as shown in Figure 8. Noticeable corrosion and section loss were observed on all brackets. At least one valve stem appeared to have been compromised to near the point of collapse.

CONCLUSIONS & RECOMMENDATIONS

IPS Wet Well

Based on these observations, the wet well structure is considered to be in fair condition. HDR recommends prompt rehabilitation to minimize further deterioration of concrete and steel components and to extend the service life of the structure. All surfaces—steel and concrete—should receive appropriate surface preparation and coating application at the time of rehabilitation. Concrete patching may be required in the wet well vapor space to replace the deteriorated material removed by abrasive blasting and create a uniform surface.

A number of acid- and abrasion-resistant coatings suitable for wastewater service are commercially available. Coatings commonly used for this application include high-solids polyurethane, polyurea, and epoxy novolac systems. Sheet goods such as PVC have also been used successfully. For all coating systems, proper surface preparation, application, and inspection are essential to long-term coating performance.

Influent Splitter Box

Based on these observations, the splitter box structure is considered to be in distress. HDR recommends that the structure be rehabilitated or replaced as soon as possible to avoid catastrophic failure of the structure. Additional structural design may be required. Due to the highly corrosive environment in the splitter box vapor space, acid-resistant materials such as fiber-reinforced plastics (FRP) and austenitic stainless steels should be considered for use as structural members and grating supports. All concrete surfaces should receive appropriate surface preparation and coating application following rehabilitation and prior to the splitter box being placed back into service.

Please call if you have any questions regarding the assessment or the recommended remedial actions.

Sincerely,
HDR Engineering, Inc.

Greg Frost
Corrosion EIT

Reviewed by,

Brien L. Clark, PE
Project Engineer

LICENSED PROFESSIONAL ENGINEER BRIEN L. CLARK No. CH 6291 Exp. 12-31-15 STATE OF CHEMICAL ENGINEER STATE OF CALIFORNIA

6-20-14

APPENDIX A: IPS WET WELL PHOTOGRAPHS

Figure 1 – Coating failure on steel bar screen

Figure 2 – Wall concrete condition in the wet well submerged zone

Figure 3 – Exposed aggregate and weakened concrete in wet well vapor space

Figure 4 – Minor corrosion on valve cover and slide gates

APPENDIX B: INFLUENT SPLITTER BOX PHOTOGRAPHS

Figure 5 – Weakened concrete, exposed aggregate, and section loss

Figure 6 – Exposed rebar in grating support beam

Figure 7 – Exposed rebar in wall of splitter box

Figure 8 – Corrosion and section loss on valve stem support bracket

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04–09–14

INLAND EMPIRE UTILITIES AGENCY*

*A Municipal Water District

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Telephone (909) 993–1600

MAILING ADDRESS
Post Office Box 9020
Chino Hills, California 91709

STRUCTURAL CONDITION ASSESSMENT REPORT BASED ON WALK–THROUGH INSPECTION OF CARBON CANYON WASTEWATER RECYCLING FACILITY (CCWRF) PRIMARY CLAIFIER NO. 1 BY RMS ON 01–22–2014

STRUCTURAL CONDITION ASSESSMENT REPORT FOR CARBON CANYON PRIMARY CLARIFIER No. 1 CONCRETE STRUCTURAL ELEMENTS STEEL AND METAL STRUCTURAL ELEMENTS PIPING & PIPE SUPPORTS GUARD RAILING & HANDRAILS FRP ODOR CONTROL DOME & THE PUMPHOUSE

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SHEET 2 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

RMS inspected the interior and exterior of Clarifier No. 1 and the sludge Pump Station. This report includes our visual evaluation of coatings, degree of metal corrosion and concrete deterioration in the Clarifier

Clarifier No. 1 was originally constructed in 1990. It is 95 feet in diameter.

Partial drawings of the Clarifier No. 1 are shown on the next 4 pages.

RMS was not able to access shop drawings for the Clarifier FRP Odor Control Cover.

Recommendation for Metal Coatings:

Based on the results of the onsite inspection, the following remedial recommendations are offered below. For purposes of this report, these recommendations have been separated into two categories; work to be completed by 2015, and work to be completed between 2015 and 2020.

Complete by 2015.

1. Perform routine touch-up coating repairs of exterior clarifier piping over areas of chipped coating and rust bleed through. Prior to coating, power tool wire brush to remove loose coating and corrosion product.

Complete between 2015 and 2020.

1. Perform a follow-up corrosion assessment of the clarifier metallic components within the next 5 years. Perform touch-up repairs to the existing coating as-needed at that time.

Note:

These recommendations are based on obervations/inspections and DFT measurements in PC#2, which has very similar coating and structural condition to PC#1.

REGISTERED PROFESSIONAL ENGINEER
ROGER M. SAGE
NO. S003598
EXP. 06–30–14
STRUCTURAL
STATE OF CALIFORNIA

Limitations:

Our conclusions are based on visual inspection of existing condition of the Clarifier structure and the piping. No material testing was performed to examine any unusual or hidden deterioration occurring within the structural components or the Clarifier. No seismic or wind structural analysis was performed for the Clarifier. This report does not include corrosion engineering work such as measuring the remaining metal and coating dry film thicknesses of the existing coating. However, it is RMS opinion that adequate data was obtained during the inspection to perform the Condition Assessment of this Clarifier.

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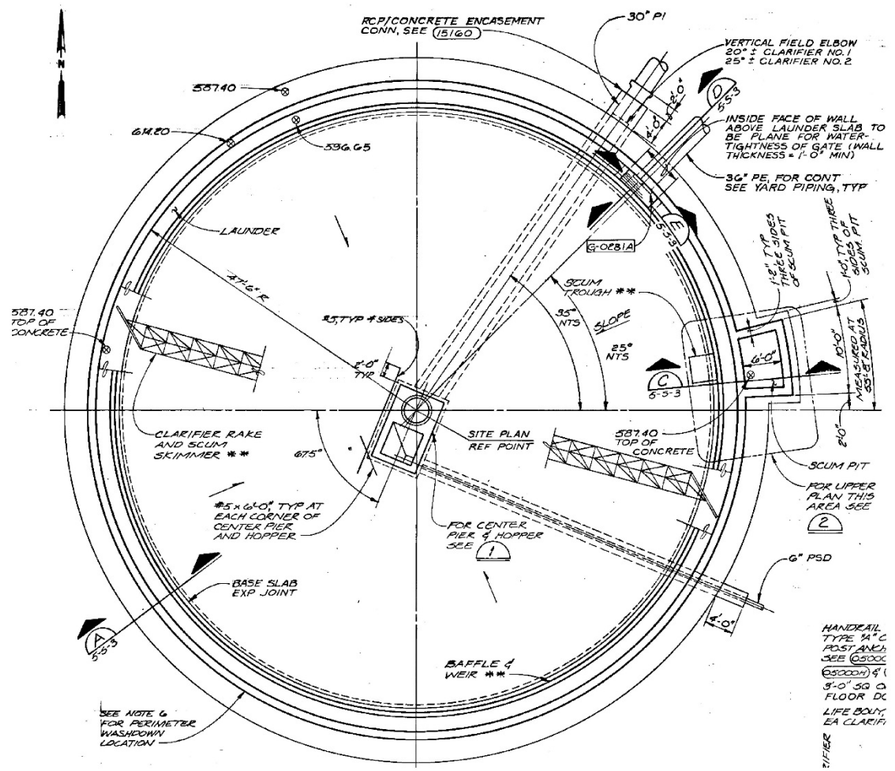
SHEET 3 OF 23
DATE: 02–03–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

IEUA Archives Record Dwg No. D6490 62.

Original 1998 Construction Drawings.



Plan

Not to Scale

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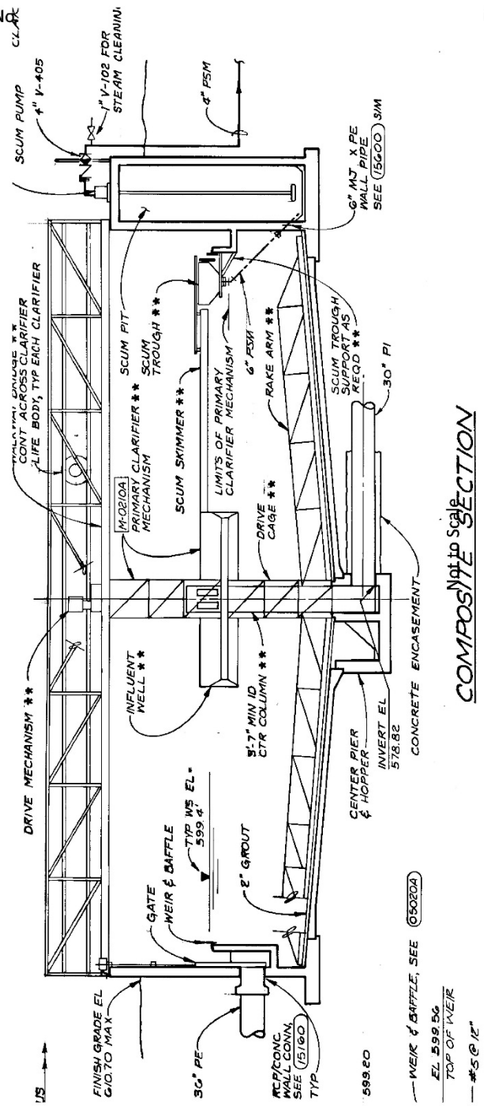
SHEET 4 OF 23
DATE: 02–03–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

IEUA Archives Record Dwg No. D6490 63.

Original 1998 Construction Drawings.



COMPOSITE SECTION

Not to Scale

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SHEET 5 OF 23
DATE: 02-03-14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
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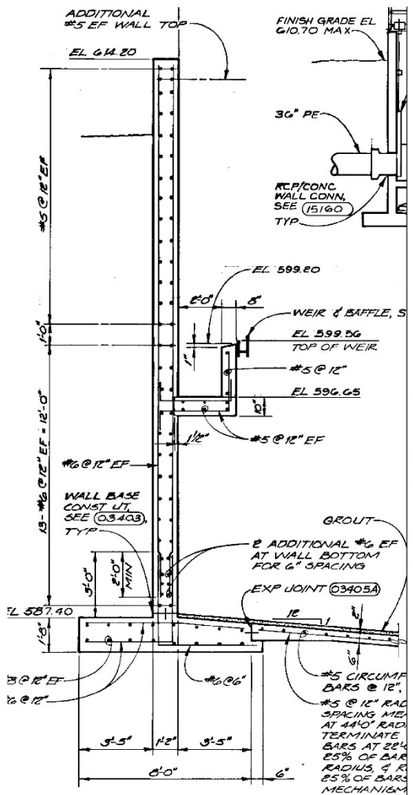
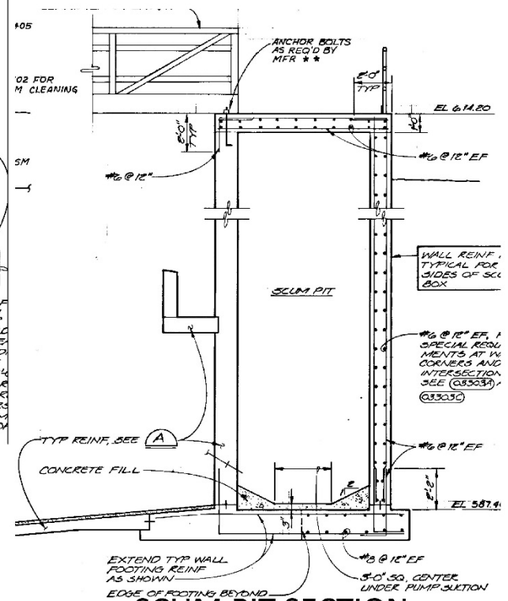
IEUA Archives Record Dwg No.
D6490 63.

Original 1998 Construction Drawings.



WALL SECTION

Not to Scale



SCUM PIT SECTION

Not to Scale

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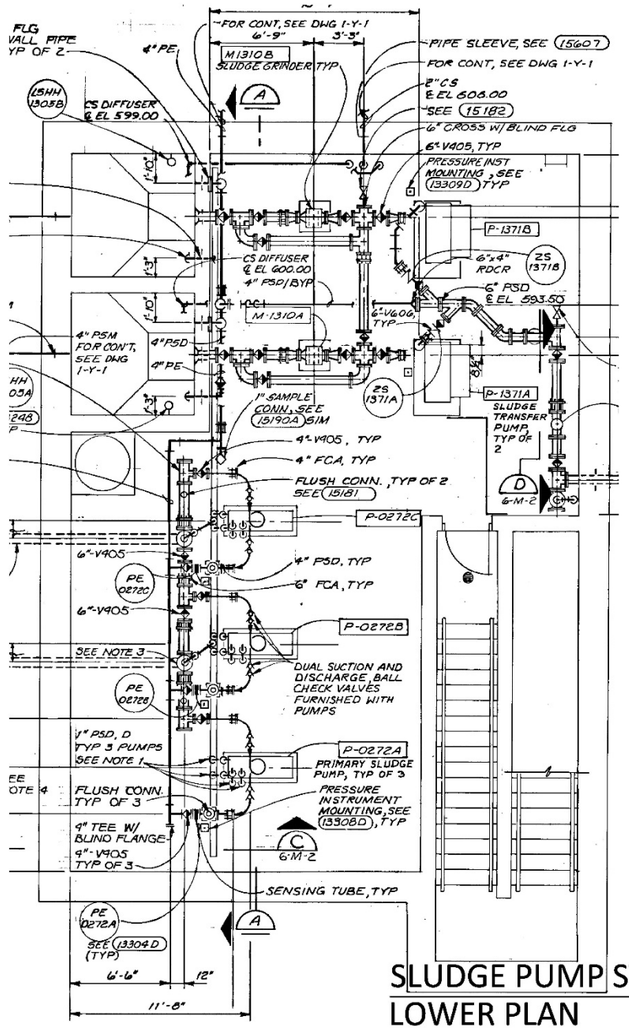
SHEET 6 OF 23
DATE: 02-03-14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

IEUA Archives Record Dwg No.
D6490 66.

Original 1998 Construction Drawings.



SLUDGE PUMP STATION - LOWER PLAN

Not to Scale

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SHEET 7 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Drive Cage Center Column and Rake Arm Metal Components - 1

The coating thickness were not measured, however, coating looked in better shape than PC#2 which had 25 to 45 mil thicknesses. No delaminations wee noticed.

Influent Well. (Feed Well). Circular baffle.

Influent Pipe

Rake Shaft

RMS RECOMMENDATIONS:

(See sheet 2 for coating recommendations, future inspections and touchup repairs)

Scraper blades should be coated next time the clarifier is out of service.

Rake Arm Assembly

Scraper Blade: No missing hardare were notced on the scraper baldes, except that per IEUA Operation Staff, blade heights need adjustment.

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SHEET 8 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Drive Cage Center Column and Rake Arm Metal Components - 2

Influent Well. Cylindrical Baffle. There is no visible signs of metal corrosion on the baffle skirt plates and other metal components.

Inspect skimmer arm every two years, with the motor stopped. Partial lowering of the wastewater maybe required. Inspection can be conducted without entry. No significant corrosion was notced at this time.

The protective coating on the drive unit is in good condition.

Drive Unit. (Column Supported Drive Assembly)

Drive Platform

Skimmer Arm.

Sludge Well to Sledge Draw Line

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SHEET 9 OF 23
DATE: 02-03-14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Drive Cage Center Column and Rake Arm Metal Components - 3

Rake Arm assembly, upper chord. We wire brushed the top surface and the coating emerged. The protective coating appears to be in good condition.

Scraper Blade. The protective coating on majority of the blades has delaminated. However, there was no signs of metal corrosion.

Operations staff stated that the blade heights above the clarifier floor top surface vary from blade to blade.

Cross ties between the rake arm assemblies appears to be in good condition, with no visible signs of corrosion.

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SHEET 10 OF 23
DATE: 04-09-14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Clarifier Concrete Wall, Floor and Joints - 1

Protective coating has been applied at certain locations on the floor slab of the clarifier.

The claw of a hammer slips easily under the coating film.

This coating has dilapidated and failed either due to age or due improper use of the coating or improper application.

RMS RECOMMENDATIONS:

(See sheet 2 for coating recommendations, future inspections and touchup repairs)

Scraper blades should be coated next time the clarifier is out of service.

Concrete surfaces with eroded cement past should be coated.

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SHEET 11 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Clarifier Concrete Wall, Floor and Joints - 2

It is not obvious why this joint is filled with grout It appears that it was placed to allow installation of the water stop per detail "C"/5-S-3 (drawing D6490-63).

Claifier Wall

Claifier Floor

RMS RECOMMENDATIONS:

(See sheet 2 for coating recommendations, future inspections and touchup repairs)

Scraper blades should be coated next time the clarifier is out of service.

Protective coating has been applied at certain locations on the floor slab of the clarifier.

This coating has dilapidated and failed either due to age or due improper use of the coating or improper application.

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SHEET 12 OF 23
DATE: 02–03–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Odor Control System - 1

Foul air draw ducting and and the expansion bellow appear to be in good condition. The connection bolts have insignificant amount of surface corrosion

Foul air ducting and duct support

Foul air ducting, duct supports and the scrubber system shown no signs of any significant corrosion or deterioration.

Foul Air Scrubber FRP tank and the galvanized access ladder appear to be in good condition. No significant signs are corrosion and deterioration were noticed.

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Email: rmseng@earthlink.net
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SHEET 13 OF 23
DATE: 02-03-14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

FRP Odor Control Dome - 1

Odor Control Dome hatches and its hinges are generally in good condition.

The entrance hatch side stiffener (lip) is sheared off at the hinge location and the hinge has been relocated.

Odor Control Dome framing and components appears to be in good condition

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SHEET 14 OF 23
DATE: 02-03-14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

FRP Odor Control Dome - 2

Odor Control Dome hatches and its hinges are generally in good condition.

Odor Control Dome framing and components appears to be in good condition

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SHEET 15 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Ladders and Stairs - 1

Ladder to lower deck is galvanized and it is in good condition. The Ladder rungs are not serrated and do not comply to current OSHA safety requirements.

The rungs get slippery when wet. Easy way to fix the problem would require wrapping it with abrasive material, in lieu of replacing it.

Concrete stairway leading down to the pump room.

The galvanized steel stair and its handrails and grated treads to the motor and control deck is in good condition with no visible signs of corrosion.

The leaky joints between stairs and the concrete wall appear to have had polyurethane injection. It is not apparent if the leak has been stopped. The application methodology and workmanship is questionable. RMS recommended Howard Ridley Company (HRC) in Chino, CA (909) 590-7415 to CCWRF plant staff.

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SHEET 16 OF 23
DATE: 02–03–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Interior Piping - Scum Draw-Off Pipe

The metal corrosion, due to coating failure, is on the surface only and it has had no significant affect on the strength of the piping, pipe flanges or the connection bolts.

The protective coating coating covering the concrete surface, in this region, has deteriorated to a point where it is no longer an effective protective coating. The blisters in coating are visible in these two photos.
See page 17.

Various views of Scum Outlet Pipe

The coating covering the pipe, connection flanges and fastener bolts has deteriorated to a point where it is no longer an effective protective coating.

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SHEET 17 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Interior Piping and Framing - Scum Collerctor and Scum Pipe

FRP Weir.
Support brackets appear to be in good condition.

Effluent Launder (Effluent Concrete Channel). The channel's concrete structure appears to be in a good condition with no significant cracks.

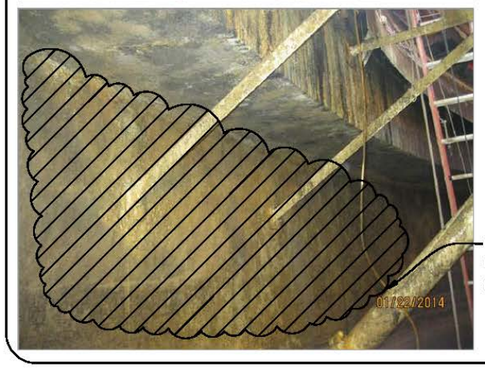
RMS RECOMMENDATIONS:

(See sheet 2 for coating recommendations, future inspections and touchup repairs)

Scraper blades should be coated next time the clarifier is out of service.

Scum Outlet Pipe

Scum Collector (Scum Box)



Coated Concrerte area

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SHEET 18 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Misc. Exterior Equipment - 1

Scum Pump Control Panel:
The enclosure is Stainless steel and corrosion is not an issue for this unit.

Scum Pump Breaker:
No protective coating remains on the breaker box.

The enclosure may need to be replaced in a couple of years; re-coating it is not an economical option. Replace the enclosure with coated metal or FRP enclosure.

Scum Pit Hatch: There no visible signs of any corrosion on this galvanized steel hatch cover and its hardware components.

Scum Pit. The protective coating on the concrete is in good condition.

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SHEET 19 OF 23
DATE: 04–09–14
BY: RMS CHKD BY:
JOB/PO NO.

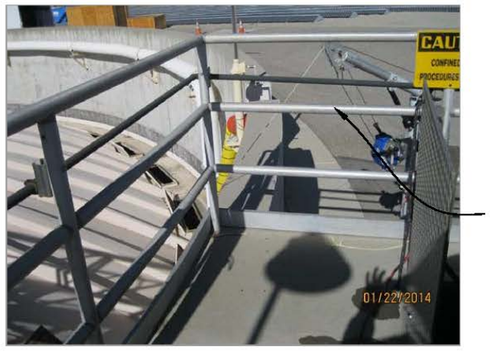
SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Misc. Exterior Equipment - 1

Piping from scum pump, the fittings and valves have surface corrosions and the protective coating is no longer effective.

Whitin a year, perform routine touch-up coating repairs of exterior clarifier piping over areas of chipped coating and rust bleed through. Prior to coating, power tool wire brush to remove loose coating and corrosion product.

Scum Pump coating appears to be in good condition.



Scum Pump Deck 3-line railing. The galvanized steel railing and the kick plates show no signs of corrosion.

Concrete deck around the pump room stairway access. The 3-line galvanized steel railing and the kick plates show no signs of corrosion.

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SHEET 20 OF 23
DATE: 02–03–14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Pump Room - 1

Primary Sludge piston pumps: These are older pumps with many moving parts and according to operations staff they require frequent maintenance. There could be safety issues involved with this heavy maintenance demand

There were no visible signs of corrosion in these pumps.

Primary Sludge piston pumps.

Minor surface corrosion was noticed on some of the valves and fittings in the pump room.

Leaky crack in lower portion of the pump room east wall.

The leaky crack may have self sealed itself due to hardening of soluble and sediment in the leaky water or sludge.

It is not apparent if the leak is from the clarifies.

The leaky crack can be repaired by proper injection of polyurethane.

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SHEET 21 OF 23
DATE: 02-03-14
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SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Pump Room - 2

Primary Sludge piping supports appear to be in good condition with no signs of corrosion.

Primary Sludge piping and pipe fittings appear to be in good condition with no signs of corrosion.

Primary Sludge pump room concrete roof appears to be in good condition with no signs of rebar corrosion or concrete deterioration No signs of corroded reinforcing steel was noticed.

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SHEET 22 OF 23
DATE: 04-09-14
BY: RMS CHKD BY:
JOB/PO NO.

SUBJECT: Inland Empire Utilities Agency, Carbon Canyon Wastewater Recycling Facility
TASK: (CCWRF), Primary Clarifier No. 1 – Structural and corrosion Inspection Report

Walkway Bridge (Access Bridge) Truss.

all walkway bridge steel components appear to be hot-dip-galvanized with no visible signs of any significant corrosion.

all walkway bridge steel components appear to be hot-dip-galvanized with no visible signs of any significant corrosion.

The walkway galvanized coating may last at least another 5 years.

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RP-4 Corrosion Condition Assessment

Primary Clarifiers

Inland Empire Utilities Agency

Rancho Cucamonga, CA

April 27, 2015

Executive Summary

HDR Engineering, Inc. (HDR) performed a site visit and corrosion condition assessment on Area 3, including primary clarifier no.1 and no. 2, at the Inland Empire Utilities Agency (Agency) Regional Plant No. 4 (RP-4) in Rancho Cucamonga, California.

The scope of this study was limited to conducting a corrosion condition assessment of the structures, providing photos of notable features observed during the assessment, and preparing recommendations for rehabilitation.

Based on the condition of the concrete and metallic structures observed during the assessment, primary clarifier no. 1 and no. 2 are considered to be in poor condition. The condition of the structures is summarized in the table below.

Structure	Condition Rating	Description
Primary Clarifier No. 1	4	Significant Deterioration (Requires immediate attention)
Primary Clarifier No. 2	4	Significant Deterioration (Requires immediate attention)

HDR recommends rehabilitation of the coating material and concrete and metallic substrates for primary clarifier no.1 and no. 2 as soon as possible to minimize further deterioration and to extend the service life of the structures. Recommendations are grouped by material type. Unless otherwise noted, recommendations apply to both clarifiers.

Structural Concrete

1. Perform a rehabilitation of the concrete substrates within the clarifier launder trough, including the splash zone and vapor space, to improve the integrity of the concrete.
2. Apply a protective coating to all concrete surfaces in the vapor space down to two feet below the lowest operating liquid level.
3. At effluent outlets or other areas where turbulent flow or high grit loads are expected, coat the concrete with a 100% solids aromatic polyurethane or similar abrasion-resistant coating.

Carbon Steel Components

Option 1 – Repair and Recoat Existing Steel Components

1. Repair or replace corroded steel members in the rake arm, skimmer arm, center column, inlet well and assembly, and scum trough and discharge pipe.
2. Replace all corroded fasteners.
3. Replace the scum box discharge pipe and fittings.
4. Remove all existing coating material on carbon steel components and replace with a new high-performance coating system.
5. Design and install cathodic protection to protect the submerged portion of the sludge rake arm assemblies from corrosion.

hdrinc.com 431 W. Baseline Road, Claremont, CA 91711-1608
(909) 626-0967

Option 2 – Replace Steel Components with 316L Stainless Steel

1. Remove and replace all submerged or non-submerged carbon steel components and replace with 316L stainless steel components.

Aluminum Components

1. For all new aluminum components to be encased in or otherwise placed in direct contact with bare concrete, coat all contact surfaces of the aluminum parts with a polyamidoamine epoxy coating such as Tnemec L69 Epoxoline.

Contents

Introduction

HDR Engineering, Inc. (HDR) performed a site visit and corrosion condition assessment on Area 3, primary clarifier no.1 and no. 2, at the Inland Empire Utilities Agency (Agency) Regional Plant No. 4 (RP-4) in Rancho Cucamonga, California, in accordance with Contract Number 4600001622. One clarifier was out of service at a time. Two field engineers visited the site to perform dry entry inspection of each clarifier after it had been removed from service and cleaned. The entry inspection of primary clarifier no. 1 was performed on September 10, 2014. The entry inspection of primary clarifier no. 2 was performed on January 7, 2015. Confined space entry support was provided by IEUA operations personnel for both entry inspections.

Primary clarifier no.1 and no. 2 are two separate circular concrete structures that are each approximately 105 feet in diameter and 25 feet tall. Influent wastewater from the primary diversion structure enters each primary clarifier through a 36-inch pipe. Both primary clarifiers contain a steel sludge scraper arm, surface skimmer arm, effluent launder, scum trough and discharge pipe, steel center column, and inlet well. Both primary clarifiers are covered by aluminum corrugated plate roof systems supported by external stainless steel trusses.

The scope of this study was limited to conducting a corrosion condition assessment of primary clarifier no.1 and no. 2, providing photos of notable features observed during the assessment, and preparing recommendations for rehabilitation.

Test Methods

Visual and Photographic Inspection

Inspections and testing were performed on foot from inside the clarifier and from the walkways above. The concrete was visually inspected for signs of acid attack, mechanical abrasion, cracking, spalling, staining, or other forms of damage. The steel was examined for signs of corrosion and metal loss.

Evaluation of the visual condition of the concrete was performed in accordance with American Concrete Institute Publication ACI 201.1R-08, *"Guide for Conducting a Visual Inspection of Concrete in Service."*

Concrete Sounding

Aural testing was performed on the concrete structure to determine the location of voids and delamination. Testing was performed by tapping the concrete with a ball-peen hammer in multiple locations across its surface. The pitch and character of the resulting sound indicated whether the concrete was sound or was delaminated from the reinforcement or substrate.

Concrete pH Testing

Phenolphthalein solution was used to test the pH of the concrete structure to determine the extent of carbonation. Phenolphthalein is a pH indicator that appears colorless below pH 8 and

bright fuchsia or purple at pH greater than 10. Sound concrete has a pH of 12 or higher. At locations inside the clarifier where the coating had failed, a small amount of concrete was chipped away and the newly exposed surface was sprayed with phenolphthalein solution. This process was repeated until a color change was observed. The approximate depth of carbonation was measured.

Dry Film Thickness

Coating thickness on steel rake arm was measured using an Elcometer Dry Film Thickness (DFT) gage. In order to measure the coating thickness of the steel components, a small area of coated steel was located and cleaned with a towel. The DFT probe was placed on the flat surface and measurements were taken at a minimum of three locations for each component.

Ultrasonic Thickness

Steel member thickness on the rake arm structure was measured using a Panametrics ultrasonic thickness (UT) gage. In order to measure the thickness of a clarifier component, a small area of bare steel on the component was located and cleaned with a wire brush and towel. A small amount of ultrasonic couplant was applied to the steel, and the UT probe was placed flat on the surface. The thickness was measured at a minimum of three locations for each component.

Structure Condition Rating

The Agency requested that HDR include a condition rating of the evaluated areas. The condition rating was subject to both qualitative and quantitative observations made during the assessment and is intended to show the degree of deterioration to structures and equipment, as well as the urgency of remedial action. Table 1 below shows the rating scale and associated descriptions.

Table 1: Condition Rating

Rating	Description
1	New or Excellent Condition
2	Minor Defects Only
3	Moderate Deterioration (Does not require immediate action)
4	Significant Deterioration (Requires immediate attention)
5	Virtually Unserviceable

Discussion of Observations and Test Results

Primary Clarifier No. 1

Structural Concrete
No voids were detected in the concrete shell by sounding. Crack locations in the walls and floor were tested and found to be solid. Delamination and peeling of the coal tar epoxy coating was observed on the shell walls.

When performing the phenolphthalein test, 12 locations tested in the submerged zone produced a color change in the concrete (pH of 10–12) at a depth of less than 1/16-inch from the concrete surface, as shown in Figure 1. The shallow depth to high pH material and lack of roughening or spalling indicated that the concrete was in good condition in the submerged zone.

Figure 1 – Phenolphthalein test on the concrete shell

Sludge Rake Arm
The steel rake arm that extends the entire diameter of the clarifier in the submerged zone was found to be in fair condition. Delamination and peeling of the coating and pitting and rust tubercle formation on the steel was observed on the rake arm, as shown in Figure 2. The coating degradation was most likely a result of mechanical abrasion caused by agitated grit in the wastewater stream.

Figure 2 – Pitting of the steel where a rust tubercle had formed on the steel rake arm

Pit depth measurements were not taken because the pits formed on the edges of the rake arm legs and there was no base reference point to make for a conclusive pit depth measurement.

Three UT and DFT measurements were taken along the vertical and horizontal rake arm legs.

The DFT measurements for each leg are listed in Table 2. The DFT measurements were taken in areas of intact coating; they do not include areas on the rake arms where the coating had failed and was completely missing.

Table 2: Primary Clarifier No. 1 Rake Arm Dry Film Thickness Data

Rake Arm Member	Avg. t (mils)
Original	Unknown
Vertical	17
Horizontal	26

Table 3 compares the UT measurements to the maximum measured thickness of the steel. The original steel thickness is not known because the rake arm assembly shop drawings were not available. For that reason, the percent wall loss was calculated based on the maximum measured thickness of the rake arm leg:

Percent wall loss = [1 - (thickness measurement / maximum thickness)] x 100%

All metal loss percentages are considered to be lower-bound values since the original steel thickness may have been the same as or greater than the maximum measured thickness.

Table 3: Primary Clarifier No. 1 Rake Arm Leg Ultrasonic Thickness Data

Rake Arm Member	t1 (in)	t2 (in)	t3 (in)	Avg. t (in)	Wall Loss (percent)
Original Steel	Unknown	Unknown	Unknown	Unknown	N/A
Vertical	0.285	0.326	0.300	0.304	7
Horizontal	0.434	0.424	0.416	0.425	2

The maximum measured thickness of the vertical rake arm legs was 0.326 inch. Based on this value, the wall loss was 7 percent. The vertical rake arm legs are in good condition with a minimal amount of section loss.

The maximum measured thickness of the horizontal rake arm legs was 0.434 inch. Based on this value, the wall loss was 2 percent. The horizontal rake arm legs are also in good condition with a minimal amount of section loss.

Skimmer Arm

The skimmer arm that circulates above the wastewater line in the clarifier was found to be in poor condition. Significant rusting and metal loss in layers was observed along the skimmer arm, as shown in Figure 3. The observed metal loss was most likely a result of acid attack in the vapor space.

Figure 3 – Rusting and metal loss on the skimmer arm

Stainless steel fasteners were found installed on the skimmer arm assembly (see Figure 4). The corrosion on the adjacent skimmer arm components may have been exacerbated by galvanic action.

Figure 4 – Stainless steel fasteners in contact with carbon steel components of skimmer arm

Effluent Launder

The effluent launder was found to be in poor condition. Concrete in the effluent launder was degraded and had exposed aggregate above the wastewater line, as shown in Figure 5. Phenolphthalein tests were not performed in these areas because they were not accessible. There was minor staining on the steel anchor bolts supporting the aluminum brackets for the hatches around the effluent launder. The observed degradation was most likely a result of acid attack in the vapor space.

Figure 5 – Condition of the concrete in the effluent launder vapor space of primary clarifier no. 1

The roof hatch support brackets were observed to be in direct contact with the concrete shell. Aluminum generally should not be placed in direct contact with concrete, as the high-pH environment can lead to accelerated corrosion of the aluminum metal. In this case, however, acid attack on the shell concrete appears to have reduced the surface pH into a range not harmful to the aluminum components.

Scum Trough and Discharge Pipe

The scum trough and discharge pipe were found to be in similar poor condition. There was significant staining and corrosion on all components of the scum trough, as shown in Figure 6. UT and DFT measurements were not taken because it was inaccessible from the clarifier floor and roof hatches. The support arm anchor bolts for the scum trough were observed to have moderate staining and surface rusting.

Figure 6 – Scum trough in primary clarifier no. 1

The scum trough discharge pipe was observed to be in similar poor condition as the scum trough. There was significant corrosion product at the shell wall and pipe interface and on the pipe joints, as shown in Figure 7. The nuts and bolts were not visible because of the large amount of corrosion product at the wall interface.

Figure 7 – Corrosion product at the scum trough discharge pipe and shell wall interface

Center Column

The center column was found to be in fair condition. Staining, rusting, and peeling of the coating were visible, as shown in Figure 8. The staining could be due to adhesion of contaminants and solids in the wastewater. The coating degradation was most likely a result of mechanical abrasion caused by agitated grit in the wastewater stream.

Figure 8 – Staining and peeling of the coating on the center column

Inlet Well and Assembly

The inlet well and assembly components were found to be in poor condition. The inlet well had staining and rusting of the steel and delamination and peeling of the coating. The top beam attached to the inlet well by a threaded rod was observed to have significant rusting and metal loss in layers along the top and bottom flanges, as shown in Figure 9. The most likely damage mechanism was acid attack on the steel components in the vapor space.

Figure 9 – Rusting and metal loss on the center column baffle assembly

Aluminum Roof

The aluminum roof and support beams were found to be in good condition. Only minor staining on the roof and beams was observed during the inspection, as shown in Figure 10. Fasteners, brackets, and support beams were in good condition. The aluminum roof support beams were observed to be in direct contact with the clarifier wall concrete.

Figure 10 – Aluminum roof and support beam

Primary Clarifier No. 1 Summary and Classification

The condition rating of primary clarifier no. 1 is classified as a Rating 4, significant deterioration. The sludge rake arm, skimmer arm, scum trough and discharge pipe, center column, and inlet well were observed to have significant delamination and peeling of the coating system and rusting and metal loss of the steel. The concrete in the effluent launder was observed to have staining and exposed aggregate in the vapor space. Roughened concrete and exposed aggregate and metal loss were probably a result of acid attack caused by hydrogen sulfide (H_2S) accumulation in the vapor space and its subsequent biological conversion to sulfuric acid (H_2SO_4). The concrete and metallic structures and coating systems will require repair to avoid further degradation and to extend the service life of the structure.

Primary Clarifier No. 2

Structural Concrete

No voids were detected in the concrete walls by sounding. Crack locations in the walls and floor were tested and found to be solid. Delamination and peeling of the coal tar epoxy coating was observed on the shell floor, as shown in Figure 11. The degradation of the coating was most likely a result of mechanical abrasion from the rake arm.

Figure 11 – Degradation of the coal tar epoxy coating on the shell floor

When performing the phenolphthalein test, nine locations tested in the submerged zone produced a color change in the concrete (pH of 10–12) at a depth of less than 1/16-inch from the concrete surface. The shallow depth to high pH material and lack of roughening or spalling indicated that the concrete was in good condition in the submerged zone.

Sludge Rake Arm

The steel rake arm that extends the entire diameter of the clarifier in the submerged zone was found to be in fair condition. Delamination and peeling of the coating and general corrosion and rust tubercle formation on the steel was observed along the rake arm, as shown in Figure 12. The coating degradation was most likely a result of mechanical abrasion caused by agitated grit in the wastewater stream.

Figure 12 – Corrosion on the steel rake arm

Three UT and DFT measurements were taken along the vertical and horizontal rake arm legs. The DFT measurements for each leg are listed in Table 4. The DFT measurements were taken in areas of intact coating; they do not include areas on the rake arm assembly where the coating had failed and was completely missing.

Table 4: Primary Clarifier No. 2 Rake Arm Dry Film Thickness Data

Rake Arm Member	Avg. t (mils)
Original	Unknown
Vertical	15
Horizontal	21

Table 5 compares the UT measurements to the maximum measured thickness of the steel. The original steel thickness is not known because the rake arm assembly shop drawings were not available. For that reason, the percent wall loss was calculated based on the maximum measured thickness of the rake arm leg:

Percent wall loss = [1 - (thickness measurement / maximum thickness)] x 100%

All metal loss percentages are considered to be lower-bound values since the original steel thickness may have been the same as or greater than the maximum measured thickness.

Table 5: Primary Clarifier No. 2 Rake Arm Leg Ultrasonic Thickness Data

Rake Arm Member	t1 (in)	t2 (in)	t3 (in)	Avg. t (in)	Wall Loss (percent)
Original Steel	Unknown	Unknown	Unknown	Unknown	N/A
Vertical	0.288	0.295	0.272	0.285	4
Horizontal	0.415	0.407	0.407	0.410	2

The maximum measured thickness of the vertical rake arm legs was 0.295 inch. Based on this value, the wall loss was 4 percent. The vertical rake arm legs are in good condition with a minimal amount of section loss.

The maximum measured thickness of the horizontal rake arm legs was 0.415 inch. Based on this value, the wall loss was 2 percent. The horizontal rake arm legs are in good condition with a minimal amount of section loss.

Skimmer Arm

The skimmer arm was found to be in poor condition. In the submerged zone general corrosion was observed along the full length of the skimmer arm from the inlet well to the outer end. Spot corrosion above the wastewater line was also observed, which can be attributed to acid attack in the vapor space. See Figure **13**.

Figure 13 – Skimmer arm corrosion

Effluent Launder

Concrete in the effluent launder was found to be in poor condition. Exposed aggregate and spalling of the concrete was observed in the areas above the wastewater line, as shown in Figure 14. Phenolphthalein tests were not performed in these areas because they were not accessible. There was staining and surface rusting on the anchor bolts supporting the brackets for the roof hatches around the effluent launder. The observed degradation was most likely a result of acid attack in the vapor space.

Figure 14 – Exposed aggregate and spalling of the concrete in the effluent launder

The roof hatch support brackets were observed to be in direct contact with the concrete shell. Aluminum generally should not be placed in direct contact with concrete, as the high-pH environment can lead to accelerated corrosion of the aluminum metal. In this case, however, acid attack on the shell concrete appears to have reduced the surface pH into a range not harmful to the aluminum components.

Aluminum Roof

The aluminum roof was found to be in good condition. No rusting or section loss was visible during the site inspection. Fasteners, brackets, and support beams were in good condition as well. The aluminum support beams were observed to be in direct contact with the clarifier shell concrete.

Scum Trough and Discharge Pipe

The scum trough was found to be in poor condition. There was staining and general corrosion on all components of the scum trough, as shown in Figure 15. The support arm stainless steel anchor bolts for the scum trough were observed to have moderate staining and surface rusting. UT and DFT measurements were not taken because it was inaccessible from the clarifier floor and roof hatches.

Figure 15 – Corrosion of the scum trough

The scum trough discharge pipe was observed to be in similar poor condition as the scum trough. General corrosion and staining along the discharge pipe was observed. There was also significant corrosion product at the shell wall and pipe interface, pipe joints, and anchor bracket, as shown in Figure 16.

Figure 16 – Significant corrosion on the discharge pipe

Center Column

The center column was found to be in fair condition. Staining, rusting, delamination and peeling of the coating were visible, as shown in Figure **17**. The staining could be due to adhesion of contaminants and solids in the wastewater. The coating degradation was most likely a result of mechanical abrasion caused by agitated grit in the wastewater stream.

Figure 17 – Delamination and peeling of the coating on the center column

Inlet Well

The inlet well was found to be in poor condition. There was rusting, staining and delamination and peeling of the coating below the wastewater line, as shown in Figure 18. Above the wastewater line, rusting and metal loss of exposed steel was observed. The observed rusting and metal loss was most likely due to acid attack in the vapor space. Galvanic corrosion was observed at the top of the inlet well baffle adjacent to the stainless steel fasteners connecting baffle sections.

Figure 18 – Staining and corrosion on the inlet well

Primary Clarifier No. 2 Summary and Classification

The condition rating of primary clarifier no. 2 is classified as a Rating 4, significant deterioration. The sludge rake arm, skimmer arm, scum trough and discharge pipe, center column, and inlet well were observed to have significant delamination and peeling of the coating system and rusting and metal loss of the steel. The concrete in the effluent launder was observed to have staining and exposed aggregate in the vapor space. Roughened concrete and exposed aggregate and metal loss were probably a result of acid attack caused by hydrogen sulfide (H_2S) accumulation in the vapor space and its subsequent biological conversion to sulfuric acid (H_2SO_4). The concrete and metallic structures and coating systems will require repair to avoid further degradation and to extend the life of the structure.

Conclusions

Based on the condition of the concrete and metallic structures observed during the assessment, primary clarifier no. 1 and no. 2 are considered to be in poor condition. The condition rating of primary clarifier no.1 and no. 2 is classified as a Rating 4, significant deterioration. Immediate action is required.

The condition of the structures is summarized in Table 6.

Table 6: Structure Condition Summary

Structure	Condition Rating	Description
Primary Clarifier No. 1	4	Significant Deterioration (Requires immediate attention)
Primary Clarifier No. 2	4	Significant Deterioration (Requires immediate attention)

Recommendations

Based on the condition of the existing coating material and concrete and metallic substrates, the following remedial actions recommended. Recommendations are grouped by material type and location within the clarifiers. Unless otherwise noted, recommendations apply to both clarifiers.

Structural Concrete

1. Perform a rehabilitation of the concrete substrates within the clarifier launder trough, including the splash zone and vapor space, to improve the integrity of the concrete.
    a. Remove all existing coating materials from the submerged and non-submerged areas of concrete in the launder trough.
    b. Remove all degraded concrete material in the launder trough and vapor space until a pH of 12 or higher is reached.
    c. Restore all areas to the original nominal thicknesses with fresh concrete. Use an appropriate concrete skim-coat material for thin application areas.
2. Apply a protective coating to all concrete surfaces in the vapor space down to two feet below the lowest operating liquid level.
    a. Coatings commonly used for this application include high-solids polyurethane, polyurea, and novolac epoxy systems. Sheet goods such as PVC or polypropylene have also been used successfully.
    b. Perform surface preparation and coating application following rehabilitation and prior to the structure being placed back into service.
    c. Perform all surface preparation, coating, and curing in accordance with the coating manufacturer's requirements.
3. At effluent outlets or other areas where turbulent flow or high grit loads are expected, coat the concrete with a 100% solids aromatic polyurethane or similar abrasion-resistant coating.

Carbon Steel Components

Option 1 – Repair and Recoat Existing Steel Components

1. Repair or replace corroded steel members in the rake arm, skimmer arm, center column, inlet well and assembly, and scum trough and discharge pipe.
    a. Replace the top beam at the inlet well.
    b. Replace the skimmer arm top angle.
    c. Fill all areas of significant localized metal loss with weld metal or structural ceramic epoxy such as Belzona 1311.
    d. Replace members with corrosion or metal loss on more than 25% of the surface.
2. Replace all corroded fasteners.
    a. Remove all stainless steel fasteners from the inlet well baffle and replace with carbon steel fasteners (up to 25% of fasteners are stainless).
    b. Identify and replace corroded anchor bolts on the roof hatch support brackets (up to 50% of anchor bolts are corroded).
3. Replace the scum box discharge pipe and fittings.
4. Remove all existing coating material on carbon steel components and replace with a new high-performance coating system.
    a. Coatings commonly used for this application include high-solids polyurethane, polyurea, and novolac epoxy systems.
    b. Perform surface preparation and coating application following repair and prior to the structure being placed back into service.
    c. Perform all surface preparation, coating, and curing in accordance with the coating manufacturer's requirements.
5. Design and install cathodic protection to protect the submerged portion of the sludge rake arm assemblies from corrosion.

Option 2 – Replace Steel Components with 316L Stainless Steel

1. Remove and replace all submerged or non-submerged carbon steel components and replace with 316L stainless steel components.
    a. Install drain holes in stainless steel components in the splash zone and vapor space where wastewater will tend to collect.
    b. Do not coat stainless steel components.
    c. Do not install galvanized or coated carbon steel components in direct metallic contact with stainless steel components.

Aluminum Components

1. For all new aluminum components to be encased in or otherwise placed in direct contact with bare concrete, coat all contact surfaces of the aluminum parts with a polyamidoamine epoxy coating such as Tnemec L69 Epoxoline.

Closure

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions regarding the assessment or the recommended remedial actions.

Sincerely,

HDR Engineering, Inc.

Erika Perez, EIT
Corrosion EIT

Brien L. Clark, PE
Technical Engineering Services Manager

238618_IEUA_RP-4_Area_3_CA_Report_GF_Rev00_EP-GF-BC.docx

4-27-15

HDR | SCHIFF

www.hdrinc.com/schiff
Corrosion Control and Condition Assessment (C3A) Department

February 12, 2013 via e-mail: Fconcemino@ieua.org

INLAND EMPIRE UTILITIES AGENCY
6075 Kimball Avenue
Chino, CA 91708

Attention: Mr. Francis Concemino

Re: RP-5 East Primary Clarifier
Corrosion Assessment
Chino, CA
HDR # 201947/201959

EXECUTIVE SUMMARY

A condition assessment was performed to determine the extent of corrosion on the interior metallic surfaces of the RP-5 East Primary Clarifier. HDR|Schiff conducted a site inspection on January 17, 2013, which included a visual inspection of the coated metal surfaces and photo documentation of corrosion in accordance with SSPC VIS-2 and ASTM D610, coating dry-film thickness (DFT) measurements in accordance with applicable sections of SSPC PA-2, obtaining remaining metal thickness of corroded areas utilizing ultrasonic instrumentation/sensors, and obtain samples as deemed necessary.

A total of 48 DFT measurements were taken on each of the arm assemblies. The average thickness measurements in some location were found to be less that the minimum coating thicknesses shown in the RP-5 specifications. Some areas of corrosion were noted with the most severe being the skimmer arm assemblies and the structural members in and around the motor assembly in the inlet well area.

The coating condition and other physical properties on the rake arms and other submerged components were found to be in generally good condition with only a few areas of corrosion noted, however, due to the areas of declining coating thicknesses, refurbishment of the coatings should be considered in future maintenance schedules.

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

INTRODUCTION

At the request of Inland Empire Utilities Agency, HDR Engineering, Inc., (HDR|Schiff), performed a coating and corrosion condition assessment to determine the extent of corrosion on the interior metallic surfaces of the RP-5 East Primary Clarifier. HDR|Schiff conducted the site inspection on January 17, 2013, in accordance with Contract Number 4600001382

The RP-5 East Primary Clarifier is approximately 100 feet in diameter and has a approximate capacity of 67,800 cubic feet. Most of the structure is constructed of concrete, with metallic components such as the skimmer arm, rake arm, feed well and center support structure. HDR|Schiff understands that the Agency noticed corrosion on above grade metallic components, which led to this investigation.

This report presents the findings of our assessment, including photo documentation of the internal visual inspection, and tabulated ultrasonic thicknesses and coating dry-film thickness measurements.

TEST PROCEDURES

The following test procedures were performed during the site visit.

- Visual observations and photo documentation of all submerged metal components including welded and bolted connections were performed to detect any areas that would preclude returning the unit to service. Documentation was performed in accordance with SSPC VIS-2 and ASTM D610. Photo documentation is found within the report.

- Dry-Film Thickness (DFT) Measurements: Protective coatings on internal structures were measured to determine remaining coating thicknesses utilizing a DeFelsko PosiTector® 6000-F1, Serial No. 631515, Dry-Film Thickness gauge. DFT measurements were performed in accordance with the applicable sections of SSPC PA-2. The unit was calibrated prior to use using a plastic shim with a thickness of 10.35 mils (0.01035”). The tabulated results are found within the report.

- Ultrasonic Thickness Measurements: Remaining steel thickness was measured at several locations using a Panametrics Model 26MG-XT gage, Serial No. 99086106.

TEST RESULTS

SQUEEGEE RAKE ARM (EAST)

The east squeegee rake arm is constructed of epoxy-coated carbon steel. No galvanic anodes were observed on the rake arm to provide cathodic protection. The east rake arm is depicted in Figure 1.

Figure 1 - Squeegee Rake Arm (East)

Coating thickness measurements were made on both side of the squeegee rake arm structure on inner and outer surfaces at random locations between the center and the outermost end of the structure. The coating thickness measurements in mils (1 mil = 0.001") are shown in Table 1 below.

SOUTH SIDE	INNER	+6'	+12'	+18'	+24'	+30'	+36'	OUTER
1	9.5	12.0	18.0	21.0	29.5	9.5	8.5	12.0
2	11.0	11.5	19.0	22.5	28.5	8.0	8.0	10.5
3	10.5	15.5	17.0	14.0	27.5	9.0	10.0	12.0
AVERAGE	10.3	13.0	18.0	19.2	28.5	8.8	8.8	11.5
NORTH SIDE	INNER	+6'	+12'	+18'	+24'	+30'	+36'	OUTER
1	24.0	13.5	38.0	17.0	15.5	22.0	17.0	17.5
2	28.5	14.0	25.5	26.0	16.5	17.5	15.0	17.5
3	25.0	13.0	24.0	19.5	17.5	19.0	15.5	16.0
AVERAGE	25.8	13.5	29.2	20.8	16.5	19.5	15.8	17.0

Table 1 - Squeegee Rake Arm (East) measured coating thicknesses (mils)

The average coating thickness for this half of the structure was determined to be 17.3 mils (0.0173").

Overall, the east rake arm was in good condition, with no visible blisters or other coating degradation.

SLUDGE RAKE ARM (WEST)

The west sludge rake arm is also constructed of epoxy-coated carbon steel. No galvanic anodes were observed on the rake arm to provide cathodic protection. The west rake arm is depicted in Figure 2.

Figure 2 - Sludge Rake Arm (West)

Coating thickness measurements were made on both sides of the skimmer rake arm structure and on inner and outer surfaces at eight locations between the center and the outermost end of the structure. The coating thickness measurements in mils (1 mil = 0.001") are shown in Table 2 below.

NORTH SIDE	INNER	+6'	+12'	+18'	+24'	+30'	+36'	OUTER
1	21.5	35.5	19.0	14.5	19.5	10.0	39.5	19.0
2	18.5	31.0	22.0	13.0	17.5	9.5	36.5	20.0
3	19.5	36.0	24.5	11.0	17.0	9.0	41.0	19.5
AVERAGE	19.8	34.2	21.8	12.8	18.0	9.5	39.0	19.5
SOUTH SIDE	INNER	+6'	+12'	+18'	+24'	+30'	+36'	OUTER
1	17.5	29.0	19.5	25.5	16.0	29.5	20.0	19.0
2	17.0	19.5	20.0	25.0	15.0	28.0	21.0	20.0
3	16.5	18.5	17.5	27.5	15.5	43.0	22.5	21.0
AVERAGE	17.0	22.3	19.0	26.0	15.5	33.5	21.2	20.0

Table 2 - Sludge Rake Arm (West) measured coating thicknesses (mils)

The average coating thickness for this half of the structure was determined to be 21.8 mils (0.0218").

Overall, the west rake arm was in good condition, with no visible blisters or other coating degradation.

CENTRAL SUPPORT ASSEMBLY

Angle Iron Brace Center Arm Support

The rake arms were connected to the central support assembly by angle iron braces. Two small areas of corrosion in the weldment at the intersection of the angle braces and the rake arm were noted. See Figure 3 below.

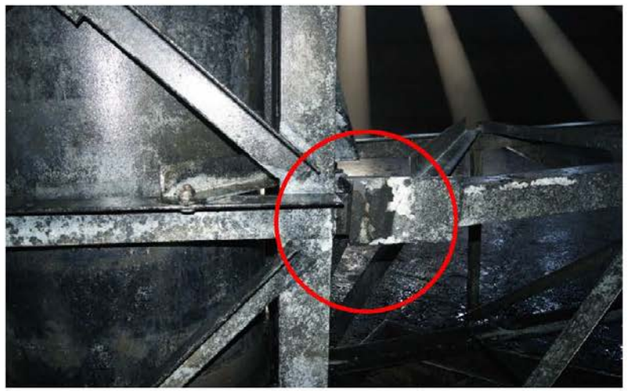

Figure 3 - Weldment corrosion at the connection between angle braces

The corrosion was noted on the assemblies for both rake arms. At this time, the degradation is not severe. Spot repair of the coating will extend the life of the weldment.

Squeegee Rake Arm (East) Plate Brace

The east plate brace supports the east squeegee rake arm from the central support assembly. Blistering of the coated surface area was noted on the 10-1/2" X 6-1/4" flat plate brace (south side, outer facing surface). See Figure 4 below.

Figure 4 - Coating blistering on flat plate brace

Blisters were measured to be 1/8" to 1/4"" in diameter with multiple areas of fractured blisters that were showing signs of general corrosion. When the blisters were ruptured using a dull putty knife, all of the blisters that were probed and ruptured contained an unknown fluid. Blisters in the coating surface are potentially caused by stress due to the vertical movement of the arm during normal operations.

Further degradation of the coating in this area is expected if left unmitigated. Removal of the blistered coating area and spot repair will extend the life of the plate brace.

Squeegee Rake Arm (West) Plate Brace

The west plate brace supports the west squeegee rake arm from the central support assembly. Coating delamination was noted on the 10-1/2" X 6-1/4" flat plate brace (south side, outer facing surface). See Figure 5 below.

Figure 5 - Coating delamination on flat plate brace

A curved pattern in the coating surface was observed indicating that the delamination was likely due to induced stresses from the vertical motion of the rake arm during operation.

Further degradation of the coating in this area is expected if left unmitigated. Removal of the delaminated coating area and spot repair will extend the life of the plate brace.

Skimmer Arm

Corrosion was observed along the full length of the skimmer arm from the inlet well to the outer end. Refer to Figures 6 and 7 below.

Figure 6 - Skimmer arm corrosion (central support end)

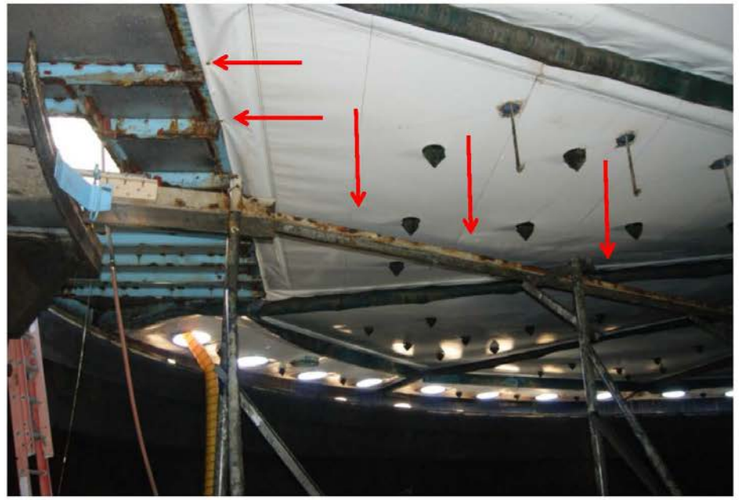

Figure 7 - Skimmer arm corrosion (assembly outer end)

These areas were noted to be the atmospheric vapor space above the normal operating liquid level. The evaluation of the rusted surface area was performed in accordance with

SSPC VIS-2 standards. The grade of rusting was measured and found to be General Rusting with a (Rust Grade of 6-G), 1% rusted.

Delamination of the carbon steel material as observed is usually attributed to hydrogen sulfide (H_2S) gas which accumulates within the vapor space. The exposed carbon steel in this particular area was typical of this type of corrosive attack.

Further degradation of the coating and steel in this area is expected if left unmitigated. Removal of the delaminated coating area and spot repair will extend the life of the skimmer arm.

INLET WELL

Corrosion was observed on the inlet well angle-iron brace and the influent baffles. See Figure 8 below.

Figure 8 - Inlet well (north side)

This area was noted to be the atmospheric vapor space above the normal operating liquid level. The evaluation of the rusted surface area was performed in accordance with SSPC VIS-2 standards. The grade of rusting was measured and found to be General Rusting with a (Rust Grade of 6-G), 1% rusted.

Delamination of the carbon steel material as observed is usually attributed to hydrogen sulfide (H_2S) gas which accumulates within the vapor space. The exposed carbon steel in this particular area was typical of this type of corrosive attack.

Further degradation of the coating and steel in this area is expected if left unmitigated. Removal of the delaminated coating area and spot repair will extend the life of the inlet well.

Inlet Well Angle-Iron Brace

Extensive coating degradation was observed on the inlet well angle iron brace. Corrosion of the exposed steel was also severe. Refer to Figure 9 and Figure 10 below.

Figure 9 - Inlet well flow baffle

Figure 10 - Inlet well support ring

Dry film thickness measurements were performed on the outer ring, column and support ring at several locations. The results are presented in Table 3 below.

LOCATION	OUTSIDE	COLUMN	RING					
NORTH-CENTER					**SOUTH**			
1	18.0	14.0	14.0		1	16.5	21.5	24.5
2	18.5	14.5	14.5		2	15.5	23.0	28.0
3	20.0	13.5	22.0		3	15.0	24.0	22.5
AVERAGE	18.8	14.0	16.8		AVERAGE	15.7	22.8	25.0
NORTHEAST					**SOUTHWEST**			
1	20.0	10.0	13.0		1	37.5	32.5	35.0
2	21.5	14.0	14.5		2	38.0	29.0	24.5
3	17.0	16.5	14.0		3	38.5	28.5	26.5
AVERAGE	19.5	13.5	13.8		AVERAGE	38.0	30.0	28.7
SOUTHEAST						**CENTER AROUND COLUMN**		
1	14.5	16.0	24.5		1	14.0	23.0	28.5
2	20.0	16.5	21.5		2	19.5	21.0	37.0
3	20.5	15.5	24.0		3	14.5	22.5	29.0
AVERAGE	18.3	16.0	23.3		AVERAGE	16.0	22.2	31.5

Table 3 - Dry film thickness measurements – inlet well system

Due to the irregularities in the exposed corroded surfaces, only limited ultrasonic thickness (UT) testing of the inlet angle support ring angle was possible. Table 4 below provides a summary of the UT measurements. The thickness readings are given in inches. N/R = UT reading not possible due to surface condition.

LOCATION	COATED	BARE
NORTHEAST		
1	0.320	N/R
2		0.257
3	0.285	N/R
4		0.268
SOUTHEAST		
1	0.264	N/R
2	0.266	N/R
SOUTH		
1	0.279	N/R
2	0.282	N/R
SOUTHWEST		
1	0.291	N/R
2	0.335	N/R
3	0.295	N/R

Table 4 - UT Thickness Measurements

Delamination of the carbon steel material as observed is usually attributed to hydrogen sulfide (H_2S) gas which accumulates within the vapor space. The exposed carbon steel in this particular area was typical of this type of corrosive attack.

The inlet well angle iron brace represented the most degraded surfaces within the clarifier. Further degradation is expected if left unmitigated. Removal of the delaminated coating area and spot repair will extend the life of the inlet well angle iron brace.

RAKE MOTOR AND DRIVE ASSEMBLY

The carbon steel surfaces of the rake motor and drive assembly that are coated with the generic epoxy material showed signs of general corrosion. See Figure 11 below.

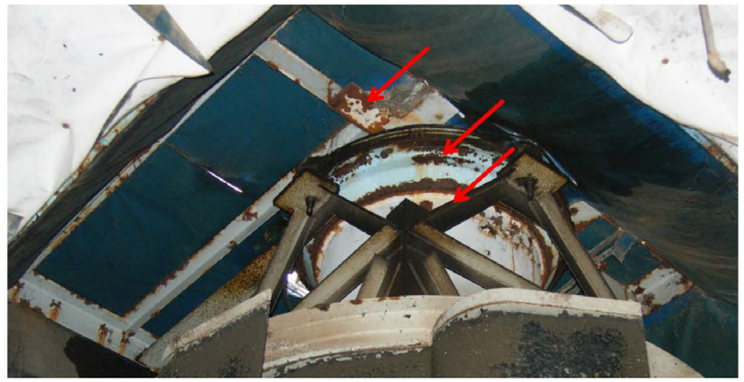

Figure 11 - Drive motor assembly showing signs of general corrosion

The corrosion appeared to be isolated at the corners and leading edges of both the drive equipment as well as the structural steel angle iron members. From the visual observations the carbon steel appears to have superficial metal loss. This superficial metal loss was typical of all areas observed in and around the drive motor assembly.

Coating touchup will extend the life of the motor assembly.

TANK WALL (CONCRETE SUBSTRATE)

A visual assessment of the tank wall was performed in order to locate any areas of degraded concrete. During the visual observations of the submerged concrete it was documented that all concrete surfaces were covered with a film of typical waste residue. Once the film residue was removed by means of scraping, the concrete surface was found to be of a smooth surface with no exposed aggregate or other signs of degradation. See Figure 12 below.

Figure 12 - Typical tank wall condition

CONCLUSIONS

During the visual observation of the submerged metal components, it was documented that all accessible welded connections were found to have been constructed with good workmanship. The lap connections were fully seal welded that eliminates the potential of corrosion cells to form in these specific areas. The areas that were observed as having visible corrosion found on the submerged metal were in areas of potential stress from the normal operating conditions. The areas of exposed metal surfaces that were located above the fluid level were found to be in poor condition based on the amount of visible corrosion that had formed. Delamination of the carbon steel material as observed is usually attributed to hydrogen sulfide (H_2S) gas which accumulates within the vapor space. The exposed carbon steel in this particular area was typical of this type of corrosive attack.

Considerations should be given to recoating the severely corroded areas on the skimmer arms and the steel in the vapor space in the near-term maintenance plan. Recoating of the submerged portions of the structure and associated components should be included in the longer term maintenance plans.

RECOMMENDATIONS

1. As Soon as Possible: Repair the severely corroded areas on the skimmer arms and the steel in the vapor space, such as the inlet well and inlet well angle iron support ring and baffle. Abrasive blast the delaminated surfaces in accordance

with the coating manufacturer's instructions and apply coating as specified in IEUA RP-5 Specifications Section 09960, High Performance Coatings.

2. During the next maintenance interval: Repair the submerged portions of the structure and associated components such as the brace plates and squeegee arm angle arm weldments. . Abrasive blast the delaminated surfaces in accordance with the coating manufacturer's instructions and apply coating as specified in IEUA RP-5 Specifications Section 09960, High Performance Coatings.

3. Ongoing basis: Continue to monitor the condition of the clarifier on a annual basis to ensure metal loss does not become severe.

CLOSURE

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other written warranty or representation, expressed or implied, is included or intended.

Please contact our office if you have any questions.

Respectfully submitted,
HDR Engineering, Inc.

Cliff Moore, PE
Sr. Corrosion Engineer

Reviewed by:

Graham E. C. Bell, Ph.D., PE
Senior Vice President

Prepared For:

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

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corrpro An Aegion Company | INLAND EMPIRE UTILITIES AGENCY CATHODIC PROTECTION SYSTEM EVALUATION | Inland Empire Utilities Agency A MUNICIPAL WATER DISTRICT

CATHODIC PROTECTION (CP) & CORROSION MONITORING SYSTEM EVALUATION REPORT

FOR THE

INLAND EMPIRE UTILITIES AGENCY IN SAN BERNARNDINO COUNTY, CA

REV. 0

CORRPRO PROJECT No. : 340160854

REV	DATE DD/MM/YY	REMARKS	PREPARED BY	REVIEWED BY
1	7/08/2014	Revised per Comments	Joshua Emmanuel **CP Specialist**	Sarvjit Singh **CP Specialist**
0	5/23/2014	Issued for Approval	Joshua Emmanuel **CP Specialist**	Sarvjit Singh **CP Specialist**
Designation/ Project			Cathodic Protection System Evaluation Report for the Inland Empire Utilities Agency	

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

Corrpro (An Aegion Company), a specialized company in cathodic protection (CP), alternating current interference mitigation (ACIM), coating inspection, electrical grounding and lightning protection is retained by Inland Empire Utilities Agency (IEUA) to evaluate the condition of the various galvanic anode cathodic protection (GACP), and corrosion monitoring systems installed for 13 recycled water pipelines owned and operated by IEUA.

Evaluation of the various cathodic protection and corrosion monitoring systems was conducted between March 10th and April 9th of 2014. During the evaluation of the cathodic protection systems, Corrpro visited all of the cathodic protection and corrosion monitoring installations owned by IEUA in order to verify the proper operation and functionality of all of the installed CP equipment.

This evaluation report lists the information regarding the field testing, including the testing procedures, field data, and photographs, in addition to an overall list of recommendations and budgetary cost estimates for the recommended repairs in order to refurbish the existing cathodic protection systems.

2.0 REFERENCE DOCUMENTATION

[1] American Concrete Pressure Pipe Association. *External Protection of Concrete Cylinder Pipe*. Reston, VA.

[2] ASTM International. (1999). *Standard Test Method for Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete*. West Conshohocken, PA.

[3] Barboian, E. (2002). *NACE Corrosion Engineer's Reference Book*. (3rd ed.). Houston, TX: NACE International.

[4] NACE International. (2004). *NACE CP 4 - Cathodic Protection Specialist Course Manual*. Houston, TX.

[5] NACE International. (2013). *NACE Standard SP0169-2013 - Control of External Corrosion on Underground or Submerged Metallic Piping System*. Houston, TX.

[6] NACE International. (2008). *NACE Standard SP0408-2008 – Cathodic Protection of Reinforcing Steel in Buried or Submerged Concrete Structures*. Houston, TX.

[7] NACE International. (2011). *NACE CP 3 - Cathodic Protection Technologist Course Manual*. Houston, TX.

[8] Peabody, A.W. (2001). *Peabody's Control of Pipeline Corrosion*. Houston, TX: NACE International.

3.0 DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations have been used in this document:

Anode: The electrode through which cathodic protection current enters the electrolyte.

Cathode: The electrode through which the cathodic protection current leaves the electrolyte or the structure receiving corrosion protection from the CP System.

Cathodic Protection (CP): Technique to protect metallic structure in contact with an electrolyte by causing direct current to flow from electrolytic environment to entire metal surface.

Electrolyte: A liquid or liquid component in composite material like soil, in which electric current flows through the movement of ions.

Galvanic Anode CP (GACP): Cathodic Protection utilizing sacrificial anodes composed of highly active metals, such as zinc, magnesium, or aluminum, to produce CP current due to the difference in potential between the sacrificial anode and the cathode (protected structure)

Groundbed: System of buried or submerged anodes

Instantaneous "OFF" potential: The structure-to-electrolyte potential measured immediately after the synchronous interruption of all sources of applied CP Current.

Impressed Current CP (ICCP): Cathodic Protection utilizing a DC power source, typically via a transformer/rectifier powered by AC electricity, to force a cathodic protection current to flow from the anode to the cathode.

Protected Structure: The structure to which cathodic protection is provided.

Protection Current: The current made to flow into a metallic structure from electrolyte in order to protect the metallic structure.

Reference Cell: An electrode that serves as basis of comparison in the measurement of other electrode potentials.

Structure/Electrolyte Potential: The difference in potential between a structure and a specified reference electrode in contact with the electrolyte.

4.0 SYSTEM DESCRIPTIONS

4.1 Bickmore Avenue Pipeline (BAP)

The portion of the Bickmore Avenue Pipeline with an installed cathodic protection system is a 1,300 foot long, 18" ductile iron pipeline (DIP) which extends from San Antonio Avenue to Fern Avenue, along the south side of Bickmore Avenue. The pipeline has been installed with a galvanic anode cathodic protection (GACP) system consisting of flush-to-grade test stations with high potential magnesium anodes.

During the CP system evaluation, all six (6) of the CP test stations designed to protect the Bickmore Avenue Pipeline were found in good condition, but all of the galvanic anodes were found disconnected from the pipeline. A detailed discussion regarding the state of the BAP cathodic protection system is located in Section 9.1 of this report.

4.2 CCWRF RWD System (CCP)

The CCWRF Reclaimed Water Distribution System network of various diameter distribution pipelines of unknown material which originate from the Carbon Canyon Water Recycling Facility along Telephone Avenue. It does not appear that this pipeline has been installed with either a cathodic protection or corrosion monitoring system.

During the CP system evaluation, the two (2) test stations which were labeled as being associated with CCP were found to be either associated with another pipeline (EPA) or were found with no test leads present. The data sheet for the one (1) nonfunctional test station associated with CCP is located in Appendix A.2.

4.3 Edison Avenue RW Main A (EPA)

The Edison Avenue Recycled Water Main A is a 3.3 mile long, 30" ductile iron pipeline which extends from the Carbon Canyon Water Recycling Facility (CCWRF) to Euclid Ave Route 83, where it connects to the Edison Avenue Recycled Water Main B. The pipeline has been installed with a galvanic anode cathodic protection system consisting of flush-to-grade test stations with high potential magnesium anodes.

A total of 11 of the CP test stations designed to protect the Edison Avenue RW Main A were found in good condition during the CP system evaluation, but some significant issues were encountered including a lack of isolation at an insulating flange kit and at a pipeline casing. A detailed discussion regarding the state of the EPA cathodic protection system is located in Section 9.3 of this report.

4.4 Edison Avenue RW Main B (EPB)

The Edison Avenue Recycled Water Main B is a 3.0 mile long, 30" ductile iron pipeline which extends from Euclid Ave Route 83, where it connects to the Edison Avenue Recycled Water Main A, to its connection point with a 30" RW and a 54" RW cement mortar lined and coated (CML&C) pipeline. The pipeline has been installed with a galvanic anode cathodic protection system consisting of flush-to-grade test stations with high potential magnesium anodes.

Only two (2) of the ten (10) CP test stations designed to protect the Edison Avenue RW Main A were found in good condition during the CP system evaluation, as all of the test stations located along Edison Avenue appear to have been paved over or removed. A detailed discussion regarding the state of the EPB cathodic protection system is located in Section 9.4 of this report.

4.5 Philadelphia RW Pipeline (PSP)

The Philadelphia RW Pipeline is a 1.8 mile long, 24" & 30" cement mortar lined and coated pipeline which extends from Ely Basin No. 1 along S. Baker Ave to Regional Plant No. 1. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

A total of six (6) out of the seven (7) of the test stations designed to monitor the Philadelphia RW Pipeline were found in good condition during the corrosion monitoring system evaluation. A detailed discussion regarding the state of the PSP corrosion monitoring system is located in Section 9.5 of this report.

4.6 Jurupa Force Main (JFM)

The Jurupa Force Main is a 2.2 mile long, 36" cement mortar lined and coated pipeline which extends from the Jurupa Basin along Mulberry Avenue to the RP-3 Basin near Hemlock Avenue. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

A total of 12 out of the 13 of corrosion monitoring test stations for the Jurupa Force Main whose GPS coordinates were provided to Corrpro were located, with the majority of the test stations being found in good condition during the corrosion monitoring system evaluation, but there may exist an another additional 11 test stations according to the JFM pipeline construction plans. Additionally, multiple electrical discontinuities were discovered during current requirement and electrical continuity of the pipeline. A detailed discussion regarding the state of the JFM corrosion monitoring system is located in Section 9.6 of this report.

4.7 RP-4 1158 Zone Pipeline (RPL)

The RP-4 1158 Zone Pipeline is a 2800 foot long, 36"/48" cement mortar lined and coated pipeline which extends from the 1158 Zone Storage Reservoirs to Regional Plant No. 4. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

All three (3) corrosion monitoring test stations for the RP-4 1158 Zone Pipeline whose GPS coordinates were provided to Corrpro were located, with two (2) test stations being in functional condition, but there may exist an another additional three (3) test stations according to the RPL pipeline construction plans. A detailed discussion regarding the state of the RPL corrosion monitoring system is located in Section 9.7 of this report.

4.8 Etiwanda Ave Pipeline (EPL)

The Etiwanda Pipeline is a 3400 foot long, 36" cement mortar lined and coated pipeline which extends along Etiwanda Avenue, directly adjacent to Regional Plant No. 4. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

Both of the two (2) test stations designed to monitor the Etiwanda Ave Pipeline were found to be functional and in good condition. A detailed discussion regarding the state of the EPL corrosion monitoring system is located in Section 9.8 of this report.

4.9 North Etiwanda Ave Pipeline (NEA)

The North Etiwanda Pipeline is a 1800 foot long, 42" cement mortar lined and coated pipeline which extends along Etiwanda Avenue from Whittram Avenue to Arrow Route. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

All four (4) test stations designed to monitor the North Etiwanda Ave Pipeline were found to be functional and in good condition. A detailed discussion regarding the state of the NEA corrosion monitoring system is located in Section 9.9 of this report.

4.10 San Antonio Channel Pipeline Segment A (SCA)

The San Antonio Channel Pipeline Segment A is a 2.8 mile long, 24" cement mortar lined and coated pipeline which extends from the Cucamonga Creek Channel near Hellman Avenue to Sultana Avenue. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

All five (5) corrosion monitoring test stations for the San Antonio Channel Pipeline Segment A whose GPS coordinates were provided to Corrpro were located, with four (4) test stations being found in functional condition, but there may exist an another additional 15 test stations according to the SCA pipeline construction plans. A detailed discussion regarding the state of the SCA corrosion monitoring system is located in Section 9.10 of this report.

4.11 RP-4 West Extension Phase 1 (WE1)

The RP-4 West Extension Phase 1 is a 2.7 mile long, 30" cement mortar lined and coated pipeline which extends along 6th Street from the Regional Plant No. 4 at Etiwanda Avenue to Cleveland Avenue. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

Nine (9) out of ten (10) corrosion monitoring test stations for the RP-4 West Extension Phase 1 whose GPS coordinates were provided to Corrpro were located, but only five (5) test stations were found to be in functional condition. Also, there may exist another additional five (5) test stations according to the WE1 pipeline construction plans. A detailed discussion regarding the state of the WE1 corrosion monitoring system is located in Section 9.11 of this report.

4.12 RP-4 West Extension Phase 2 (WE2)

The RP-4 West Extension Phase 2 is a 2.4 mile long, 24" & 30" cement mortar lined and coated pipeline which extends from the Cucamonga Creek Channel near Hellman Avenue to Cleveland Avenue. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

Seven (7) out of nine (9) corrosion monitoring test stations for the RP-4 West Extension Phase 2 whose GPS coordinates were provided to Corrpro were located and found to be in functional condition, but there may exist an another additional four (4) test stations according to the WE1 pipeline construction plans. A detailed discussion regarding the state of the WE1 corrosion monitoring system is located in Section 9.12 of this report.

4.13 Whittram Pipeline (WPL)

The Whittram Pipeline is a 1.4 mile long, 16" pipeline of unknown composition which extends along Whittram Avenue from Etiwanda Avenue to the Banana Basin at

Banana Avenue. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

Seven (7) out of eight (8) test stations for the Whittram Pipeline whose GPS coordinates were provided to Corrpro were located, but only two (2) test stations were found to be in functional condition; the majority of test stations located appear to be intended for locating PVC waterlines. Additionally, the pipeline appears to be electrically discontinuous which leads Corrpro to believe that the majority of the pipeline is composed of PVC. A detailed discussion regarding the state of the WPL corrosion monitoring system is located in Section 9.13 of this report.

4.14 1299 Recycled Water Pipeline (ZRP)

The 1299 Recycled Water Pipeline is a 2.4 mile long, 36" cement mortar lined and coated pipeline which extends from Etiwanda Avenue to East Avenue. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

All 12 test stations for the 1299 Recycled Water Pipeline whose GPS coordinates were provided to Corrpro were located and were found to be in good condition. A detailed discussion regarding the state of the ZRP corrosion monitoring system is located in Section 9.14 of this report.

4.15 East 1630 RW Pipeline Segment A (ERP)

The East 1630 RW Pipeline Segment A is a 2.2 mile long, 36" cement mortar lined and coated pipeline which extends from East Avenue to the Etiwanda Creek Flood Control Channel. The pipeline has been installed with a corrosion monitoring system consisting of flush-to-grade test stations and pipe test leads.

Both test stations for the East 1630 RW Pipeline Segment A whose GPS coordinates were provided to Corrpro were located and were found to be in good condition, but there may exist an another additional eight (8) test stations according to the ERP pipeline construction plans. Additionally, the pipeline was found to be electrically discontinuous during current requirement and electrical continuity testing of the pipeline between the two (2) test stations located. A detailed discussion regarding the state of the ERP corrosion monitoring system is located in Section 9.15 of this report.

5.0 NACE CATHODIC PROTECTION CRITERIA

The cathodic protection systems were tested to verify that it meets the criteria mentioned in Section 6.0 of NACE *SP0169-2013* [5].

1. A negative (cathodic) potential of at least 850 mV with the CP applied. This potential is measured with respect to a saturated copper/copper sulfate reference electrode contacting the electrolyte. Voltage drops other than those across the structure-to-electrolyte boundary must be considered for valid interpretation of this voltage measurement (NACE SP0169-2007, Para. 6.2.2.1.1).

2. A negative polarized potential of at least 850 mV relative to a saturated copper/copper sulfate reference electrode.

3. A minimum of 100 mV of cathodic polarization between the structure surface and a stable reference electrode contacting the electrolyte. The formation or decay of polarization can be measured to satisfy this criterion (NACE SP0169, Para. 6.2.2.1.3).

6.0 CORROSION MONITORING OF CONCRETE PIPE

The corrosion monitoring systems installed on concrete coated pipelines (e.g. CML&C) were evaluated as per the ASTM International *Standard Test Method for Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete* [2] to estimate the likelihood of whether corrosion is occurring on the structures.

1. If potentials over an area are more positive than -0.20 V CSE, there is a greater than 90% probability that no reinforcing steel corrosion is occurring in that area at the time of measurement.

2. If potentials over an area are in the range of -0.20 V CSE to -0.35 V CSE, corrosion activity of the reinforcing steel in that area is uncertain.

3. If potentials over an area are more negative than -0.35 V CSE, there is a greater than 90% probability that reinforcing steel corrosion is occurring in that area at the time of measurement.

7.0 FIELD TESTING PROCEDURES

7.1 CP System & Corrosion Monitoring Testing Procedure

In order to verify that the cathodic protection systems meet the NACE CP Criteria established in Section 5.0 of this report, structure-to-electrolyte potential measurements are obtained using a portable and/or permanent reference electrode. Two types of portable reference cells are typically used when evaluating cathodically protected structures. Whenever the protected structure is buried in soil, a copper/copper sulfate reference electrode (CSE) contacting moistened soil is typically used as a reference

The reference electrode is connected to the negative terminal of high input impedance digital voltmeter and an electrical connection with the structure, either a permanently installed (e.g. exothermically welded) structure test lead or a temporary, mechanical connection, is connected to the positive terminal of the voltmeter.

For pipelines where cathodic protection systems are installed “ON” structure-to-electrolyte potential measurements (i.e. with cathodic protection current applied) are measured, and where it is possible to interrupt the cathodic protection current (e.g. disconnecting galvanic anodes), “Instant-OFF” are also recorded. Anode current output was recorded by measuring the voltage drop across a shunt of calibrated resistance. In addition, the open circuit potentials of the sacrificial anodes were measured with respect to the portable reference electrode in order to check their integrity.

For pipelines where corrosion monitoring systems are installed, only “Native” (as-found) structure-to-electrolyte potential measurements are measured.

8.0 SUMMARY OF TESTING RESULTS

A summary of the test data acquired from the system evaluation is listed below including pipe-to-soil potential, soil resistivity, and current requirement summary plots. Detailed data sheets, specific to individual CP installations and include GPS coordinates, test data and photographs, are shown in Appendix A of this report.

8.1 Pipe-to-Soil Potentials

Pipe-to-soil potentials were measured at each functional test station located during the system evaluation. Summary plots of the potential measurements for each pipeline are shown below. Some gaps exist in the pipe-to-soil potential plots as a number of test stations were unable to be located or were found to be nonfunctional.

8.1.1 Bickmore Avenue Pipeline (BAP)

Figure 1 - Structure-to-Electrolyte Potentials of BAP

8.1.2 Edison Avenue RW Main A (EPA)

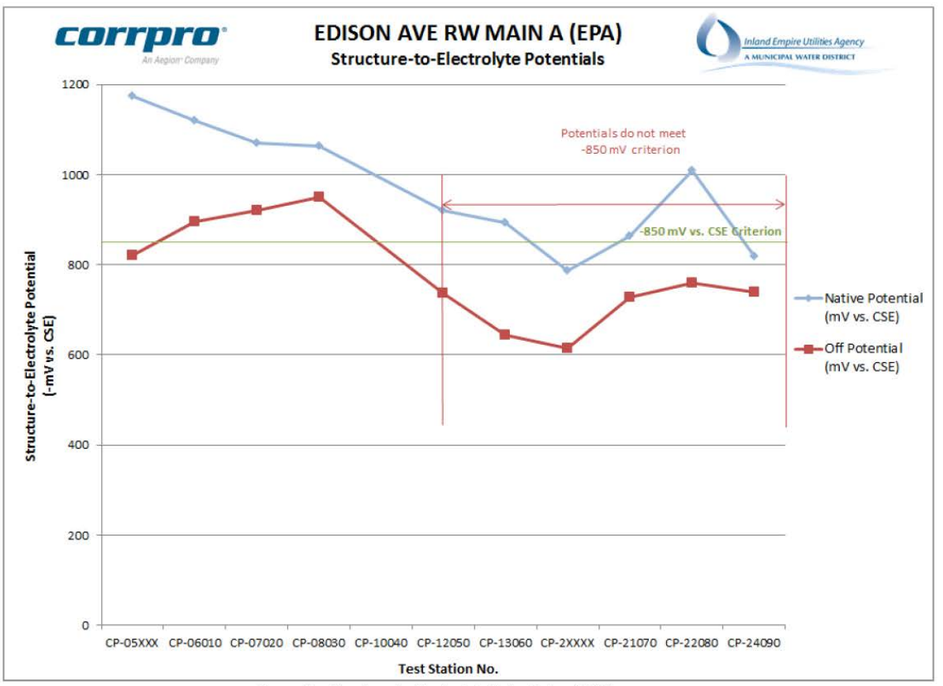

Figure 2 - Structure-to-Electrolyte Potentials of EPA

8.1.3 Edison Avenue RW Main B (EPB)

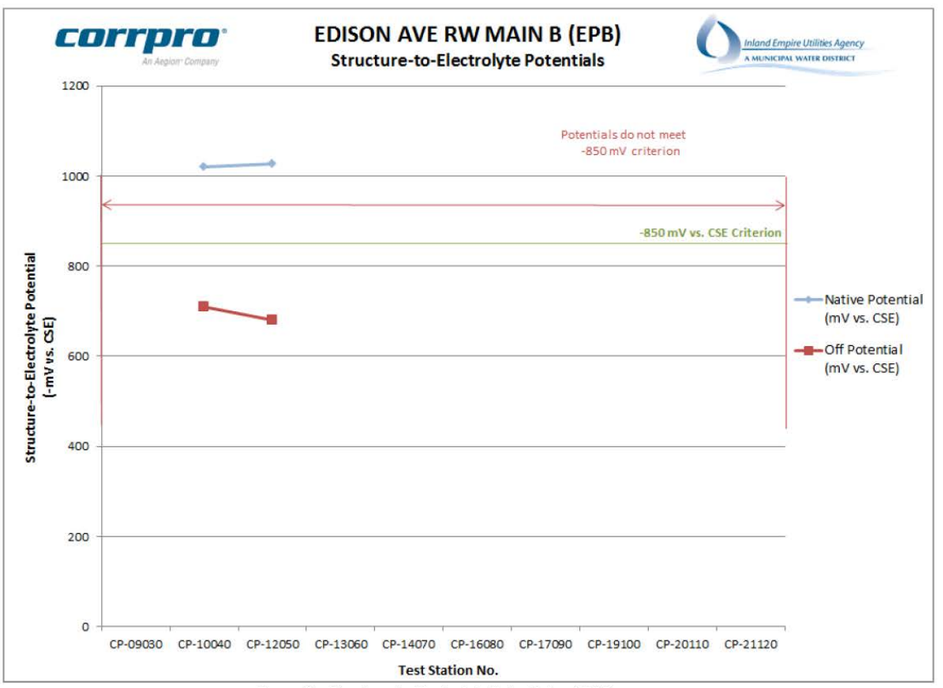

Figure 3 - Structure-to-Electrolyte Potentials of EPB

8.1.4 Philadelphia RW Pipeline (PSP)

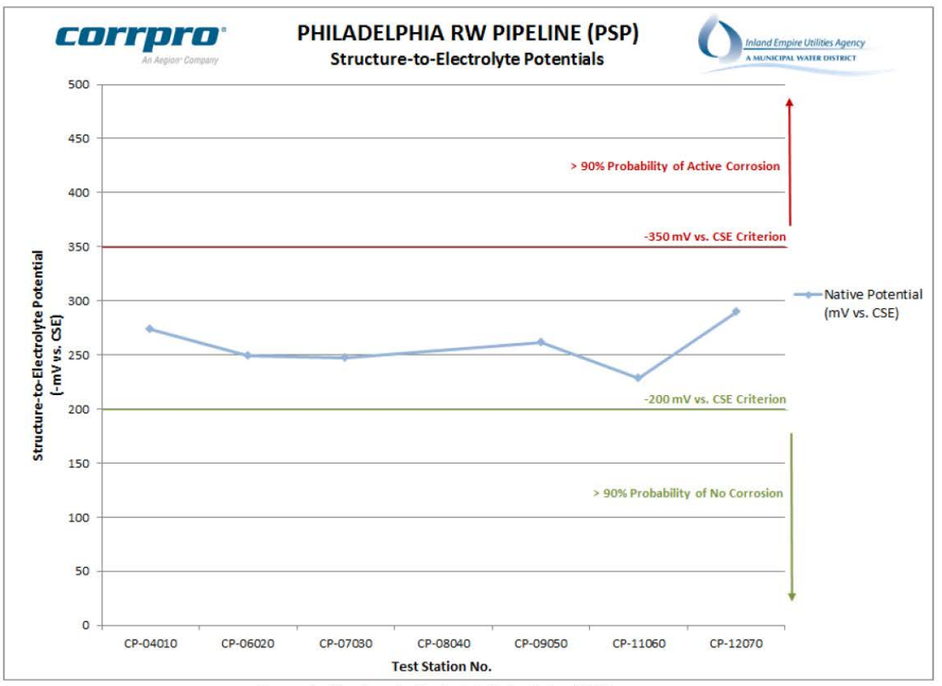

Figure 4 - Structure-to-Electrolyte Potentials of PSP

8.1.5 Jurupa Force Main (JFM)

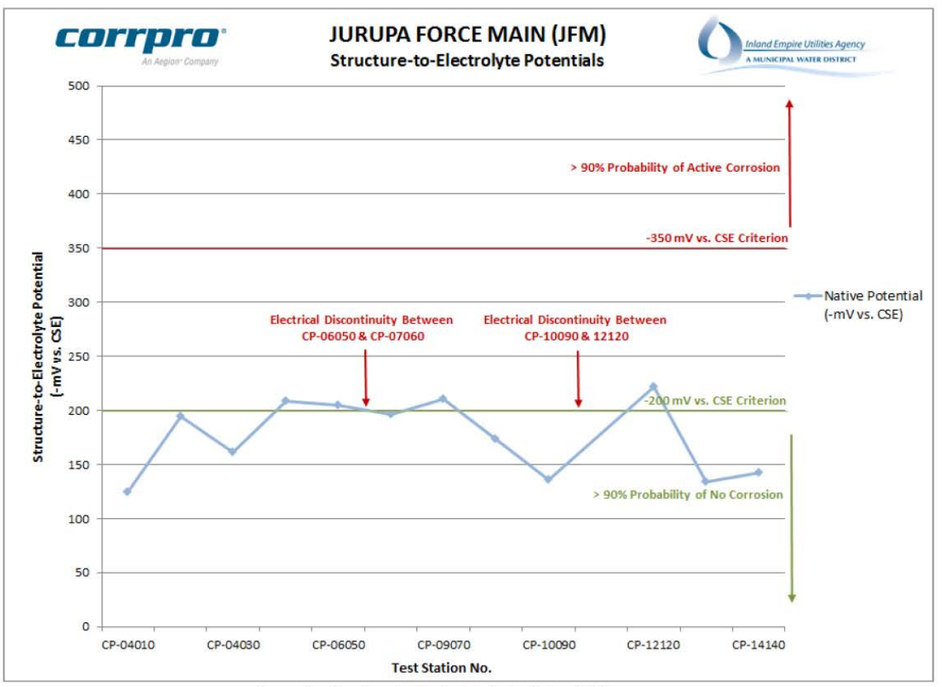

Figure 5 - Structure-to-Electrolyte Potentials of JFM

8.1.6 RP-4 1158 Zone Pipeline (RPL)

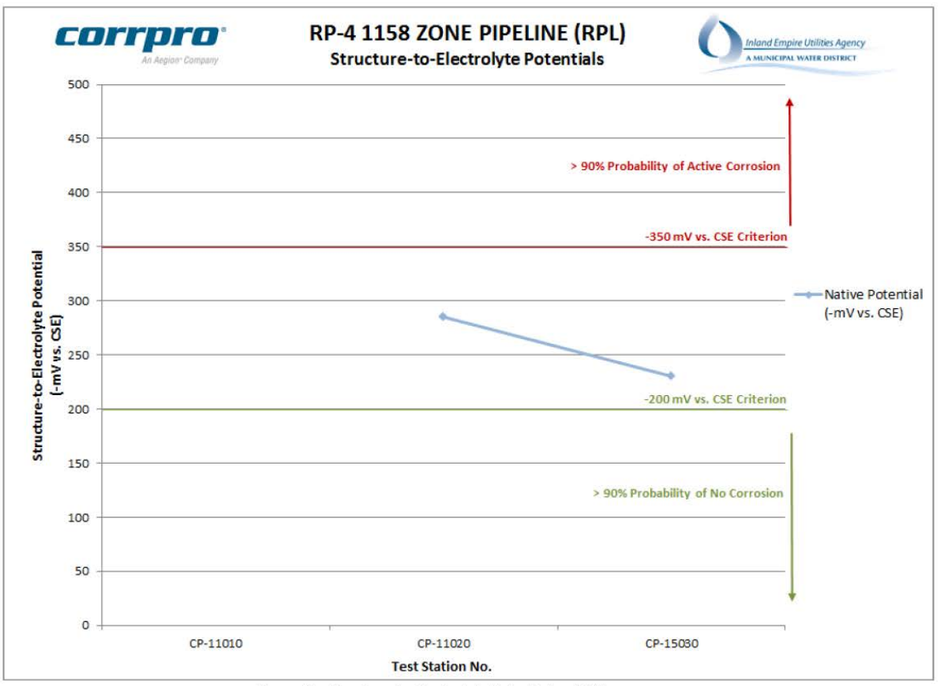

Figure 6 - Structure-to-Electrolyte Potentials of RPL

8.1.7 Etiwanda Ave Pipeline (EPL)

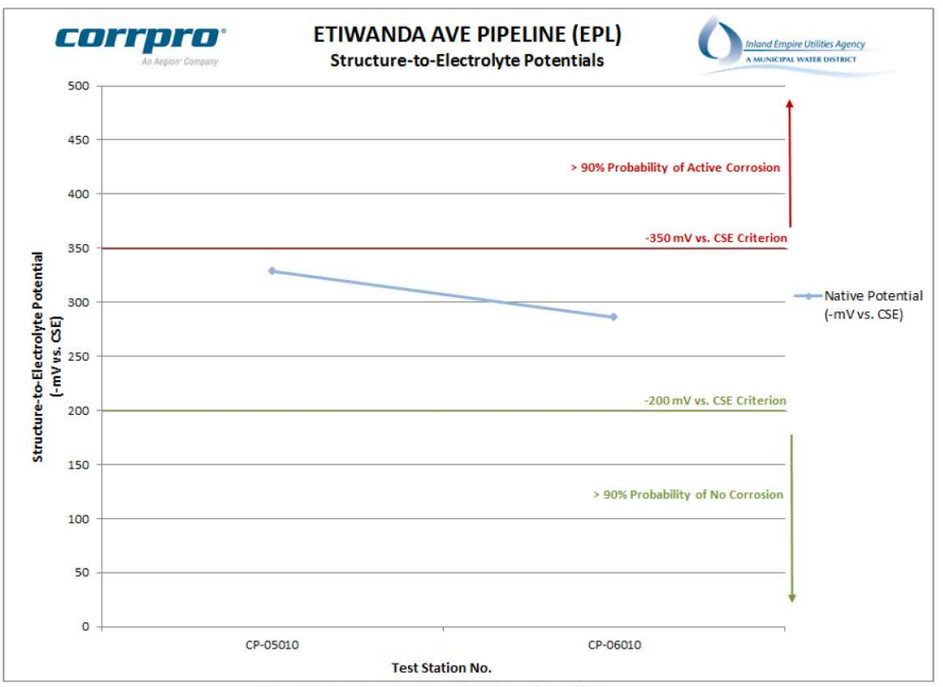

Figure 7 - Structure-to-Electrolyte Potentials of EPL

8.1.8 North Etiwanda Ave Pipeline (NEA)

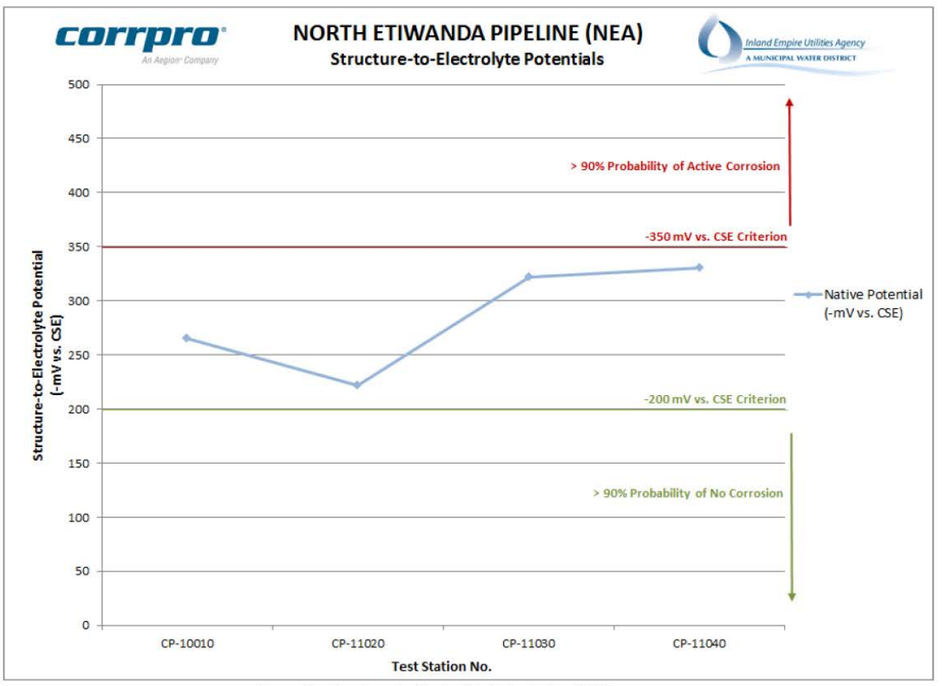

Figure 8 - Structure-to-Electrolyte Potentials of NEA

8.1.9 San Antonio Channel Pipeline Segment A (SCA)

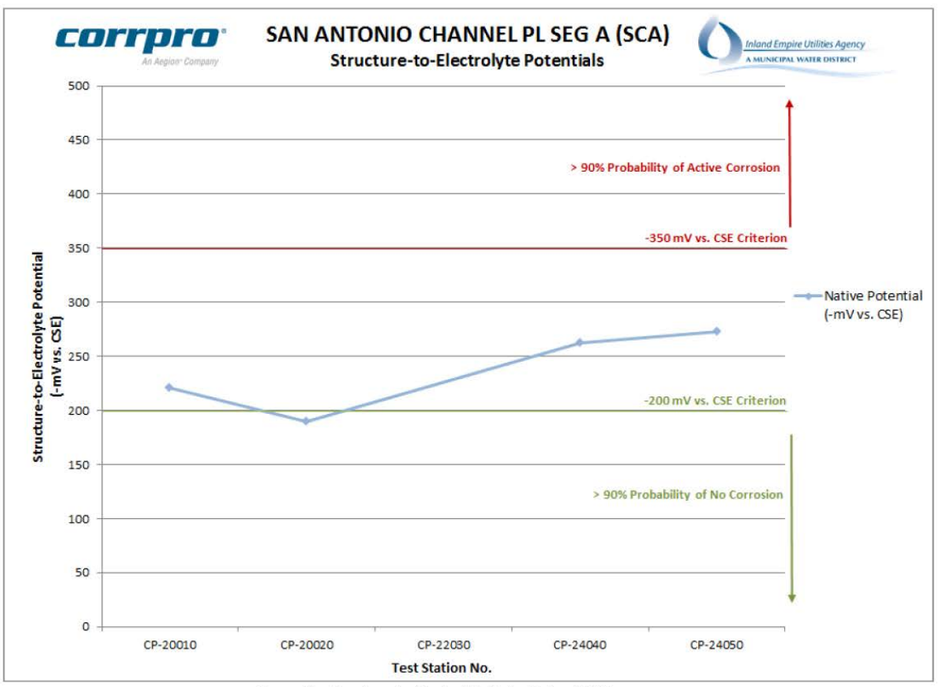

Figure 9 - Structure-to-Electrolyte Potentials of SCA

8.1.10 RP-4 West Extension Phase 1 (WE1)

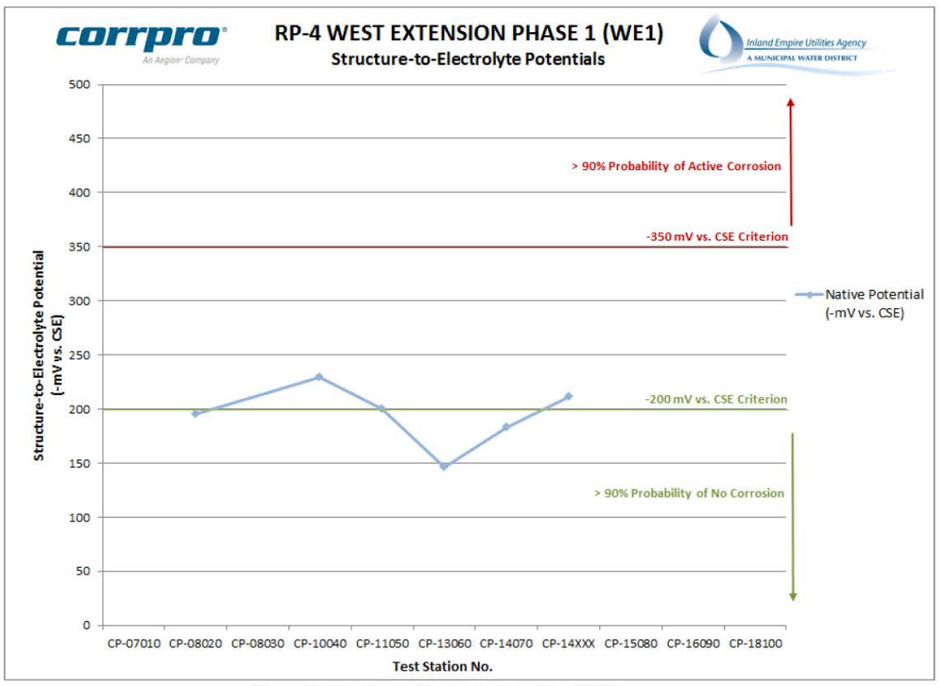

Figure 10 - Structure-to-Electrolyte Potentials of WE1

8.1.11 RP-4 West Extension Phase 2 (WE2)

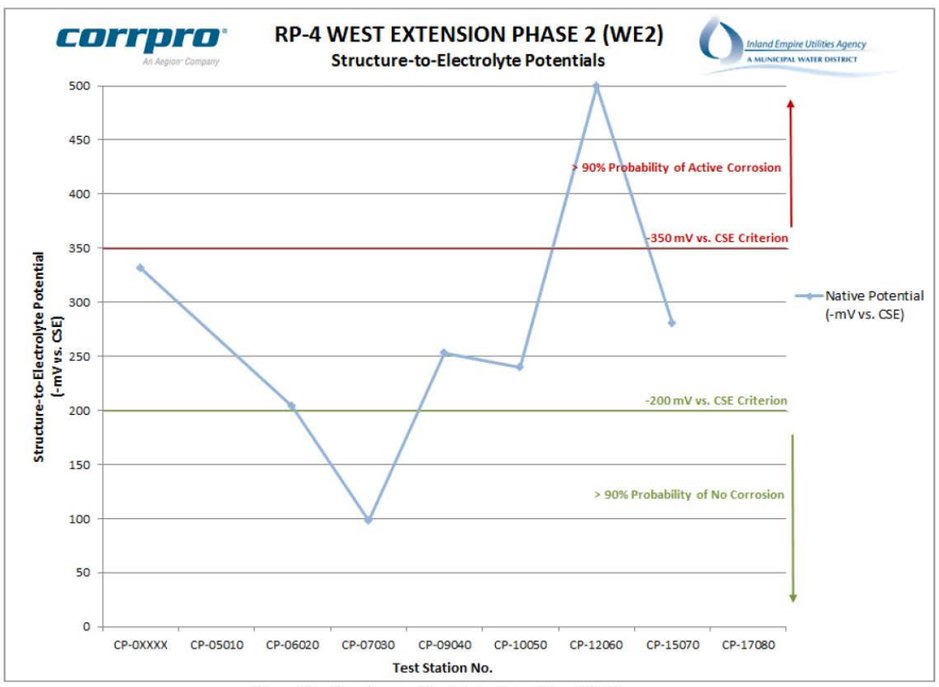

Figure 11 - Structure-to-Electrolyte Potentials of WE2

8.1.12 Whittram Pipeline (WPL)

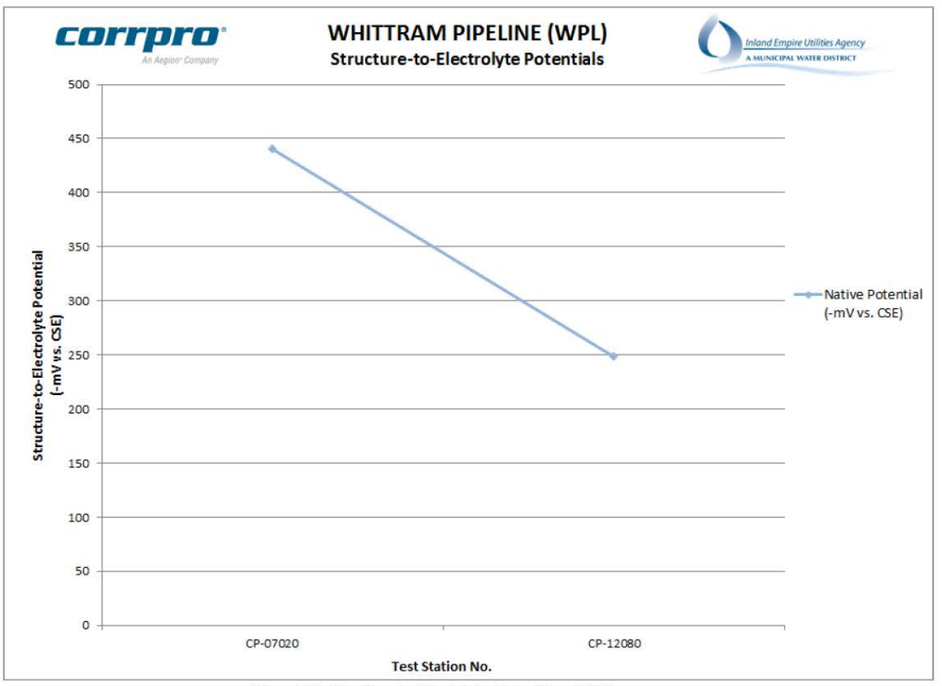

Figure 12 - Structure-to-Electrolyte Potentials of WPL

8.1.13 1299 Recycled Water Pipeline (ZRP)

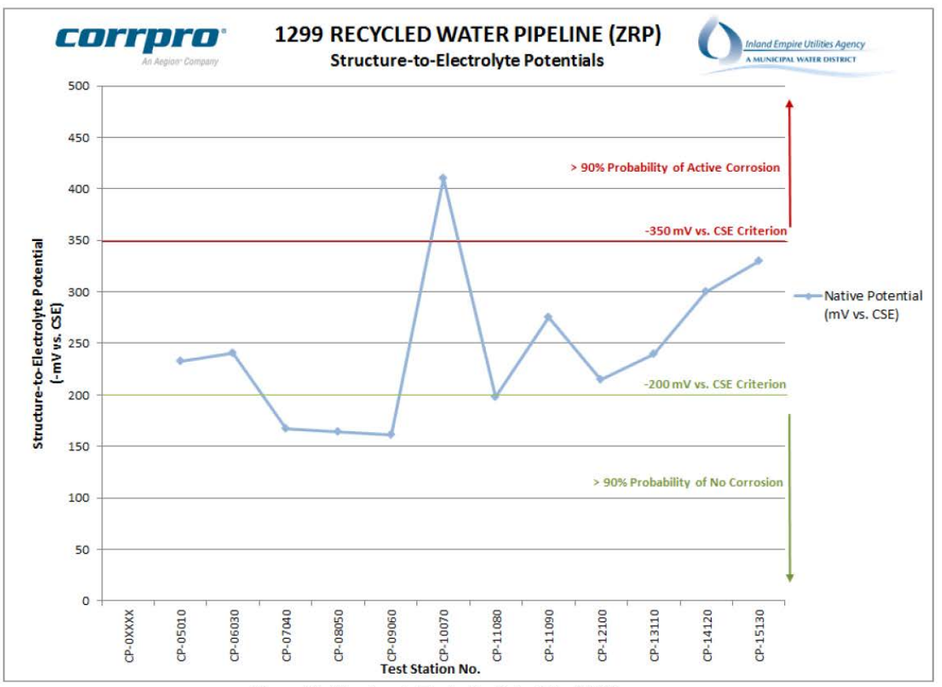

Figure 13 - Structure-to-Electrolyte Potentials of ZRP

8.1.14 East 1630 RW Pipeline Segment A (ERP)

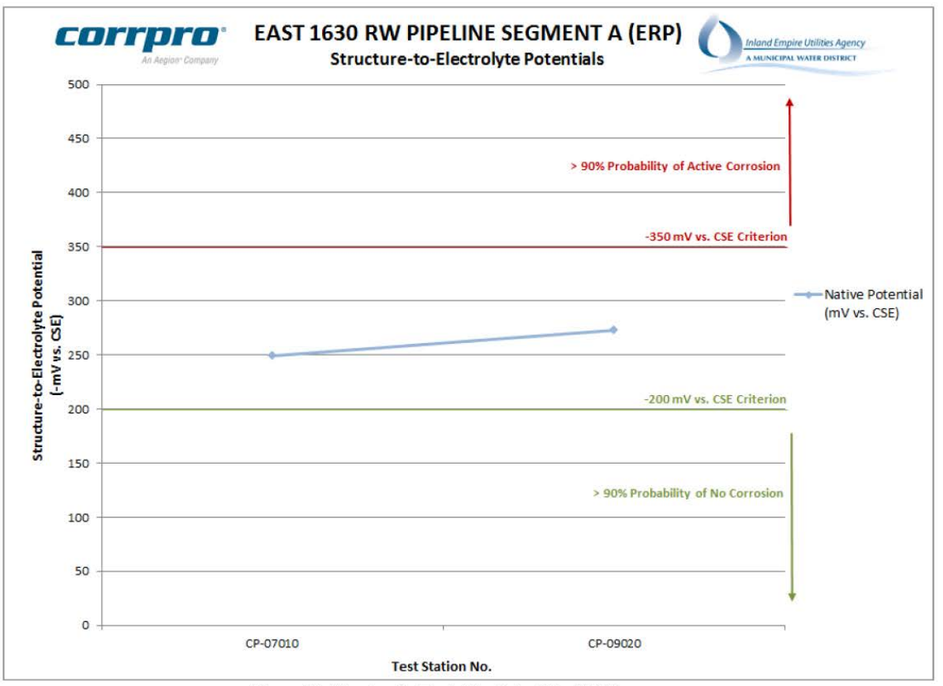

Figure 14 - Structure-to-Electrolyte Potentials of ERP

8.2 Soil Resistivity Data

Soil resistivities were measured using Wenner 4-Pin testing at intervals of 1 mile along pipeline during the system evaluation. Summary plots and tables of the soil resistivity measurements are shown below. It should be noted that a correlation can be observed in the data with soil resistivities towards the Southwestern corner of San Bernardino County (i.e. Pressure Zones 800 & 930) were found to be significantly lower and more corrosive compared to those measured to the north.

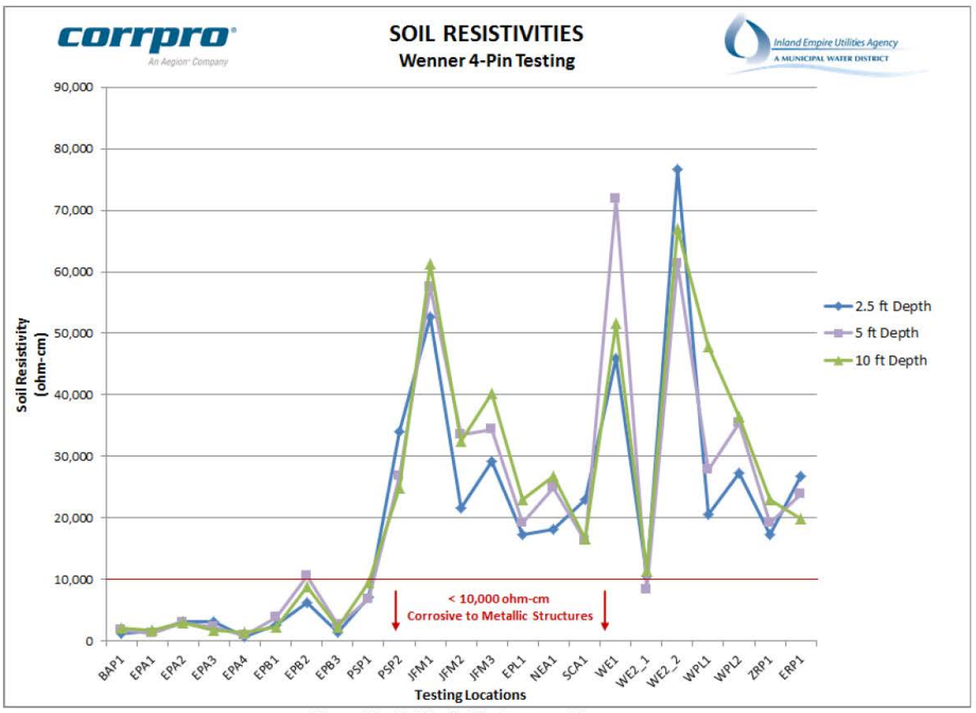

Figure 15 – Soil Resistivity Summary Plot

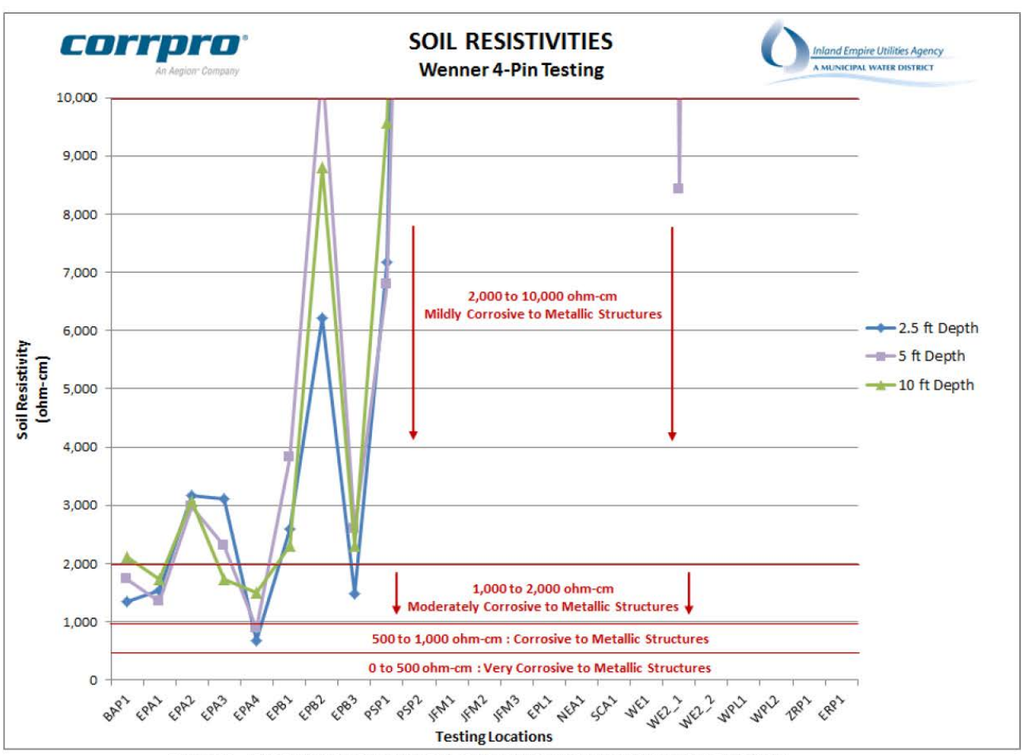

Figure 16 – Soil Resistivity Summary Plot (Scaled to Show Areas with Low Soil Resistivity)

Wenner 4-Pin Soil Resistivity Data

Location No.	Latitude	Longitude	Pin Spacing (ft)	Resistance (ohms)	Average Resistivity (ohm-cm)	Layer	Layer Resistance (ohms)	Layer Resistivity (ohm-cm)
BAP1	33.96113	-117.65546	2.5	2.8	1,341	0 to 2.5	2.8	1,341
			5	1.8	1,724	2.5 to 5	5.0	2,413
			10	1.1	2,107	5 to 10	2.8	2,708
EPA1	33.99017	-117.64778	2.5	3.2	1,532	0 to 2.5	3.2	1,532
			5	1.4	1,341	2.5 to 5	2.5	1,192
			10	0.9	1,724	5 to 10	2.5	2,413
EPA2	33.99060	-117.65841	2.5	6.6	3,160	0 to 2.5	6.6	3,160
			5	3.1	2,968	2.5 to 5	5.8	2,799
			10	1.6	3,064	5 to 10	3.3	3,166
EPA3	33.99454	-117.67843	2.5	6.5	3,112	0 to 2.5	6.5	3,112
			5	2.4	2,298	2.5 to 5	3.8	1,822
			10	0.9	1,724	5 to 10	1.4	1,379
EPA4	33.98294	-117.69012	2.5	1.4	670	0 to 2.5	1.4	670
			5	0.92	881	2.5 to 5	2.7	1,285
			10	0.78	1,494	5 to 10	5.1	4,908
EPB1	33.99355	-117.63689	2.5	5.4	2,585	0 to 2.5	5.4	2,585
			5	4	3,830	2.5 to 5	15.4	7,386
			10	1.2	2,298	5 to 10	1.7	1,641
EPB2	33.99800	-117.60684	2.5	13	6,224	0 to 2.5	13.0	6,224
			5	11	10,533	2.5 to 5	71.5	34,231
			10	4.6	8,809	5 to 10	7.9	7,570
EPB3	33.99788	-117.62667	2.5	3.1	1,484	0 to 2.5	3.1	1,484
			5	2.7	2,585	2.5 to 5	20.9	10,018
			10	1.2	2,298	5 to 10	2.2	2,068
PSP1	34.02772	-117.59915	2.5	15	7,181	0 to 2.5	15.0	7,181
			5	7.1	6,798	2.5 to 5	13.5	6,454
			10	5	9,575	5 to 10	16.9	16,186
PSP2	34.03327	-117.60560	2.5	71	33,991	0 to 2.5	71.0	33,991
			5	28	26,810	2.5 to 5	46.2	22,134
			10	13	24,895	5 to 10	24.3	23,235
JFM1	34.04791	-117.47605	2.5	110	52,663	0 to 2.5	110.0	52,663
			5	60	57,450	2.5 to 5	132.0	63,195
			10	32	61,280	5 to 10	68.6	65,657
JFM2	34.04794	-117.49285	2.5	45	21,544	0 to 2.5	45.0	21,544
			5	35	33,513	2.5 to 5	157.5	75,403
			10	17	32,555	5 to 10	33.1	31,651
JFM3	34.05181	-117.50773	2.5	61	29,204	0 to 2.5	61.0	29,204
			5	36	34,470	2.5 to 5	87.8	42,053
			10	21	40,215	5 to 10	50.4	48,258

Figure 17 - Soil Resistivity Summary Table

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Wenner 4-Pin Soil Resistivity Data (cont.)

Location No.	Latitude	Longitude	Pin Spacing (ft)	Resistance (ohms)	Average Resistivity (ohm-cm)	Layer	Layer Resistance (ohms)	Layer Resistivity (ohm-cm)
EPL1	34.08304	-117.52411	2.5	36	17,235	0 to 2.5	36.0	17,235
			5	20	19,150	2.5 to 5	45.0	21,544
			10	12	22,980	5 to 10	30.0	28,725
NEA1	34.09871	-117.52359	2.5	38	18,193	0 to 2.5	38.0	18,193
			5	26	24,895	2.5 to 5	82.3	39,417
			10	14	26,810	5 to 10	30.3	29,044
SCA1	34.07444	-117.62943	2.5	48	22,980	0 to 2.5	48.0	22,980
			5	17	16,278	2.5 to 5	26.3	12,602
			10	8.7	16,661	5 to 10	17.8	17,062
WE1	34.08615	-117.53293	2.5	96	45,960	0 to 2.5	96.0	45,960
			5	75	71,813	2.5 to 5	342.9	164,143
			10	27	51,705	5 to 10	42.2	40,395
WE2_1	34.08442	-117.57015	2.5	22	10,533	0 to 2.5	22.0	10,533
			5	8.8	8,426	2.5 to 5	14.7	7,022
			10	6	11,490	5 to 10	18.9	18,056
WE2_2	34.07758	-117.57954	2.5	160	76,600	0 to 2.5	160.0	76,600
			5	64	61,280	2.5 to 5	106.7	51,067
			10	35	67,025	5 to 10	77.2	73,959
WPL1	34.09475	-117.50600	2.5	43	20,586	0 to 2.5	43.0	20,586
			5	29	27,768	2.5 to 5	89.1	42,643
			10	25	47,875	5 to 10	181.3	173,547
WPL2	34.09440	-117.52361	2.5	57	27,289	0 to 2.5	57.0	27,289
			5	37	35,428	2.5 to 5	105.5	50,484
			10	19	36,385	5 to 10	39.1	37,396
ZRP1	34.09918	-117.52012	2.5	36	17,235	0 to 2.5	36.0	17,235
			5	20	19,150	2.5 to 5	45.0	21,544
			10	12	22,980	5 to 10	30.0	28,725
ERP1	34.11904	-117.51475	2.5	56	26,810	0 to 2.5	56.0	26,810
			5	25	23,938	2.5 to 5	45.2	21,621
			10	10.4	19,916	5 to 10	17.8	17,051

Figure 18 - Soil Resistivity Summary Table (cont.)

8.3 Current Requirement & Electrical Continuity Testing Data

Current requirement and electrical continuity testing was performed along each pipeline during the system evaluation in order to estimate the amount of cathodic protection current that would be required in order to sufficiently cathodically protect each pipeline and to verify whether the pipelines have electrical continuity for their entire lengths. Summary plots of the current requirement and electrical continuity testing for each pipeline are shown below. It should be noted that electrical discontinuities were discovered on the JFM, WPL (assumed to be PVC), and ERP pipelines. The JFM and ERP pipelines, which are made of CML&C, cannot easily be cathodically protected without locating and repairing these electrical continuity issues.

Current Requirement & Electrical Continuity Data						
Pipeline Name	Material	Diameter (inches)	Approximate Length (miles)	Theoretical Current Requirement (A)	Empirical Current Requirement (A)	Electrical Continuity
BAP	Ductile Iron	18	0.25	0.25	0.23	Continuous
EPA	Ductile Iron	30	3.3	5.47	6.19	Continuous
EPB	Ductile Iron	30	3	4.98	1.08	Continuous
PSP	CML&C	30	1.8	22.39	14.00	Continuous
JFM	CML&C	36	2.2	32.84	24.66	Discontinuous
RPL	CML&C	48	0.53	10.55	15.56	Continuous
EPL	CML&C	36	0.64	9.55	11.11	Continuous
NEA	CML&C	42	0.34	5.92	14.67	Continuous
SCA	CML&C	24	2.8	27.87	16.40	Continuous
WE1	CML&C	30	2.7	33.59	28.14	Continuous
WE2	CML&C	30	2.4	29.86	40.00	Continuous
WPL	PVC	16	1.4	9.29	--	Discontinuous
ZRP	CML&C	36	2.4	35.83	45.88	Continuous
ERP	CML&C	36	2.2	32.84	--	Discontinuous

Figure 19 - Current Requirement & Electrical Continuity Data Summary Table

8.3.1 Bickmore Avenue Pipeline (BAP)

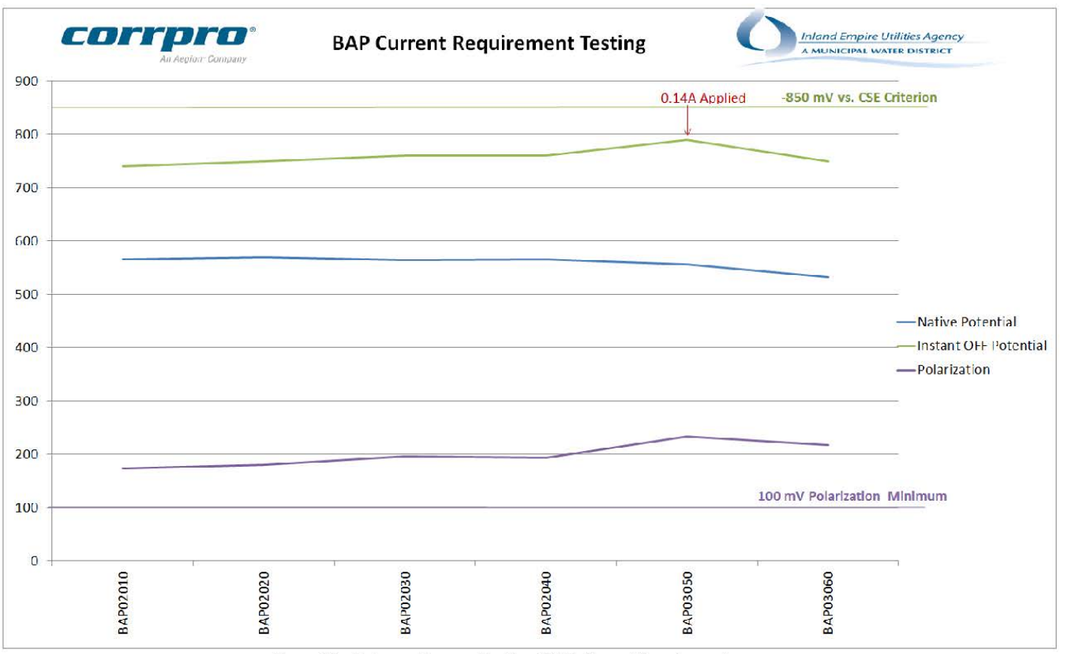


Figure 20 - Bickmore Avenue Pipeline (BAP) Current Requirements

8.3.2 Edison Avenue RW Main A (EPA)

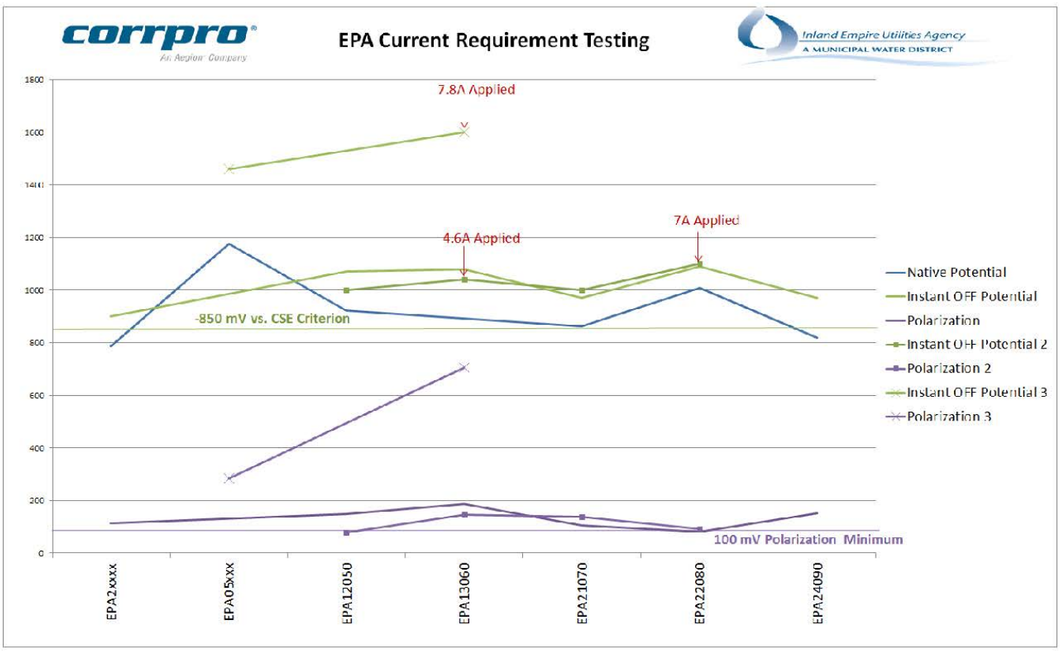


Figure 21 - Edison Avenue RW Main A Current Requirement

8.3.3 Edison Avenue RW Main B (EPB)

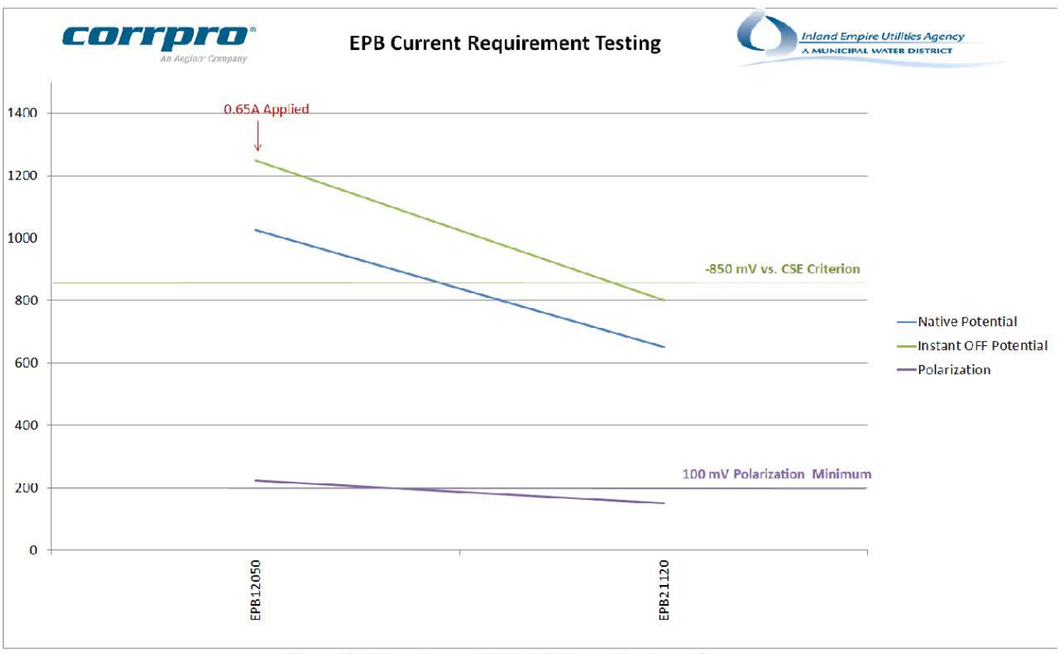


Figure 22 - Edison Avenue RW Main B Current Requirement

8.3.4 Philadelphia RW Pipeline (PSP)

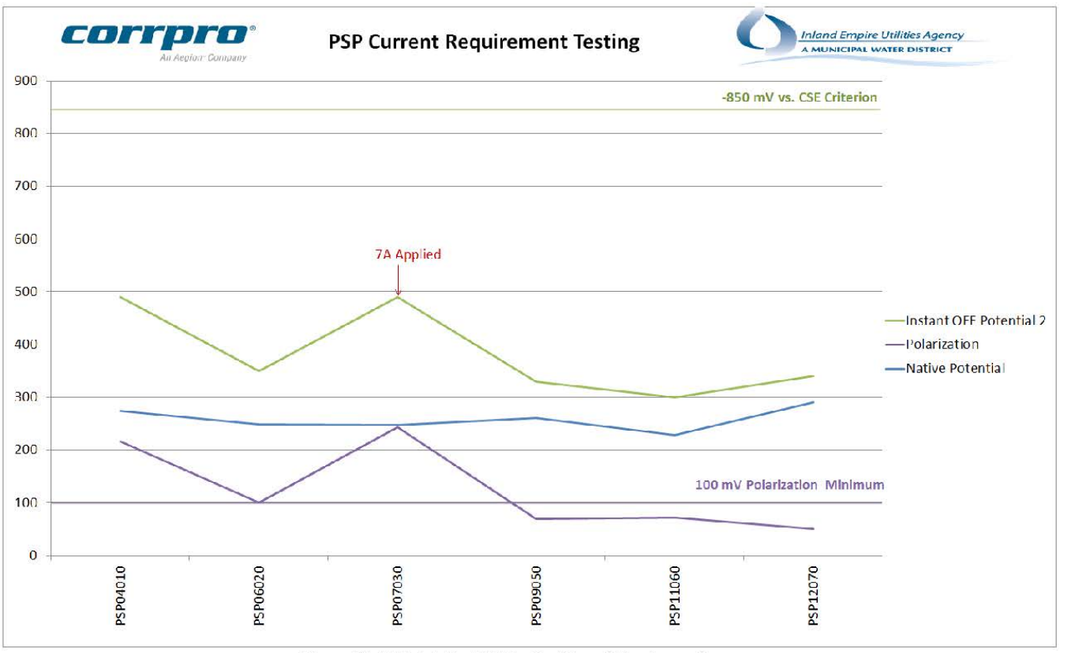


Figure 23 - Philadelphia RW Pipeline Current Requirement

8.3.5 Jurupa Force Main (JFM)

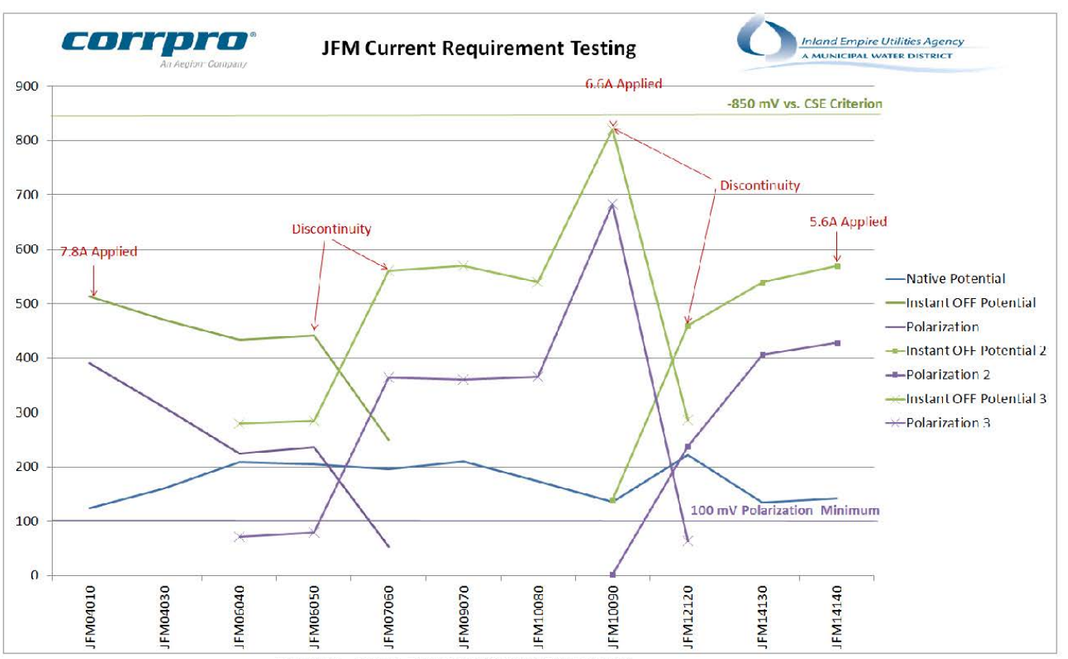


Figure 24 - Jurupa Force Main Current Requirement

8.3.6 RP-4 1158 Zone Pipeline (RPL)

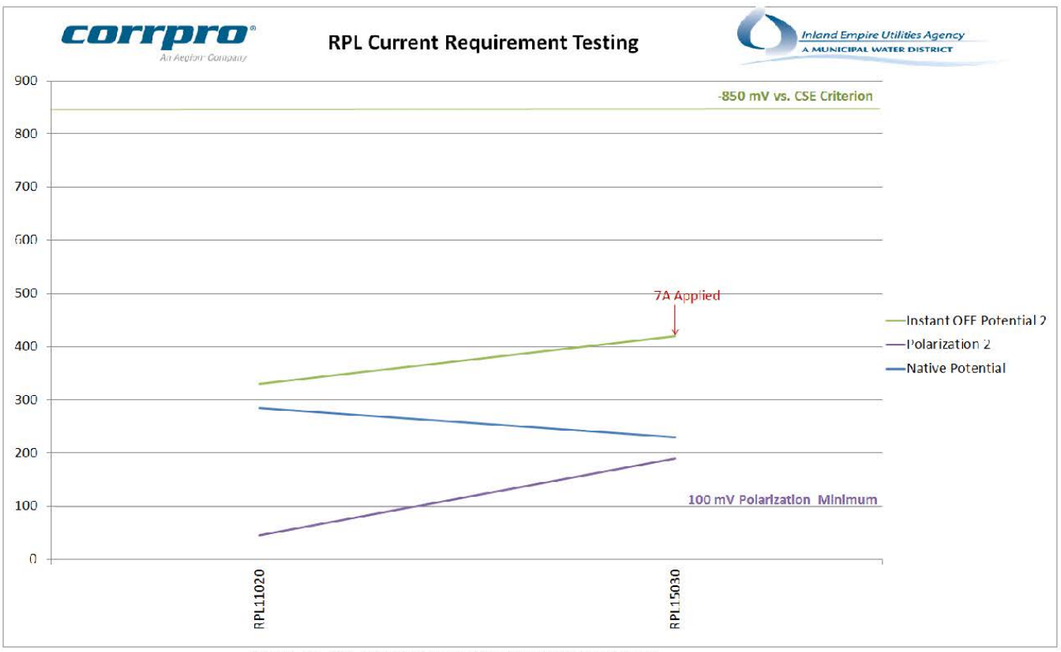


Figure 25 - RP-4 1158 Zone Pipeline Current Requirement

8.3.7 Etiwanda Ave Pipeline (EPL)

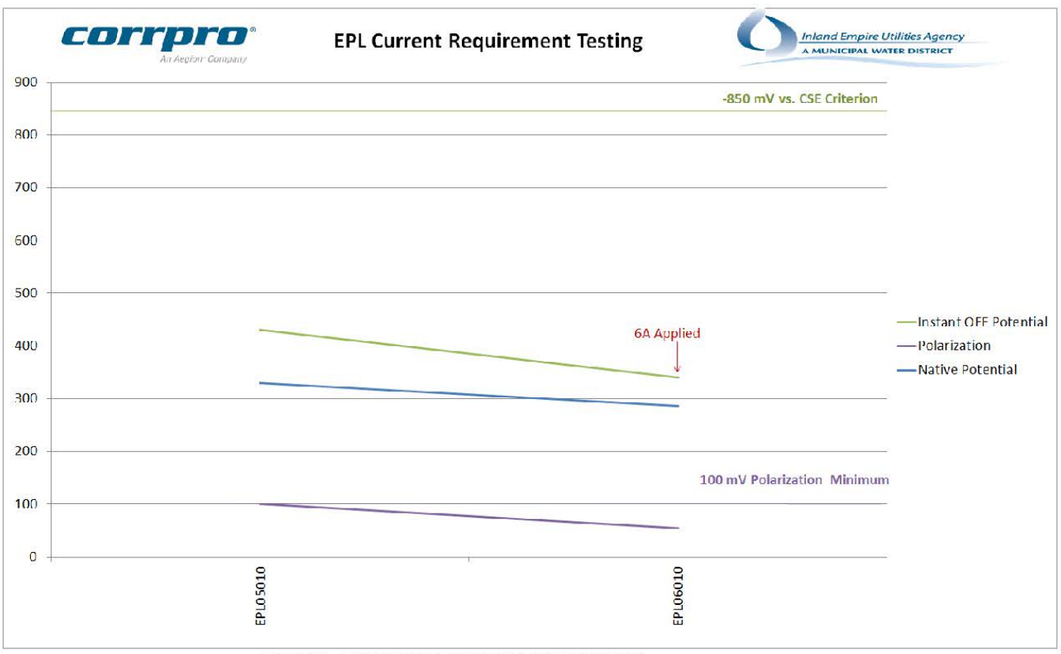


Figure 26 - Etiwanda Ave Pipeline Current Requirement

8.3.8 North Etiwanda Pipeline (NEA)

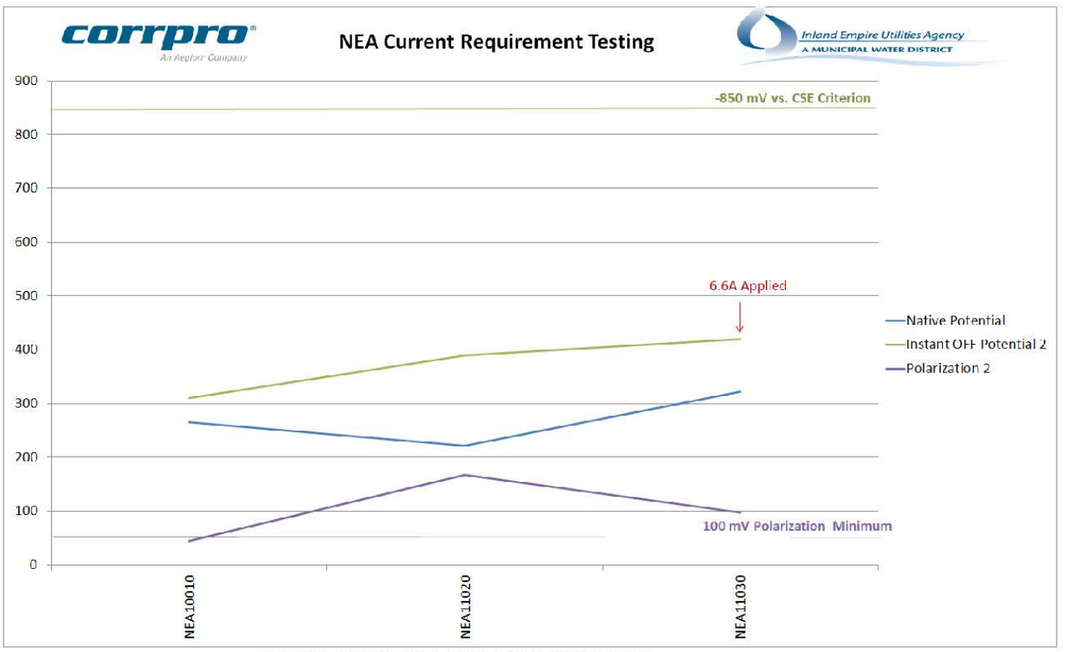


Figure 27 - North Etiwanda Pipeline Current Requirement

8.3.9 San Antonio Channel PL Seg. A (SCA)

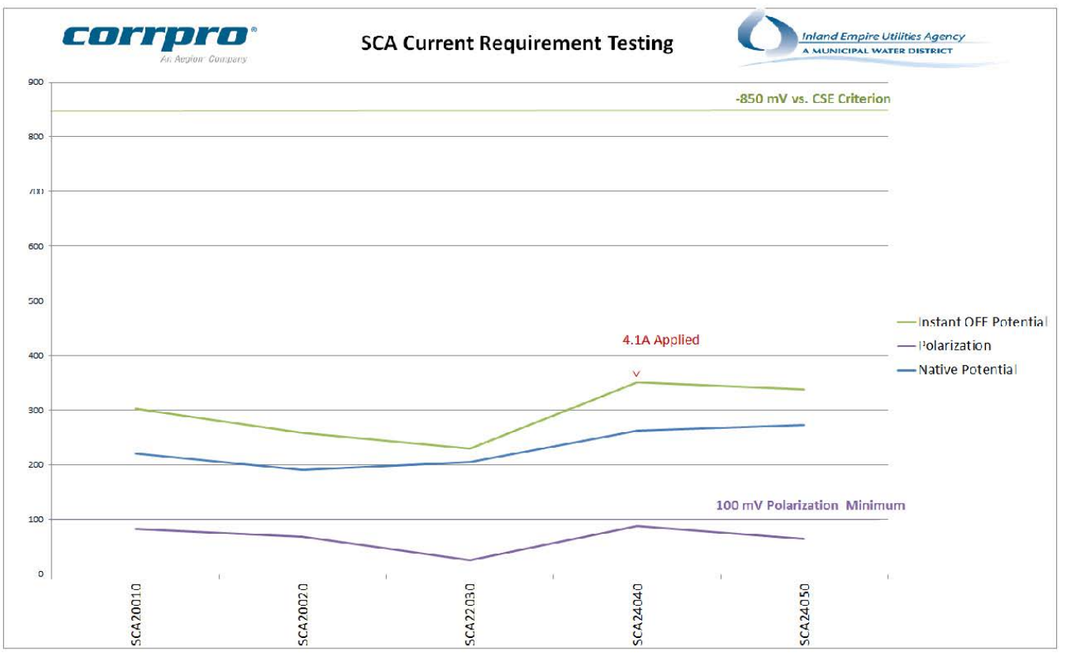


Figure 28 - San Antonio Channel PL Seg. A Current Requirements

8.3.10 RP-4 West Extension Phase 1 (WE1)

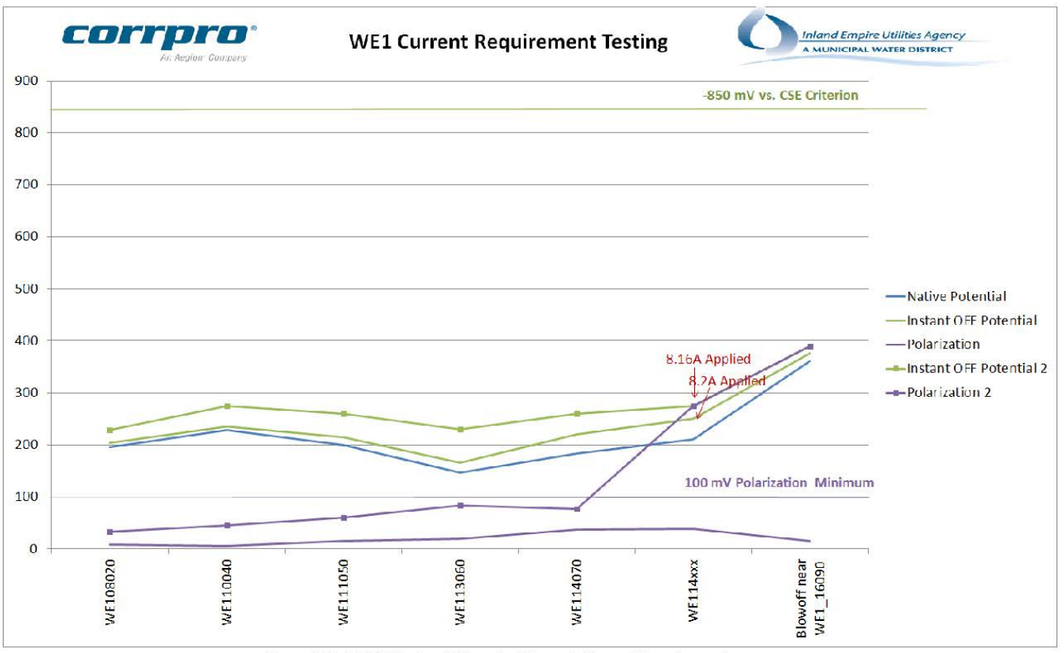


Figure 29 - RP-4 Western Extension Phase 1 Current Requirement

8.3.11 RP-4 Western Extension Phase 2 (WE2)

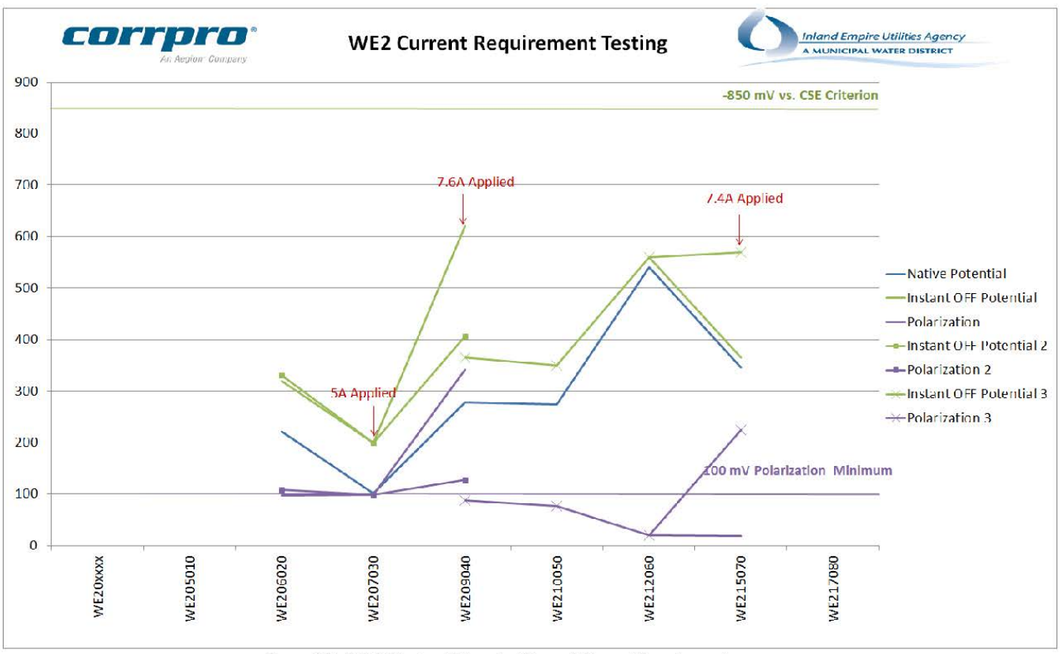
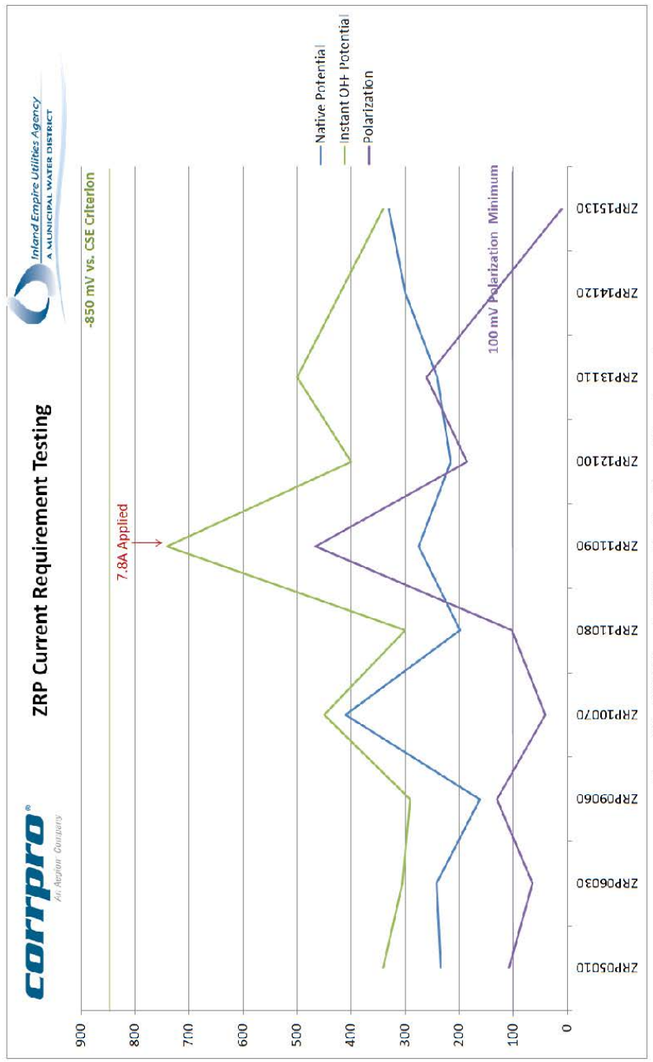


Figure 30 - RP-4 Western Extension Phase 2 Current Requirement



9.0 DISCUSSIONS & ANALYSIS

9.1 Bickmore Avenue Pipeline (BAP)

The cathodic protection (CP) system installed on the Bickmore Avenue Pipeline was found to have all six (6) test stations in good condition with functional test, anode, and reference cell leads. However, the galvanic anodes intended to supply cathodic protection current to the pipeline were found to be disconnected at each test station. After all 18 anodes were connected to the pipe using split bolts, current requirement testing concluded that the amount of current supplied by the anodes will provide sufficient cathodic protection for the pipeline.

The average soil resistivities along BAP were found to be 1,341 ohm-cm to a depth of 2.5 ft, 1,724 ohm-cm to a depth of 5 ft, and 2,107 to a depth of 10 ft. These resistivities are considered to range from "Moderately Corrosive" to "Mildly Corrosive" to buried steel structures.

Soil Resistivity vs. Degree of Corrosivity

Soil resistivity (ohm-cm)	Degree of corrosivity
0–500	Very corrosive
500–1,000	Corrosive
1,000–2,000	Moderately corrosive
2,000–10,000	Mildly corrosive
Above 10,000	Negligible

Reference: *NACE Corrosion Basics.*

Figure 32 - Degree of Corrosivity to Buried Steel Structures due to Soil Resistivity [8]

9.2 CCWRF RWD System (CCP)

The Carbon Canyon Water Recycling Facility Reclaimed Water Distribution System does not appear to be installed with either a corrosion monitoring or cathodic protection system. The one (1) test station evaluated on CCP was found to be nonfunctional, as the test station box contained no test leads. The second test station previously thought to be on the CCP line was found to be connected to the EPA line and had identical construction type (test station enclosure, terminal board, and wire) to those installed on the EPA line. As a result, no monitoring testing of the Carbon Canyon Water Recycling Facility Reclaimed Water Distribution System until corrosion monitoring test stations are installed on the pipeline system.

9.3 Edison Ave RW Main A (EPA)

The cathodic protection (CP) system installed on the Edison Avenue RW Main A was found to have nine (9) out of ten (10) test stations in good working condition, one (1) was nonfunctional as no test leads were present, and one (1) has a crushed test station lid. Additionally, two (2) more test stations were discovered to be connected to the EPA pipeline at the point of connection to the CCWRF and at a casing installed below the crossing of a stormwater channel.

A major issue discovered during the evaluation testing is that the EPA pipeline is electrically shorted to a bare metallic casing installed below the stormwater channel near the intersection of Mountain Avenue and Eucalyptus Avenue. This issue is significant because it has a very detrimental effect to the CP system installed along this pipeline which is very observable in the pipe-to-soil potential plot shown in Figure 2. In Figure 2, pipe-to-soil potentials are near or above the -850 mV criterion necessary for cathodic protection at the beginning of the pipeline near CCWRF, but steeply decline near the area of the shorted casing (labeled CP-2XXX) to unprotected levels. Additionally, it is unlikely that the piping installed within the casing is receiving any significant benefit from the cathodic protection system, as the casing that surrounds it will be "shielding" the pipeline.

Also of note is that the pipeline is not electrically isolated at the point of connection to the CCWRF (labeled CP-05XXX) as the insulating flange kit test station that should have been installed at this location as per the construction drawings is not functioning. Additionally, electrical isolation between the EPA and EPB lines does not exist, and both CP systems for these lines are linked together.

Average soil resistivities along EPA were found to be 2,601 ohm-cm to a depth of 2.5 ft, 2,202 ohm-cm to a depth of 5 ft, and 2,170 ohm-cm to a depth of 10 ft. These soil resistivities are considered to be "Mildly Corrosive".

9.4 Edison Ave RW Main B (EPB)

The cathodic protection (CP) system installed on the Edison Avenue RW Main B was found to have only two (2) out of the ten (10) listed test stations in good condition; the remaining eight (8) test stations, which all should have been located in the Westbound lane of Edison Avenue, were found to be either removed or paved over, and were therefore unable to be evaluated.

Pipe-to-soil potentials measured at the two (2) accessible test stations and at an aboveground piping appurtenance at the east end of EPB were found to be depressed and not meeting the -850 mV criterion, which implies that the galvanic

anodes associated with the eight (8) test stations which could not be located are likely disconnected from the pipeline.

The average soil resistivities along the EPB line were found to be 3,431 ohm-cm to a depth of 2.5 ft, 5,649 ohm-cm to a depth of 5 ft, and 4,468 ohm-cm to a depth of 10 ft, which are considered to be "Mildly Corrosive".

9.5 Philadelphia RW Pipeline (PSP)

The corrosion monitoring system installed on the Philadelphia RW Pipeline was found to have six (6) out of seven (7) test stations in good working condition, and only one (1) was found to be nonfunctional, as no test leads were present.

All of the pipe-to-soil potentials measured on the PSP line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the PSP were found to be 20,586 ohm-cm to a depth of 2.5 ft, 16,804 ohm-cm to a depth of 5 ft, and 17,235 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.6 Jurupa Force Main (JFM)

The corrosion monitoring system installed on the Jurupa Force Main was found to have ten (10) out of 13 test stations in good working condition, two (2) were missing a second test lead, and one (1) could not be located.

The majority of pipe-to-soil potentials measured (66%) on the JFM line were more electropositive than -200 mV (vs CSE), which indicates that there is a 90% probability that no corrosion is occurring in these locations, with the remaining pipe to soil potentials falling in the range of uncertainty (between -350 and -200 mV (vs CSE)), according to the ASTM standard referenced in Section 6.0 of this report.

A major issue discovered during the evaluation testing is that the JFM line has at least two (2) electrical discontinuities along its length which were discovered during current requirement and electrical continuity testing. The electrical discontinuities were detected between stations 06050 and 07060, and between stations 10090 and 12120. In order for this line to be protected with a cathodic protection system, these electrical discontinuities should be located and repaired.

The average soil resistivities along the JFM line were 34,470 ohm-cm to a depth of 2.5 ft, 41,811 ohm-cm to a depth of 5 ft, and 44,683 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.7 RP-4 1158 Zone Pipeline (RPL)

The corrosion monitoring system installed on the RP-4 1158 Zone Pipeline was found to have one (1) out of three (3) test stations in good working condition, one (1) nonfunctional as no test leads were present, and one (1) had nonfunctional casing test leads.

Both of the pipe-to-soil potentials measured on the RPL line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the RPL line were 45,960 ohm-cm to a depth of 2.5 ft, 71,813 ohm-cm to a depth of 5 ft, and 51,705 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.8 Etiwanda Ave Pipeline (EPL)

The corrosion monitoring system installed on the Etiwanda Ave Pipeline was found to have both test stations in good working condition, with one (1) of which having a broken "CLMC PS" test lead. The Insulating Flange Kit located at test station CP-05010 was found to be functioning properly.

Both of the pipe-to-soil potentials measured on the EPL line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the EPL were found to be 17,235 ohm-cm to a depth of 2.5 ft, 19,150 ohm-cm to a depth of 5 ft, and 22,980 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.9 North Etiwanda Pipeline (NEA)

The corrosion monitoring system installed on the North Etiwanda Pipeline was found to have all four (4) test stations in good working condition, but two (2) of which had broken test leads which were supposed to be installed on the opposite side of an insulating flange. The effectiveness of these two (2) insulating flange kits therefore could not be determined to be functional or nonfunctional.

All four (4) of the pipe-to-soil potentials measured on the NEA line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the NEA line were found to be 18,193 ohm-cm to a depth of 2.5 ft, 24,895 ohm-cm to a depth of 5 ft, and 26,810 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.10 San Antonio Channel Seg. A (SCA)

The corrosion monitoring system installed on the San Antonio Channel Seg. A was found to have four (4) out of five (5) in good working condition, and only one (1) was nonfunctional, as the test leads are likely disconnected from the pipe. Two (2) Insulating Flange Kits at stations 20010 and 20020 appear to be nonfunctional, as testing indicated that both sets of test leads were electrically continuous with each other.

The majority of pipe-to-soil potentials measured (75%) on the SCA line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain. The other measured potential was more electropositive than -200 mV (vs CSE), which indicates that there is a 90% probability that no corrosion is occurring in this location, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the SCA were found to be 22,980 ohm-cm to a depth of 2.5 ft, 16,278 ohm-cm to a depth of 5 ft, and 16,661 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.11 RP-4 Western Extension Phase 1 (WE1)

The corrosion monitoring system installed on the RP-4 Western Extension Phase 1 was found to have six (6) out of 11 test stations in good working order, one (1) could not be located, three (3) had broken test leads, and (1) had no test leads present.

Half of the pipe-to-soil potentials measured on the WE1 line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain. The other half of measured potentials were more electropositive than -200 mV (vs CSE), which indicates that there is a 90% probability that no corrosion is occurring in these locations, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the WE1 line were found to be 45,960 ohm-cm to a depth of 2.5 ft, 71,813 ohm-cm to a depth of 5 ft, and 51,705 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.12 RP-4 Western Extension Phase 2 (WE2)

The corrosion monitoring system installed on the RP-4 Western Extension Phase 2 was found to have seven (7) out of nine (9) test stations in good working condition, while the other two (2) could not be located.

One (1) pipe-to-soil potentials measured on the WE2 line at Station 12060 was found to be equal to -500 mV, which is significantly more electronegative than -350 mV (vs CSE), which indicates that there is a 90% probability that corrosion is occurring in this location; however this potential is much higher than a typical pipe-to-soil potential for CML&C pipe, and combined with a highly depressed potential of -100 mV measured at Station 07030, it is a very good possibility that the WE2 pipeline is experiencing stray current interference.

The remainder of pipe-to-soil potentials measured did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the WE2 were found to be 43,566 ohm-cm to a depth of 2.5 ft, 34,853 ohm-cm to a depth of 5 ft, and 39,258 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.13 Whittram Pipeline (WPL)

The corrosion monitoring system installed on the Whittram Pipeline was found to have only two (2) out of nine (9) test stations in functional condition, as six (6) contained only wires typical for location of PVC lines in place of test leads, and one (1) was nonfunctional as no leads were present. The presence of PVC locator wires, along with the greatly fluctuating pipe-to-soil potentials recorded and the lack of electrical continuity between test stations, indicate that the WPL line is likely primarily constructed of PVC and not CLM&C.

The average soil resistivities along the WPL line were found to be 23,938 ohm-cm to a depth of 2.5 ft, 31,598 ohm-cm to a depth of 5 ft, and 42,130 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.14 1299 Recycled Water Pipeline (ZRP)

The corrosion monitoring system installed on the 1299 Recycled Water Pipeline was found to have 12 out of 13 test stations in good functional condition, and only one (1) is nonfunctional as its test leads are disconnected from the pipe.

One (1) pipe-to-soil potentials measured on the ZRP line at Station 10070 was found to be equal to -410 mV, which is significantly more electronegative than -350 mV (vs CSE), which indicates that there is a 90% probability that corrosion is occurring in this location; however this potential is much higher than a typical pipe-to-soil potential for CML&C pipe, and due to the fact that this elevated potential was measured near a right-of-way where two (2) large diameter gas transmission lines and a large diameter water transmission pipeline, which all are protected by impressed current cathodic protection systems, are routed, it is a very good possibility that the ZRP pipeline is experiencing stray current interference.

Seven (7) of the pipe-to-soil potentials measured on the WE1 line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain. The remaining four (4) measured potentials were more electropositive than -200 mV (vs CSE), which indicates that there is a 90% probability that no corrosion is occurring in these locations, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the ZRP were found to be 17,235 ohm-cm to a depth of 2.5 ft, 19,150 ohm-cm to a depth of 5 ft, and 22,980 to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

9.15 East 1630 RW Pipeline Segment A (ERP)

The corrosion monitoring system installed on the East 1630 RW Pipeline Segment A was found to have both test stations in good, functional condition. However, while performing current requirement and electrical continuity testing, an electrical discontinuity was detected between these two stations, at Stations 07010 and 09020.

Both of the pipe-to-soil potentials measured on the ERP line did not exceed -350 mV (vs CSE), but were more electronegative than -200 mV, which indicates that corrosion at the measured locations is uncertain, according to the ASTM standard referenced in Section 6.0 of this report.

The average soil resistivities along the ERP were found to be 26,810 ohm-cm to a depth of 2.5 ft, 23,938 ohm-cm to a depth of 5 ft, and 19,916 ohm-cm to a depth of 10 ft, which are considered to have "Negligible Corrosivity".

10.0 RECOMMENDATIONS

10.1 Improvements and Repairs

1. Corrpro recommends that the cathodic protection systems installed on the EPA and EPB pipelines be repaired and augmented in order to provide sufficient levels of cathodic protection to the entire ductile iron pipeline. This is important due to the corrosive soil resistivities measured along these pipelines. This could be accomplished in more than one way:

   A. The most ideal way to improve the cathodic protection system would be to physically eliminate the electrical short between EPA and the steel casing at the stormwater channel crossing near the intersection of Mountain Avenue and Eucalyptus Avenue and to install additional galvanic anode test stations along Edison Avenue to replace those which have been destroyed. However, removing the electrical short may not be feasible due to the difficult access to the pipeline casing in this area.

   B. An alternative way to establish effective cathodic protection to the EPA and EPB pipelines without removing the electrical short to the casing would be to install an impressed current cathodic protection system near the shorted casing and size it large enough to protect the two (2) pipelines and the casing together. It should be noted that without removing the electrical short to the casing, it is unlikely that the section of piping installed within the shorted casing will receive sufficient cathodic protection. Test stations (but not galvanic anodes) will need to be installed along Edison Avenue to allow for monitoring testing of EPB.

2. Investigate the ZRP and WE2 pipelines to determine whether stray current interference or active corrosion is occurring on the pipelines where elevated pipe-to-soil potentials were measured. This investigation should include gaining access to the cathodic protection systems of the pipelines that may be causing the stray current interference and performing interrupted pipe-to-soil measurements and stray current mapping to determine whether foreign CP currents are being picked up by the pipelines owned by IEUA.

3. Install corrosion monitoring test stations on critical metallic pipelines. Large, important portions of the piping infrastructure owned by IEUA do not have corrosion monitoring or cathodic protection facilities installed including the RP4 and TP1 Outfalls. Pipelines can be inexpensively retrofitted with corrosion monitoring systems using vacuum excavation to install two-wire test stations in order to enable periodic monitoring testing.

10.2 Monitoring Testing & Future Projects

1. Perform annual monitoring testing on all of the cathodic protection and corrosion monitoring systems to develop long term records of pipe-to-soil potentials and cathodic protection system performance and store them in the IEUA GIS database. Large changes in pipe-to-soil potentials or other data could reveal ineffective cathodic protection levels, the presence of stray current interference, or active corrosion before significant damage occurs.

2. Develop standard corrosion control and cathodic protection specifications and construction details to be used with future projects. This will help improve the quality, uniformity, and functionality of the corrosion control systems installed which will ultimately lead to lower long-term maintenance costs.

3. Test stations that were identified as no longer existing or being nonfunctional should be replaced or repaired. Additionally, efforts should be undertaken to determine whether any other test stations, which IEUA does not currently have the GPS coordinates to, exist. Two (2) additional casing test stations were discovered by Corrpro and in reviewing plans provided by IEUA, a significant amount of additional test stations may still exist elsewhere.

Respectfully Submitted,

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