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## EXECUTIVE SUMMARY

This report summarizes approximately nine months of data review, field investigations, meetings, and hydraulic modeling activities that were conducted in 2017 for the Lift Station Master Plan project (“Project”). The objective of the Project was to consolidate and confirm available information, gather new field condition data, and identify system upgrades that are needed to improve overall reliability and wet weather capacity. Necessary improvements were identified and prioritized to address safety, reliability, capacity, and general maintenance. Conceptual costs were then developed for each of the recommended projects. The Project concluded with development of a 10-year Capital Improvement Program (“CIP”) that distributes costs across the planning horizon.

### ES.1 Introduction

The Richmond Municipal Sewer District (“City,” “RMSD,” or District”) provides wastewater collection and treatment for the residents and businesses located in the central part of the City of Richmond as shown in Figure ES-1 (also included as Figure 1-1). The sewer collection system includes approximately 183 miles of gravity sewer pipelines<sup>1</sup> and 13 lift stations. The City has completed numerous studies related to the wastewater facilities, including a Sewer Collection System Master Plan (2011), Pump Station Analysis (2008), and Forcemain Assessment (2016). The Lift Station Master Plan draws from these projects and expands them as needed to identify rehabilitation needs and capacity limitations of the existing wastewater collection system lift stations.

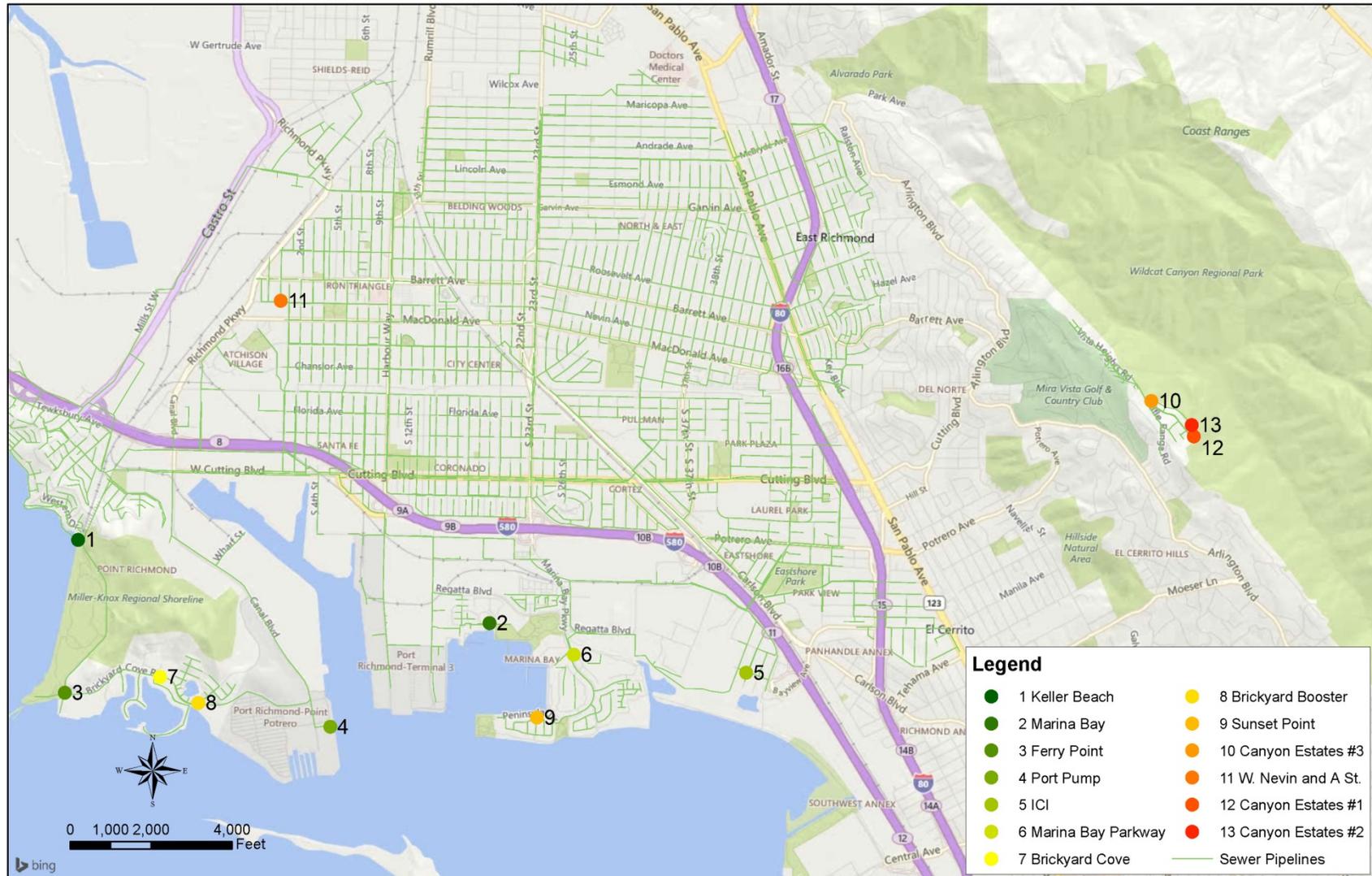
The Project focuses on the City’s thirteen wastewater lift stations. Information is presented in following report chapters, which are summarized in this Executive Summary:

- Executive Summary
- Chapter 1 – Introduction
- Chapter 2 – Summary of Available Data
- Chapter 3 - Condition Assessment Protocol
- Chapter 4 - Condition Assessment
- Chapter 5 – Hydraulic Model and Capacity Assessment
- Chapter 6 –Capital Improvement Program

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<sup>1</sup> Per Veolia Water August 14, 2018

Figure ES-1. RMSD Wastewater Pipelines and Lift Stations



## ES.2 Summary of Available Data

Chapter 2 describes available background documents and information held by the City and its contract operator, Veolia Water. Available data includes record drawings, reports, system modeling information, Geographic Information System (“GIS”) data, and operational records.

### ES.2.1 System Description

The City’s wastewater collection area includes approximately 183 miles of sewer pipes and 13 wastewater lift stations. The lift stations are located primarily within neighborhood collection systems. Existing lift stations are submersible wet well type stations, with the exception of two locations. Lift stations utilize programmable logic controllers (“PLCs”) for pump starting and stopping, logging of operational data, and reporting of alarm conditions. The stations all use cellular network communication providing for remote monitoring and limited remote operation. All stations are powered by diesel emergency generators in the event of utility power failure.

### ES.2.2 Lift Station Data and System Information

The City and Veolia maintain a data library that includes a wastewater system hydraulic model; master plan reports; CCTV inspection reports; a wastewater collection system GIS asset registry; force main evaluation and inspection reports; lift station record drawings; routine maintenance and inspection records (including computerized maintenance system data); repair records; and station-specific pump curves and operational settings information. Chapter 2 provides additional information on the data that was reviewed, and how this data was used to develop project recommendations. As a component of the Project, available records were consolidated and provided to Veolia and the City for its files.

## ES.3 Condition Assessment Protocol

The condition assessment protocol establishes methodologies for evaluating existing facilities. Generally-accepted remaining useful life estimates for each pump station asset type are provided. Actual observations were used to develop recommendations, in lieu of asset age or useful life. Recommendations were then prioritized as needed to address safety and reliability needs. Within each priority class, projects were scheduled across a 10-year planning horizon based on criticality as determined through Veolia field experience, followed by station age.

Each lift station assessment comprised a desktop analysis and a visual field inspection. The findings were recorded in detailed inspection checklists; individual lift station checklists are included as appendices to this report.

## ES.4 Lift Station Condition Assessment

The City’s wastewater lift stations were assessed through a desktop evaluation followed by a field inspection of each station. The primary focus of the assessments was operational reliability.

### ES.4.1 Lift Station Inspections

The City's wastewater lift stations were inspected on September 11 and 14, 2017. One follow-up inspection was completed in January 2018 to further evaluate electrical needs.

Inspections were documented in detailed forms that are included as appendices to this report. Items that required modification, repair or replacement were identified, prioritized, and assigned conceptual costs.

Each of the recommended lift station improvement projects has been prioritized as follows:

- Projects to Address Immediate Safety and Reliability Issues. The Priority "A" CIP includes projects that address immediate safety and reliability issues. Priority "A" projects are recommended for completion in the first two to five years of the CIP.
- Projects to Extend Remaining Useful Life. Veolia will continue its program of preventative repairs and replacements in order to maximize asset useful life. Projects that fall into the Priority "B" category are recommended for completion within five to seven years.
- Projects in Priority "C" represent long-term improvements that should be considered for implementation as part of a longer-term CIP.

### ES 4.2 Lift Station Conceptual Costs

Recommended projects have been assigned conceptual costs, which were calculated as follows:

- $(\text{Unit Costs}) \times (\text{Installation Costs}) \times (\text{Contingency}) = \text{Construction Cost}$
- $\text{Construction Cost} \times (\text{Soft Costs}) = \text{Conceptual Project Cost}$

Unit costs were developed using manufacturer's estimates and/or recently acquired bid data for similar Bay Area projects. Pre-established percentages were then applied to the equipment costs to represent "installation" costs. For example, for electrical, control and SCADA systems, 68 percent was added to represent installation costs comprising labor (33 percent), transportation (4.75 percent), tax (9.25 percent), and overhead and profit (21 percent). The percentage used to represent installation costs was reduced to 50 percent for items that do not require electrical and controls.

An estimating contingency of 30 percent was added after applying the installation cost percentage, to address the level of uncertainty of the cost estimate. The resulting cost represents the project construction cost.

Finally, 40 percent was added to the construction cost to represent "soft" costs comprising engineering, technical services and specialty inspections, permitting, construction unknowns, estimating (bidding climate) fluctuations, and database updates.

The level of accuracy in cost estimating follows the Association for the Advancement of Cost Engineering (“AACE”) Class 5, Concept Screening, with an expected accuracy range of -30 to +50 percent. Costs are indexed to the Engineering News Record Construction Cost Index (“ENR CCI”), San Francisco, of May 2018 (12014.72).

### ES.5 Lift Station Capacity Assessment

The City’s existing wastewater collection system hydraulic model is a skeletonized model that includes the City’s trunk sewers and five of the thirteen lift stations. The existing model network was updated during the Project to include the most current system data and as-built information. Modeling tasks included adding the remaining eight lift stations, and also the infrastructure needed to connect these stations to the modeled sewer network. The updated network was evaluated using the City’s designated design storm. This 10-year, 24-hour design storm has a recurrence interval of 10 years, and matches specific rainfall volume targets established by the National Oceanic and Atmospheric Administration (NOAA) for a 24-hour period.

“Firm” capacity was evaluated for each station assuming the largest pump would be out of service. A lift station is considered under capacity when the incoming flow is greater than the stated capacity of the operating pump(s).

The capacity assessment identified four stations that do not have sufficient firm capacity to convey all incoming flows during the design storm. Capacity shortfalls for two of the stations, Brickyard Booster and Marina Bay Cove, should be able to be addressed through minor operational adjustments and/or a closer review of the data used to evaluate flows. The third station, Ferry Point, is scheduled to be relocated and rebuilt as part of the Terminal One development. This station also needs substantial repairs and conversion of the current dry pit / wet pit configuration to a single wet well. During the relocation and upgrade of this lift station, capacity needs should be reviewed to assure that the new station is properly sized to convey design flows.

The remaining station, Marina Bay Parkway, is shown as significantly under capacity in the hydraulic model. However, operationally, this station has not had sewer system overflows during heavy rainfall events. The City is planning to conduct a flow monitoring program during the 2018-19 wet weather season, and to update the sewer hydraulic model in 2019. As part of this effort, installation of a temporary flow monitor upstream of the Marina Bay Parkway lift station is recommended. By collecting additional flows and recalibrating the model with a specific focus on this lift station, the City can confirm whether a capacity deficiency is present and, if necessary, develop a strategy to address this issue in the most cost effective manner possible. The solution may require pump upgrades, but could also involve inflow and infiltration reduction in the sewershed that is tributary to the lift station.

### ES.6 Capital Improvement Program

The CIP presents a consolidated list of projects by priority and implementation timeline. Projects are scheduled in priority order, with Priority “A” projects in the first five years,



followed by Priority “B” and then “C” projects. One Priority “C” project, replacement of the Canyon Estates No. 1 lift station, is scheduled outside of the 10-year CIP timeframe.

Table ES-1 presents the proposed CIP. The Priority A projects have a combined total cost of \$5,029,300 (including the complete replacement of the Ferry Point Lift Station for \$2,966,600). The CIP includes \$1,412,400 in Priority B projects, and \$3,226,800 in Priority C projects. The Priority C estimate includes future replacement of the Canyon Estates No. 1 Lift Station, which would occur beyond the 10-year CIP planning horizon.



Table ES-1. Proposed 10-Year Capital Improvement Program

	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	Future	Total
Brickyard Booster				\$ 165,600			\$ 299,300					\$ 464,900
Brickyard Cove				\$ 121,600			\$ 44,100		\$ 135,100	\$ 135,100		\$ 435,900
Canyon Estates 1					\$ 191,900			\$ 193,000	\$ 193,000		\$ 2,912,900	\$ 3,490,800
Canyon Estates 2					\$ 148,000			\$ 112,100		\$ 9,100		\$ 269,200
Canyon Estates 3					\$ 138,000			\$ 106,700		\$ 9,100		\$ 253,800
Ferry Point <sup>See Note 1</sup>	\$ 29,666	\$ 266,994	\$ 2,669,940									\$ 2,966,600
ICI	\$ 427,000						\$ 3,800			\$ 8,200		\$ 439,000
Keller Beach	\$ 187,400					\$ 39,700				\$ 2,700		\$ 229,800
Marina Bay Cove		\$ 115,700				\$ 316,500				\$ 5,500		\$ 437,700
Marina Bay Parkway			\$ 133,700				\$ 17,300					\$ 151,000
Nevin & A	\$ 185,300						\$ 1,500			\$ 900		\$ 187,700
Port				\$ 126,200			\$ 53,900			\$ 8,200		\$ 188,300
Sunset Pointe		\$ 122,300				\$ 31,500						\$ 153,800
	<b>\$ 829,366</b>	<b>\$ 504,994</b>	<b>\$ 2,803,640</b>	<b>\$ 413,400</b>	<b>\$ 477,900</b>	<b>\$ 387,700</b>	<b>\$ 419,900</b>	<b>\$ 411,800</b>	<b>\$ 328,100</b>	<b>\$ 178,800</b>	<b>\$ 2,912,900</b>	<b>\$ 9,668,500</b>

Note 1. Ferry Point lift station upgrades should be coordinated with Terminal One development project lift station relocation/upgrades.

- Priority A Projects
- Priority B Project
- Priority C Projects



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## 1.0 INTRODUCTION

The Richmond Municipal Services District provides wastewater collection and treatment services to most of the City of Richmond. Relatively small areas of the collection system within the City of Richmond boundaries are served by West County Wastewater District to the north, and Stege Sanitary District to the east and south. For the purposes of this report, any references to “Richmond”, “RMSD”, or “City” refers to the services provided by RMSD. RMSD owns and operates approximately 183 miles of sewer collection system pipelines and 13 wastewater lift stations, with nine stations located in the lower elevation areas along the western and southern boundaries of the service area. Three additional stations are owned and operated by the City but convey flow to the Stege Sanitary District service area. These stations are located on the eastern service area boundary, east of Arlington Avenue in the Richmond hills. A fourth station is located near Nevin Avenue and A Street. Figure 1-1 shows the RMSD service area and wastewater infrastructure, including the locations of the RMSD lift stations.

All of the pump stations lift sewage from a local sewer to a nearby collector sewer or trunk sewer. Throughout this report, the terms, “pump station” and “lift station” are used interchangeably.

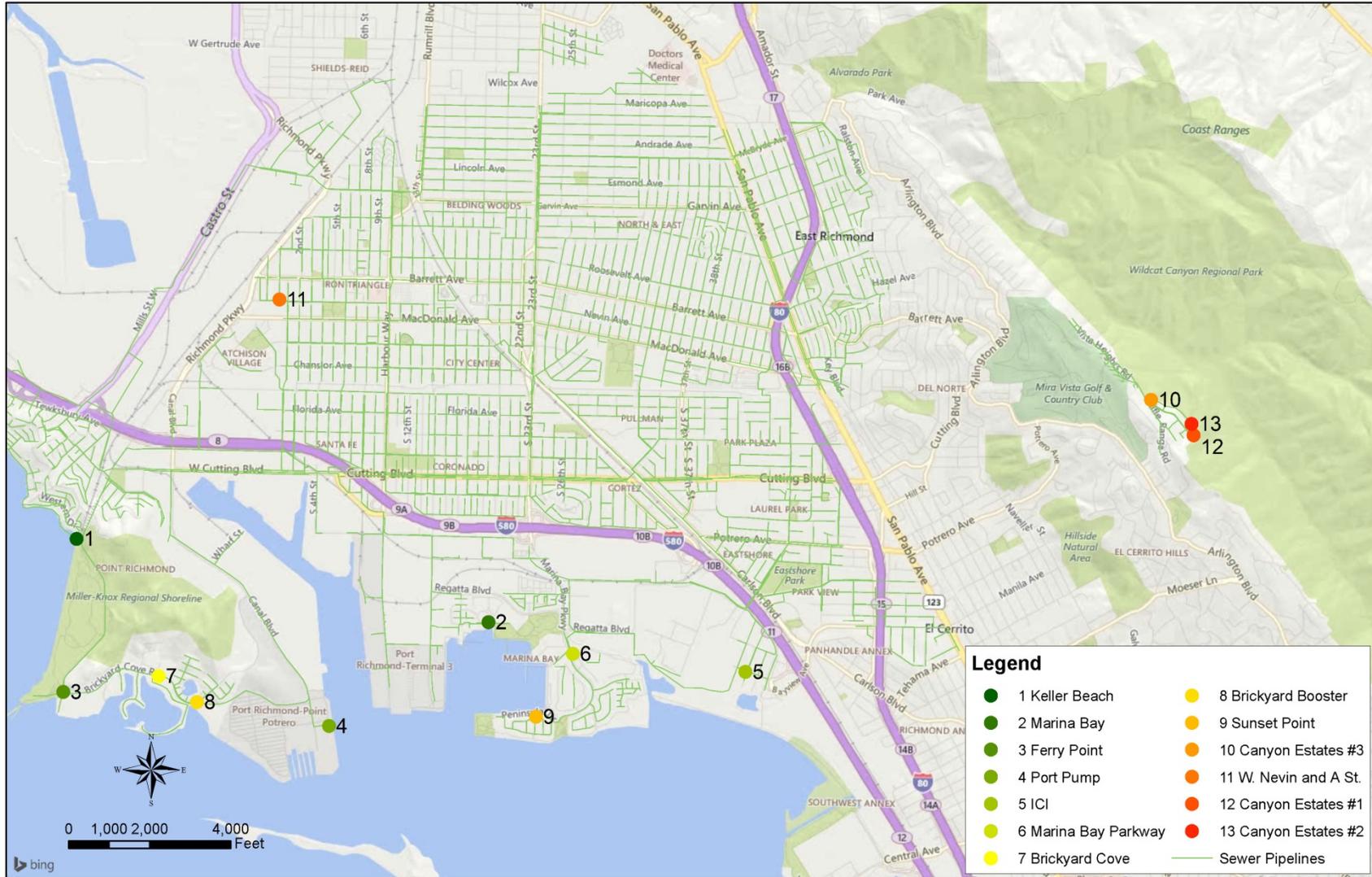
### 1.1 Project Purpose

Veolia Water (“Veolia”) provides wastewater collection system operations and maintenance services as a contractor to the City, and in 2017, engaged V. W. Housen & Associates (“VWHA”) to complete a Lift Station Master Plan (“LSMP”). The purpose of the LSMP was to evaluate lift station capacities and conditions, and to identify future modifications that are needed for the stations to adequately convey wet weather design flows and maintain operational reliability. The project included updating the wastewater collection system hydraulic model to include the City’s 13 lift stations, and evaluating the condition of the existing stations. The LSMP provides recommendations for lift station modifications needed to provide reliable dry and wet weather pumping capacity. Recommendations are presented in the form of a prioritized 10-year capital improvement program (“CIP”) that includes capacity and rehabilitation improvements with conceptual costs.

### 1.2 Background

The City and Veolia completed an earlier lift station evaluation in conjunction with the 2008 System Evaluation and Capacity Assurance Plan (“SECAP”). The SECAP and accompanying Pump Station Analysis listed the components of each station, but did not completely evaluate lift station capacities. The SECAP also did not provide a full condition assessment of each of the lift stations. In 2011, the City and Veolia completed a separate sewer collection system master plan (“2011 Sewer Master Plan”). The 2011 Sewer Master Plan included development of a skeletonized hydraulic model that was used to evaluate the City’s sewer infrastructure during a 10-year, 24-hour design storm event. The hydraulic model network was developed by Veolia staff and conveyed to a consultant for use in developing the 2011 Sewer Master Plan. The model

Figure 1-1. RMSD Wastewater Pipelines and Lift Stations



network included five of the City's 13 wastewater lift stations: Keller Beach, Ferry Point, Marina Bay Parkway, Marina Bay Cove, and I.C.I.

The 2011 Master Plan hydraulic model included pump set points and capacities for the five modeled stations. 2008 Pump Station Analysis data were used as inputs to the model. The hydraulic model was calibrated to measured dry and wet weather flow data, and its results used to identify capacity improvement needs. The 2011 Sewer Master Plan does not identify any capacity needs at the five modeled lift stations.

In January 2016, the City and Veolia completed a separate wastewater force main system condition assessment study. In completing this study, the City determined that there is minimal available as-built information for existing force mains, including almost no information on force main elevations and how and where some force mains connect to the existing gravity system. However, the completed report provided useful information on existing force main condition, and helped to supplement knowledge on potential pipe sizes and alignments.

VWHA reviewed the 2008 SECAP and Pump Station Analysis documents during preparation of the LSMP. Through this review and subsequent discussions with Veolia staff, it became apparent that many of the current lift station characteristics are different than reported in the 2008 SECAP and Pump Station Analysis. Therefore, as a component of the LSMP, the existing hydraulic model has been updated to include more current data for the five modeled stations, and expanded to include the remaining eight lift stations.

In addition, VWHA conducted a visual condition assessment of the 13 lift stations to identify station modification and rehabilitation needs. The visual inspections reviewed the existing condition of mechanical, electrical, SCADA, structural, site and access components.

### 1.3 Report Organization

The LSMP Report ("Report") comprises the following chapters. The sequence of chapters follows the sequence of tasks outlined in the scope of work for the Project. This section describes the content of each chapter.

#### Executive Summary

The Executive Summary provides a comprehensive overview of the Report contents and summarizes key aspects of each chapter.

#### Chapter 1 – Introduction

This introductory chapter provides background information on the scope and objectives of the Project, and presents the content and organization of the Report.

## Chapter 2 – Summary of Available Data

Veolia maintains a computerized maintenance management system that includes operational data and maintenance records. Other data available includes pump curves and system settings. The City and Veolia possess most but not all of the construction drawings for the lift stations. Available drawings range from original construction through upgrades and remodels. This chapter describes the lift station documentation that was reviewed for the Project.

## Chapter 3 – Condition Assessment Protocol

This chapter describes the process that was followed to assess the lift station facilities. The Condition Assessment Protocol establishes methodologies for evaluating existing facilities and provides a level of standardization across all stations.

## Chapter 4 - Condition Assessment

This chapter presents the findings of condition assessments that were conducted at the City’s 13 lift stations. This chapter also identifies and prioritizes projects that are recommended to address issues that were observed during the assessments. High priority projects (Priority “A”) are recommended for implementation within approximately five years. Medium priority projects (Priority “B”) are recommended for implementation in five to seven years, and lower priority projects (Priority C) should be considered for implementation beyond the seven to ten year timeframe. In addition to describing lift station needs, this chapter presents conceptual costs for each of the recommended upgrades.

## Chapter 5 – Hydraulic Model and Capacity Assessment

This chapter summarizes updates that were made to the existing hydraulic model for the Project. Capacity needs are summarized and a plan is presented that integrates recommended capacity improvements with other rehabilitation needs.

## Chapter 6 – Recommended Capital Improvement Program

This chapter presents a CIP to address the identified lift station repair, renewal, and replacement needs. The CIP was developed using the results from the lift station condition and capacity assessments, and presents an implementation timeline with anticipated costs. The CIP addresses the most critical projects first, and distributes cost to promote a fundable long-term program.

## Appendices

The following appendices to the Project contain additional technical information and assumptions:

- Appendix A: Model Lift Station Condition Assessment Form
- Appendices B through N: Summarized Condition Assessment Forms



- Appendix B: Brickyard Booster Lift Station
- Appendix C: Brickyard Cove Lift Station
- Appendix D: Canyon Estates No. 1 Lift Station
- Appendix E: Canyon Estates No. 2 Lift Station
- Appendix F: Canyon Estates No. 3 Lift Station
- Appendix G: Ferry Point Lift Station
- Appendix H: I.C.I. Lift Station
- Appendix I: Keller Beach Lift Station
- Appendix J: Marina Bay Cove Lift Station
- Appendix K: Marina Bay Parkway Lift Station
- Appendix L: Nevin & A Street Lift Station
- Appendix M: Port Lift Station
- Appendix N: Sunset Pointe Lift Station



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## 2.0 SUMMARY OF AVAILABLE DATA

The purpose of this chapter is to describe the RMSD service area and available system documentation. Veolia provided historical master planning reports, a force main assessment report, and other miscellaneous reports for use in developing the LSMP. The City and Veolia maintain most but not all of the construction drawings for the lift stations. Available drawings range from original construction drawings through documentation of upgrades and remodels. In addition, Veolia provided relevant operational data and maintenance records for the lift stations. Other data utilized included pump curves obtained from Veolia and the pump manufacturer, system settings provided by Veolia, and supplemental information obtained through public (internet) sources.

### 2.1 RMSD Service Area

Wastewater services within the City of Richmond are provided by three sewer districts. This LSMP provides information on the lift stations that are owned and/or operated by the RMSD:

- Richmond Municipal Sewer District – provides wastewater collection, treatment and disposal for the central portion of the City of Richmond, and a small community of homes east of and adjacent to El Cerrito (within the City of Richmond). The RMSD wastewater treatment plant also receives leachate from the County landfill.
- West County Wastewater District - provides wastewater collection, treatment and disposal for City of San Pablo, the northern portion of the City of Richmond, the Crestview portion of the City of Pinole, as well as the unincorporated communities of El Sobrante, East Richmond Heights, Rollingwood, Tara Hills, and Bayview.
- Stege Sanitary District – provides wastewater collection services for the City of El Cerrito, the unincorporated community of Kensington, and the Richmond Annex community within the southeastern portion of the City of Richmond. In addition, Stege Sanitary District serves approximately 100 homes outside of its boundaries by contract with the City of Richmond. These homes are located in the Canyon Estates area. Although SSD provide collection system service, RMSD maintains the three lift stations within the Canyon Estates area.

### 2.2 Summary of Existing Information

The following information was provided by Veolia, the City, or supplemented by the project team. Each subsection discusses the information obtained, its source, and how the information was used in the Project.

#### 2.2.1 Master Plan Reports

The City and Veolia completed a SECAP in June 2008 that reviewed pipeline capacity, but did not include any modeling or analysis of lift stations. The City and Veolia completed a separate Pump Station Analysis in June 2008 that focused on lift station equipment, flows, and capacities.

The 2008 SECAP did not include the development or use of a hydraulic model that was calibrated to measured flow data. Therefore a subsequent wastewater collection system master plan was completed by the City and Veolia in 2011. The 2011 Sewer Master Plan utilized a new hydraulic model that was calibrated to measured flows from a system-wide flow monitoring study completed in 2010. The 2011 Sewer Master Plan evaluated the hydraulic capacity of the collection system under a 10-year recurrence, 24-hour duration design storm event. The capacity assessment included an evaluation of lift station capacities for five City lift stations, using as a basis the firm capacity of each lift station as stated in the 2008 Pump Station Analysis.

The 2011 Master Plan utilized a hydraulic model network that was originally developed by Veolia and provided to a consultant for further development, calibration, and capacity analysis. The completed and calibrated hydraulic model from the 2011 Sewer Master Plan was updated as part of the LSMP.

### 2.2.2 Force Main Condition Assessment Report

In 2010, Veolia contracted with V&A Consulting Engineers (“V&A”) to complete a force main condition assessment study. The study evaluated five force main systems: Marina Bay Parkway, Ferry Point and Keller Beach, Canyon Estates, Brickyard Cove and Brickyard Booster, and Port. The assessment included visually inspecting manholes and a wet well, and performing as-needed non-destructive testing. The report included information regarding force main length that was labeled as approximate, and also included field notes with depth from rim to pipe inverts but without elevations. The report included some information on system configuration and connectivity that helped to inform the LSMP.

### 2.2.3 Miscellaneous Reports and Data

Additional maintenance records and reports were obtained from Veolia and from public sources on the internet, and used to supplement the master planning documents and force main condition assessment study. Table 2-1 lists all master planning documents and supplemental reports that were used as reference documents in development of the LSMP.

Table 2-1. Master Planning Studies and Other Reference Reports

Document Title	Date	By
System Evaluation and Capacity Improvement Plan	June 2008	Psomas
Pump Station Analysis	June 2008	Psomas
Sewer Collection System Master Plan	Nov 2011	West Yost Associates
Final EIR Bottoms Property Residential Project, City of Richmond, Contra Costa County, California	Nov 2014	First Carbon Solutions
Force Main System Condition Assessment Report	Jan 2016	V&A Consulting Engineers
City of Richmond Terminal One Project Draft Environmental Impact Report	Feb. 2016	ESA
Pump Station Preventative Maintenance Inspection Reports	June 2017	Veolia
Veolia Pump Data Spreadsheet	August and October 2017	Veolia

#### 2.2.4 Record Drawings

The City provided available record drawings for the 13 lift stations. The available drawings and historical reports included information such as wet well configuration, pump piping, and some force main details, but did not include all of the information needed to develop system curves for each station (e.g., force main length, invert elevations, or profiles). Drawings for only four of the lift stations, Canyon Estates #1, I.C.I., Marina Bay Parkway and Nevin & A Street, contained all of the components needed to develop a system curve. However, the accuracy of the information provided in these documents could not be confirmed.

The system curve is important because it determines the operating parameters for each pump. In the absence of system curves, VWHA assumed that the best efficiency point as shown on existing pump curves would determine the available pumping capacity for existing pumps. If existing pump curves were not available, then the stated capacity as provided by Veolia was used as the pump capacity. It should be noted that pumping capacity varies depending on system conditions, and this approach only approximates the actual pumping capacity at each station.



Table 2-2 lists the record drawings that were provided for use in developing the LSMP. Tables 2-3 thru 2-15 provide specific details about the information available for each lift station.

Table 2-2. Available Record Drawings

Drawing Title	Date	Design Firm
Line 'R' Shoreline Interceptor	1959	City of Richmond Department of Public Works Division of Engineering
Sewering of Ferry Point Assessment District	1961	City of Richmond Department of Public Works Division of Engineering
North Shore Pump Station	1981	Anderson Nichols
I.C.I. Americas, Inc./ City of Richmond Sewer System Improvements – B	1982	Kennedy/Jenks Consultants
Canyon Estates Interceptor	1982	Kennedy/Jenks Engineers
Brickyard Landing Off-site Sanitary Sewer to Canal Boulevard	1984	A-N West Inc.
Marina Bay Parkway Extension	1986	City of Richmond Department of Public Works Division of Engineering
Marina Bay Parkway Pump Station	1987	A-N West Inc.
Sanitary Sewer System Miller Knox Regional Shoreline	1989	East Bay Regional Park District
Subdivision 7440 Sunset Pointe Improvement Plans	1995	Charles W Davidson Co. Consulting Civil Engineers
Nevin Avenue Pump Station Replacement Keller Beach Pump Station Remodel	1996	A-N West Inc.
Canyon Estates No. 2 and No. 3 Pump Station Replacements	2001	Kennedy/Jenks Consultants
Seacliff Estates Brickyard Sewer Pump Station	2003	Thompson-Hysell Engineers
Pump Station Repairs and Improvements Phase 1	2005	Boyle Engineering
Pump Station Repairs and Improvements Phase 2	2005	Boyle Engineering
Bradley A. Moody Memorial Underpass Project	2012	BKF Engineers

Table 2-3. Brickyard Booster Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Brickyard Landing Off-site Sanitary Sewer to Canal Boulevard	1984 / A-N West Inc.	Original drawings for the Brickyard Cove Pump Station and a 2 <sup>nd</sup> pump station which was later replaced with the Brickyard Booster Pump Station. Drawings include the force main from Brickyard Cove Pump Station to 2 <sup>nd</sup> pump station which continues to a discharge manhole at Canal Blvd. Includes the plan and profile for force main. Force main has a continuous downhill slope for the final 1870 feet of pipe to the discharge manhole.
Seacliff Estates Brickyard Sewer Pump Station	2003 / Thompson-Hysell Engineers	This project was the construction of a new pump station to replace the pump station at a site approximately 500' away (the 2nd pump station in the Brickyard Landing drawings, 1984). A new force main was built between the new pump station and the existing station at which point the force main was reconnected to the existing force main from the existing pump station site (as shown on 1984 drawings). The exact location of the new pump station in relation to original pump station cannot be determined from the drawings. Therefore the exact length of the FM cannot be determined.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Installed Automatic Transfer Switch and step-down transformer for power supplied by electrical generator which was installed at the Brickyard Cove Pump Station site approximately 1300 feet east of this site. In addition, this station was tied into the telemetry at the Brickyard Cove site and a new I/O panel was installed.
City of Richmond, CA Force Main System Condition Assessment Report	2016 / V&A Consulting	Included inspection of the Brickyard Booster Pump Station wet well and the Brickyard Booster Pump Station force main discharge manhole. Information included depth from rim to inverts but no rim elevation.

Table 2-4. Brickyard Cove Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Brickyard Landing Off-site Sanitary Sewer to Canal Boulevard	1984 / A-N West Inc.	Original drawings for the Brickyard Cove Pump Station and a 2 <sup>nd</sup> pump station which was later replaced with the Brickyard Booster Pump Station. Drawings include the force main from Brickyard Cove Pump Station to 2 <sup>nd</sup> pump station.
Seacliff Estates Brickyard Sewer Pump Station	2003 / Thompson-Hysell Engineers	This project was the construction of a new pump station to replace the pump station at a site approximately 500' away (the 2nd pump station in the Brickyard Landing drawings, 1984). Originally the Brickyard Cove force main discharged into the 2 <sup>nd</sup> pump station's wet well which was abandoned as part of this project. The Brickyard Cove force main is shown on the drawing being modified to discharge directly into the Brickyard Booster Pump Station wet well. However, the 2005 as-built drawings indicate it was not built as shown. Regardless, there is no invert elevation information available for the discharge point on these drawings.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Replaced pumps with Flygt submersible pumps, replaced wet well cover and hatch, added valve vault which includes piping, check and plug valves and flow meter, installed level transmitter and float switch, removed and replaced existing pump control panel with new pump control power pedestal which includes main C/B section, power section, motor starters section and telemetry panel, installed new emergency generator inside new fence enclosure and bollards. As-builts show that this force main discharges to a manhole near Brickyard Booster Pump Station and flows by gravity to the wet well. However, there is no information about the invert elevations.
City of Richmond, CA Force Main System Condition Assessment Report	2016 / V&A Consulting	Included inspection of the Brickyard Cove Pump Station force main discharge manhole. Information included depth from rim to inverts but no rim elevation. The report notes a 6" PVC force main inlet, an 8" HDPE influent pipe and an 8" PVC effluent pipe. There is a discrepancy as the table in Appendix A shows the FM as 8" and the gravity inlet as 6". Therefore, the accuracy of the rim to invert measurements is in question.

Table 2-5. Canyon Estates #1 Lift Station Record Drawing Drawings

Drawing/Report Title	Year / Engineer	Description
Canyon Estates Interceptor	1982 / Kennedy/Jenks Engineers	Original drawings for Canyon Estates Nos. 1, 2 & 3 pump stations and force mains. Includes plan and profile for force main.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Installed new emergency generator with enclosure and 3 automatic transfer switches (one for each of the two pumps and the third for Canyon Estates #2 & #3 pump stations), installed step-up transformer for Canyon Estates #3 Pump Station power supply, removed telemetry panel and installed new pump control panel, new ultrasonic level transmitter and level float switch.
City of Richmond FM System Condition Assessment Report	2016 / V&A Consulting	Included inspection of Canyon Estates No. 1 Pump Station force main discharge manhole including depth to invert but no rim elevation.

Table 2-6. Canyon Estates #2 Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Canyon Estates Interceptor	1982 / Kennedy/Jenks Engineers	Original drawings for Canyon Estates Nos. 1, 2 & 3 pump stations and force mains. Force main for this station was installed inside an existing 8" sewer. There are details for tying into the manhole but no details about invert elevation for the force main.
Redwood Retaining Wall at Pump Station No. 2 for Canyon Estates Interceptor (Single page 8.5 x 11)	1983 / City of Richmond DPW / Division of Engineering	Drawing shows retaining wall around pump station site. Retaining wall is no longer there but no drawings were found showing its demolition and how the site was re-graded and its effect on the pump station elevations.
Canyon Estates No. 2 and No. 3 Pump Station Replacements	2001 / Kennedy/Jenks Consultants	Replaced existing pump station with new packaged pump station at existing site.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Power feed changed from utility meter near the access stairs to Canyon Estates #1 Pump Station. Added backup power from generator at Canyon Estates #1 Pump Station. Installed new level transmitter.

Table 2-7. Canyon Estates #3 Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Canyon Estates Interceptor	1982 / Kennedy/Jenks Engineers	Original drawings for Canyon Estates Nos. 1, 2 & 3 pump stations and force mains. Discharge manhole for the force main is shown but exact invert elevation information is not included.
Canyon Estates No. 2 and No. 3 Pump Station Replacements	2001 / Kennedy/Jenks Consultants	Abandoned existing pump station and installed new pump station approximately 100' away; connected to existing force main. The invert elevation information for the wet well is not given. Scaling the drawings and calculating the invert elevation using the call-outs in the drawing produces two different numbers.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Power feed changed from utility meter near the access stairs to Canyon Estates #1 Pump Station. Added backup power from generator at Canyon Estates #1 Pump Station. Installed new level transmitter.

Table 2-8. Ferry Point Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Sewering of Ferry Point Assessment District	1961 / City of Richmond Department of Public Works Division of Engineering	Original drawings for Ferry Point Pump Station (did not originally have a building around it). The force main for this pump station utilized an existing 6" CI salt water line (no plan or profile since it was an existing pipe). Drawings detail the end of the force main where it transition from the existing 6" CI salt water line to a new pipe which is routed to a transition structure at the south end of the tunnel. Drawings show as-built invert elevation for the discharge point.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Installed emergency generator and automatic transfer switch, PLC, level transmitter, level float switch and antenna.
Veolia Water – Force Main Repair 02-29-08	2008/Veolia	This information consists of a hand sketch of an 8" and 6" pipe connecting with a wye fitting and then shows an additional 15' of piping downstream of the wye. It also includes a set of photographs. It appears from the photographs that this occurs at the south end of the tunnel. The transition structure can be seen in the background. It is not clear if the transition structure has been abandoned.
City of Richmond, CA Force Main System Condition Assessment Report	2016 / V&A Consulting	The report states that the discharge manhole for Ferry Point Pump Station is located at the intersection of Dornan Drive with Garrard Boulevard, which is on the north end of the tunnel. Report includes depth from rim to pipe inverts but no information regarding the elevation of the discharge point. In addition, it is possible the flow changes to gravity at some point in the tunnel as this 8" pipe has a slope of -0.0257.
City of Richmond Terminal One Project Draft EIR	Feb 2016 / ESA	This project will contribute 106 gpm of wastewater flow to the Ferry Point Pump Station.
City of Richmond Design Review Board Staff Report for Terminal One Residential Project	Nov 2017 / City of Richmond, Planning and Building Services Department	This development will be built in close vicinity to the Ferry Point Pump Station and includes reconfiguration of the traffic island where the pump station is currently located.
		Drawings were not located for the building at Ferry Point Pump Station. The pump station was originally built without a superstructure. The date this structure was added and the details of how it was built are unknown.

Table 2-9. I.C.I. Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
I.C.I. Americas, Inc./ City of Richmond Sewer System Improvements - B	1982 / Kennedy/Jenks Consultants	These are the original pump station and force main as-built drawings.
Pump Station Repairs and Improvements Phase 2	2005 / Boyle Engineering	Installed new enclosure for existing generator, new ultrasonic level transmitter and float switch and new antenna.

Table 2-10. Keller Beach Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Line 'R' Shoreline Interceptor	1959 / City of Richmond Department of Public Works Division of Engineering	Original drawings for Keller Beach Pump Station. Original station used ejector pumps in an upper/lower level structure. Includes force main alignment and profile. Shows force main discharging into a transition structure on the south side of the tunnel. However the Veolia Water – Force Main Repair drawing from 2008 imply the transition structure is no longer used.
Sewering of Ferry Point Assessment District	1961 / City of Richmond Department of Public Works Division of Engineering	Original drawings for Ferry Point Pump Station. The transition structure detail is pertinent to Keller Beach Pump Station as the detail includes as-built elevation information showing the flow line elevation for the incoming force mains including Keller Beach.
Nevin Avenue Pump Station Replacement Keller Beach Pump Station Remodel	1996 / A-N West Inc.	Modified the wet well and upgraded to a submersible pump station with an adjacent valve vault. Connected to the existing force main. Installed service panel and HPS light.
Pump Station Repairs and Improvements Phase 2	2005 / Boyle Engineering	Installed new level transmitter and float switch, telemetry panel and new emergency generator and ATS.
Veolia Water – Force Main Repair 02-29-08	2008/Veolia	This information consists of a hand sketch of an 8" and 6" pipe connecting with a wye fitting and then approximately 15' of piping downstream of the wye. It also includes a set of photographs. It appears from the photographs that this occurs at the south end of the tunnel. The transition structure can be seen in the background. It is not clear if the transition structure has been abandoned.
City of Richmond, CA Force Main System Condition Assessment Report	2016 / V&A Consulting	Report includes assessment of the Keller Beach Pump Station force main that is exposed on the steep hillside east of the pump station between the railroad tracks and Dornan Drive. It was determined that the pipe has not experienced any significant wall thickness loss and the report recommends providing slope stabilization and more dirt coverage over the pipe. Report also includes information for a discharge manhole on the north end of the tunnel including depth from rim to inverts but no rim elevation. However, this may not be the true discharge point of the force main.

Table 2-11. Marina Bay Cove Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
North Shore Pump Station	1981 / Anderson Nichols	This is the site of Marina Bay Cove Pump Station. Project was for replacement of existing pump station. Installed new wet well and pumps. Existing 4" force main was kept in service and installed a parallel 4" force main. No valve vault shown.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Installed new generator and automatic transfer switch, relocated pump control panel, installed new ultrasonic level transmitter, level float sensor and modified existing fence to add 12' access gate. Note: Generator is not located as shown on drawings.
		1981 drawings do not include a valve vault but 2005 drawings show the existing valve vault. Vault could not be opened during the field visit to see the configuration. Veolia confirmed that there is a separate force main for each pump.



Table 2-12. Marina Bay Parkway Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Marina Bay Parkway Extension	1986 / City of Richmond DPW	Includes force main for Marina Bay Parkway Pump Station (not the pump station).
Marina Bay Parkway Pump Station	1987 / A-N West Inc.	Original drawings for pump station only (not force main).
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Added new (third) pump, replaced access hatches with new hatches with safety grates, replaced damaged pump guide bar rails, added level transmitter and float switch. Although the drawings show only one new pump, Veolia states that three new pumps were installed in 2006.
Bradley A. Moody Memorial Underpass Project	2012 / BKF Engineers	This project included modification of the discharge point of the Marina Bay Parkway Pump Station force main.
City of Richmond, CA Force Main System Condition Assessment Report	2016 / V&A Consulting	The report includes inspection of the Marina Bay Parkway Pump Station force main discharge manhole. Does not include depth from rim to inverts or rim elevation.

Table 2-13. Nevin & A Street Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Nevin Avenue Pump Station Replacement Keller Beach Pump Station Remodel	1996 / A-N West Inc.	Abandoned existing pump station in street and installed new pump station in sidewalk and new force main.
Pump Station Repairs and Improvements Phase 2	2005 / Boyle Engineering	Installed new emergency generator and ATS, new ultrasonic level transmitter, level float sensor and fence enclosure for new electrical equipment and existing panels

Table 2-14. Port Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Entire station was modified with new system including a FRP tank for the wet well, pumps, guide bars, safety hatch, discharge piping, vent pipe with carbon filter, level transmitter and float switch. Replaced exhaust fan and duct. Installed mag flowmeter and gas detectors on both levels of station. Also installed new lighting in wet well and at grade level (inside), replaced power equipment with new pump control power pedestal including new pump control and telemetry panels and ATS. Installed new generator.  Note: The location of the generator and electrical equipment is not as shown on the drawings. Instead it is located in an enclosed area on the north side of the building.
		Missing drawings for the original pump station and building. Could not locate information about the force main. Reviewed "Port of Richmond Improvement Plans Honda Port of Entry" which includes the pump station and the force main area but the force main is not shown
City of Richmond, CA Force Main System Condition Assessment Report	2016 / V&A Consulting	Included inspection of Port Pump Station force main discharge manhole including depth to invert but no rim elevation.

Table 2-15. Sunset Pointe Lift Station Record Drawing Details

Drawing/Report Title	Year / Engineer	Description
Subdivision 7440 Sunset Pointe Improvement Plans	1995 / Charles W Davidson Co. Consulting Civil Engineers	Original drawings for Sunset Pointe Pump Station, discharge pipe is connected to force main built by others. Therefore, length of force main and discharge point cannot be confirmed.
Pump Station Repairs and Improvements Phase 1	2005 / Boyle Engineering	Installed new generator, replaced meter panel, pump control panel and telemetry panel with new pad mounted pump control pedestal including automatic transfer switch, added level transmitter and float ATS. Installed new generator.

### 3.0 CONDITION ASSESSMENT PROTOCOL

This chapter describes the process that was used to assess the condition of the City’s lift station facilities. The Condition Assessment Protocol includes methodologies for evaluating existing facilities and provides a partial level of standardization for these assessments. By using the same condition assessment methodology for future evaluations, Veolia will be able to monitor changes that have occurred over time for any single facility.

#### 3.1 FACILITY USEFUL LIFE

Facility useful life is a variable that is dependent on many factors, including physical characteristics such as age and material. For all assets, the actual age of the asset is only a starting point in assessing asset useful life. Useful life calculations are influenced by operational characteristics such as amount of use and maintenance history. In many cases, intangible factors such as poor installation or defective material may significantly shorten an asset’s useful life.

Industry-accepted estimated useful lives for various wastewater lift station components are presented in Table 3-1. These values are theoretical, and may be heavily influenced by site conditions, use and maintenance. Useful life estimates were intended to be assigned to each lift station component following these guidelines, and then adjusted during field inspections in order to most closely represent observed conditions. However, accurate information regarding the installation date of many of the lift station components was not available. Therefore, remaining useful life estimates are not included in the assessment reports.

Table 3-1 Average Theoretical Useful Life Estimations for Lift Station Components

Facility	Average Useful Life
Structures (concrete and CMU)	50 Years
Roofs	20 Years
Electrical	Power – 20 to 30 Years
Generators	15 Years
Controllers	10 to 15 Years
Field Instruments	10 to 15 Years
Pumps (Submersibles)	15 Years
Pumps (Dry Pit)	25 Years

#### 3.2 LIFT STATION CONDITION ASSESSMENT PROTOCOL

Each lift station assessment comprised a desktop analysis utilizing existing drawings and documentation, a site visit, and one follow-up progress meeting. Prior to and after the site visits,

the team reviewed all pertinent available information. This information included construction drawings for a majority of the stations, and the previously completed master plans and reports that are discussed in Chapter 2.

Site visits were completed in Fall 2017. The site visits were attended by VWHA and its subconsultants, including ECS Engineering (electrical) and TJC & Associates (structural). In addition, two Veolia staff members were present. During the site visits, the operation of and known challenges for each station were discussed with Veolia.

The purpose of the site visits was to complete the following:

- Document the condition of the major assets and the type of improvements needed
- Observe accessibility for maintenance personnel
- Gain a better understanding of the operation of each pump station and its challenges
- Identify any site constraints in regards to rehabilitating, upgrading or replacing the pump station

The site visit observations were limited to conditions that could be observed from the ground surface. The assessment team did not conduct confined space entries or destructive testing. To remain consistent with a scoping-level study, the evaluations did not include in-depth structural, electrical or civil evaluations, calculations or investigations. More detailed evaluations may be required during the predesign phase for each project. The site visits included an assessment of the following areas:

- Safety and Security – Visually assessed the security of the site and the equipment. Noted any safety equipment on site and any potential site hazards
- Site Evaluation – Observations included ease of site access and site drainage
- Wet Well and Valve Vault – Opened hatches where feasible in order to facilitate visual inspection. Inspected exposed piping, valves, pump rails, ladders, level sensors, conduit, and appurtenances. The walls were observed for condition of coating (if applicable), spalling, softness of concrete, and erosion or cracking of concrete.
- Electrical Service and Distribution System – Observed visual condition and possible electrical code issues related to the electrical equipment including electrical service and metering equipment, transformers, electrical distribution, wiring, grounding, motor starters and overloads, emergency generator, Automatic Transfer Switches, and equipment labeling
- Control and SCADA Systems – Completed a visually assessment of level and pump controls, control and status monitoring PLCs, cellular modems, communication antennae, and intrusion systems
- Building and Site Structural Condition – Visually inspected the interior, exterior and roof of buildings for physical or structural issues, condition of retaining walls, sound walls,

concrete slabs, fences, antenna and light pole and mountings, and equipment support and hold down components

- Pumps - Pumps were assessed by reviewing the pertinent construction drawings, specifications, asset and work history reports, 2016 preventative maintenance inspection reports, and/or the 2017 pump data spreadsheet. In addition, pump curves for most of the stations were obtained from the pump manufacturers using a combination of pump model numbers and serial numbers included in the 2017 pump data spreadsheet.

A model lift station condition assessment form was used in the field by inspection personnel. This form is included in Appendix A. After the desktop analysis and site visits, a summarized condition assessment form was prepared for each lift station addressing all observations, including comments by field personnel. These summarized condition assessment forms are included in Appendices B to N.

Recommended improvements were then developed for each pump station. Each recommendation was assigned a relative priority. Recommended improvements were reviewed with Veolia staff during a meeting in December 2017. Meeting discussions resulted in a follow-up site visit to several pump stations, some of which will require extensive electrical work. The follow-up site visit was attended by ECS Engineering, Veolia and Central Sierra, Veolia's electrical contractor. Subsequently, planning level cost estimates were prepared for all recommended improvements.

### 3.3 LIFT STATION CAPACITY ASSESSMENT PROTOCOL

Five previously-modeled lift stations were reviewed and updated in the hydraulic model to more closely reflect wet well configurations, elevations, pump characteristics, and pump set points. In addition, eight new lift stations were added to the existing hydraulic model. New lift station parameters used assumptions for wet well invert and floor elevations, wet well volume, inlet pipeline invert and discharge pipeline outlet elevations, and pumping capacities. All of these parameters were established using engineering judgment due to limited and sometimes conflicting facility data.

Available system information was insufficient for the development of system curves for any of the modeled pumps. Therefore, each pump was modeled as a fixed speed pump, using the design point pump capacity as provided on vendor pump curves, or as established by Veolia staff. A review of pump run times was used to check pumping capacity assumptions. Table 3-2 on the following page lists the pump station parameters used for the pump station modeling effort. Most of the elevations were estimated and adjusted as needed to obtain a balance between as-built elevations, elevations reported by Google Earth, and existing hydraulic model network elevations. Therefore, none of the elevations shown are confirmed elevations; they are only representations of the "best fit" using available data, and should be confirmed through a field survey as part of future design activities.

Lift stations were evaluated for firm capacity under design storm flows. Firm capacity is defined as the pumping capacity with the largest pump out of service. Pumps were considered adequate if the station could convey flows during the 10-year, 24-hour design storm scenario, with the



largest pump out of service, and without creating surcharge conditions upstream of the lift station.

Table 3-2 Lift Station Model Parameters <sup>Note 1</sup>

Lift Station Name	Wet Well Area (sq ft)	Ground Elevation (ft)	Wet Well Floor Elevation (ft)	Inlet Elevation (ft)	Outlet Elevation (ft)	No. Pumps	Pump Capacity (gpm)
Brickyard Booster	28.3	21.53	1.73	17.53	18.03	2	550
Brickyard Cove	12.6	14.53	1.03	2.60	11.53	2	265
Canyon Estates 1	38.5	746.64	728.64	734.64	744.64	2	250
Canyon Estates 2	12.6	693.00	682.00	688.00	686.00	2	45
Canyon Estates 3	12.6	757.00	749.00	753.00	755.50	2	45
Ferry Point	7.6	12.43	-2.02	3.40	10.43	2	250
I.C.I.	31.5	12.63	0.43	6.23	9.13	2	275
Keller Beach	110.3	7.98	-10.73	-6.15	5.30	2	720
Marina Bay Cove	28.3	13.07	-4.09	-3.09	10.07	2	100
Marina Bay Parkway	180.8	15.63	-8.16	-1.59	7.66	3	2125
Nevin and A	28.3	17.80	-4.28	1.72	14.75	2	600
Port	7.6	9.44	-3.99	0.10	0.52	2	210
Sunset Pointe	12.6	14.84	-1.13	2.87	10.84	2	286

Note 1. Elevations listed are representations of the “best fit” using available data, and should be confirmed through a field survey as part of future design activities

## 4.0 LIFT STATION CONDITION ASSESSMENTS

This chapter presents findings from desktop and field assessments that were conducted by VWHA and its subconsultants to evaluate and document the condition of the City’s wastewater lift stations. This chapter discusses potential issues, provides recommendations for projects to address the identified issues, and establishes relative priorities for these projects. These recommendations are also included in the CIP discussed in Chapter 6.

This chapter is organized as follows

- Lift Station Assessments
- Recommended Lift Station Improvements, Costs, & Priorities

### 4.1 Lift Station Assessments

This section presents the findings of the lift station assessments. The primary focus of the assessments was to identify pump station improvements needed to maintain operational reliability. However, where apparent safety issues were observed, those conditions were noted in the inspection reports.

#### 4.1.1 Brickyard Booster Lift Station Findings

The Brickyard Booster Pump Station is a submersible pump station located on an approximately seven foot wide center median on Seacliff Drive east of the intersection with Sandpiper Spit, as shown in Figure 4.1.

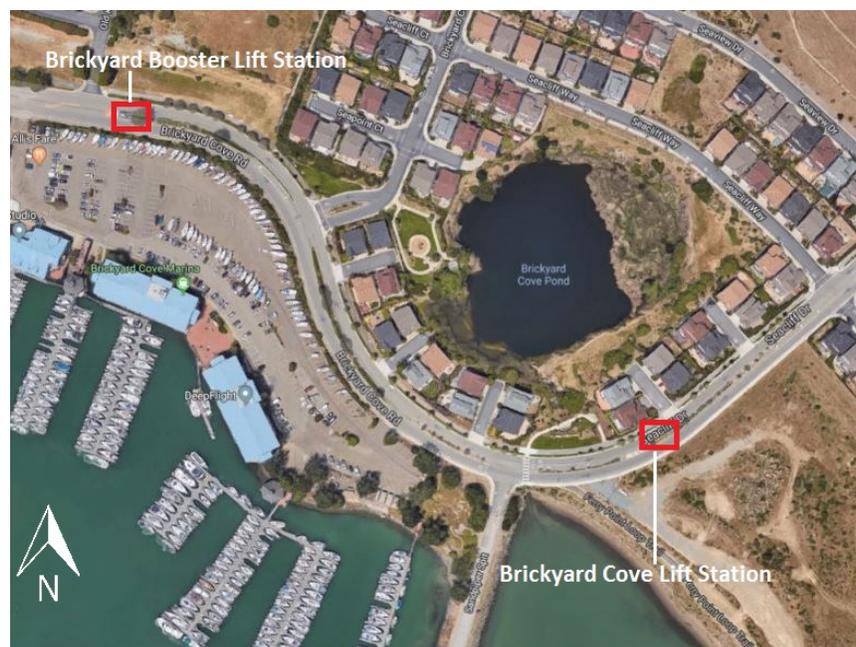


Figure 4-1. Brickyard Booster and Brickyard Cove Lift Station Sites



The pump station includes a 6-foot diameter concrete wet well with two Flygt submersible pumps, an adjacent valve vault with a pig launch fitting, freestanding pump control and remote Input/Output (“I/O”) panels, and an automatic transfer switch and step down transformer for emergency power. Emergency power is supplied to this station by the generator at the Brickyard Cove Pump Station, which is located approximately 1,300 feet to the east. The pump station was built in 2003; the emergency power provisions and the tie-in to the Brickyard Cove Pump Station telemetry were added in 2005. The station is generally in good condition.

Items identified during the field inspection as requiring attention include the following. Figure 4.2 provides visual documentation of some of the items that are noted below:

1. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installation of manually controlled site and wet well lighting.
2. The T-lock horizontal joints on the wet well liner are failing and peeling off at all visible seams. It is likely that the submerged seams are also failing. Recommend repair of T-lock lining.
3. The pump station is located in a median and is therefore vulnerable to damage from car accidents. Numerous bollards protect the pump station. However, the transformer remains vulnerable to damage from westbound traffic. Recommend the addition of bollards to protect the east side of the transformer.
4. The transformer enclosure is failing and should be replaced.
5. The programmable logic controller (PLC) is obsolete and should be replaced.
6. The industrial uninterruptible power supply (UPS) is an Allen Bradley unit located in the PLC enclosure. This unit should be replaced with a commercial free-standing unit which is less expensive and easier to maintain when the batteries need replacing.
7. Provide proper arc flash labels.
8. Retrofit EYS conduit sealing fittings and ensure they are properly installed per code.
9. Power is supplied from this pump station to the Brickyard Cove Pump Station, which is located approximately 1,300 feet east of this site. The service voltage is 208/120V. The generator, which is located at the Brickyard Cove Pump Station site and provides emergency power to both this pump station and Brickyard Cove Pump Station, is 480V. Therefore this pump station has a step-down transformer to reduce the emergency power voltage to 230/208V. Ideally each site would have a separate electrical service and a separate generator. However, there is not a suitable place to locate a generator at this site. Therefore, this station must continue to rely on emergency power from the generator located at Brickyard Cove. The service voltage, controls and pumps should be upgraded to 480V, 3-phase to reduce the voltage drop between the stations and eliminate the need for a step down transformer for the power supplied by the emergency generator.

10. Recommend removal and replacement of electrical panel support system with an engineered support system.
11. The wet well level readings are erroneous most likely due to the depth of the wet well. Recommend addition of a stilling well to improve the accuracy of the level readings.

This station does not have a pump connection or other means to bypass the station if the station should fail. Adding a connection in the valve vault may be feasible, and the cost estimate includes a cost for this work. However, road closure during bypassing operations would be required since there is no room on the existing site to operate a portable pump.

Figure 4-2. Sample of Brickyard Booster Lift Station Observations



Deteriorating T-Lock Lining in Wet Well



Corroded Transformer Enclosure

#### 4.1.2 Brickyard Cove Lift Station Findings

The Brickyard Cove Pump Station is a submersible pump station located on an approximately thirteen foot wide center median on Brickyard Cove Road east of the intersection with Old Kiln Way as shown in Figure 4-1, above. The pump station includes a 6-foot diameter concrete wet well with two Flygt submersible pumps, an adjacent valve vault with a flow meter, two antenna masts, pump control power pedestal, bollards, and emergency generator inside a fence enclosure. The pump station was originally built in 1984 and was upgraded in 2005. The station is generally in good condition.

Items identified during the field inspection as requiring attention include the following:

1. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installation of manually controlled site and wet well lighting.
2. The pump station is located in the median and is therefore vulnerable to damage from car accidents. Bollards protect the pump station from impact from most directions. However,

additional bollards are needed on the west end of the median to protect the pump station from a car driving onto the wet well and valve vault, and also at the east end of the generator enclosure area to protect the pump control power pedestal from westbound traffic.

3. Remove the abandoned 6' x 6' wood mast as a collapse may damage vital equipment.
4. The antennae are attached to a steel mast with galvanized band crimp clamps. Attach antennae permanently and properly to new recommended light post.
5. The PLC is obsolete and should be replaced.
6. Provide proper arc flash labels.
7. Retrofit EYS fittings and ensure they are properly installed per code.
8. The flow meter instrumentation is mounted behind a deadfront door in a power section. This is contrary to industry standard. Recommend relocating flow meter instrumentation into the pedestal.
9. Dress up and protect loose communication cables running unprotected, not in conduit, between the pedestal and the antennae.
10. Power is supplied to this pump station from the Brickyard Pump Station, which is located approximately 1,300 feet west of this site. The service voltage is 208/120V. The generator, which is located at this site and provides the emergency power to both this pump station and Brickyard Pump Station, is 480V. The Brickyard Pump Station has a step-down transformer to reduce the emergency power voltage to 120/208V. As discussed above, the service voltage, controls, and pumps should be upgraded to 480V, 3-phase to reduce the voltage drop between the stations and eliminate the need for a step down transformer at Brickyard Pump Station.
11. The discharge pipes in the wet well are ductile iron pipe and the elbows and pipe near top of wet well are heavily corroded. The condition of the pipes further down in the wet well could not be assessed due to limited visibility. However, it is assumed they are in a similar condition. Recommend cleaning and coating discharge pipes and fittings within the wet well.
12. Recommend removal and replacement of electrical panel support system with an engineered support system.
13. Recommend removal and repair of cracked concrete at the valve vault.

This station also does not have a pump connection or other means to bypass the station if the station should fail. Adding a connection in the valve vault may be feasible, and the cost estimate includes a cost for this work. However, road closure during bypassing operations would be required since there is no room on the existing site to operate a portable pump.

Figure 4-3 on the following page provides examples of the issues listed above for the Brickyard Cove Lift Station.

Figure 4-3. Sample of Brickyard Cove Lift Station Observations



Constrained Site



Corroding Wet Well Piping

#### 4.1.3 Canyon Estates Lift Stations

There are three lift stations in the Canyon Estates area as shown on Figure 4-4 on the following page. Lift Station Nos. 2 and 3 are low flow submersible pump stations. Flows from these two lift stations are routed to Canyon Estates No. 1 Lift Station. According to the Local Area Formation Commission (LAFCO) Combined Municipal Service Review and Sphere of Influence Study dated May 2014, Stege Sanitary District began providing collection services to the Canyon Estates area in 1982 after this area was badly damaged in a landslide. However, although the wastewater is received by the Stege Sanitary District, RMSD continues to maintain these pump stations by contract.

The three Canyon Estates Lift Stations are connected in terms of electrical service. The electrical service for all stations is 240 V, single phase power that originates at Canyon Estates No. 1. Canyon Estates No. 1 supplies permanent power to Lift Station Nos. 2 and 3. A backup generator located at Canyon Estates No. 1 provides backup power to Canyon Estates Nos. 2 and 3.

Figure 4-4. Canyon Estates Lift Stations Sites



#### 4.1.3.1 Canyon Estates No. 1 Lift Station Findings

Canyon Estates No. 1 Lift Station is located at the end of the Wildcat Drive cul-de-sac. The station includes an above-grade two-room wood framed building with redwood plywood siding outside, gypsum board and duct liner board inside for sound attenuation, and an asphalt shingle roof.

An emergency generator is located in a fenced enclosure adjacent to the building. Each room has a separate ventilation system. The pump room houses two progressive cavity pumps, a seal water system, and a parallel discharge pipe system with a flow meter in one branch. The electrical room houses the pump control, telemetry and lighting panel and a flow recorder panel. Two automatic transfer switches (for the pumps located at this station) are located on the south side of the building on the exterior wall. A third automatic transfer switch (for emergency power for Canyon Estates Nos. 2 & 3) is located on the exterior of the west wall of the building near the generator.

A 7-foot diameter wet well is located approximately 10 feet west of the pump station entrance. There are two separate 6-inch suction lines for each pump. The pump station was built in 1982 and was upgraded in 2005 to add an emergency generator that provides emergency power for this pump station and Canyon Estates Nos. 2 and 3 pump stations. In addition, the power for Canyon Estates Nos. 2 and 3 were modified to be supplied from this site instead of from utility poles at each site. This site includes a step-up transformer to supply power to Canyon Estates No. 3 Pump Station. The station is generally in good condition.

Items identified during the field inspection as requiring attention include the following:



1. There is no lighting on the south side of the building where panels are located, or in the wet well. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Additionally, the lighting inside the pump station is poor. Site and wet well lighting should be installed and all lighting should be upgraded to LED.
2. The existing Circle AW meter/CT enclosure and Sylvania distribution panel have exceeded their useful service lives and should be replaced.
3. The existing electrical service is 240V, single phase. The electrical distribution system could be simplified if the utility power service could be upgraded to three phase. Due to the long lead time needed to upgrade the utility power service, VWHA recommends beginning discussions with PGE regarding electrical service to 480V three phase.
4. The VFDs are currently used to convert single phase power to three phase power, as required to run the pump motors. This configuration is prone to tripping. If three phase power can be brought to the site, the newer VFD should be rewired to a location after the three pole ATS (or could possibly be removed completely). This electrical system recommendation is not possible until the service can be upgraded as discussed in Item 3, above.
5. The pump circuit breakers in the Sylvania panel are mislabeled as roto phase units and are a safety issue. The older Sylvania pump starter enclosures are redundant, and include labels indicating that power originates from non-existent Roto Phase units. This mislabeling presents a safety issue. Recommend that all of the equipment described herein be removed and/or replaced, and that labels are corrected immediately.
6. The breakers provided by Tesco in the 2005 expansion are panelboard type, and not molded case, which is industry standard. It is assumed that the panelboard type breakers were needed to address the 240/120 V, single phase system. Any future modifications to the electrical system should utilize molded case type circuit breakers.
7. One of the Tesco panels has a breaker mislabeled “Main Service Disconnect”. This is a code violation and a safety issue, and should be corrected immediately.
8. The PLC is obsolete and should be replaced.
9. Retrofit EYS fittings and ensure they are properly installed per code.
10. The facilities in the electrical room have been upgraded, and some equipment has been installed outdoors that would typically be mounted indoors. Recommend that indoor equipment formally abandoned in place be removed from the electrical room, allowing all electrical equipment to be installed either indoors or in a secure enclosure.
11. A 400A generator plug is shown to have been demolished in the 2005 plans. However this plug is still on site, is in poor condition, and should be removed (see Figure 4-5).
12. HVAC equipment is mounted above electrical equipment which is a minor code violation. This equipment is also not adequately supported. HVAC equipment should be relocated and supported and braced in accordance with industry standards.

13. The wooden antenna mast is attached to the wood building. If the antenna mast receives a lightning strike, this strike could damage the Mission System Radio or start a building fire. Recommend grounding of the antenna shelf and replacing the mast with grounded metal pole.
14. Recommend monitoring vertical shrinkage crack in the retaining wall adjacent to generator. If widths increase, consider remedial action.
15. Provide proper arc flash labels on all electrical equipment.
16. The industrial UPS is an Allen Bradley unit located in the PLC enclosure. This unit should be replaced with a commercial free-standing unit which is less expensive and easier to maintain when the batteries need replacing.
17. Provide lateral restraints for piping.
18. Recommend removal and replacement of the generator base isolators with appropriately sized isolators.
19. Recommend evaluating structural adequacy of unistrut support for electrical panels and upgrading if required.
20. Replace missing anchor bolts on monorail.
21. Modify piping to include a bypass pumping connection. One possible location is on the exterior of building, where pipe currently exits the building and elbows down.
22. Upgrade all lighting to LED.
23. Recommend installation of exterior lighting on south side of building and a light in the wet well.
24. Provide backup seal water system.
25. A cell phone reception study is recommended to identify ways to address unreliable cell phone reception at the three Canyon Estates stations.

Figure 4-5. Abandoned  
Emergency Generator Plug



#### 4.1.3.2 Canyon Estates No. 2 Lift Station Findings

The Canyon Estates No. 2 Lift Station is a submersible pump station located approximately 160 feet northeast of Wildcat Drive in an undeveloped area on the edge of Wildcat Canyon Regional Park. Access to the site is via a set of stairs approximately 160 feet long descending 45 feet and then across a footpath approximately 100 feet long. The pump station is surrounded by a fenced enclosure and includes a 4-foot diameter wet well with two Flygt submersible grinder pumps, an adjacent valve box, hoist and rail support over the wet well, freestanding pump control, and



telemetry panels and a wooden antenna mast. The wet well appears to be of fiberglass construction.

A different pump station was originally built on this site in 1982 and was completely replaced in 2003. Electrical and communication upgrades were completed in 2005 including changing the source of the regular and emergency power feeds to Canyon Estates No. 1 Pump Station. The original pump station was built approximately three feet below grade within a retaining wall structure and stair access. The site has since been regraded and there is now a retaining wall northeast of the wet well. The station is generally in good condition.

Items identified during the field inspection as requiring attention include the following:

1. Access is very difficult at this station (See Figure 4-6). A separate study that includes a site-specific geotechnical analysis would be required if the City were to decide to improve access to this site. The scope of this study will depend on the work to be completed. Therefore, a cost estimate for this study was not included in this Report.
2. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installing manually controlled site and wet well lighting.
3. Recommend replacement of pump control back board and posts with an engineered support system.
4. There is severe erosion on east corner of site. Recommend engaging the services of a geotechnical engineer familiar with the area to develop mitigative measures. Also, recommend replacing the fence post pier that been compromised due to erosion.
5. Recommend construction of retaining wall on downslope side.
6. Add barbed wire to top of fence to improve site security.
7. Recommend upgrading the site to three phase power if three phase utility service can be brought into the Canyon Estates #1 Lift Station.
8. Provide proper arc flash labels.
9. Retrofit EYS fittings and ensure they are properly installed per code.
10. The PVC conduit between Station Nos. 1 and 2 is exposed in some locations. Recommend installing this electrical service conduit underground, where it will be better protected.
11. Upgrade the remote I/O with the PLC/RTU at Pump Station No. 1.
12. The wooden antenna mast could be subject to a lightning strike that could damage the Mission System Radio or start a fire. Recommend grounding the antenna shelf and replacing the mast with a grounded metal pole.
13. Complete cell phone reception study.
14. Modify piping to include a bypass pumping connection.

Figure 4-6 shows examples of issues that are discussed above for the Canyon Estates No. 2 Lift Station.

Figure 4-6. Sample of Canyon Estates No. 2 Lift Station Observations



Current Site Access



Erosion on East Side of Site

#### 4.1.3.3 Canyon Estates No. 3 Lift Station Findings

The Canyon Estates No. 3 Lift Station is a submersible pump station located adjacent to a private driveway of a resident at 1460 Rifle Range Road. Generally access to the site is via a set of stairs approximately 110 feet long descending 33 feet. If maintenance is required at this station, Veolia asks permission from the property owner to utilize the adjacent driveway. The lift station is surrounded by a fenced enclosure and includes a 4-foot diameter wet well with two Flygt submersible grinder pumps, an adjacent valve box, hoist and rail support over the wet well, freestanding pump control and telemetry panel, and a wooden antenna mast. The wet well material appears to be fiberglass.

The lift station was constructed in 2003. Electrical and communication upgrades were completed in 2005, including changing the source of both the regular and emergency power feeds to Canyon Estates No. 1 Lift Station. In order to obtain power from Canyon Estates No. 1 Lift Station, a step up transformer is required at the Canyon Estates No. 1 Lift Station and a step down transformer is required at this site. The station is generally in good condition. All issues are similar to Lift Station No. 2.

Items identified during the field inspection as requiring attention include the following:



1. Access to the station is very difficult. This station should be included with the study discussed for Lift Station No. 2, above, should the City decide to improve access to this station. At a minimum, the access stairway should be brought into CalOSHA compliance.
2. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installing manually controlled site and wet well lighting.
3. Recommend removal of abandoned meter enclosure at road.
4. Recommend upgrading the site to three phase power if three phase utility service can be brought into the Pump Station No. 1.
5. Provide proper arc flash labels.
6. Retrofit EYS fittings and ensure they are properly installed per code.
7. Recommend reinstallation of the electrical service conduit so that it is completely underground.
8. The antenna mast does not present the same issues as with Pump Stations Nos. 1 and 2. However, there remains a need to ground the existing antenna mast. In addition, the antennae poles are currently secured by means of band crimp straps. This should be replaced with an engineered anchorage system.
9. Recommend removal and replacement of electrical panel support system with an engineered support system.
10. Complete cell phone reception study.
11. Upgrade the remote I/O with the PLC/RTU at Pump Station No. 1.
12. Modify piping to include a bypass pumping connection.

Figure 4-7 on the following page shows examples of issues that are discussed above for the Canyon Estates No.32 Lift Station.

Figure 4-7. Sample of Canyon Estates No. 3 Lift Station Observations



Current Site Access



Abandoned Electrical Meter

#### 4.1.4 Ferry Point Lift Station Findings

Ferry Point Lift Station is a dry well pump station located within a large traffic island at the corner of Brickyard Cove Road and Dornan Drive as shown in Figure 4-8. The lift station includes a 4-foot diameter concrete wet well and 7-foot diameter dry well that houses two Smith and Loveless dry well pumps. The dry well is considered a confined space.



Figure 4-8. Ferry Point Lift Station Site



In the past, an approximately 31-foot by 14-foot wood frame and wood siding structure was built on site that includes two rooms. One room is located above the dry well and houses the pump control, power and telemetry panels, ceiling mounted lifting hooks, floor mounted crane, semi-permanent ventilation system for the dry well, and dry well access point. The adjacent room is a storage/maintenance room with a potable water sink. An emergency generator, automatic transfer switch, and a hydrogen peroxide injection system are located just outside of the building in a fenced area.

Adjacent to this fenced area is a separate fenced area that contains the hydrogen peroxide polyethylene storage tank. During the summer, hydrogen peroxide is injected into the wet well to alleviate odor issues downstream of the pump station. The hydrogen peroxide system is maintained by an outside contractor, and not Veolia. Although the wet well and dry well were originally built in 1963, it is unknown when the building was constructed. The emergency generator was installed in 2005.

During the site visit, Veolia reported that the suction pipe for one of the pumps between the wet well and the dry well is leaking. There have been numerous attempts to fix the leak while the station is in service. However, the repairs made have not been reliable. As a result, Veolia made the decision to take the second pump out of service to eliminate the risk of flooding the dry well and the station does not have pumping redundancy. Repairing the pipe will be a large project that will require taking the station out of service. Veolia is investigating a temporary solution to the issue that uses above-ground pumps.

Of the 23 sewer and stormwater lift stations that Veolia manages, this station is the only station that does not utilize a submerged, semi-permanent (guide rail) pump application that can be easily accessed by a service-utility vehicle for routine maintenance & repair. Accessing the current pumps for repair introduces added risk of flooding engulfment and other risks associated with confined space entry.

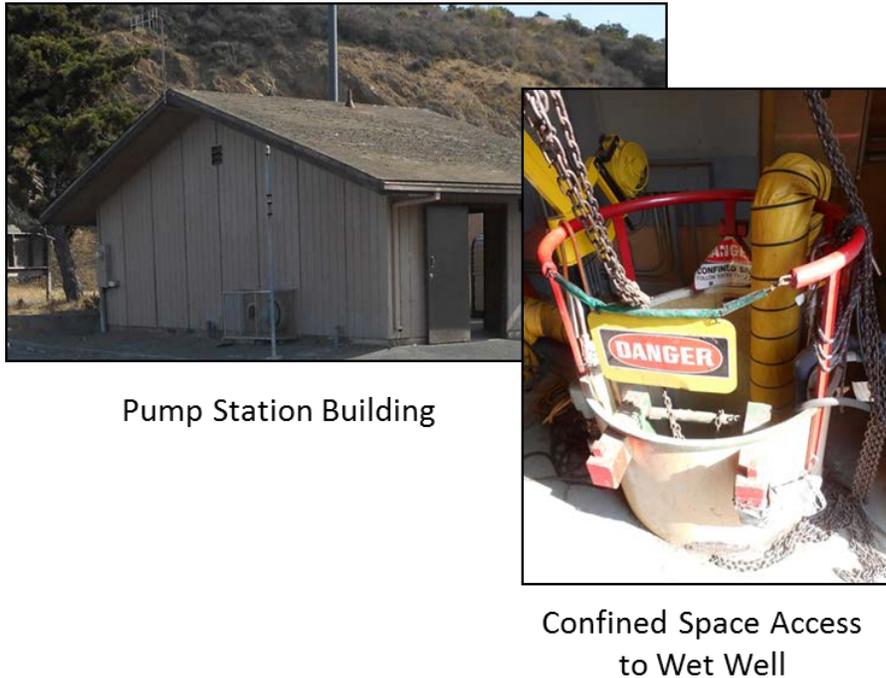
The proposed Terminal One Residential Project is located southeast of the intersection of Brickyard Cove Road and Dornan Drive, which is the site of the Ferry Point Pump Station. This project is currently under review by the City of Richmond and includes 316 residential units and public park areas. Planning documents for the development show that the roads around the traffic median where the Ferry Point Pump Station is currently located will be reconfigured to eliminate the median. The resulting pump station site will be bordered by Dornan Drive to the west, Brickyard Cove Road to the south, and open space to the north and east.

The Terminal One Residential Project is estimated to increase flows to the Ferry Point Pump Station by 106 gallons per minute (gpm). The hydraulic analysis shows that this station does not have sufficient firm capacity to convey projected design storm flows from current and proposed users. Based on the need for extensive upgrades to correct the leaking suction line, accessibility concerns, and the need to increase the capacity of the pump station, a new submersible pump station is recommended. The new station would need to be constructed in a new location and then tied into the existing system through a controlled shutdown and bypassing operation in

order to minimize service interruptions. After the new station is commissioned, the existing station would be demolished.

Figure 4-9 provides additional information on observed issues at the Ferry Point Pump Station.

Figure 4-9. Sample of Ferry Point Pump Station Observations



#### 4.1.5 I.C.I. Lift Station Findings

I.C.I. Lift Station is a submersible pump station located in a commercial/industrial area at the intersection of Seaport Avenue and South 49th Street as shown in Figure 4-10. The pump station is located within a 12-foot by 32-foot fenced area and includes a 6-foot diameter stainless steel wet well with two Flygt submersible pumps, an adjacent valve vault with a cross with a blind flange, freestanding pump control panel and telemetry and



Figure 4-10.  
I.C.I. Lift Station Site

metering cabinets, and an automatic transfer switch and emergency generator. The lift station was built in 1992 with minor upgrades in 2005 including a new enclosure for the generator and the addition of an antenna pole. The station is generally in good condition.

Items identified during the field inspection as requiring attention include the following:

1. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installation of manually controlled site and wet well lighting.
2. The wet well hatch cover is scheduled to be replaced in 2018 with a new 300 psf-rated safety hatch cover that can be installed over the existing frame after removing existing access doors. If this replacement does not occur, it should be scheduled as part of the 2018-19 capital improvement program.
3. The discharge pipes are ductile iron pipe, and the elbows and pipe near top of wet well are heavily corroded. The condition of the pipes further down in the wet well could not be assessed due to limited visibility. However, it is assumed they are in a similar condition. Recommend removing surface corrosion, and cleaning and coating discharge pipes and fittings within the wet well.
4. Explosion risk is elevated due to pump power cables that were at one time spliced into existing cables in the wetwell. Veolia will resolve this issue in 2018.
5. The ultrasonic level sensor is mounted too close to the wet well wall; this affects the accuracy of the readings. Recommend moving the unit further away from the wall in accordance with the manufacturer's instructions.
6. The generator and transfer switch require replacement. Veolia has indicated that this item may already be scheduled for 2018.
7. The channel used for a cell modem antenna mast should be grounded for safety.
8. Recommend replacing the PLC in the existing enclosure.
9. Provide proper arc flash labels.
10. Replace EYS fittings with termination enclosures.
11. Modify piping to include a bypass pumping connection.
12. The industrial UPS is an Allen Bradley unit located in the PLC enclosure. This unit should be replaced with a commercial free-standing unit which is less expensive and easier to maintain when the batteries need replacing.
13. Recommend removal and replacement of electrical panel support system with an engineered support system.
14. Generate an accurate singleline diagram for this site.

Figure 4-11 provides additional information on several of the issues that are discussed above.

Figure 4-11. Sample of I.C.I. Lift Station Observations



Pipe Corrosion in Wet Well



Original Generator Transfer Switch

4.1.6 Keller Beach Lift Station Findings

Keller Beach Lift Station is a submersible pump station located within East Bay Regional Park District’s Keller Beach Park as shown in Figure 4-12. The lift station includes a 6-foot by 10-foot concrete wet well with one Flygt submersible pump and one Vaughn submersible grinder pump. The station has an adjacent valve vault with a bypass connection. The freestanding telemetry, pump control and power panels, and automatic transfer switch and emergency generator are located within a nearby fenced enclosure. The pump station wet well was built in 1959. In 1996, the wet well was modified and a valve vault added. The emergency generator was added in 2005. The station is generally in good condition.



Figure 4-12. Keller Beach Lift Station Site

V&A's evaluation of the Keller Beach force main is included in the Force Main System Condition Assessment Report dated January 2016. The Keller Beach Pump Station force main is exposed on the steep hillside east of the lift station between Dornan Road and the railroad tracks. There is visible corrosion on the exposed portion of the force main. However, V&A concluded that only the immediate surface of the pipe exterior is corroded. Also, V&A determined that outside of the limits of the exposed pipe, the depth of cover along the hillside appears to be less than 12 inches.

V&A recommended covering the exposed section of force main and also adding a layer of fill over the entire length of pipe in the hillside, in combination with other slope stabilization methods such as vegetation, geo-textile mats, and new drainage channels. In addition V&A recommended providing an odor control system at this pump station, as the presence of sewer offgassing is indicated by the poor condition of the Ferry Point/Keller Beach discharge manhole.

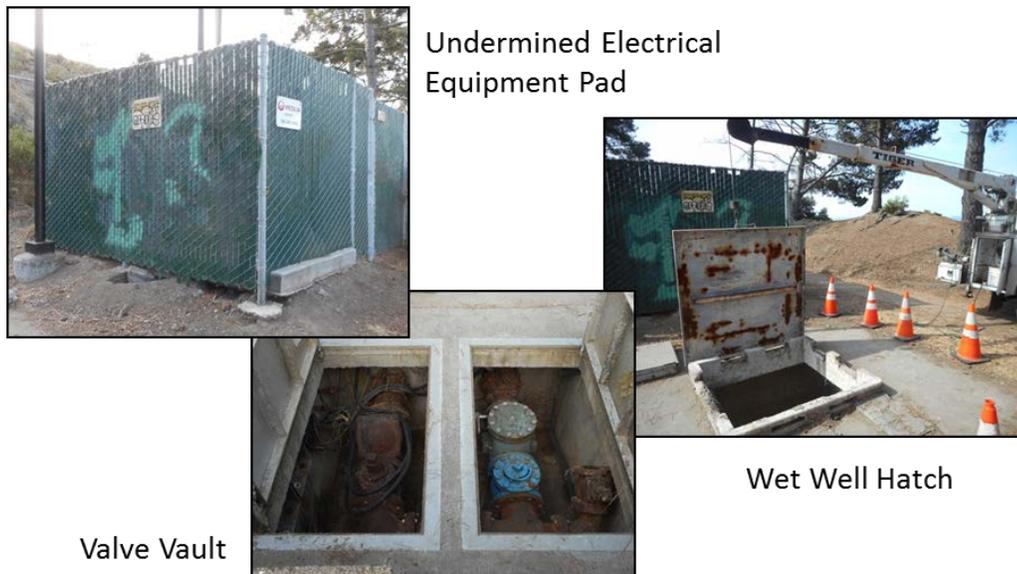
In addition to these recommended improvements, items identified by VWHA during the field inspection as requiring attention include the following:

1. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installing manually controlled site and wet well lighting.
2. The main wet well hatch cover, which is approximately 4-feet by 4-feet in size, must be lifted by boom truck. Recommend replacing this hatch cover with a lift-assisted safety hatch cover.
3. The concrete pad supporting the telemetry and electrical panels has been undermined by ground squirrels and there is a substantial gap below the pad. Recommend providing support to the undermined concrete slab and installation of anti-gopher fencing a minimum of two feet into the ground around the perimeter of the pad
4. Recommend removal of the existing antenna mast and old radio enclosure, and provision of a permanent mast for cell modem communication.
5. The wet well concrete curb is compromised and should be repaired or replaced.
6. The interior concrete surface of the wet well is friable and might indicate the beginning of biogenic sulfide corrosion of the concrete. Recommend applying a coating to the interior of the wet well.
7. The wet well access ladder is corroded and only extends a few feet into the wet well. This ladder does not appear to be structurally sound and removal or replacement is recommended.
8. Replace PLC in existing enclosure.
9. Provide proper arc flash labels.
10. Retrofit EYS fittings and ensure they are properly installed per code.
11. Provide cable management hardware.

12. The transfer switch enclosure has a breaker that appears to be the main service disconnect. However, an old service disconnect breaker in the Tesco pedestal is still labeled as the main service disconnect. The breakers should be properly labeled to eliminate this safety issue and code violation.
13. Pipes, fittings, valves and conduits in valve vault are corroded. Veolia tests the valves regularly to ensure they are functioning and has confirmed that these valves are in good working order. However, systematic coating and/or replacement of all corroded items within the valve vault are recommended.
14. There is particular concern at this site regarding sanitary sewer overflows due to the proximity of the lift station to Keller Beach. As a result, the alarm set point is very low. The City should have a site-specific emergency response plan, as well as a backup pump readily available for this site and a spill kit onsite, to improve response in the event of a sanitary sewer spill. In addition, the discharge piping should be modified to include a bypass pumping connection.
15. There are miscellaneous unused wires and cables and abandoned conduit in the valve vault that should be removed.
16. Recommend removal and replacement of the generator base isolators with appropriately sized isolators.

Figure 4-13 show several of the Keller Beach Lift Station features.

Figure 4-13. Keller Beach Lift Station Features



#### 4.1.7 Marina Bay Cove Lift Station Findings

The Marina Bay Cove Lift Station is a submersible pump station located on the north side of Esplanade Drive across the street from the Inner Harbor Basin as shown in Figure 4-14. The lift station includes a 6-foot diameter concrete wet well with two Flygt submersible pumps, an adjacent valve vault, freestanding electrical and telemetry panels, and an emergency generator and automatic transfer switch within an ornamental steel fenced enclosure. The pump station was built as the North Shore Pump Station in 1981, and was later renamed the Marina Bay Cove Pump Station. It is not known when the valve vault was added. The emergency generator was added in 2005 and new Flygt pumps were installed in 2017. The station is generally in good condition.

Figure 4-14. Marina Bay Cove Lift Station Site



Items identified by VWHA during the field inspection as requiring attention include the following:

1. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installing manually controlled site and wet well lighting.



2. The wet well hatch cover is scheduled to be replaced in 2018 with a new 300 psf-rated safety hatch cover that can be installed over the existing frame after removing existing access doors. If this replacement does not occur, it should be scheduled as part of the 2018-19 capital improvement program.
3. The interior concrete surface of the wet well is friable with exposed aggregate which might indicate the beginning of biogenic sulfide corrosion of the concrete. Recommend applying a coating to the interior of the wet well.
4. There is minor corrosion on the fence. The fence should be repainted.
5. Recommend removing the existing antenna mast and providing a permanent grounded mast for the cell modem antenna.
6. Recommend a new dedicated 480 volt service at this site. This work would involve abandoning the existing feeder conduit from the park service, and will likely take several years to implement.
7. Replace PLC in existing enclosure.
8. Secure and mount unsupported antenna cables.
9. Provide proper arc flash labels.
10. Retrofit EYS fittings and ensure they are properly installed per code.
11. Recommend removal and replacement of the generator base isolators with appropriately sized isolators.
12. Recommend removal and replacement of electrical panel support system with an engineered support system.
13. Modify piping to include a bypass pumping connection.

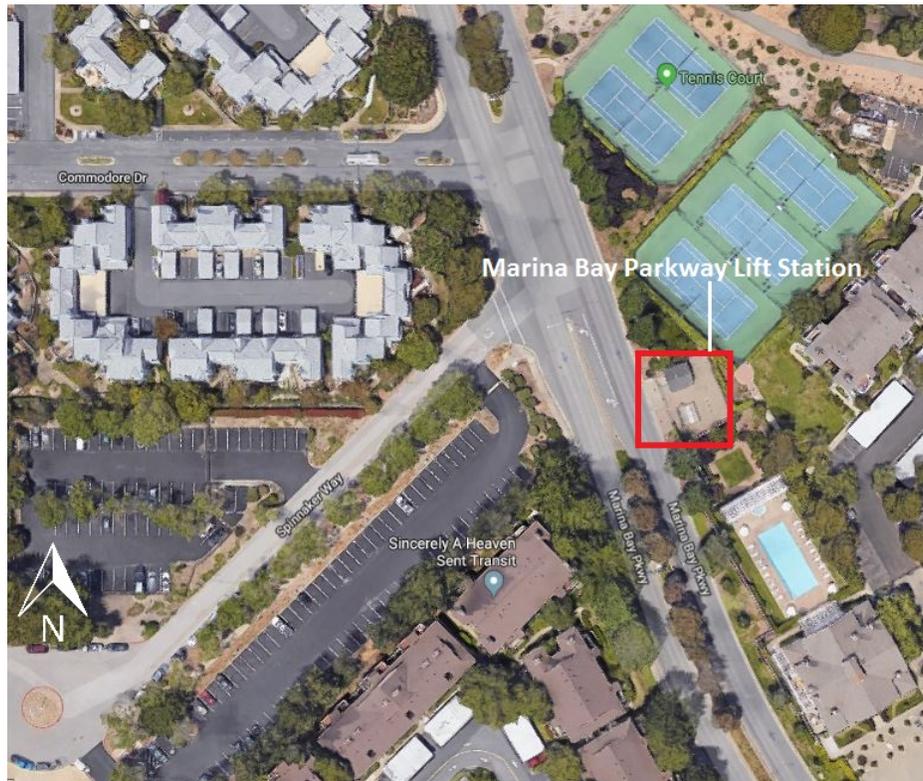
#### 4.1.8 Marina Bay Parkway Lift Station Findings

Marina Bay Parkway Lift Station is a submersible pump station located on the east side of Marina Bay Parkway south of the intersection with Spinnaker Way as shown in Figure 4-15 on the following page. The lift station includes three Flygt submersible pumps in a 13-foot by 14-foot concrete wet well, buried isolation and check valves, a flow meter in a below grade vault, and a 15-foot, 4-inch by 13-foot, 4-inch reinforced concrete masonry unit building with wood siding and a standing seam metal roof. The building houses the electrical equipment and an emergency generator. The entire site is surrounded by fencing. The station was built in 1987 with room for a third pump, which was installed in 2005.

Items identified by VWHA during the field inspection as requiring attention include the following:

1. Recommend installation of A34 clips between roof diaphragm and top-plate, retrofit of diaphragm with cross ties and verification that out-of-plane bracing of CMU end walls is present.

Figure 4-15. Marina Bay Parkway Lift Station Site



2. There is minimal site lighting and no wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installing manually controlled site and wet well lighting.
3. Recommend removal of antenna mast, which is not in use.
4. Replace PLC in existing enclosure.
5. Provide proper arc flash labels.
6. The 10" discharge pipe elbow within the wet well can be removed for connecting a temporary bypass pipe as needed. One option for a permanent bypass connection of the wet well could involve replacing the 10" elbow with a tee and installing a plug valve downstream of the tee in the wet well. Further design would be required to confirm the feasibility of this approach.
7. An existing flowmeter is currently not in service, and not listed as a system asset (See Figure 4-16). Recommend commissioning the existing flow meter.

Figure 4-16. Non-Commissioned Flowmeter



8. Retrofit EYS fittings and ensure they are properly installed per code.
9. Recommend removal and replacement of the generator base isolators with appropriately sized isolators.
10. Remove corroded wet well access ladder.

#### 4.1.9 Nevin & A Street Lift Station Findings

Nevin & A Street Lift Station is a submersible pump station located in a commercial/industrial area on the northeast corner at the intersection of A Street and Nevin Avenue as shown in Figure 4-17. The 6-foot diameter wet well with two submersible Flygt pumps and the valve vault are located within the sidewalk area. The pump control and power panels, automatic transfer switch and emergency generator are located in a fenced enclosure adjacent to the wet well and valve vault, which is located next to a building. The lift station was originally built in 1996 and the generator and fence enclosure were added in 2005. The station is generally in good condition.



Figure 4-17. Nevin & A Lift Station Site

Items identified by VWHA during the field inspection as requiring attention include the following:

1. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installing manually controlled site and wet well lighting.
2. The wet well hatch cover and frame are scheduled to be replaced in 2018 with a new frame and H-20S rated traffic cover. If this replacement does not occur, it should be scheduled as part of the 2018-19 capital improvement program.

3. Recommend removing two existing antenna masts and providing a permanent mast for cell modem antenna.
4. Replace PLC in existing enclosure.
5. Provide proper arc flash labels.
6. Convert EYS fittings to termination enclosures.
7. Provide cable management hardware.
8. Properly mount level element.
9. It is not clear that the breaker labeled “service disconnect” is the true service disconnect – this should be confirmed and properly labeled.
10. Recommend removal and replacement of the generator base isolators with appropriately sized isolators.
11. Modify piping to include a bypass pumping connection.
12. The adjacent structure may be constructed of unreinforced masonry units. Verify with owner that State mandated mitigative measures have been implemented.

Figure 4-18 provides additional information related to Nevin & A pump station concerns.

Figure 4-18. Sample of Nevin & A Lift Station Observations



Exposed Wires Behind  
Electrical Panel



Adjacent Masonry Unit Structure

#### 4.1.10 Port Lift Station Findings

Port Lift Station is a submersible pump station located in the Point Potrero Marine Terminal Automotive Distribution Center at the Port of Richmond as shown in Figure 4-19. The lift station

consists of a multilevel structure at and below grade with a footprint of approximately 13-feet by 13-feet. The underground walls are reinforced concrete and the above-grade structure is comprised of reinforced concrete masonry unit block walls.



Figure 4-19. Port Lift Station Site

The lift station was completely rehabilitated in 2005 with a new wet well, pumps and electrical equipment. The lift station consists of two Flygt submersible pumps installed in a 7-foot diameter reinforced fiberglass tank wet well installed within the below-grade room. The drawings show the check valves for each pump within the wet well tank. The discharge piping penetrates the tank and runs within the space between the tank and the concrete walls. This piping includes a flow meter, an isolation valve, and a bypass connection which extends to the room located above, at grade. The force main exits the structure through the below-grade concrete wall. The station includes both a ceiling-mounted monorail hoist and a floor-mounted jib crane. The pump control power pedestal and emergency generator are located within a fenced area on the north side of the building. The station is generally in good condition. Items identified by VVHA during the field inspection as requiring attention include the following:

1. Recommend removing antenna mast, which is not being used.
2. Recommend installation of manually controlled exterior lighting by the entrance door and for the fenced area.
3. There are gas monitors in both the below-grade and at-grade spaces (See Figure 4-20). Veolia reports

Figure 4-20. Existing Gas Monitors



frequent alarms due to malfunctioning of these monitors. Recommend replacing the monitoring system with a vacuum type system or other solution to be developed by Veolia.

4. Replace PLC in existing enclosure.
5. Provide proper arc flash labels.
6. A flow meter is assumed to be installed as shown on the drawings. However, the lower level was not inspected due to confined entry limitations. During the site visit, it was noted that the display module for this meter is mounted in the telemetry panel but has never been connected. Recommend commissioning the existing flow meter.
7. The 2005 drawings designate the at-grade room as a Class 1, Division 2 area. However, this rating is questionable since the entire ground level could be considered an extension of the lower level because the ladder opening, which separates the at-grade and below-grade spaces, has no hatch. Recommend that this area is reclassified as Class 1 Division 1, and equipment upgraded appropriately. Currently, the upper level is not built to Class 1, Div 1 standards.
8. Retrofit EYS fittings and ensure all code required EYS fittings are installed per code.
9. Recommend removal and replacement of the generator base isolators with appropriately sized isolators.

#### 4.1.11 Sunset Pointe Lift Station Findings

Sunset Pointe Lift Station is a submersible pump station located to the east of the entrance gate for the Sunset Pointe community on Waterview Drive with its emergency generator located in Shimada Friendship Park as shown in Figure 4-21. The lift station includes a 5-foot diameter concrete wet well with two Flygt submersible pumps, an adjacent valve vault with a bypass connection point, and a freestanding pump control pedestal. An emergency generator for this lift station is located approximately 700 feet away, adjacent to the restroom facility at Shimada Friendship Park. The pump station was built in 1995 and the emergency power was added in 2005. The pumps were replaced with Flygt pumps in 2017. The station is generally in good condition.

Items identified by VWHA during the field inspection as requiring attention include the following:

1. There is no site or wet well lighting. This makes it difficult for maintenance personnel to work on the station at night during an emergency. Recommend installing manually controlled site and wet well lighting.
2. The wet well hatch cover is scheduled to be replaced in 2018 with a new 300 psf-rated safety hatch cover that can be installed over the existing frame after removing existing access doors. If this replacement does not occur, it should be scheduled as part of the 2018-19 capital improvement program.

Figure 4-21. Sunset Pointe Lift Station Location



3. The station is located adjacent to the street with no protection from vehicular impact. Provide bollards to protect electrical equipment.
4. Replace PLC in existing enclosure.
5. Recommend that VFDs are protected by circuit breakers, and not motor circuit protectors, which is the current configuration.
6. Provide proper arc flash labels.
7. Retrofit EYS fittings and ensure they are properly installed per code.
8. The standby generator is not mounted on spring isolators. Install spring isolators or verify vibration within generator is within acceptable limits.
9. Modify piping to include a bypass pumping connection.

## 4.2 LIFT STATION IMPROVEMENT COSTS

This section presents the estimated costs needed to address each of the issues identified at the wastewater lift stations and described in Section 4.1. The cost table for each lift station shows the unit costs for each recommended improvement. Construction cost is estimated based on unit cost multiplied by the number of units anticipated, multiplied by an installation factor.

In the case of electrical, control and SCADA systems, where equipment quotations have been used, equipment costs include an installation factor of 1.68. The installation factor for these project components includes the following elements:

- Labor: 33%
- Transportation: 4.75%
- Tax: 9.25%
- Overhead and Profit: 21%

The sum of the elements (*i.e.*, 33% + 4.75% + 9.25% + 21%) represents 68% of the equipment cost, or as a multiplication factor, is 1.68 of equipment cost. For equipment not requiring electrical and controls work, the installation factor has been reduced to 1.50.

The tables also identify the recommended priority for each individual item, and present the total project cost for each of the recommended items.

Total project costs are calculated by applying estimating contingency and associated non-construction costs to the construction costs for each item. Estimating contingency is established at 30 percent and is intended to address the level of uncertainty of the associated cost estimate. As each project becomes more defined, the estimating contingency should be lowered accordingly.

The associated non-construction cost is established at 40% and includes the following components, which were developed in coordination with Veolia Water:

- Engineering (10%)
- Project management (0% - included in Veolia management costs)
- Bidding activities (0% - included in Veolia management costs)
- Technical services and specialty inspection (5%)
- Permitting (2%)
- Construction and project contingencies (10%)
- Estimating unknowns due to bid climate (12%)



- Database updates (1%)

All costs reference the Engineering News Record Construction Cost Index (ENR CCI) for San Francisco, May 2018 (12014.72). The level of accuracy in cost estimating follows the Association for the Advancement of Cost Engineering (“AAACE”) Class 5, Concept Screening, with an expected accuracy range of -30% to +50%.

### 4.3 LIFT STATION IMPROVEMENT PRIORITIES

Each of the lift station improvement projects has been prioritized as follows:

1. Priority “A” (Immediate needs): These projects are recommended for completion in two to five years to address an apparent safety or system reliability issue.
2. Priority “B” (Planned improvements): These projects are recommended for implementation within five to seven years to address longer term reliability concerns.
3. Priority “C” (Long-term improvements): The noted deficiencies should be monitored, and included in budget planning for future years. If the issues do not worsen over time, these improvements can be planned for completion beyond the seven-year horizon.

Table 4-1 provides an index to Tables 4-2 through 4-14, which list, for each station, the project needs, priorities, associated construction cost estimates, and total project costs.

Table 4-1. Lift Station Improvement Project Summaries

Table No.	Station Name
4-2	Brickyard Booster Pump Station
4-3	Brickyard Cove Pump Station
4-4	Canyon Estates No. 1 Pump Station
4-5	Canyon Estates No. 2 Pump Station
4-6	Canyon Estates No. 3 Pump Station
4-7	Ferry Point Pump Station
4-8	I.C.I. Pump Station
4-9	Keller Beach Pump Station
4-10	Marina Bay Cove Pump Station
4-11	Marina Bay Parkway Pump Station
4-12	Nevin & A Street Pump Station
4-13	Port Pump Station
4-14	Sunset Point Pump Station



Table 4-2. Brickyard Booster Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
BBLS1	Repair T-Lock Liner Joints	A	EA	\$ 4,800	1	1	\$ 4,800	\$ 1,440	\$ 6,240	\$ 2,496	\$ 8,736
BBLS2	Install Bollards	A	EA	\$ 6,800	1	1	\$ 6,800	\$ 2,040	\$ 8,840	\$ 3,536	\$ 12,376
BBLS3	Install Transducer Stilling Well	A	EA	\$ 4,200	1	1	\$ 4,200	\$ 1,260	\$ 5,460	\$ 2,184	\$ 7,644
BBLS4	Install Bypass Connection	A	EA	\$ 12,396	1	1	\$ 12,396	\$ 3,719	\$ 16,115	\$ 6,446	\$ 22,561
BBLS5	Lighting	A	EA	\$ 2,500	2	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
BBLS6	Replace Electrical Transformer	A	EA	\$ 7,500	1	1.68	\$ 12,600	\$ 3,780	\$ 16,380	\$ 6,552	\$ 22,932
BBLS7	Replace PLC	A	EA	\$ 22,500	1	1.68	\$ 37,800	\$ 11,340	\$ 49,140	\$ 19,656	\$ 68,796
BBLS8	Arc Flash Labels	A	EA	\$ 3,500	1	1	\$ 3,500	\$ 1,050	\$ 4,550	\$ 1,820	\$ 6,370
BBLS9	Retrofit EYS Fittings	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
										<b>Total Priority A Projects</b>	<b>\$ 165,613</b>
<b>Priority B Projects</b>											
BBLS10	Upgrade Communication Cables	B	EA	\$ 1,500	1	1.68	\$ 2,520	\$ 756	\$ 3,276	\$ 1,310	\$ 4,586
BBLS11	Replace Power / Control Panel Supports	B	EA	\$ 7,500	1	1	\$ 7,500	\$ 2,250	\$ 9,750	\$ 3,900	\$ 13,650
BBLS12	Upgrade Electrical Service, 480 vac, 3 Phase	B	EA	\$ 25,000	1	1	\$ 25,000	\$ 7,500	\$ 32,500	\$ 13,000	\$ 45,500
BBLS12	Upgrade Electrical Service, R&R Pedestal	B	EA	\$ 65,000	1	1.68	\$ 109,200	\$ 32,760	\$ 141,960	\$ 56,784	\$ 198,744
BBLS12	Upgrade Electrical Service, Pedestal Slab	B	EA	\$ 5,000	1	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
BBLS12	Upgrade Electrical Serv, R&R ATS	B	EA	\$ 10,000	1	1.68	\$ 16,800	\$ 5,040	\$ 21,840	\$ 8,736	\$ 30,576
BBLS12	Upgrade Electrical Service, Conductors	B	EA	\$ 3,000	1	1.68	\$ 5,040	\$ 1,512	\$ 6,552	\$ 2,621	\$ 9,173
										<b>Total Priority B Projects</b>	<b>\$ 299,281</b>



Table 4-3. Brickyard Cove Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
BCLS1	Install Bypass Connection	A	EA	\$ 10,086	1	1	\$ 10,086	\$ 3,026	\$ 13,112	\$ 5,245	\$ 18,357
BCLS2	Lighting	A	EA	\$ 2,500	2	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
BCLS3	Remove Existing Antenna Mast	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
BCLS4	Commission Existing Flow Meter	A	EA	\$ 500	1	1.68	\$ 840	\$ 252	\$ 1,092	\$ 437	\$ 1,529
BCLS5	Replace PLC	A	EA	\$ 25,000	1	1.68	\$ 42,000	\$ 12,600	\$ 54,600	\$ 21,840	\$ 76,440
BCLS6	ARC Flash Labels	A	EA	\$ 3,500	1	1	\$ 3,500	\$ 1,050	\$ 4,550	\$ 1,820	\$ 6,370
BCLS7	Retrofit EYS Fittings	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
<b>Total Priority A Projects</b>											<b>\$ 121,623</b>
<b>Priority B Projects</b>											
BCLS8	Repair Valve Vault Concrete	B	EA	\$ 4,700	1	1	\$ 4,700	\$ 1,410	\$ 6,110	\$ 2,444	\$ 8,554
BCLS9	Replace Power / Control Panel Supports	B	EA	\$ 7,500	1	1	\$ 7,500	\$ 2,250	\$ 9,750	\$ 3,900	\$ 13,650
BCLS10	Install Bollards	B	EA	\$ 9,600	1	1	\$ 9,600	\$ 2,880	\$ 12,480	\$ 4,992	\$ 17,472
BCLS11	Wetwell Piping Clean and Coat	B	EA	\$ 1,920	1	1	\$ 1,920	\$ 576	\$ 2,496	\$ 998	\$ 3,494
BCLS12	Mount Antenna Cable to Pole	B	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
<b>Total Priority B Projects</b>											<b>\$ 44,080</b>
<b>Priority C Projects</b>											
BCLS13	Upgrade Electrical Service, 480 vac, 3 Phase	C	EA	\$ 25,000	1	1	\$ 25,000	\$ 7,500	\$ 32,500	\$ 13,000	\$ 45,500
BCLS13	Upgrade Electrical Service, R&R Pedestal	C	EA	\$ 65,000	1	1.68	\$ 109,200	\$ 32,760	\$ 141,960	\$ 56,784	\$ 198,744
BCLS13	Upgrade Electrical Service, Pedestal Slab	C	EA	\$ 5,000	1	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
BCLS13	Upgrade Electrical Service, Conductors	C	EA	\$ 3,000	1	1.68	\$ 5,040	\$ 1,512	\$ 6,552	\$ 2,621	\$ 9,173
BCLS14	Upgrade Communication Cables	C	EA	\$ 500	1	1.68	\$ 840	\$ 252	\$ 1,092	\$ 437	\$ 1,529
<b>Total Priority C Projects</b>											<b>\$ 270,234</b>



Table 4-4. Canyon Estates No. 1 Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
CEONE1	Install Pipe Restraints	A	EA	\$ 7,500	1	1	\$ 7,500	\$ 2,250	\$ 9,750	\$ 3,900	\$ 13,650
CEONE2	Install Monorail Anchor Bolts	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
CEONE3	Install Bypass Connection	A	EA	\$ 12,248	1	1	\$ 12,248	\$ 3,674	\$ 15,922	\$ 6,369	\$ 22,291
CEONE4	Lighting	A	EA	\$ 2,500	1	1.68	\$ 4,200	\$ 1,260	\$ 5,460	\$ 2,184	\$ 7,644
CEONE5	Replace Generator Base Isolators	A	EA	\$ 10,000	1	1	\$ 10,000	\$ 3,000	\$ 13,000	\$ 5,200	\$ 18,200
CEONE6	Relocate HVAC Equipment	A	EA	\$ 5,000	1	1	\$ 5,000	\$ 1,500	\$ 6,500	\$ 2,600	\$ 9,100
CEONE7	Relabel Pump Circuit Breakers	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
CEONE8	Relabel Tesco Circuit Breaker	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
CEONE9	Relocate Outdoor Electrical Eqp. to Indoors	A	EA	\$ 1,000	1	1	\$ 1,000	\$ 300	\$ 1,300	\$ 520	\$ 1,820
CEONE10	Replace Antenna Pole and Remount Ants.	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
CEONE11	Replace PLC	A	EA	\$ 25,000	1	1.68	\$ 42,000	\$ 12,600	\$ 54,600	\$ 21,840	\$ 76,440
CEONE12	Arc Flash Labels	A	EA	\$ 5,000	1	1	\$ 5,000	\$ 1,500	\$ 6,500	\$ 2,600	\$ 9,100
CEONE13	Retrofit EYS Fittings	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
CEONE14	Install Backup Seal Water System	A	EA	\$ 12,500	1	1	\$ 12,500	\$ 3,750	\$ 16,250	\$ 6,500	\$ 22,750
CEONE15	Cell Phone Reception Study	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
<b>Total Priority A Projects</b>											<b>\$ 191,915</b>
<b>Priority B Projects</b>											
CEONE16	Upgrade Electrical Service, 480 vac, 3phase	B	EA	\$ 50,000	1	1	\$ 50,000	\$ 15,000	\$ 65,000	\$ 26,000	\$ 91,000
CEONE16	Upgrade Electrical Service, Meter & Breaker	B	EA	\$ 65,000	1	1.68	\$ 109,200	\$ 32,760	\$ 141,960	\$ 56,784	\$ 198,744
CEONE16	Upgrade Electrical Service, Power Center	B	EA	\$ 3,000	1	1.68	\$ 5,040	\$ 1,512	\$ 6,552	\$ 2,621	\$ 9,173
CEONE16	Upgrade Electrical Service, ATS	B	EA	\$ 15,000	1	1.68	\$ 25,200	\$ 7,560	\$ 32,760	\$ 13,104	\$ 45,864
CEONE16	Demo Existing Generator Plug	B	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
CEONE16	Upgrade Electrical Service, Distribution	B	EA	\$ 12,000	1	1.68	\$ 20,160	\$ 6,048	\$ 26,208	\$ 10,483	\$ 36,691
CEONE16	Upgrade Electrical Service, Rewire VFD's	B	EA	\$ 1,000	1	1	\$ 1,000	\$ 300	\$ 1,300	\$ 520	\$ 1,820
<b>Total Priority B Projects</b>											<b>\$ 386,022</b>
<b>Priority C Projects</b>											
CEONE17	Replace UPS	C	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
CEONE18	Convert Pump Station to Submersible - Future	C	EA	\$ 1,600,000	1	1	\$ 1,600,000	\$ 480,000	\$ 2,080,000	\$ 832,000	\$ 2,912,000
<b>Total Priority C Projects</b>											<b>\$ 2,912,910</b>



Table 4-5. Canyon Estates No. 2 Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
CETWO1	Site Drainage Modifications	A	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
CETWO2	Install Downslope Retaining Wall	A	EA	\$ 12,000	1	1	\$ 12,000	\$ 3,600	\$ 15,600	\$ 6,240	\$ 21,840
CETWO3	Install Bypass Connection	A	EA	\$ 3,420	1	1	\$ 3,420	\$ 1,026	\$ 4,446	\$ 1,778	\$ 6,224
CETWO4	Lighting	A	EA	\$ 2,500	1	1.68	\$ 4,200	\$ 1,260	\$ 5,460	\$ 2,184	\$ 7,644
CETWO5	Replace Antenna	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
CETWO6	Upgrade Remote I/O w/PLC/RTU at Ps No. 1	A	EA	\$ 27,500	1	1.68	\$ 46,200	\$ 13,860	\$ 60,060	\$ 24,024	\$ 84,084
CETWO7	Arc Flash Labels	A	EA	\$ 2,500	1	1	\$ 2,500	\$ 750	\$ 3,250	\$ 1,300	\$ 4,550
CETWO8	Retrofit EYS Fittings	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
CETWO9	Cell Phone Reception Study	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
CETWO10	Replace Power / Control Panel Supports	A	EA	\$ 6,500	1	1	\$ 6,500	\$ 1,950	\$ 8,450	\$ 3,380	\$ 11,830
										<b>Total Priority A Projects</b>	<b>\$ 148,002</b>
<b>Priority B Projects</b>											
CETWO11	Repair Fence and Add Barb Wire Top	B	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
CETWO12	Upgrade Electrical Service, 480 vac, 3 Phase	B	EA	\$ 25,000	1	1	\$ 25,000	\$ 7,500	\$ 32,500	\$ 13,000	\$ 45,500
CETWO12	Upgrade Electrical Service Starters/Breakers	B	EA	\$ 7,500	2	1.68	\$ 25,200	\$ 7,560	\$ 32,760	\$ 13,104	\$ 45,864
CETWO12	Upgrade Electrical Service , Power Center	B	EA	\$ 3,000	1	1.68	\$ 5,040	\$ 1,512	\$ 6,552	\$ 2,621	\$ 9,173
CETWO12	Upgrade Electrical Service, Distribution	B	EA	\$ 2,000	1	1.68	\$ 3,360	\$ 1,008	\$ 4,368	\$ 1,747	\$ 6,115
										<b>Total Priority B Projects</b>	<b>\$ 112,112</b>
<b>Priority C Projects</b>											
CETWO13	Bury Exposed Conduit from Canyon No. 1	C	EA	\$ 5,000	1	1	\$ 5,000	\$ 1,500	\$ 6,500	\$ 2,600	\$ 9,100
										<b>Total Priority C Projects</b>	<b>\$ 9,100</b>



Table 4-6. Canyon Estates No. 3 Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
CETHREE1	Replace Power / Control Panel Supports	A	EA	\$ 6,500	1	1	\$ 6,500	\$ 1,950	\$ 8,450	\$ 3,380	\$ 11,830
CETHREE2	Install Bypass Connection	A	EA	\$ 3,420	1	1	\$ 3,420	\$ 1,026	\$ 4,446	\$ 1,778	\$ 6,224
CETHREE3	Lighting	B	EA	\$ 2,500	1	1.68	\$ 4,200	\$ 1,260	\$ 5,460	\$ 2,184	\$ 7,644
CETHREE4	Ground and Resupport Antenna Mast	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
CETHREE5	Modify Access Stairway to CalOSHA Compliant	A	EA	\$ 8,000	1	1	\$ 8,000	\$ 2,400	\$ 10,400	\$ 4,160	\$ 14,560
CETHREE6	Upgrade Remote I/O w/PLC/RTU at Ps No. 1	A	EA	\$ 27,500	1	1.68	\$ 46,200	\$ 13,860	\$ 60,060	\$ 24,024	\$ 84,084
CETHREE7	Arc Flash Labels	A	EA	\$ 2,500	1	1	\$ 2,500	\$ 750	\$ 3,250	\$ 1,300	\$ 4,550
CETHREE8	Retrofit EYS Fitting	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
CETHREE9	Remove abandoned meter enclosure at road	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
CETHREE10	Cell Phone Reception Study	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
										<b>Total Priority A Projects</b>	<b>\$ 137,992</b>
<b>Priority B Projects</b>											
CETHREE11	Upgrade Electrical Service, 480 vac, 3 phase	B	EA	\$ 25,000	1	1	\$ 25,000	\$ 7,500	\$ 32,500	\$ 13,000	\$ 45,500
CETHREE11	Upgrade Electrical Service, Starters/Breakers	B	EA	\$ 7,500	2	1.68	\$ 25,200	\$ 7,560	\$ 32,760	\$ 13,104	\$ 45,864
CETHREE11	Upgrade Electrical Service, Power Center	B	EA	\$ 3,000	1	1.68	\$ 5,040	\$ 1,512	\$ 6,552	\$ 2,621	\$ 9,173
CETHREE11	Upgrade Electrical Service, Distribution	B	EA	\$ 2,000	1	1.68	\$ 3,360	\$ 1,008	\$ 4,368	\$ 1,747	\$ 6,115
										<b>Total Priority B Projects</b>	<b>\$ 106,652</b>
<b>Priority C Projects</b>											
CETHREE12	Bury Electrical Conduit Adjc to Stairs	C	EA	\$ 5,000	1	1	\$ 5,000	\$ 1,500	\$ 6,500	\$ 2,600	\$ 9,100
										<b>Total Priority C Projects</b>	<b>\$ 9,100</b>

Table 4-7. Ferry Point Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
FPLS1	Replace Pump Station	A	EA	\$ 1,600,000	1	1	\$ 1,600,000	\$ 480,000	\$ 2,080,000	\$ 832,000	\$ 2,912,000
FPLS2	Evaluate Force Main Condition and Capacity	A	EA	\$ 30,000	1	1	\$ 30,000	\$ 9,000	\$ 39,000	\$ 15,600	\$ 54,600
										<b>Total Priority A Projects</b>	<b>\$ 2,966,600</b>

Note: Ferry Point Lift Station requires upgrades to address maintenance, safety, access, and capacity needs. Replacement of the lift station is planned as part of a planned development project. The priority/schedule shown anticipates replacement as a component of, and not separate from, this development project.



Table 4-8. I.C.I. Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A projects</b>											
ICI1	Install Safe Hatch	A	EA	\$ 6,000	1	1	\$ 6,000	\$ 1,800	\$ 7,800	\$ 3,120	\$ 10,920
ICI2	Lighting	A	EA	\$ 2,500	1	1.68	\$ 4,200	\$ 1,260	\$ 5,460	\$ 2,184	\$ 7,644
ICI3	Replace EYS Fittings with Termination Encl.	A	EA	\$ 7,500	1	1.68	\$ 12,600	\$ 3,780	\$ 16,380	\$ 6,552	\$ 22,932
ICI4	Level Transducer Relocation	A	EA	\$ 1,920	1	1	\$ 1,920	\$ 576	\$ 2,496	\$ 998	\$ 3,494
ICI5	Install Bypass Connection	A	EA	\$ 9,906	1	1	\$ 9,906	\$ 2,972	\$ 12,878	\$ 5,151	\$ 18,029
ICI6	Provide Lateral Restraint for Control Panel	A	EA	\$ 3,500	1	1	\$ 3,500	\$ 1,050	\$ 4,550	\$ 1,820	\$ 6,370
ICI7	Ground Cell Modem Antenna Mount	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
ICI8	Replace PLC	A	EA	\$ 25,000	1	1	\$ 25,000	\$ 7,500	\$ 32,500	\$ 13,000	\$ 45,500
ICI9	Arc Flash Labels	A	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
ICI10	Replace Emergency Generator	A	EA	\$ 100,000	1	1.68	\$ 168,000	\$ 50,400	\$ 218,400	\$ 87,360	\$ 305,760
<b>Total Priority A Projects</b>											<b>\$ 427,019</b>
<b>Priority B Projects</b>											
ICI11	Wetwell Piping Clean and Coat	B	EA	\$ 2,100	1	1	\$ 2,100	\$ 630	\$ 2,730	\$ 1,092	\$ 3,822
<b>Total Priority B Projects</b>											<b>\$ 3,822</b>
<b>Priority C Projects</b>											
ICI13	Prepare Up to date Single Line Diagram	C	EA	\$ 2,000	1	1	\$ 2,000	\$ 600	\$ 2,600	\$ 1,040	\$ 3,640
ICI14	Replace UPS	C	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
ICI15	Remove Existing Tall Antenna Mast	C	EA	\$ 2,000	1	1	\$ 2,000	\$ 600	\$ 2,600	\$ 1,040	\$ 3,640
<b>Total Priority C Projects</b>											<b>\$ 8,190</b>



Table 4-9. Keller Beach Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
KBLS1	Bypass Connection	A	EA	\$ 4,560	1	1	\$ 4,560	\$ 1,368	\$ 5,928	\$ 2,371	\$ 8,299
KBLS2	Discharge Piping Repairs and Coating	A	EA	\$ 5,100	1	1	\$ 5,100	\$ 1,530	\$ 6,630	\$ 2,652	\$ 9,282
KBLS3	Install Wetwell Safe Hatch	A	EA	\$ 7,800	1	1	\$ 7,800	\$ 2,340	\$ 10,140	\$ 4,056	\$ 14,196
KBLS4	Wetwell Slab Repairs	A	EA	\$ 5,400	1	1	\$ 5,400	\$ 1,620	\$ 7,020	\$ 2,808	\$ 9,828
KBLS5	Remove Wetwell Ladder	A	EA	\$ 600	1	1	\$ 600	\$ 180	\$ 780	\$ 312	\$ 1,092
KBLS6	Lighting	A	EA	\$ 2,500	2	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
KBLS7	Remove Antenna	A	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
KBLS8	Replace Generator Base Isolators	A	EA	\$ 10,000	1	1	\$ 10,000	\$ 3,000	\$ 13,000	\$ 5,200	\$ 18,200
KBLS9	Main Service Disconnect Labeling	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
KBLS10	Arc Flash Labels	A	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
KBLS11	EYS Fitting Retrofit	A	EA	\$ 7,500	1	1.68	\$ 12,600	\$ 3,780	\$ 16,380	\$ 6,552	\$ 22,932
KBLS12	PLC Replacement	A	EA	\$ 25,000	1	1.68	\$ 42,000	\$ 12,600	\$ 54,600	\$ 21,840	\$ 76,440
										<b>Total Priority A Projects</b>	<b>\$ 187,387</b>
<b>Priority B Projects</b>											
KBLS13	Wetwell Piping Clean and Coat	B	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
KBLS14	Wetwell Concrete Clean and Re-Line Surface	B	EA	\$ 14,000	1	1	\$ 14,000	\$ 4,200	\$ 18,200	\$ 7,280	\$ 25,480
KBLS15	Grout beneath Electrical slab	B	EA	\$ 4,800	1	1	\$ 4,800	\$ 1,440	\$ 6,240	\$ 2,496	\$ 8,736
										<b>Total Priority B Projects</b>	<b>\$ 39,676</b>
<b>Priority C Projects</b>											
KBLS16	Replace UPS	C	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
KBLS17	Pump Cable Support Hardware	C	EA	\$ 1,000	1	1	\$ 1,000	\$ 300	\$ 1,300	\$ 520	\$ 1,820
										<b>Total Priority C Projects</b>	<b>\$ 2,730</b>



Table 4-10. Marina Bay Cove Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
MBCLS1	Install Safe Hatch	A	EA	\$ 6,000	1	1	\$ 6,000	\$ 1,800	\$ 7,800	\$ 3,120	\$ 10,920
MBCLS2	Replace Generator Base Isolators	A	EA	\$ 1,000	1	1	\$ 1,000	\$ 300	\$ 1,300	\$ 520	\$ 1,820
MBCLS3	Install Bypass Connection	A	EA	\$ 10,086	1	1	\$ 10,086	\$ 3,026	\$ 13,112	\$ 5,245	\$ 18,357
MBCLS4	Replace PLC	A	EA	\$ 25,000	1	1.68	\$ 42,000	\$ 12,600	\$ 54,600	\$ 21,840	\$ 76,440
MBCLS5	Arc Flash Labels	A	EA	\$ 4,000	1	1	\$ 4,000	\$ 1,200	\$ 5,200	\$ 2,080	\$ 7,280
MBCLS6	Retrofit EYS Fittings	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
										<b>Total Priority A Projects</b>	<b>\$ 115,727</b>
<b>Priority B Projects</b>											
MBCLS7	Clean and Paint Fence	B	EA	\$ 3,360	1	1	\$ 3,360	\$ 1,008	\$ 4,368	\$ 1,747	\$ 6,115
MBCLS8	Wetwell Concrete Clean and Re-Line	B	EA	\$ 7,000	1	1	\$ 7,000	\$ 2,100	\$ 9,100	\$ 3,640	\$ 12,740
MBCLS9	Lighting	B	EA	\$ 2,500	2	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
MBCLS10	Replace Power / Control Panel Supports	B	EA	\$ 7,500	1	1	\$ 7,500	\$ 2,250	\$ 9,750	\$ 3,900	\$ 13,650
MBCLS11	Relocate Electrical Service	B	EA	\$ 25,000	1	1	\$ 25,000	\$ 7,500	\$ 32,500	\$ 13,000	\$ 45,500
MBCLS12	Replace Electrical Pedestal	B	EA	\$ 55,000	1	1.68	\$ 92,400	\$ 27,720	\$ 120,120	\$ 48,048	\$ 168,168
MBCLS13	Modify Electrical Pedestal Concrete Slab	B	EA	\$ 5,000	1	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
MBCLS14	Replace Automatic Transfer Switch	B	EA	\$ 10,000	1	1.68	\$ 16,800	\$ 5,040	\$ 21,840	\$ 8,736	\$ 30,576
MBCLS15	Reroute secondary conduit	B	EA	\$ 3,000	1	1.68	\$ 5,040	\$ 1,512	\$ 6,552	\$ 2,621	\$ 9,173
										<b>Total Priority B Projects</b>	<b>\$ 316,498</b>
<b>Priority C Projects</b>											
MBCLS16	Replace Antenna Pole and Mount Cell Ants.	C	EA	\$ 2,500	1	1	\$ 2,500	\$ 750	\$ 3,250	\$ 1,300	\$ 4,550
MBCLS17	Secure Mount Antenna Cables	C	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
										<b>Total Priority C Projects</b>	<b>\$ 5,460</b>



Table 4-11. Marina Bay Parkway Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
MBP1	Install Bypass Connection	A	EA	\$ 12,248	1	1	\$ 12,248	\$ 3,674	\$ 15,922	\$ 6,369	\$ 22,291
MBP2	Replace Generator Base Isolators	A	EA	\$ 10,000	1	1	\$ 10,000	\$ 3,000	\$ 13,000	\$ 5,200	\$ 18,200
MBP3	Lighting	B	EA	\$ 2,500	1	1.68	\$ 4,200	\$ 1,260	\$ 5,460	\$ 2,184	\$ 7,644
MBP4	Replace PLC	A	EA	\$ 25,000	1	1.68	\$ 42,000	\$ 12,600	\$ 54,600	\$ 21,840	\$ 76,440
MBP5	Arc Flash Labels	A	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
MBP6	Retrofit EYS Fittings	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
MBP7	Commision Existing Flow Meter	A	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
									<b>Total Priority A Projects</b>		<b>\$ 133,675</b>
<b>Priority B Projects</b>											
MBP8	Anchor and Brace Roof Structure	B	EA	\$ 6,000	1	1	\$ 6,000	\$ 1,800	\$ 7,800	\$ 3,120	\$ 10,920
MBP9	Remove existing Antenna Mast	C	EA	\$ 2,000	1	1	\$ 2,000	\$ 600	\$ 2,600	\$ 1,040	\$ 3,640
MBP10	Remove Wetwell Ladder	C	EA	\$ 1,500	1	1	\$ 1,500	\$ 450	\$ 1,950	\$ 780	\$ 2,730
									<b>Total Priority B Projects</b>		<b>\$ 17,290</b>



Table 4-12. Nevin & A Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
NA1	Install Safe Hatch	A	EA	\$ 6,000	1	1	\$ 6,000	\$ 1,800	\$ 7,800	\$ 3,120	\$ 10,920
NA2	Relocate Level Transducer	A	EA	\$ 1,920	1	1	\$ 1,920	\$ 576	\$ 2,496	\$ 998	\$ 3,494
NA3	Lighting	A	EA	\$ 2,500	1	1.68	\$ 4,200	\$ 1,260	\$ 5,460	\$ 2,184	\$ 7,644
NA4	Remove Antenna Mast / mount Cell Antenna	B	EA	\$ 3,500	1	1	\$ 3,500	\$ 1,050	\$ 4,550	\$ 1,820	\$ 6,370
NA5	Replace Generator Base Isolators	A	EA	\$ 10,000	1	1	\$ 10,000	\$ 3,000	\$ 13,000	\$ 5,200	\$ 18,200
NA6	Properly Label Main Circuit Breaker	A	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
NA7	Replace PLC	A	EA	\$ 25,000	1	1.68	\$ 42,000	\$ 12,600	\$ 54,600	\$ 21,840	\$ 76,440
NA8	Arc Flash Labels	A	EA	\$ 3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
NA9	Convert EYS Fitting to Termination Enclosure	A	EA	\$ 7,500	1	1.68	\$ 12,600	\$ 3,780	\$ 16,380	\$ 6,552	\$ 22,932
NA10	Install Bypass Connection	A	EA	\$ 10,086	1	1	\$ 10,086	\$ 3,026	\$ 13,112	\$ 5,245	\$ 18,357
NA11	Investigate Adjacent Building Stability	A	EA	\$ 8,000	1	1	\$ 8,000	\$ 2,400	\$ 10,400	\$ 4,160	\$ 14,560
										<b>Total Priority A Projects</b>	<b>\$ 185,287</b>
<b>Priority B Projects</b>											
NA12	Provide Pump Cable Support Hardware	B	EA	\$ 500	1	1.68	\$ 840	\$ 252	\$ 1,092	\$ 437	\$ 1,529
										<b>Total Priority B Projects</b>	<b>\$ 1,529</b>
<b>Priority C Projects</b>											
NA13	Replace UPS	C	EA	\$ 500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
										<b>Total Priority C Projects</b>	<b>\$ 910</b>



Table 4-13. Port Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
PLS1	Install Bypass Connection	A	EA	3,420	1	1	3,420	1,026	4,446	1,778	6,224
PLS2	Commision Existing Flow Meter	A	EA	1,000	1	1	1,000	300	1,300	520	1,820
PLS3	Replace Generator Base Isolators	A	EA	10,000	1	1	10,000	3,000	13,000	5,200	18,200
PLS4	Replace PLC	A	EA	30,000	1	1.68	50,400	15,120	65,520	26,208	91,728
PLS5	Arc Flash Labels	A	EA	3,500	1	1	3,500	1,050	4,550	1,820	6,370
PLS6	Upgrade EYS Fittings	A	EA	1,000	1	1	1,000	300	1,300	520	1,820
<b>Total Priority A Projects</b>											<b>126,162</b>
<b>Priority B Projects</b>											
PLS7	Install Replacement Gas Detection System	B	EA	8,000	1	1.68	13,440	4,032	17,472	6,989	24,461
PLS8	Lighting	B	EA	2,500	1	1.68	4,200	1,260	5,460	2,184	7,644
PLS9	Hazardous Area Classification Study	B	EA	12,000	1	1	12,000	3,600	15,600	6,240	21,840
<b>Total Priority B Projects</b>											<b>53,945</b>
<b>Priority C Projects</b>											
PLS10	Prepare and Recoat Building Exterior Walls	C	EA	2000	1	1	2,000	600	2,600	1,040	3,640
PLS11	Remove Existing Antenna	C	EA	2,500	1	1	2,500	750	3,250	1,300	4,550
<b>Total Priority C Projects</b>											<b>8,190</b>

Table 4-14. Sunset Pointe Lift Station Projects with Priorities and Costs

Project	Description	Project Priority (A, B, C or O&M)	Unit	Unit Cost	Quantity	Inst. Factor	Total Cost	Estimating Contingency 30%	Bid Construction Cost	Engineering and Administrative Costs, 40%	Total Project Cost, Dollars
<b>Priority A Projects</b>											
SPLS1	Install Safe Hatch	A	EA	6,000	1	1	\$ 6,000	\$ 1,800	\$ 7,800	\$ 3,120	\$ 10,920
SPLS2	Install Bypass Connection	A	EA	5,700	1	1	\$ 5,700	\$ 1,710	\$ 7,410	\$ 2,964	\$ 10,374
SPLS3	Replace Generator Base Isolators	A	EA	10,000	1	1	\$ 10,000	\$ 3,000	\$ 13,000	\$ 5,200	\$ 18,200
SPLS4	Replace PLC	A	EA	25,000	1	1.68	\$ 42,000	\$ 12,600	\$ 54,600	\$ 21,840	\$ 76,440
SPLS5	Arc Flash Labels	A	EA	3,000	1	1	\$ 3,000	\$ 900	\$ 3,900	\$ 1,560	\$ 5,460
SPLS6	Retrofit EYS Fittings	A	EA	500	1	1	\$ 500	\$ 150	\$ 650	\$ 260	\$ 910
<b>Total Priority A Projects</b>											<b>\$ 122,304</b>
<b>Priority B Projects</b>											
SPLS7	Install Bollards	B	EA	6,900	1	1	\$ 6,900	\$ 2,070	\$ 8,970	\$ 3,588	\$ 12,558
SPLS8	Lighting	B	EA	2,500	2	1.68	\$ 8,400	\$ 2,520	\$ 10,920	\$ 4,368	\$ 15,288
SPLS9	Convert to Circuit Breakers for the VFD's	B	EA	600	2	1.68	\$ 2,016	\$ 605	\$ 2,621	\$ 1,048	\$ 3,669
<b>Total Priority B Projects</b>											<b>\$ 31,515</b>



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## 5.0 LIFT STATION CAPACITY ANALYSIS

Chapter 5 describes the process used to update the City’s existing wastewater collection system hydraulic model network to include the City’s wastewater lift stations, and summarizes capacity analysis results. The existing model included five larger lift stations, and utilized theoretical pump information and generalized assumptions as presented in the 2008 Pump Station Analysis. The goal of the hydraulic model update was to add more accurate lift station information to the five previously-modeled stations, add the remaining eight lift stations to the modeled sewer network, and evaluate the firm capacity of all 13 lift stations under the design storm event.

Hydraulic Modeling activities included the following:

- Reviewed existing as-built drawings and operational data provided by Veolia
- Updated information for five lift stations that were previously included in the wastewater collection system hydraulic model: Marina Bay Parkway, I.C.I., Ferry Point, Marina Bay Cove, and Keller Beach
- Added eight lift stations and associated attributes<sup>2</sup>
- Evaluated firm capacity of each station (i.e., with the largest pump out of service) under the design storm scenario
- Established pumping requirements needed to avoid predicted capacity issues

### 5.1 Data Collection and Review

Data from various sources were reviewed for the hydraulic modeling effort. Available data included design and as-built drawings, existing model data, City GIS asset data, and lift station operational data. The following lift station attributes were used to incorporate each facility into the existing hydraulic model:

- Node identification
- Ground surface elevation
- Inlet pipeline and discharge force main diameters and elevations
- Pipe lengths, diameters, and alignments to the connection with the closest modeled gravity sewer line

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<sup>2</sup> Establishing wet well dimensions, set points, inlet and discharge elevations, and pump capacities for all stations required finding reasonable, common data points across inconsistent data sources. Therefore, the assigned characteristics include some level of assumption and estimation, and must be confirmed further during future design activities.

- Wetwell configuration (area and depth to wetwell floor)
- Pump on and off set points
- Pump capacities

Appendix O lists the various data sources, discrepancies, and assumptions used during the hydraulic model update.

## 5.2 Hydraulic Modeling

The City's wastewater collection system hydraulic model was developed in 2011 using Innovyze® InfoWorks™ CS software. Since this time, Innovyze has discontinued Infoworks™ CS. Therefore, VWHA converted the City's model to the new Innovyze modeling platform, Infoworks™ ICM. The hydraulic model includes the City's main trunk sewers (typically 12-inch diameter and larger) and associated facilities, and is a skeletonized representation of the sewer system in its configuration and operation. The original model included the five largest pump stations, and was updated in this Project to include the remaining eight stations, as well as all force main piping and gravity piping needed to connect each new station to the existing modeled network.

The 2011 model was calibrated to dry and wet weather flow conditions from a system-wide flow monitoring program that was completed in 2009 and 2010. The City has not conducted flow monitoring since this time. Therefore, the calibrated model provides the best available representation of flow behavior within the system.

Flows within the model are assigned by basin to the nearest modeled downstream manhole. In addition to adding new lift stations and associated downstream infrastructure, flow assignments from basins that are located upstream of each new lift station were adjusted so they enter the new station. Other than changing the locations where flows enter the system, the unit flow values and/or wet weather parameters associated with these flows were not changed.

After these changes were made, the updated model was evaluated using rainfall data from the 10-year, 24-hour design storm event. Flows entering each pump station were compared to flows leaving each station, and system hydraulics upstream of each station were reviewed to confirm that the station has sufficient firm capacity to convey peak wet weather flows.

## 5.3 HYDRAULIC MODELING RESULTS

Table 5-1 on the following page presents results from the hydraulic modeling effort. In summary, four stations appear to have insufficient firm capacity.



Table 5-1. Hydraulic Modeling Results

Station Name	Capacity Results and Discussion
Brickyard Booster	Documentation lists this station as having one smaller pump and one larger pump. The pumps appear to be the same model, with different sized impellers. With the larger pump off, there is insufficient capacity (550 gpm available; 595 gpm required). This issue can be resolved by upsizing the smaller pump impeller to match the impeller of the larger pump.
Brickyard Cove	This station has sufficient capacity.
Canyon Estates 1, 2, and 3	All stations have sufficient capacity.
Ferry Point	This station is slightly under capacity (250 gpm available; 300 gpm required). However, substantial as-built information was missing for this station. If the assumptions used were not correct, then the estimated pumping capacity may also be incorrect. This station is scheduled to be replaced as part of the Terminal One project. During the design phase, pump requirements should be reviewed closely.
I.C.I.	This station has sufficient capacity.
Keller Beach	This station has sufficient capacity.
Marina Bay Cove	This station is slightly under capacity (100 gpm available; 107 gpm required). However, pump data was not available for this station, and it is likely that the issues can be resolved without replacing existing pumps.
Marina Bay Parkway	This station is under capacity (2,125 gpm available; 2,752 gpm required). The station does not have known SSO issues during wet weather events. Therefore, before upsizing pumps, additional field and modeling evaluations during the 2018-19 wet weather season are recommended.
Nevin and A	This station has sufficient capacity.
Port	This station has sufficient capacity.
Sunset Pointe	This station has sufficient capacity.

#### 5.4 CAPACITY IMPROVEMENT RECOMMENDATIONS

As shown in Table 5-1, four stations appear to have insufficient firm capacity based on hydraulic modeling results. The difference between needed and available capacity, however, was minor for three of the four stations. A substantial number of assumptions had to be made regarding pump and system elevations and capacities, due to conflicts found within existing documentation, or in



some cases, missing information. Therefore, it is recommended that the City and Veolia seek solutions for the minor discrepancies that resolve the issues without requiring pump replacement. The three stations with minor capacity needs include the Brickyard Booster, Marina Bay Cove, and Ferry Point lift stations.

#### 5.4.1 Brickyard Booster Lift Station Discussion

The Brickyard Booster Lift Station has one smaller pump (550 gpm) and one larger pump (660 gpm). The pumps are the same model, but appear, based on information from available pump curves, to have different impellers. With the larger pump turned off, there is insufficient capacity to convey design storm flow. However, only 595 gpm of capacity is required. Therefore, by upsizing the smaller impeller, the capacity of the pumps would become equal and the issue would be resolved. This change could be addressed under normal pump station maintenance. Therefore, associated costs have not been assigned in the CIP.

#### 5.4.2 Marina Bay Cove Lift Station Discussion

The Marina Bay Cove Lift Station requires 107 gpm of capacity. However, a single pump has 100 gpm capacity based on historical pump data provided by Veolia. Actual pump curves were not available for this station. Given the minimal capacity deficit, it is likely that this issue can be resolved through operational adjustments and further engineering review, in lieu of capital replacements.

#### 5.4.3 Ferry Point Lift Station Discussion

The Ferry Point Lift Station has 250 gpm firm capacity. The hydraulic model shows a need for 300 gpm of capacity, after the proposed Terminal One development is completed. There were many issues with available Ferry Point data that introduce error into the calculated pumping capacity. For example, the design point operating pressure is very high, and the information needed to confirm this data point is not available. Also, the configuration of the Ferry Point force main is unknown, and details regarding the location and manner in which Keller Beach pumped flows combine with Ferry Point flows downstream of both stations, near the Dornan Drive tunnel, are not documented. Ferry Point Lift Station is planned for relocation as part of the City's Terminal One project. Capacity needs should be refined as a component of the predesign effort for this project.

#### 5.4.4 Marina Bay Parkway Lift Station Discussion

The Marina Bay Parkway Lift Station was replaced in 1987, with a third pump added in 2005. The hydraulic model shows this station as having a 627 gpm (0.90 million gallons per day or "mgd") capacity deficiency during the design storm event. Veolia operations has confirmed that during some wet weather events, this station has difficulty in keeping up with incoming flows. However, the station does not have a history of SSOs during heavy wet weather events.



Before upsizing pumps at this station, it is recommended that during a future wet weather event, Veolia evaluate the actual performance of the lift station and compare this performance to hydraulic model results. Since the station is not experiencing the capacity constraints that are predicted by the hydraulic model, this theoretical result could be caused by issues within the modeled pipeline network, incorrect assignment of pump station capacities, or incorrect modeling of localized area flows. More specifically, the City and Veolia plan to conduct a system-wide flow monitoring study in winter 2018-19. As part of this study, temporary metering upstream of the Marina Bay Parkway lift station would help to refine predicted wet weather flows.

After the potential issues are identified and corrected, the model should provide a more accurate representation of station performance. At this time, a new model run using the design storm scenario would confirm whether additional capacity is needed. The cost for necessary capacity upgrades should be added to the CIP after these needs have been further refined.



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## 6.0 RECOMMENDED CAPITAL IMPROVEMENT PROGRAM

Chapter 6 presents the recommended CIP for the RMSD wastewater lift stations. The CIP was developed using project findings, recommendations, details, and conceptual costs that are presented earlier in this report. This chapter summarizes and presents a consolidated list of lift station projects by priority and cost. The recommended CIP identifies the needed improvements at a master planning level, and does not constitute conceptual or preliminary design of these improvements. Subsequent preliminary designs are required to finalize lift station needs, and to develop detailed requirements for the proposed projects.

This chapter is organized as follows:

- Basis for Capital Improvement Program Development
- Proposed CIP

### 6.1 BASIS FOR CAPITAL IMPROVEMENT PROGRAM DEVELOPMENT

The CIP is intended to comprise a fundable program that addresses the City’s objectives for sewer infrastructure improvement, redundancy, and reliability. The following criteria were used to prioritize the various lift station projects and to develop a timeline for implementation.

1. Projects to Address Immediate Safety and Reliability Issues. The Priority “A” CIP includes projects that address immediate safety and reliability issues. Priority “A” projects are recommended for completion in the first two to five years of the CIP.
2. Projects to Extend Remaining Useful Life. Veolia will continue its program of preventive repairs and replacements in order to maximize asset useful life. Projects that fall into the Priority “B” category should be scheduled for completion within five to ten years, as they address issues that may continue to persist and present increased risk to the City. The projects should be reviewed within three to five years to confirm their general scope and relative priorities.
3. Projects in the Priority “C” category address issues that currently introduce minimal risk. With monitoring, these issues can likely be implemented beyond a seven to ten year time frame.

In addition to meeting the above requirements, the CIP spreads costs as equitably as possible across 10-year CIP timeframe. A consistent cash flow will help stabilize the projects funding requirements.

### 6.2 PROPOSED CAPITAL IMPROVEMENT PROGRAM

Table 6-1 presents a summarized list of proposed CIP projects by priority. Table 6-2 distributes these projects over the 10-year CIP timeframe. In general, after the initial prioritization tasks, projects within each prioritization class were scheduled based on criticality as determined by



Veolia field experience, followed by the relative age of each lift station and its components, with the oldest stations scheduled first.

The CIP is intended to be a dynamic planning document that is adjusted from time to time to address future issues and priorities that may arise after completion of this Report. The most critical components of the CIP are summarized below. Additional information on the individual projects, including individual project cost estimates, can be found in Chapter 4 of this report.

The proposed CIP comprises an average annual budget that is between \$400,000 and \$500,000 for lift station repairs and upgrades. Two full station replacements at Ferry Point and Canyon Estates No. 1 lift stations are recommended in addition to annual equipment upgrades. The Ferry Point Lift Station replacement project may involve shared funding with Terminal One Development, LLC. The Canyon Estates No. 1 Lift Station replacement cost is excluded from the current CIP because it will likely be required outside of a 10- year timeline.

#### 6.2.1 Proposed Lift Station Rehabilitation Projects

The CIP Priority “A” projects include recommended improvements at all lift stations to address safety and reliability issues. These projects were identified through review of existing documentation and from the project condition assessment activities. The Priority “A” projects have a combined total cost of \$5 million and include the following:

- Complete replacement of the Ferry Point Lift Station for \$3.0 million. It is assumed that this work will be completed in coordination with necessary lift station improvements that are needed for implementation of the planned Richmond Terminal 1 development project.
- Remaining Priority “A” projects totaling \$2.0 million at most or all lift stations:
  1. Access hatch fall protection at I.C.I., Nevin & A, Marina Bay Cove, Sunset Point, and Keller Beach pump stations
  2. Explosive atmosphere exclusion at I.C.I. pump station
  3. Some upgrading of control and monitoring equipment (SCADA). The current system has proven reliable, and is the primary form of alarm monitoring. Upgrades are recommended to only specific components of this system.
  4. Arc Flash labeling of electrical equipment
  5. Equipment support and bracing, with the scope to be determined on a station-by-station basis
  6. Improved lighting
  7. Electrical upgrades at some stations
  8. Communication antenna replacements and upgrades. This work is in process by Veolia.



9. Constructing sewage bypassing connections
10. Replacement of emergency generator base isolators at Sunset and Keller Beach pump stations.

Priority “B” projects include projects at all lift stations with a total estimated cost of \$1.4 million. This group of projects includes the following:

- Piping cleaning, corrosion removal, and recoating
- Wetwell cleaning and lining. This work is in process by Veolia. Source Control assistance in the sewershed that contributes flow to the Marina Bay Parkway lift station has been identified as a priority.
- Electrical upgrades at some stations
- Civil, site, and structural modifications

Priority “C” projects include a limited number of projects at most lift stations with a total estimated cost of \$3.2 million. This group of projects is listed below. Electrical upgrades, although planned for the future, require significant coordination with PG&E. Therefore, the City should consider initiating discussions with PG&E related to future electrical upgrades within the next year.

- Electrical upgrades to three-phase power at the three Canyon Estates lift stations
- UPS replacements at lift stations not previously refitted. This work is in process by Veolia.
- Addressing the H<sub>2</sub>S alarm station at the Port lift station
- Minor repairs and upgrades at lift stations
- The conversion of Canyon Estates No. 1 lift station to a submersible style lift station at the end of the existing station’s useful life (beyond the 10-year planning horizon), for a cost of \$2.9 million.

#### 6.2.2 Additional Project Considerations (Pump Operation)

Operational data provided to VWHA, specifically pump run times (hours) and pump cycle counts, show that three of the lift stations (Marina Bay Cove, Nevin & A, and Brickyard Booster) have significant daily run times and on-off cycles. With lead-lag pump alternation, these pumps should still be operating within the pump manufacturer’s typically acceptable operational parameters (6 to 10 starts / hour). However, during daily peak flow times, these pumps are likely to reach or exceed the upper limit of acceptable start-stops per hour.

It can be expected that the pumps at these three stations will require more frequent replacement. Veolia and the City should consider ways to increase the wetwell storage volume at these stations by adjusting station level controls pump start and stop elevations. If such an adjustment



is feasible, this operational change would reduce hourly starts and help to extend the pump useful service life.



Table 6-1 Proposed Pump Station Needs by Priority

Project / Lift Station Name	Priority A Project Totals	Priority B Project Totals	Priority C Project Totals	Total Project Cost
Brickyard Booster	\$ 165,600	\$ 299,300	\$ -	\$ 464,900
Brickyard Cove	\$ 121,600	\$ 44,100	\$ 270,200	\$ 435,900
Canyon Estates No. 1 <sup>Note 1</sup>	\$ 191,900	\$ 386,000	\$ 2,912,900	\$ 3,490,800
Canyon Estates No. 2	\$ 148,000	\$ 112,100	\$ 9,100	\$ 269,200
Canyon Estates No. 3	\$ 138,000	\$ 106,700	\$ 9,100	\$ 253,700
Ferry Point <sup>Note 2</sup>	\$ 2,966,600	\$ -	\$ -	\$ 2,966,600
ICI	\$ 427,000	\$ 3,800	\$ 8,200	\$ 439,000
Keller Beach	\$ 187,400	\$ 39,700	\$ 2,700	\$ 229,800
Marina Bay Cove	\$ 115,700	\$ 316,500	\$ 5,500	\$ 437,700
Marina Bay Parkway	\$ 133,700	\$ 17,300	\$ -	\$ 151,000
Nevin & A	\$ 185,300	\$ 1,500	\$ 900	\$ 187,700
Port	\$ 126,200	\$ 53,900	\$ 8,200	\$ 188,300
Sunset Pointe	\$ 122,300	\$ 31,500	\$ -	\$ 153,800
<b>Total CIP</b>	<b>\$ 5,029,300</b>	<b>\$ 1,412,400</b>	<b>\$ 3,226,800</b>	<b>\$ 9,668,400</b>

Note 1. Beyond the 10-year planning horizon.

Note 2. New stationis required for Terminal 1 project. Upgrades should be made during this time.



Table 6-2. Proposed 10-Year Capital Improvement Program

	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	Future	Total
Brickyard Booster				\$ 165,600			\$ 299,300					\$ 464,900
Brickyard Cove				\$ 121,600			\$ 44,100		\$ 135,100	\$ 135,100		\$ 435,900
Canyon Estates 1					\$ 191,900			\$ 193,000	\$ 193,000		\$ 2,912,900	\$ 3,490,800
Canyon Estates 2					\$ 148,000			\$ 112,100		\$ 9,100		\$ 269,200
Canyon Estates 3					\$ 138,000			\$ 106,700		\$ 9,100		\$ 253,800
Ferry Point <sup>See Note 1</sup>	\$ 29,666	\$ 266,994	\$ 2,669,940									\$ 2,966,600
ICI	\$ 427,000						\$ 3,800			\$ 8,200		\$ 439,000
Keller Beach	\$ 187,400					\$ 39,700				\$ 2,700		\$ 229,800
Marina Bay Cove		\$ 115,700				\$ 316,500				\$ 5,500		\$ 437,700
Marina Bay Parkway			\$ 133,700				\$ 17,300					\$ 151,000
Nevin & A	\$ 185,300						\$ 1,500			\$ 900		\$ 187,700
Port				\$ 126,200			\$ 53,900			\$ 8,200		\$ 188,300
Sunset Pointe		\$ 122,300				\$ 31,500						\$ 153,800
	<b>\$ 829,366</b>	<b>\$ 504,994</b>	<b>\$ 2,803,640</b>	<b>\$ 413,400</b>	<b>\$ 477,900</b>	<b>\$ 387,700</b>	<b>\$ 419,900</b>	<b>\$ 411,800</b>	<b>\$ 328,100</b>	<b>\$ 178,800</b>	<b>\$ 2,912,900</b>	<b>\$ 9,668,500</b>

Note 1. Ferry Point lift station upgrades should be coordinated with Terminal One development project lift station relocation/upgrades.

- Priority A Projects
- Priority B Project
- Priority C Projects



**APPENDIX A**  
**Model Lift Station Condition Assessment Form**





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Assessment Summary and Recommendations for **XXNAMEXX** Pump Station

Assessment Performed by	
Assessment Date	

Desktop Condition Assessment

Facility Name	
Facility Address/Location	
APN#	
Parcel Size	
Status	<input type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b> Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently <input type="checkbox"/> Yes <input type="checkbox"/> No (less than XX hours) Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No	
Year Originally Constructed	
Year of Latest Upgrade/Remodel	
Recent Repairs/Improvements/Maintenance	
Adjacent Land Use	<input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Other: Planned Area <input type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
O&M History Available	<input type="checkbox"/> Yes <input type="checkbox"/> No
O & M Manuals Available	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p>Operations Staff Issues of Concern</p>	
<p>Recommended Maintenance Program</p>	<p><input type="checkbox"/> Routine</p> <p><input type="checkbox"/> Special Requirements</p> <p style="margin-left: 20px;"><input type="checkbox"/> Perform pump/motor maintenance</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other _____</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other _____</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other _____</p>
<p>Additional Comments</p>	

Aerial Photo of Site or  
Site Layout or Site  
Sketch

### On-Site Condition Assessment for Pump Station (Sunset Point)

**Summary of Site  
Assessment and  
Recommendations.**

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

Yes; list recommended improvements:

- Site and wet well lighting
- Bollards

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes; but would interfere with exit gate. Entrance gate would need to remain open to enable cars to pass both ways into this gated community.

No

Are the existing facilities upgradeable?

Yes, list recommended upgrades to existing facilities:

No, recommend replacement of existing facilities with the following new facilities:

Facility Assessment - Other			
Safety Equipment	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input type="checkbox"/> None	
Fire Protection	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed /Age	Fire Protection
Security	Security of Doors, Windows, & Panels	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments:	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments:	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments:	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
Odor Control	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input type="checkbox"/> None	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____

Building and Grounds Assessment – General		
Potential Site Hazards	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes
	Landslide Hazards	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Liquefaction	<input type="checkbox"/> Yes <input type="checkbox"/> No

Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b> (At generator site)	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type:  Lockable?	Year Constructed /Age	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:   Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
<b>Access</b>	Surfacing <input type="checkbox"/> Asphalt (PS) <input type="checkbox"/> Concrete (Generator) <input type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces:  Truck Accessible?	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:   Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
<b>Water Service</b>	<input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:   Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	Size:  Material: Concrete  Coating:  Operating Volume: _____cf  Personnel Accessibility  Equipment Ingress/Egress  Grease/Cleanliness	Year Constructed /Age	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments:          Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
<b>Valve Vault</b>	Size: _____ft by _____ft by _____ft  Material:  Coating:  Personnel Accessibility:  Equipment Ingress/Egress:  Housekeeping:	Year Constructed /Age	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:     Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____



Mechanical Systems Assessment			
<b>Main Pump 1</b>	Type: Submersible Duty: _____gpm_____ft HP: _____ Manufacturer: Flygt Model: _____ Serial number: _____	Year Constructed / Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Motor Type _____ HP: Voltage: Manufacturer _____	Year Constructed / Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Seals Type _____	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Check Valve Type: Size: Manufacturer: Flygt	Year Constructed /Age/Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve	Year Constructed /Age/Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Size: Manufacturer _____	Year Constructed /Age/Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping	Year Constructed /Age /Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: Size:	Year Constructed /Age /Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
Main Pump 2	Type: _____ Duty: _____gpm _____ft HP: _____ Manufacturer: _____ Model: _____ Serial number: _____	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Motor Type _____ HP _____ Manufacturer _____	Year Constructed /Age /Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Seals Type _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Check Valve Type: Size: Manufacturer: Flygt	Year Constructed /Age/Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve	Year Constructed /Age/Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Size: Manufacturer _____	Year Constructed /Age/Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping	Year Constructed /Age /Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: Size:	Year Constructed /Age /Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
Force Main Piping On Site	Type _____ Size _____  Isolation Valve Type _____ Size _____	Year Constructed /Age /Remaining Life  Year Constructed /Age /Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments
Hoists	<input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
Surge /Transient Control	<input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
Seal Water System	<input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
Sump Pump System	<input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
Heating, Ventilation and Cooling Systems	<input type="checkbox"/> Not Applicable	Year Constructed/Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
Gates	<input type="checkbox"/> Not Applicable	Year Constructed /Age/Remaining Life	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:



Electrical and Power System Assessment			
Service Size	Amps Volts: Meter Number:		

Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Manufacturer:	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Main Motor Protector (Pumps 1 & 2) Load: Frame Amps: Trip Amps:	Year Constructed /Age	
	Main Load VFD (Pumps 1 and 2) Load: Manufacturer Model No. Size:	Year Constructed /Age	
			MC Industry Std. Remaining Life: MC Adjusted Remaining Life if Applicable: _____

Electrical and Power System Assessment (cont'd)			
Lighting Panel	Voltage: Amps:	Year Constructed /Age	List of Loads Lighting, station lights, pedestal heater, telemetry, generator battery charger, generator heater, receptacles.  Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 15 years Adjusted Remaining Life if Applicable: _____
Lighting	<u>Exterior</u> Type: Adequate Lighting:	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
General, Electrical	Convenience Receptacles	Year Constructed /Age	Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____

Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Manufacturer: Model No. Range:	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 10 years Adjusted Remaining Life if Applicable: _____
	Flow Element <input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Pressure Element <input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Vibration Sensor <input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Bearing Temp Sensor <input type="checkbox"/> Not Applicable	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____
	Gas Detection <input type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: _____ Adjusted Remaining Life if Applicable: _____

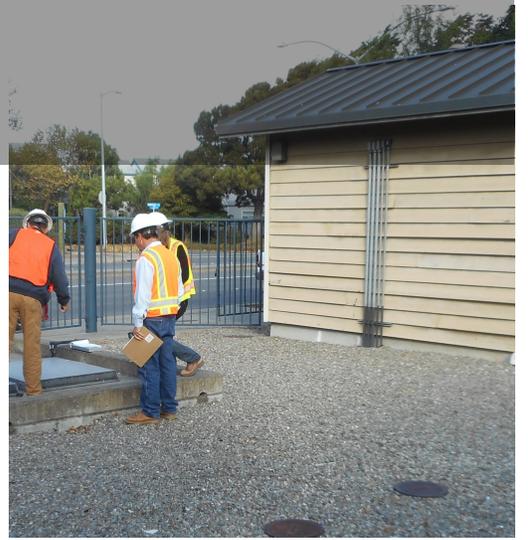
Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: Manufacturer: Model No.	Year Constructed /Age	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: years Adjusted Remaining Life if Applicable: _____
	Input/Output List  Comment:		

Instrumentation / Control Assessment (cont'd)			
<p>SCADA/Telemetry</p>	<p> <input type="checkbox"/> Data Monitoring  <input type="checkbox"/> Pumping Rate  <input type="checkbox"/> Pressure  <input type="checkbox"/> Wet well Level  <input type="checkbox"/> Other: Hi &amp; Lo Alarms  <input type="checkbox"/> Remote Control  <input type="checkbox"/> Pump On/Off  <input type="checkbox"/>  <input type="checkbox"/> Other _____                      Manufacturer _____                      Model _____                       Communication Mode  <input type="checkbox"/> Hardwire/Leased line  <input type="checkbox"/> Fiber Optic  <input type="checkbox"/> Internet  <input type="checkbox"/> Radio  <input type="checkbox"/> Cell Modem                       SCADA Software:                       _____                       Alarms:                       Autodialer Backup?                 </p>	<p>Year Constructed /Age</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments: .</p> <p>Industry Std. Remaining Life: _____                      Adjusted Remaining Life if Applicable: _____</p>

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**APPENDIX B**  
**Brickyard Booster Lift Station Assessment Form**





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## Assessment Summary and Recommendations for Brickyard Pump Station

Assessment Performed by	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
Assessment Date	September 11, 2017

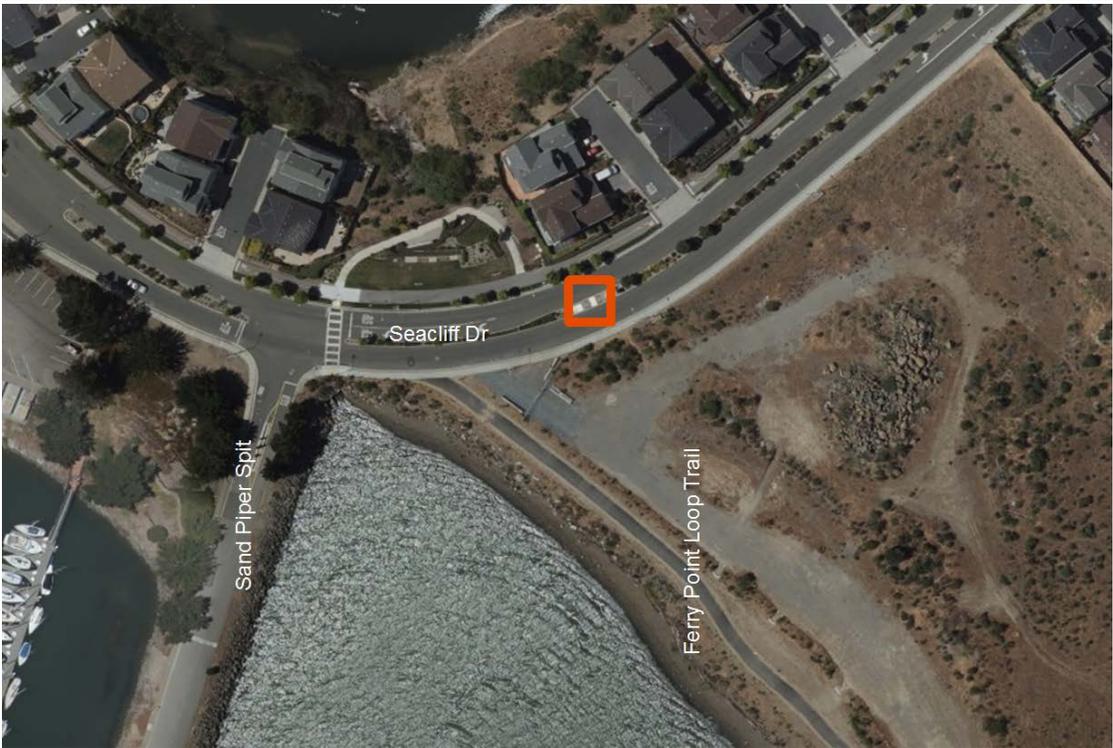
### Desktop Condition Assessment

Facility Name	Brickyard Booster
Facility Address/Location	Island in middle of Seacliff Dr. near Ferry Point Loop Trail
APN#	
Parcel Size	
Status	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

Operations Staff Facility Importance	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently (less than XX hours) <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
Year Originally Constructed	2002
Year of Latest Upgrade/Remodel	2005: Installed Automatic Transfer Switch and step-down transformer for power supplied by electrical generator which was installed at the Brickyard Cove PS site approximately 1300 ft. east of this site. Tied in telemetry to Brickyard Cove site. Also installed new IO panel.
Recent Repairs/Improvements/Maintenance (2013 – 2017)	From Veolia's Richmond Asset and Work History Details.xls 5/7/216 Pump #1 run hours high checked amp draw normal swapped mini relays started calling for second pump more need new relays
Adjacent Land Use	<input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Other: Planned Area <input type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
O&M History Available	<input type="checkbox"/> Yes <input type="checkbox"/> No
O & M Manuals Available	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p>Operations Staff Issues of Concern</p>	
<p>Recommended Maintenance Program</p>	<p><input type="checkbox"/> Routine</p> <p><input type="checkbox"/> Special Requirements</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Perform pump/motor maintenance</li><li><input type="checkbox"/> Other _____</li><li><input type="checkbox"/> Other _____</li><li><input type="checkbox"/> Other _____</li></ul>
<p>Additional Comments</p>	

Aerial Photo of Site or  
Site Layout or Site  
Sketch



On-Site Condition Assessment for Pump Station (Brickyard Booster)

Summary of Site Assessment and Recommendations.

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

Yes; list recommended improvements:

- Add site and wet well lighting.
- Additional bollards needed on east side of transformer.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes; describe:

No – would require closing a lane to stage a pump, only one lane in each direction on either side of median.

Are the existing facilities upgradeable?

Yes, list recommended upgrades to existing facilities:

- Repair wet well T-lock liner.
- Replace transformer near ATS.
- Replace PLC RIO in existing enclosure.
- Provide proper Arc Flash Labels.
- Ensure EYS fittings are properly installed per code.
- Upgrade service voltage to 480 V, 3 phase to match generator and deal with distance between pump stations.
- Upgrade controls and pump to 480 V.
- Install stilling well to improve the accuracy of the level readings.

No, recommend replacement of existing facilities with the following new facilities:

Veolia Water- City of Richmond

Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Panel is shown with intrusion switches on P&ID however Veolia confirmed switches are not operational.	
	Bollards	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Additional bollards needed on east side of transformer.	
<b>Odor Control</b>	Treatment Type <input checked="" type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Drawings note the wet well vent pipe contains an integral carbon filter, Orenco CF4 or equal.</li> </ul>

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Building and Grounds Assessment – General		
Potential Site Hazards	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No. Outside tsunami inundation area; outside FEMA flood zone (100/500)
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential "very high". <input type="checkbox"/> No
	Traffic Hazard	<input checked="" type="checkbox"/> Yes; Pump station is located in center median. <input type="checkbox"/> No

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Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	<input checked="" type="checkbox"/> Not Applicable Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type _____  Lockable? ___Yes ___No	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access:  Number of parking spaces Parking is not available directly at the site. Site is located in center median  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Water Service</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Overflows will flow down the street to nearby storm drain.</li> </ul>

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Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	Size: 6 ft. dia. X 29 ft.  Material: Concrete  Coating: T-lock  Operating Volume: ___cf  Personnel Accessibility None  Equipment Ingress/Egress 3'-0" x 6'-0" (need to confirm size) spring assist access cover with safety grate Guide bars Truck crane  Grease/Cleanliness Clean	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>T-lock failing at all visible seams installed in the field. Likely that all seams (including submerged/not visible) have also failed.</li> </ul>
<b>Valve Vault</b>	Size: 7'-0" x 4'-6" x 5'-0"  Material: Concrete  Coating: None  Personnel Accessibility Via double leaf spring assist access cover No internal ladder  Equipment Ingress/Egress Portable truck mounted crane  Housekeeping Good	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Piping in valve vault includes a 4" blind flanged cross noted as a pig launch station. Can this be used for bypass pumping? There is no space for portable pump on the site.</li> </ul>

Building and Grounds Assessment – Structural - Other			
Control/Electrical Area	No fenced area.	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• Electrical panels, transformer and transfer switch are located in center of median on concrete pads.</li> <li>• East side of transformer is not protected from vehicular accidents.</li> <li>• No site lighting.</li> <li>• Structural Evaluation                          Site specific spectral response acceleration short period (S<sub>s</sub>) →1.571g                          Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →0.615g</li> <li>•</li> </ul>
Other Structures	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment			
<b>Main Pump 1</b>	Type: Submersible Duty: 500 gpm @ 55 ft. HP: 15 per drawings, 5 per Phase 1 drawings, 18 per inspection reports Manufacturer: Flygt Model: NP3153.090-6502 Serial number: 0330100	Year Constructed 2002/15	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2016 inspection report notes that condition of rail is "OK", all other components are noted as "Good".</li> </ul>
	Motor Type: Submersible C1, D1 squirrel cage induction motor with Flygt miniCAS relay HP: 5 Voltage: 208/3P Manufacturer: Flygt	Year Constructed 2002	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Need to confirm location of EYS fittings and that they are properly installed.</li> </ul>
	Seals Type: Mechanical	Year Constructed 2002	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Swing? Size : 4" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4" Manufacturer: Unknown	Year Constructed 2002	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: There is some failure of the coating on the valve operator.
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP? Size: 4"	Year Constructed 2002	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: Submersible Duty: 500 gpm @ 55 ft. HP: 15 per drawings, 5 per Phase 1 drawings, 18 per inspection reports Manufacturer: Flygt Model: NP3153.090-6502 Serial number: 0360033	Year Constructed 2002/15	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2016 inspection report notes that condition of rail is "OK", all other components are noted as "Good".</li> </ul>
	Motor Type: Submersible C1, D1 squirrel cage induction motor with Flygt miniCAS relay HP: 5 Voltage: 208/3P Manufacturer: Flygt	Year Constructed 2002	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Need to confirm location of EYS fittings and that they are properly installed.</li> </ul>
	Seals Type: Mechanical	Year Constructed 2002	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Swing? Size : 4" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4" Manufacturer: Unknown	Year Constructed 2002	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: There is some failure of the coating on the valve operator.
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP? Size: 4"	Year Constructed 2002	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

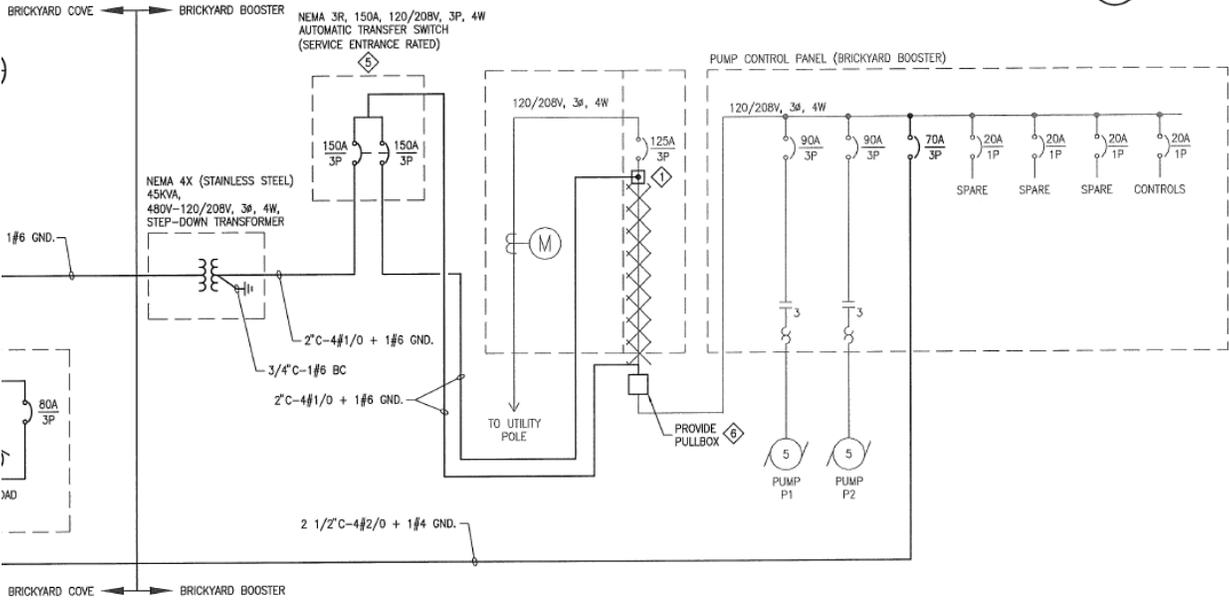
Mechanical Systems Assessment (cont'd)			
Force Main Piping On Site	Type: DIP? Size: 6"  Isolation Valve Type: Plug Valve (buried just outside of valve vault Size: 6"	Year Constructed  Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments
Hoists	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Surge /Transient Control	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Seal Water System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Sump Pump System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Heating, Ventilation and Cooling Systems	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Gates	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<p><b>Emergency Generator/Auxiliary Engine</b></p>	<p><input checked="" type="checkbox"/> Not applicable</p> <p><input type="checkbox"/> On-Site Emergency Generator</p> <p style="margin-left: 20px;"><input type="checkbox"/> Diesel</p> <p style="margin-left: 20px;"><input type="checkbox"/> Gasoline</p> <p style="margin-left: 20px;"><input type="checkbox"/> Natural Gas</p> <p style="margin-left: 20px;"><input type="checkbox"/> Other _____</p> <p style="margin-left: 20px;">Manufacturer _____</p> <p style="margin-left: 20px;">Model No. _____</p> <p style="margin-left: 20px;">Size (kW) _____</p> <p style="margin-left: 20px;">Size KVA _____</p> <p style="margin-left: 20px;">Automatic Transfer Switch</p> <p style="margin-left: 40px;">Amps: 150</p> <p style="margin-left: 40px;">Manufacturer: Cummins Onan</p> <p style="margin-left: 40px;">Model: PowerCommand</p> <p><input type="checkbox"/> Adaptor for "Plug In" Potable Unit</p> <p>Onsite Load Bank</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>Emergency power is provided by generator at Brickyard Cove Pump Station. ATS for generator is located at this station.</li> <li>ATS is in good condition.</li> <li>Transformer enclosure is failing</li> </ul> <div style="text-align: center;">  </div>

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Electrical and Power System Assessment

Service Size	Amps: 125 (200) Volts: 208/120 Meter Number 1009918377	This station feeds power to Brickyard Cove which is approximately 1300 feet west of this site. No arc flash labels.
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PANEL SCHEDULE A

LOCATION: LIFT STATION	TYPE: Q0324L125G	125 AMPS	VOLTS: 120/208
DIMENSIONS:	NEMA: 1	X.M.L.O.	PHASE: 3
MOUNTING: POST		M.C.B.	WIRES: 4
FEED: BOTTOM		10,000 A.I.C.	BONDED GROUND BUS

BRKR A P	DESCRIPTION	WIRE SIZE	CIRCUIT NO	P H A S E A B C	L O A D S A B C	CIRCUIT NO	WIRE SIZE	DESCRIPTION	BRKR A P
90	3 PUMP NO. 1	(2) 5800	1	11600		2	5800	(2) PUMP NO. 2	90 3
--	--	5800	3	11600		4	5800	--	--
--	--	5800	5			6	5800	--	--
*20	1 GEN BATTERY CHARGER	212 1000	7	2000		8	1000	30 GEN KEEP WARM HEATER	30 2*
20	1 CONTROL PANEL	212 500	9	1500		10	1000	--	--
20	1 SPARE		11			12		BLANK	
	BLANK		13	0		14		BLANK	
	BLANK		15	0		16		BLANK	
	BLANK		17	0		18		BLANK	
	BLANK		19	0		20		BLANK	
	BLANK		21	0		22		BLANK	
	BLANK		23	0		24		BLANK	
TOTALS:				13600	13100	11600	TOTAL LOAD:		38,300 WATTS
						TOTAL AMPS:		106 AMPS	

\* FOR FUTURE GENERATOR

Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Pedestal Manufacturer: Hoffman? NEMA 3 Gray Non-SST  Main Service Disconnect (Brickyard Cove) Load: 35A Frame Amps: 100/125 Trip Amps: 70  Main Motor Protector (Pumps 1 and 2) Load: 15A Frame Amps: 100 Trip Amps: 90  Main Load Starter (Pumps 1 and 2) Load: 15A Manufacturer: Cutler Hammer Model No. AN16KN0 Size: 3	Year Constructed   Year Constructed   Year Constructed   Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• Flygt miniCAS pump protection relays.</li> <li>• No arc flash labels.</li> </ul>

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Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120/208 Amps: 150/3 (no main CB)  Pedestal Mounted	Year Constructed 2002	List of Loads Generator heater, battery charger, control panel  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Lighting</b>	<u>Exterior - Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: <ul style="list-style-type: none"> <li>• Need site lighting and a light in the wet well.</li> </ul>
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	

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Instrumentation / Control Assessment			
Field Instruments	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1- 50 ft.	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Veolia staff reports that the readings are not accurate. Recommend installation of a stilling well.
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: RIO (PLC at Brickyard Cove) Manufacturer: Allen Bradley Model No.: SLC 500 I/O only A-B UPS	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing; the rest of the equipment in the control panel has been well maintained and updated with a useable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> </ul> Industry Std. Remaining Life: 0 years
	Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Transfer Switch Position, UPS (on battery, fail) and panel intrusion.  Comment: Mission system is back-up telemetry.		

Instrumentation / Control Assessment (cont'd)			
SCADA/Telemetry	<input checked="" type="checkbox"/> Data Monitoring <input type="checkbox"/> Pumping Rate <input type="checkbox"/> Pressure <input type="checkbox"/> Wet well Level <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Remote Control <input type="checkbox"/> Pump On/Off <input type="checkbox"/> <input type="checkbox"/> Other _____ Manufacturer _____ Model _____  Communication Mode <input type="checkbox"/> Hardwire/Leased line <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Internet <input type="checkbox"/> Radio <input checked="" type="checkbox"/> Hardwire RS-485 cable; <input type="checkbox"/> Cell  SCADA Software: RSView  Alarms:  Autodialer Backup?	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• All PLC inputs are likely available in SCADA.</li> </ul> Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.

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**APPENDIX C**  
**Brickyard Cove Lift Station Assessment Form**





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## Assessment Summary and Recommendations for Brickyard Cove Pump Station

Assessment Performed by	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
Assessment Date	September 11, 2017

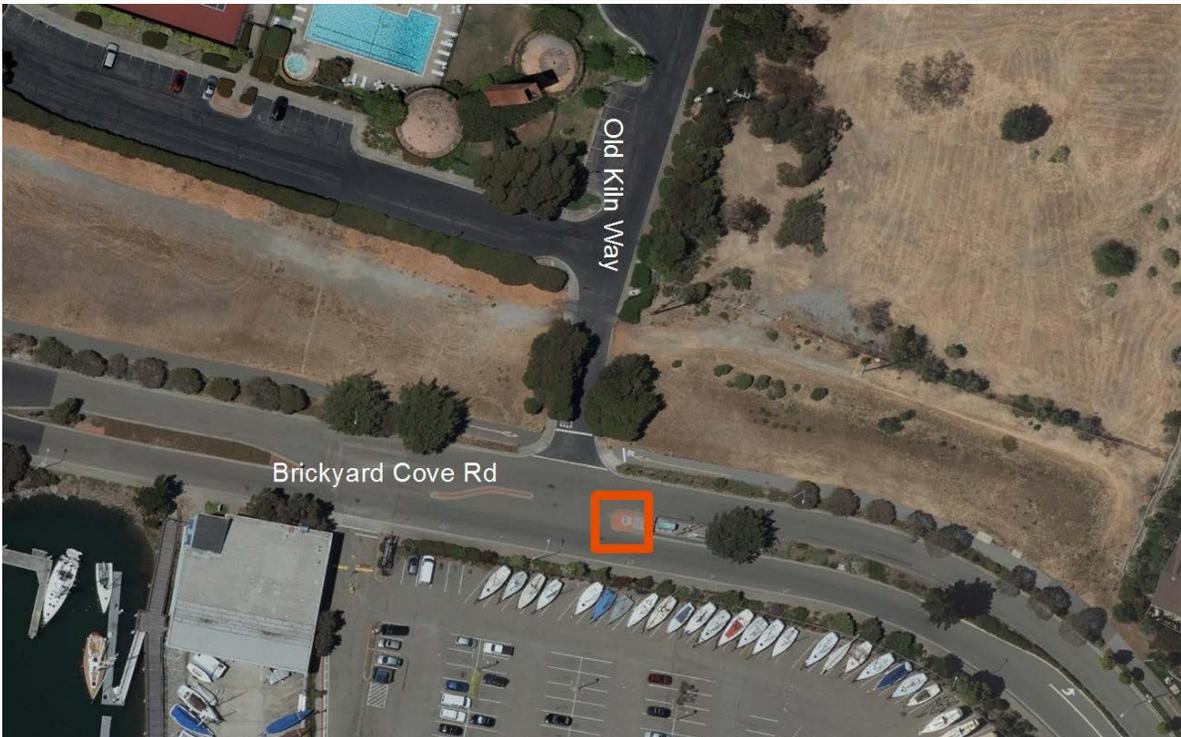
### Desktop Condition Assessment

Facility Name	Brickyard Cove Pump Station
Facility Address/Location	Corner of Brickyard Cove Dr. and Old Kiln Way
APN#	
Parcel Size	
Status	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

Operations Staff Facility Importance	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently (less than XX hours) <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
Year Originally Constructed	Unknown
Year of Latest Upgrade/Remodel	2005: Replaced pumps with Flygt submersible pumps, replaced wet well cover and hatch, added valve vault which includes piping, check and plug valves and flow meter, installed level transmitter and float switch, removed and replaced existing pump control panel with new pump control power pedestal which includes main C/B section, power section, motor starters section and telemetry panel, installed new emergency generator inside new fence enclosure and bollards.
Recent Repairs/Improvements/Maintenance (2013 – 2017)	From Veolia's Richmond Asset and Work History Details.xls None
Adjacent Land Use	<input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Other: Planned Area <input type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
O&M History Available	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
O & M Manuals Available	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Operations Staff Issues of Concern</b>	
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<b>Additional Comments</b>	The City has an air quality monitoring station located at this site – not operated by Veolia.

Aerial Photo of Site  
or Site Layout or  
Site Sketch



On-Site Condition Assessment for Pump Station (Brickyard Cove)

Summary of Site Assessment and Recommendations.

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

Yes; list recommended improvements:

- Site and wet well lighting.
- Additional bollards needed on west end of median and at the east end of the generator enclosure area to protect the pump control power pedestal.
- Remove abandoned 6x6 mast. Collapse may take out vital equipment.
- Antenna poles are attached to mast with galvanized band crimp clamps. Should be attached properly.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes

No – would require closing a lane to stage a pump, only one lane in each direction on either side of median.

Are the existing facilities upgradeable?

Yes, list recommended upgrades to existing facilities:

- Replace PLC in existing enclosure.
- Provide proper Arc Flash labels.
- Upgrade service voltage, pumps and controls to 480 V to match generator.
- Relocate flowmeter out of electrical space in pedestal.
- Dress up and protect loose communication cables.
- Ensure EYS fittings are properly installed per code.
- Paint pump discharge piping within wet well.

No, recommend replacement of existing facilities with the following new facilities:

Facility Assessment – Other			
Safety Equipment	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
Fire Protection	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Security	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Panel is shown with intrusion switches on P&ID however Veolia confirmed switches are not operational.	
	Bollards	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Additional bollards needed on west end of median and at the east end of the generator enclosure area to protect the pump control power pedestal.	
Odor Control	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Building and Grounds Assessment – General		
Potential Site Hazards	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No. Outside tsunami inundation area; outside FEMA flood zone (100/500)
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential "very high". <input type="checkbox"/> No
	Traffic Hazard	<input checked="" type="checkbox"/> Yes; Pump station is located in center median. <input type="checkbox"/> No

Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input checked="" type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type: Double swing 6' panels  Lockable? Yes	Year Constructed 2005	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> All weather gravel (inside fenced area) <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces Parking is not available directly at the site. Site is located in center median.  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Water Service</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Overflows will drain to either side of the street</li> </ul>

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**Building and Grounds Assessment – Structural – Pump Station**

<b>Wet Well</b>	Size: 6 ft. dia. x 14 ft.  Material: Concrete  Coating: None.  Operating Volume: __cf  Personnel Accessibility N/A  Equipment Ingress/Egress Via double door 3' x 5' hatch with safety grate Guide bars  Grease/Cleanliness Some grease floating in water	Year Constructed 2006/11	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>Concrete surface is powdery but no exposed aggregate.</li> </ul>
<b>Valve Vault</b>	Size: 8'-6" x 5'-0" x 5'-0"  Material: Concrete  Coating: None  Personnel Accessibility Via two separate double door 3' x 5' hatches and access ladder  Equipment Ingress/Egress Via truck mounted crane  Housekeeping Good	Year Constructed 2005	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>Concrete crack along lid edge due to rebar too close to surface.</li> </ul>

Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>	<p>Fenced Area: Approx. 24'-6" x 11'-6"</p> <p>Includes: Concrete pad for pump control pedestal: Approx. 1'-10" x 5'-10" Separate generator pad Balance of surface within fenced area is gravel.</p> <p>Personnel Accessibility Double swing 6' wide gates</p> <p>Equipment Ingress/Egress Double swing 6' wide gates</p> <p>Housekeeping Good</p>	<p>Year Constructed 2005</p>	<p>Condition: Exterior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:  <ul style="list-style-type: none"> <li>• No site lighting.</li> <li>• Need bollards on west end of median and also on east side of fenced area.</li> <li>• Structural Evaluation Site specific spectral response acceleration short period (S<sub>s</sub>) →1.557g Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →0.608g</li> </ul> </p>
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	<p>Condition: <input type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p>

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Mechanical Systems Assessment			
<b>Main Pump 1</b>	Type: Submersible C Type Duty: 200 gpm @ 20 ft. HP: 3 (Sam Terry thinks they are 5HP? – Veolia to confirm) Manufacturer: Flygt Model: CP 3085.092-0764 Serial number: 0620041	Year Constructed 2005/12	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: • The 2016 inspection report notes that condition of rail is "OK", condition of lifting bail is "worn" and all other components are noted as "Good".
	Motor Type: C1, D1, Submersible squirrel cage induction motor with Flygt miniCAS relay HP: 3 Voltage: 208/3P Manufacturer: Flygt	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: • Need to confirm location of EYS fittings and that they are properly installed.
	Seals Type: Mechanical	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size: 4" Manufacturer: Unknown	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4" Manufacturer: Unknown	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size: 4"	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: The discharge elbows near top of wet well are heavily corroded. Could not assess condition of pipe further in the wet well due to limited visibility.

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Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: Submersible C Type Duty: 200 gpm @ 20 ft. HP: 3 (Sam Terry thinks they are 5HP? – Veolia to confirm) Manufacturer: Flygt Model: CP 3085.092-0764 Serial number: 0620041	Year Constructed 2005/12	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2016 inspection report notes that condition of rail is "OK", condition of lifting bail is "no good" and all other components are noted as "Good".</li> </ul>
	Motor Type: C1, D1, Submersible squirrel cage induction motor with Flygt miniCAS relay HP: 3 Voltage: 208/3P Manufacturer: Flygt	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Need to confirm location of EYS fittings and that they are properly installed.</li> </ul>
	Seals Type: Mechanical	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size: 4" Manufacturer: Unknown	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4" Manufacturer: Unknown	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size: 4"	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Discharge elbow near top of wet well is heavily corroded. Could not assess condition of pipe further in the wet well due to limited visibility.

Mechanical Systems Assessment (cont'd)			
Force Main Piping On Site	Type: Polyethylene Size: 6"  Isolation Valve Type: Plug Valve (in Valve Vault) Size: 6"	Year Constructed 1984  Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments
Hoists	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Surge /Transient Control	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Seal Water System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Sump Pump System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Heating, Ventilation and Cooling Systems	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Gates	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

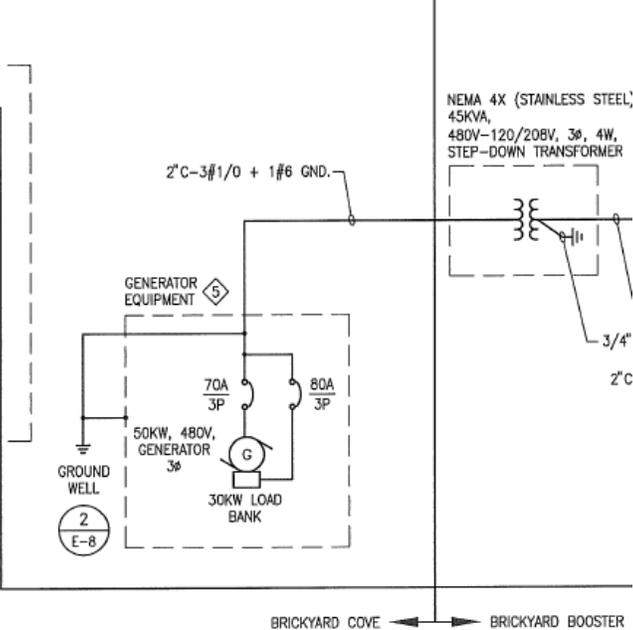
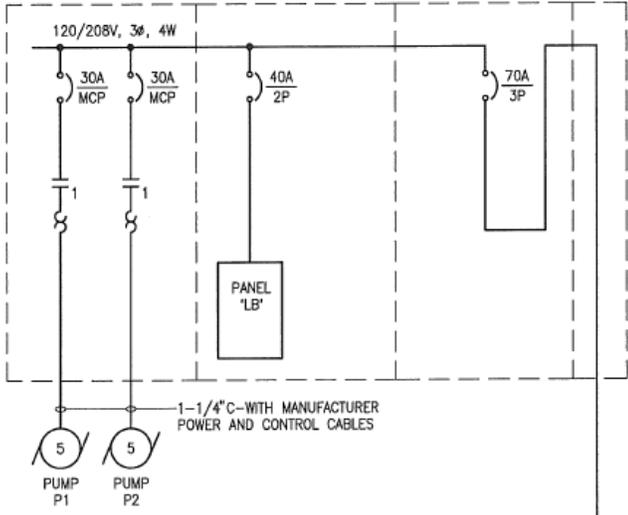
Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> On-Site Emergency Generator <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Cummins Model No. DGCA-5741148 Size (kW): 50 Size KVA: 62.5  Automatic Transfer Switch Located at Brickyard site (approx. 1300 feet east of this site)  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• Base isolators are corroded.</li> </ul>

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Electrical and Power System Assessment

Service Size	Amps 70 Volts: 120/208, 3Ø, 4W Meter Number: N/A	Power is fed to this booster pump station from the panel at Brickyard Booster PS which is approximately 1300 feet east of this site. No arc flash labels.
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PUMP CONTROL POWER PEDESTAL 'MSB' (BRICKYARD COVE)



NAMEPLATE LB  
 BUS:AMPS 100 VOLTS 120/240V, 1Ø, 3W

	VA		OUTLETS			20A, 1P		OUTLETS			VA		
	A	B	LTG	REC	MISC	10KAICS	UON	LTG	REC	MISC	A	B	
LIGHTING	160		2			1	20	2			1000		JACKET WATER HEATER
RECEPTACLES		360	2			3		4			1000		JACKET WATER HEATER
CONTROLS	160					5		6			500		GENERATOR BATTERY CHARGER
SPARE						7		8					SPARE
BUSSED SPACE						9		10					SPARE
						11		12					BUSSED SPACE
						13		14					
						15		16					
						17		18					
TOTAL LOAD	320	360									1500	1000	TOTAL LOAD
<u>3.2</u> KW + .25 X <u>0.8</u> KW <u>4</u> KW <u>240</u> VOLTS 1PH= <u>17</u> AMPS													

Electrical and Power System Assessment (cont'd)			
Motor Controls	Type: Pedestal NEMA 3RX SS Manufacturer: Tesco	Year Constructed 2006/11	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• Flygt pumps with door mounted mini CAS.</li> <li>• No arc flash labels.</li> </ul>
	Main Motor Protector Load : 6.5 A Frame Amps: 30/100 Trip Amps:30/100	Year Constructed	
	Main Load Starter (2) Load: 6.5 A Manufacturer: Cutler Hammer Model No. ANI6GNO Size: 2	Year Constructed	

Electrical and Power System Assessment (cont'd)			
Lighting Panel	Voltage: 120/208 Amps: 100 (40 amp main)	Year Constructed 2005/11	List of Loads: Lighting, receptacles, BU controls, telemetry, generator battery, generator jacket heater  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Lighting	<u>Exterior - Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: • Need site lighting and a light in the wet well.
General, Electrical	Convenience Receptacles	Year Constructed	

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Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No.: HydroRanger 200 Range: 1-50 ft. (Cal 0-14 ft.)	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 7-10 years
	Flow Element Type: Magnetic Manufacturer: Endress+Hauser ProMag Model No 50W1F Size: 6" Flow range _____	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • The transmitter needs to be relocated (not in an appropriate space).
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Air Quality Monitor (Owned and maintained by City of Richmond)		

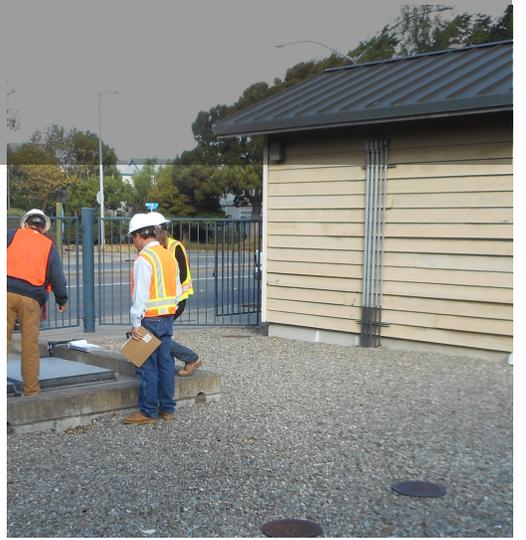
Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No.: SLC 505 A-B Panelview 600 A-B UPS Mission BU Telemetry	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC Obsolete and the UPS is likely to be replaced when batteries need replacing, the rest of the equipment in the control panel has been well maintain and updated with a useable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> <li>Relocate and ground Cell Modem Antenna mast.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Flow, Generator and Fuel Status, Transfer Switch Position, UPS on Battery, Fuel Leak, Power Fail and Panel Intrusion. Also shown but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, overspeed.  Comment: Mission system w/ Coax directly through side of pedestal.			

Instrumentation / Control Assessment (cont'd)			
<p>SCADA/Telemetry</p>	<p><input checked="" type="checkbox"/> Data Monitoring  <input type="checkbox"/> Pumping Rate  <input type="checkbox"/> Pressure  <input checked="" type="checkbox"/> Wet well Level  <input checked="" type="checkbox"/> Other: Hi&amp;Lo Level  <input type="checkbox"/> Remote Control  <input type="checkbox"/> Pump On/Off  <input type="checkbox"/>  <input type="checkbox"/> Other_____</p> <p>Manufacturer_____</p> <p>Model_____</p> <p>Communication Mode  <input type="checkbox"/> Hardwire/Leased line  <input type="checkbox"/> Fiber Optic  <input type="checkbox"/> Internet  <input type="checkbox"/> Radio  <input checked="" type="checkbox"/> Cell Modem</p> <p>SCADA Software: RSView</p> <p>Alarms:</p> <p>Autodialer Backup? No</p>	<p>Year Constructed 2005/11</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Mast #1 is 15' high wooden mast with 5 GHz radio with stainless steel straps and no ground.</li> <li>• Mast #2 is 20' high Mission antenna, not properly grounded</li> <li>• All PLC inputs are likely available in SCADA.</li> </ul> <p>Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p>

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**APPENDIX D**  
**Canyon Estates No. 1 Lift Station Assessment Form**





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### Assessment Summary and Recommendations for Canyon Estates #1 Pump Station

<b>Assessment Performed by</b>	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 11, 2017

### Desktop Condition Assessment

<b>Facility Name</b>	Canyon Estates #1 Pump Station
<b>Facility Address/Location</b>	Cul de Sac of Wildcat Dr.
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

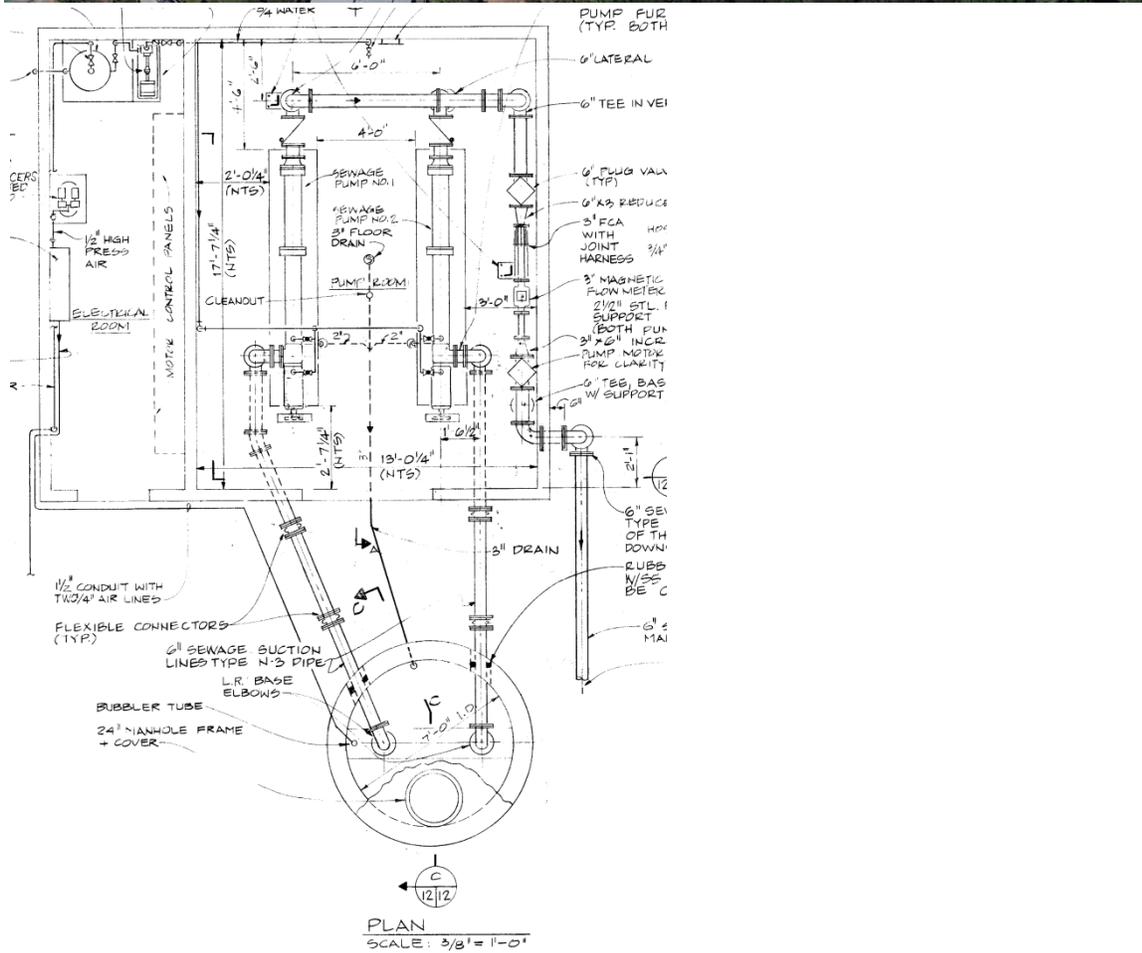
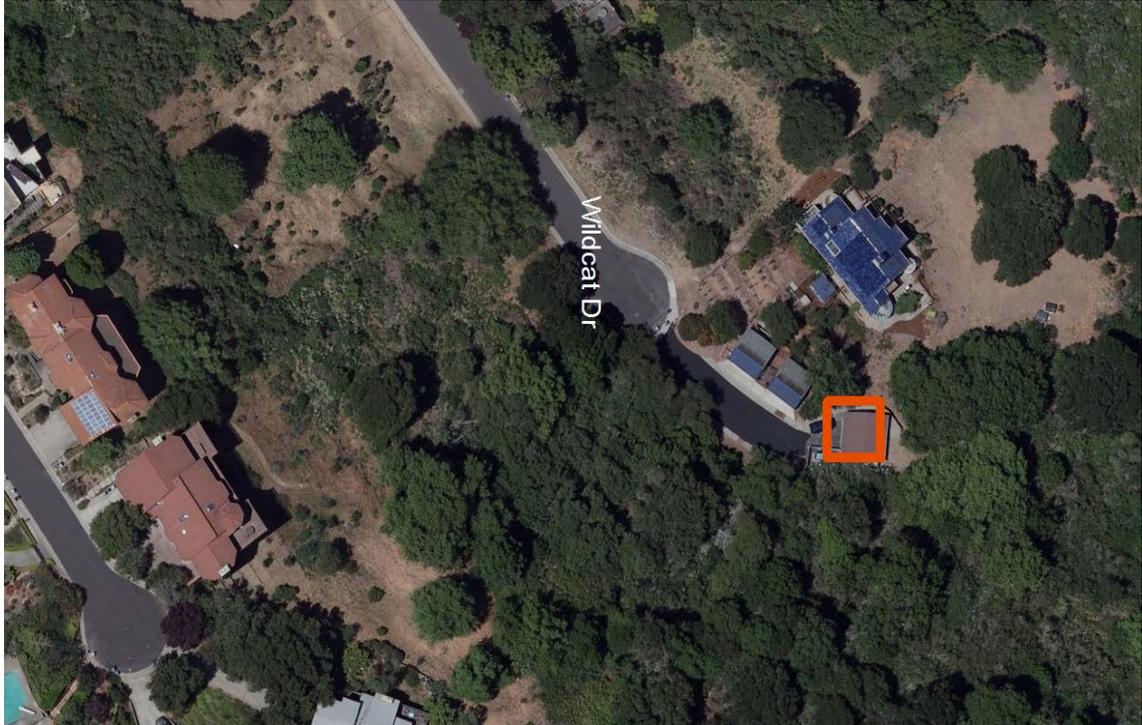
<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently <input type="checkbox"/> Yes <input type="checkbox"/> No (less than XX hours) Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Year Originally Constructed</b>	1982
<b>Year of Latest Upgrade/Remodel</b>	2005: Installed new emergency generator with enclosure and 3 automatic transfer switches (one for each of the pumps at this station and the third for Canyon Estates #2 & #3 pump stations), step-up transformer for Canyon Estates #3 PS power supply, removed telemetry panel and installed new pump control panel, new ultrasonic level transmitter and level float switch.

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<b>Recent Repairs/ Improvements/ Maintenance</b>	<p>The seal water system water supply line broke in 2014 and the system ran dry for 48 hours severely damaging the Moyno progressive cavity pumps. Subsequent to this, the system was relocated from the electrical room to the pump room, a water hammer device was installed on the inlet line and a low level alarm float switch was added to the air-gap tank .</p> <p>From Richmond Asset and Work History Details.xls (from Veolia)</p> <p>6/3/14: Contactor for seal flush water tank failed , replaced and returned to operation</p> <p>9/9/14: Pump is out of service at the moment , new pump and VFD is being ordered for replacement; using rental pump</p> <p>11/4/14 New Liberty pump installed last month, no more Moynos but checked these progressive cavity pumps</p> <p>11/4/14: Pump quit working, installed temp sump pump , temp door with hole for hose from sump; ordered new pumps to install , have one on line with old motor and roto phase , other pump on order along with vfd , going to make this a capitol project</p> <p>1/6/15 install new vfd and wire into system to replace rotophase</p> <p>4/3/15: Water line broken that feeds seal water tank; pipe has been breaking frequently , checked pressure and reads 120psi , will order water hammer arrestor and possibly a prv to install in line</p> <p>6/3/15 leak in seal water line , too much pressure , install water hammer arrestor device; repaired broken pipe and install water hammer arrestor in line</p> <p>2/3/16 pump tripping on overload; replaced drive belt and returned to service , cleaned check valve that was full of rags</p> <p>5/12/17: Air compressor - This asset W/O is no longer required. A request has been sent to remove it from the system.</p>												
<b>Adjacent Land Use</b>	<table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Residential</td> <td><input type="checkbox"/> Commercial</td> <td><input type="checkbox"/> Other: _____</td> </tr> <tr> <td><input checked="" type="checkbox"/> Single Family Homes</td> <td><input type="checkbox"/> Industrial</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Apartments</td> <td><input checked="" type="checkbox"/> Park (Wildcat Canyon Regional Park)</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Condos</td> <td><input type="checkbox"/> School</td> <td></td> </tr> </table>	<input checked="" type="checkbox"/> Residential	<input type="checkbox"/> Commercial	<input type="checkbox"/> Other: _____	<input checked="" type="checkbox"/> Single Family Homes	<input type="checkbox"/> Industrial		<input type="checkbox"/> Apartments	<input checked="" type="checkbox"/> Park (Wildcat Canyon Regional Park)		<input type="checkbox"/> Condos	<input type="checkbox"/> School	
<input checked="" type="checkbox"/> Residential	<input type="checkbox"/> Commercial	<input type="checkbox"/> Other: _____											
<input checked="" type="checkbox"/> Single Family Homes	<input type="checkbox"/> Industrial												
<input type="checkbox"/> Apartments	<input checked="" type="checkbox"/> Park (Wildcat Canyon Regional Park)												
<input type="checkbox"/> Condos	<input type="checkbox"/> School												
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No												
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No												
<b>Operations Staff Issues of Concern</b>													
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____												
<b>Additional Comments</b>													

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Aerial Photo of Site or  
Site Layout or Site  
Sketch



On-Site Condition Assessment for Pump Station (Canyon Estates #1)

Summary of Site Assessment and Recommendations.

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

Yes; list recommended improvements:

- Evaluate vertical shrinkage crack in retaining wall adjacent to generator and repair if required.
- Install exterior lighting on south side of building.
- Install light in wet well.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes; within parking area on site. Need to modify pumping to include connection point.

No

Are the existing facilities upgradeable?

Yes, list recommended upgrades to existing facilities:

- The electrical distribution system could be simplified if the utility power service could be upgraded to three phase. Therefore, if possible, upgrade electrical service to three phase.
- Replace PLC in existing enclosure.
- Provide proper arc flash labels.
- Provide lateral restraints for piping.
- Evaluate size of generator base isolators and upsize if necessary.
- Evaluate structural adequacy of unistrut support for electrical panels and upgrade if required.
- Replace missing connection bolts on monorail.
- Modify piping to include bypass pumping connection – possible location on exterior of building where pipe exits building and elbows down.
- Ground the antenna shelf and replace the mast with grounded metal pole.
- Equipment formally abandoned in place should be removed from the electrical room (i.e. unused conduit, mounting components and enclosures).
- HVAC equipment is mounted above electrical equipment which is a minor code violation and should be relocated.
- Remove the abandoned 400A generator plug.
- Correct the mis-labeled “Main Service Disconnect” breaker in one of the Tesco panels.
- Replace the existing Circle AW meter/CT enclosure and Sylvania Distribution panel.
- Upgrade all lighting to LED.
- Replace the electrical convenience receptacles.

No, recommend replacement of existing facilities with the following new facilities:

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Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input checked="" type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Fire extinguisher in control room only.
<b>Security</b>	Security of Doors, Windows, & Locks	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: P&ID shows both panel intrusion and building intrusion switch however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Building and Grounds Assessment – General		
Potential Site Hazards	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input checked="" type="checkbox"/> Yes; adjacent to a residential house and also at the border of Wildcat Canyon Regional Park <input type="checkbox"/> No
	Adjacent Flood Hazards	<input checked="" type="checkbox"/> Yes; culvert west of generator location. <input type="checkbox"/> No
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; rain induced landslide area; within existing landslide distribution area; within earthquake induced study area <input type="checkbox"/> No
	Liquefaction	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Lightening	<input checked="" type="checkbox"/> Yes; the antenna mast is made up of wood and attached to the wood building and could be subject to a lightning hit that destroys the Mission System Radio or starts a fire. The antenna shelf must be grounded and the mast should be replaced with grounded metal pole. <input type="checkbox"/> No



Building and Grounds Assessment – Site Evaluation			
<p><b>Fencing</b></p>	<p>Type  <input type="checkbox"/> Wood  <input type="checkbox"/> Steel  <input type="checkbox"/> CMU  <input checked="" type="checkbox"/> Chain Link  <input type="checkbox"/> Other _____</p> <p>Gate Type: A single and a double swing gate</p> <p>Lockable? Yes</p>	<p>Year Constructed</p>	<p>Condition:                      Exterior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor                      Interior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p> 
<p><b>Access</b></p>	<p>Surfacing  <input checked="" type="checkbox"/> Asphalt  <input type="checkbox"/> Concrete  <input type="checkbox"/> All weather gravel   <input type="checkbox"/>                      Other _____</p> <p>Parking/Vehicle Access</p> <p>Number of parking spaces                      Street parking on court,                      space on site for one vehicle                      or truck</p> <p>Truck Accessible? Yes</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p>
<p><b>Water Service</b></p>	<p>Size 3/4"</p> <p>Material:                      Galvanized/copper/PVC</p> <p>Backflow Preventer: Yes</p>	<p>Year Constructed                      2001</p>	<p>Condition: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p>
<p><b>Drainage</b></p>	<p>Area of Catchment                      _____</p>		<p>Condition: <input type="checkbox"/> Good   <input checked="" type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:                      • Overflows will flow down the street to nearby storm drain.</p>

Building and Grounds Assessment – Structural – Pump Station			
<p><b>Suction Well</b></p>	<p>Size: 7' I.D. x 18'</p> <p>Material: Precast Concrete</p> <p>Coating: Unknown</p> <p>Operating Volume ___cf</p> <p>Personnel Accessibility 24" manhole cover</p> <p>Equipment Ingress/Egress No equipment in manhole, only piping</p> <p>Grease/Cleanliness Did not open manhole cover</p>	<p>Year Constructed 1982</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments: • Did not access the wet well.</p>
<p><b>Dry Well</b></p>	<p><input checked="" type="checkbox"/> Not Applicable</p>	<p>Year Constructed</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p>

**Building and Grounds Assessment – Structural - Other**

<p><b>Control/Electrical/ Pump Room Building</b></p>	<p>Size: 19'-6" by 21'-0"</p> <p>Material: Wood frame with redwood plywood siding outside and gypsum board and duct liner board inside for sound attenuation</p> <p>Roof type: Asphalt Shingles</p> <p>Date of Latest Repair _____</p> <p>Roof Condition: Fair</p> <p>Personnel Accessibility 3'-0" door for Control Room 4'-0" door for Pump Room</p> <p>Equipment Ingress/Egress Piping along south wall is not easily accessible</p> <p>Housekeeping: Fair</p>	<p>Year Constructed 1982</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>The facilities in the electrical room have been upgraded in a piece meal way and some equipment has been installed outdoors that would typically be mounted indoors. Equipment formally abandoned in place should be removed from the electrical room (i.e. unused conduit, mounting components and enclosures).</li> <li>HVAC equipment is mounted above electrical equipment which is a minor code violation. It should be corrected.</li> <li>Heavily insulated for sound.</li> <li>Access to pipe, fittings, valves and flow meter along the south wall is very difficult.</li> <li>Based on the year this building was constructed it is highly likely that the framing has seismic deficiencies. The roof framing was not able to be inspected due to the presence of acoustical ceiling tiles.</li> <li>Structural Evaluation Site specific spectral response acceleration short period (S<sub>s</sub>) →2.455g Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →1.021g <u>FEMA P-154</u> Probability of collapse 1x10<sup>1.8</sup> (1 in 63 following MCE) <u>ASCE/SEI 41 Tier 1</u> 12 noncompliant conditions identified</li> </ul>
<p><b>Other Structures</b></p>	<p><input checked="" type="checkbox"/> Not Applicable</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:</p>

Mechanical Systems Assessment			
<b>Main Pump 1</b> <span style="color: red;">Need info</span>	Type: Two Stage Progressive Cavity Duty: _____gpm_____ft HP: _____ Manufacturer: Liberty Model: 2G065G1L Serial number: 52285	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type: TEFC Induction HP: 20 Voltage: 240V/3P Manufacturer: Baldor	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Local E-Stop
	Seals Type_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Lever and spring Size: 6" Manufacturer: Matco	Year Constructed 1982	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 6" Manufacturer_____	Year Constructed 1982	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping Type: DIP Size: 6"	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size: 8" reduced to 6"	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Includes high pressure shutdown or alarm.

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Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: Two Stage Progressive Cavity Duty: _____gpm_____ft HP: _____ Manufacturer: Liberty Model: 2G065G1L Serial number: 51485	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type: TEFC Induction HP: 20 Voltage: 240V/3P Manufacturer: Baldor	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Local E-Stop
	Seals Type _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Lever and spring Size: 6" Manufacturer: Matco	Year Constructed 1982	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 6" Manufacturer _____	Year Constructed 1982	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping Type: DIP Size: 6"	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size: 8" reduced to 6"	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Includes high pressure shutdown or alarm for each pump.

Mechanical Systems Assessment (cont'd)			
<p><b>Common Discharge Piping</b></p>	<p>Type: CIP? Size: 6"</p> <p>Isolation Valve Type: Plug (within PS along S wall Size: 6"</p> <p>Check Valve Type: Check style foot valve Size: 6" Manufacturer: Mueller 105M-AP</p>	<p>Year Constructed 1982</p>	<p>Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments: The discharge piping from the two pumps is combined into a 6" pipe which is then routed to the south wall of the pump station. The piping is then split into parallel upper and lower piping. The upper pipe includes foot check valve, reducer, flow meter, increaser and plug valve. The lower pipe includes only a plug valve. It is then combined into a single pipeline before exiting the building. Access to piping in difficult.</p>  
<p><b>Force Main Piping On Site</b></p>	<p>Type: PVC, Class 160 Size: 6"</p> <p>Isolation Valve Type: Plug (within PS along S wall Size: 6"</p>	<p>Year Constructed 1982</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Unknown</p> <p>Comments</p>

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Mechanical Systems Assessment (cont'd)			
Hoists	Type: Overhead I-beams, no hoists in place Capacity _____	Year Constructed 1982	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Surge /Transient Control	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Seal Water System	Type: Air gap tank with seal water pump Pump Manufacturer: PACO Capacity: 50 gal.	Year Constructed 1982, however relocated in 2014 after the supply line broke. Water-air gap tank, seal water pump & controls moved from M&C room to main pump room. Water air-hammer device installed on incoming pipe to air-gap tank. Mission SCADA Low-level alarm float installed inside air-gap tank.	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Might consider upgrading level controls for this for reliability.</li> </ul> 
Sump Pump System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Heating, Ventilation and Cooling Systems</b>		Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Pump Room Supply Fan	800 CFM (Supply fan below ceiling, exhaust fan above ceiling)	1982	<ul style="list-style-type: none"> <li>• Ceiling mounted exhaust handlers in each room.</li> </ul>
Control Room Supply Fan	800 CFM (Supply fan below ceiling, exhaust fan above ceiling)	1982	
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

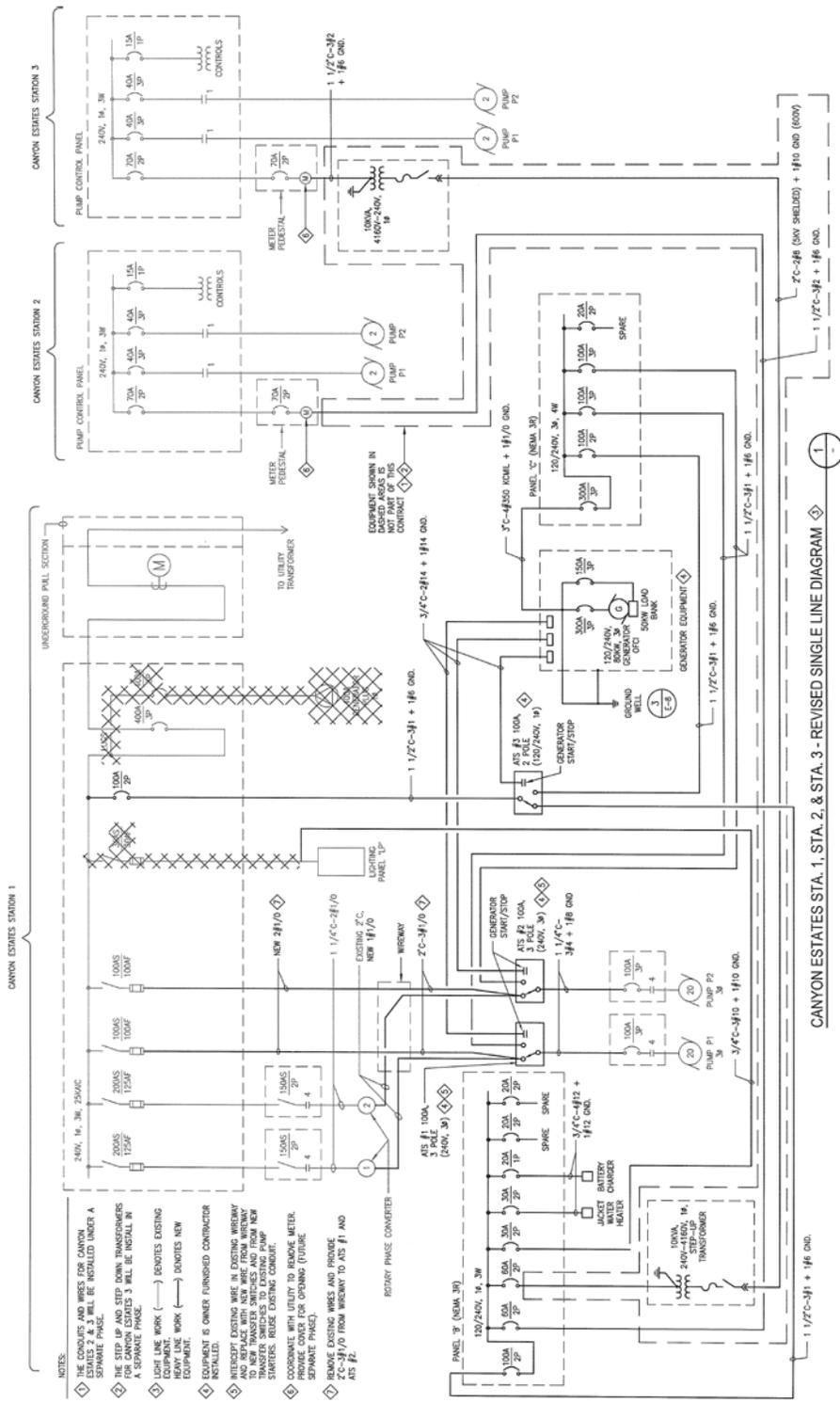
Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> On-Site Emergency Generator <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Cummins Model No. DGDA5739165 Size (kW): 80 Size KVA: 100 (243 A@240V 3PH)  Automatic Transfer Switch (3 total, 2 three phase and 1 single phase) Amps: 100 each Manufacturer: Cummins-Onan Model No. _____  <input checked="" type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• There are 3 Automatic Transfer Switches – one for each of the pumps at Canyon Estates #1 (each 100A) and a third (100A) to power Panel 'B' which feeds Canyon Estates #2 &amp; #3.</li> <li>• A 400A generator plug is shown to have been demolished in the 2005 plans however it is still on site and is in poor condition. It should be removed.</li> <li>• Generator mounted generator breaker is 300 Amp trip unit.</li> <li>• Base isolators may be undersized.</li> </ul>



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Electrical and Power System Assessment

Service Size	Amps: 400 Volts: 120/240, 1P Meter Number: 5000024007	Single phase only. No arc flash labels.
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Electrical and Power System Assessment (cont'd)			
Electrical Distribution	Type _____ Manufacturer: Circle-AW Sylvania & Tesco	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The existing Circle AW meter/CT enclosure and Sylvania Distribution panel are past their useful life and should be replaced. Optimally, the new service would be three phase. The pump circuit breakers in the Sylvania panel are mis-labeled roto phase units and are a safety issue. The first [older] Sylvania pump starter enclosures are redundant and a safety issue because they are misleading; the Croy labels on them indicate power is from the non-existent Roto Phase units. All the equipment described herein should be removed and/or replaced.</li> <li>The newer VFD should be rewired to be after the three pole ATS if three phase power can be brought to the site (or possibly removed completely).</li> <li>All of the straightforward questions regarding manufacturers and ratings are impossible to answer on this project without deconstructing the controls. Veolia described how the system operated but it was so complex as to make these simple questions irrelevant.</li> <li>The breakers provided by Tesco in the 2005 expansion are panelboard type not molded case (the industry standard). This is likely because of the way the 2005 specifications were written in respect to 240/120 V, single phase systems.</li> <li>One of the Tesco panels has a breaker mis-labeled "Main Service Disconnect". This is a code violation and a safety issue and should be corrected.</li> <li>No arc flash labels.</li> </ul> MCC Industry Std. Remaining Life: 0 and 10 Years
	Main Motor Protector Load : 100A Frame Amps: 400A Trip Amps: 400A	Year Constructed	
	Main Load Starter/VFD Load _____ Manufacturer _____ Model No. _____ Size: _____	Year Constructed	
	Main Load Starter/VFD Load _____ Manufacturer _____ Model No. _____ Size: _____	Year Constructed	



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Electrical and Power System Assessment (cont'd)			
Lighting Panel	Voltage: 120/240 Amps: 30A	Year Constructed 1982	List of Loads Control room fan, Pump room fan, lights, seal water pump, telemetry panel, pump control panel, F-1, F-2, receptacles  Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Lighting	<u>Pump Room</u> Type: Class 1 Div. 2 fluorescent fixtures (4 fixtures – each: 2x40W) Condition: Poor Adequate Lighting: No  <u>Control Room</u> Type: Industrial open type fluorescent fixtures (2 fixtures – each: 2x40W) Condition: Poor Adequate Lighting: No  <u>Exterior - Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed 1982	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>There is no site lighting. Need exterior lighting on south side of building.</li> <li>Need light in wet well.</li> <li>All lighting should be upgraded to LED</li> </ul> Industry Std. Remaining Life: 0 years
General, Electrical	Convenience Receptacles	Year Constructed 1982	<ul style="list-style-type: none"> <li>The original receptacles appear to remain in service in fair-poor condition for their age.</li> </ul> Industry Std. Remaining Life: 0 years

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Instrumentation / Control Assessment			
Field Instruments	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1-50 ft. (Cal 0-18 ft. +/-)	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Flow Element Type: Magnetic Manufacturer: Fisher & Porter (ABB now) Model No. _____ Size: 3" Flow range _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor Comments: • Not used?
	Pressure Element	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Pressure gauge and pressure switch mounted on backplate attached to flange downstream of each pump before check valve. Not used.
			
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:	

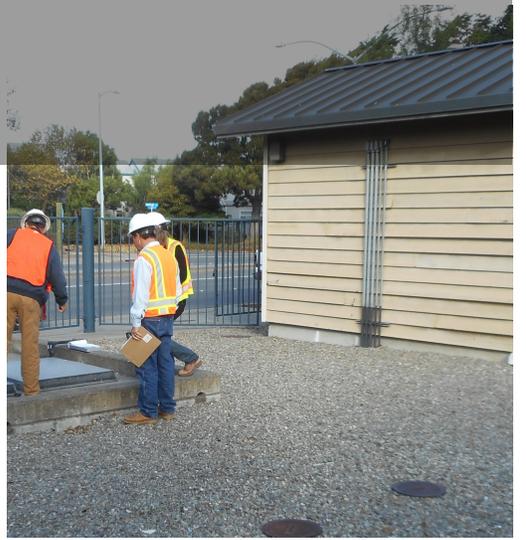
Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No. SLC505  Allen Bradley UPS A-B Panel View 600	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• PLC is obsolete and the UPS is likely to be replaced when batteries need replacing, the rest of the equipment in the control panel has been well maintain and updated with a useable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> </ul> Industry Std. Remaining Life: 0 years
	Input/Output List Pump Run, Fail (possibly seal fail too), Hi and lo level, level, generator and fuel status, transfer switch position, UPS on battery, fuel leak, building intrusion switch, power fail, panel intrusion (didn't see this), flow (didn't see this). Also shown but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed.  Comment: Mission B/U Telemetry system monitors high wet well level.		

Instrumentation / Control Assessment (cont'd)			
<p>SCADA/Telemetry</p>	<p><input checked="" type="checkbox"/> Data Monitoring  <input type="checkbox"/> Pumping Rate  <input type="checkbox"/> Pressure  <input checked="" type="checkbox"/> Wet well Level  <input checked="" type="checkbox"/> Other: Hi &amp; Lo Level  <input checked="" type="checkbox"/> Remote Control  <input type="checkbox"/> Pump On/Off  <input type="checkbox"/>  <input checked="" type="checkbox"/> Other: Monitor Seal Fail, Pump Fail, Ready and Run            Manufacturer_____            Model_____                        Communication Mode  <input type="checkbox"/> Hardwire/Leased line  <input type="checkbox"/> Fiber Optic  <input type="checkbox"/> Internet  <input checked="" type="checkbox"/> Radio  <input checked="" type="checkbox"/> Cell (TB)?             SCADA Software: RSView             Alarms: No autodialer, Back-up is Mission system.</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor            Comments:  <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> <li>Poor cell reception at times. (TB)?</li> </ul>             Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p>

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**APPENDIX E**  
**Canyon Estates No. 2 Lift Station Assessment Form**





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### Assessment Summary and Recommendations for Canyon Estates #2 Pump Station

Assessment Performed by	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
Assessment Date	September 11, 2017

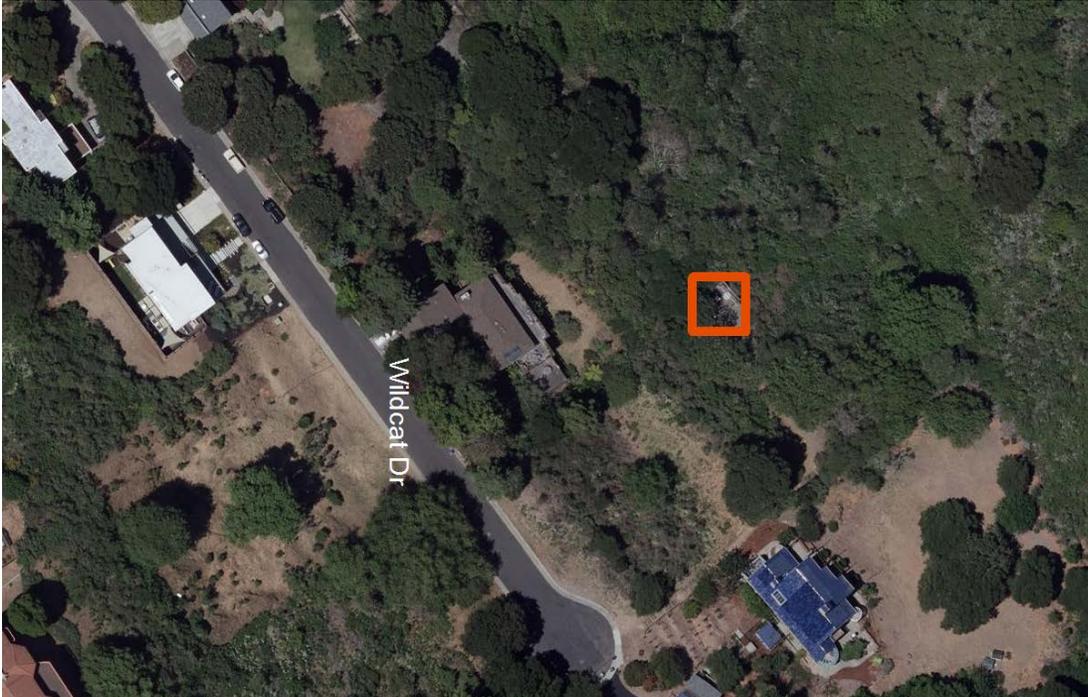
### Desktop Condition Assessment

Facility Name	Canyon Estates #2 Pump Station
Facility Address/Location	Wildcat Dr.
APN#	
Parcel Size	Acres
Status	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

Operations Staff Facility Importance	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently (less than XX hours) <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
Year Originally Constructed	Originally built in 1982. Original pump station removed and new pump station installed in 2001.
Year of Latest Upgrade/Remodel	2005: Power feed changed from utility meter to Canyon Estates #1 PS including backup power from generator at Canyon Estates #1 PS. Installed new level transmitter.
Recent Repairs/Improvements/Maintenance (2013 – 2017)	From Veolia's Richmond Asset and Work History Details.xls None.
Adjacent Land Use	<input checked="" type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input checked="" type="checkbox"/> Park (Wildcat Canyon Regional Park) <input type="checkbox"/> Condos <input type="checkbox"/> School
O&M History Available	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
O & M Manuals Available	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p>Operations Staff Issues of Concern</p>	
<p>Recommended Maintenance Program</p>	<p><input type="checkbox"/> Routine</p> <p><input type="checkbox"/> Special Requirements</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Perform pump/motor maintenance</li><li><input type="checkbox"/> Other _____</li><li><input type="checkbox"/> Other _____</li><li><input type="checkbox"/> Other _____</li></ul>
<p>Additional Comments</p>	

Aerial Photo of Site or  
Site Layout or Site  
Sketch



On-Site Condition Assessment for Pump Station (Canyon Estates #2)

Summary of Site Assessment and Recommendations.

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

Yes; list recommended improvements:

- Access is an important issue that needs to be addressed.
- Replace pump control back board and posts.
- Improve drainage around station.
- Construct retaining wall on down slope side and replace fence post pier that has eroded in the east corner of the site.
- Add barbed wire to top of fence?
- Add site and wet well lighting.
- Ground antenna mast.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes:

No – No vehicle access.

Are the existing facilities upgradeable?

Yes, list recommended upgrades to existing facilities:

- Upgrade the site to three phase power if three phase utility service can be brought into Canyon Estates #1 PS.
- Upgrade the remote I/O with the PLC/RTU at Canyon Estates No. 1 Pump Station.
- Provide proper arc flash labels.
- Ensure EYS fittings are properly installed per code.
- Install electrical service conduit underground.

No, recommend replacement of existing facilities with the following new facilities:

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Facility Assessment – Other			
Safety Equipment	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
Fire Protection	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Security	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Valve vault not lockable.	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Remote site – potentially vulnerable to vandalism. Add barbed wire to top. (TB)	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Panel is shown with intrusion switches on P&ID however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
Odor Control	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>This station experiences odor issues due to low flows. When this occurs the staff manually doses wet well with chemicals or tablets. Veolia also pumps down via SCADA when there are odor complaints.</li> </ul>

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Building and Grounds Assessment – General		
Potential Site Hazards	Overgrown Trees On/Adjacent to Site	<input checked="" type="checkbox"/> Yes; There are trees/shrubs adjacent to the fence. There is minor overgrowth onto the site but in general it appears that the trees/shrubs are kept trimmed. <input type="checkbox"/> No
	Adjacent Fire Hazards	<input checked="" type="checkbox"/> Yes; Surrounded by vegetation, adjacent to open space. <input type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No, Outside FEMA flood zone (100/500).
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within rain induced landslide area; within existing landslide distribution area; within earthquake induced study area <input type="checkbox"/> No
	Liquefaction	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Lightening	<input checked="" type="checkbox"/> Yes; The antenna mast is made up of wood and could be subject to a lightning hit that destroys the Mission System Radio or starts a fire. The antenna shelf must be grounded and the mast should be replaced with grounded metal pole. <input type="checkbox"/> No



Building and Grounds Assessment – Site Evaluation			
<p><b>Fencing</b></p>	<p>Type</p> <p><input type="checkbox"/> Wood</p> <p><input type="checkbox"/> Steel</p> <p><input type="checkbox"/> CMU</p> <p><input checked="" type="checkbox"/> Chain Link</p> <p><input type="checkbox"/> Other _____</p> <p>Gate Type:</p> <p>Double swing 8' panels</p> <p>Lockable? Yes</p>	<p>Year Constructed</p>	<p>Condition:</p> <p>Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• The fence itself is in good shape however the soil around the fence post piers has eroded; post is compromised.</li> <li>• Add barbed wire to top.</li> </ul>
<p><b>Access</b></p>	<p>Surfacing</p> <p><input type="checkbox"/> Asphalt</p> <p><input type="checkbox"/> Concrete</p> <p><input checked="" type="checkbox"/> All weather gravel</p> <p><input type="checkbox"/> Other _____</p> <p>Parking/Vehicle Access</p> <p>None</p> <p>Truck Accessible? No</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Access to the site is difficult. Site must be accessed via stairs and a dirt path. There is no vehicular access.</li> <li>• Stairs are in poor condition</li> </ul> 
<p><b>Water Service</b></p>	<p><input checked="" type="checkbox"/> Not Applicable</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p>
<p><b>Drainage</b></p>	<p>Area of Catchment</p> <p>_____</p>		<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Overflow from the station will flow downhill.</li> <li>• Severe erosion on east corner of site. Drainage needs to be improved to direct water away from this area.</li> </ul>

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Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	<p>Size: 4' Dia. X 8' Deep</p> <p>Material: Fiberglass? (Based on 2001 drawings – no callout, just how it is drawn, see specs.)</p> <p>Coating: ?</p> <p>Operating Volume:</p> <p>Personnel Accessibility N/A</p> <p>Equipment Ingress/Egress Spring assisted hatch with safety grate I-beam located above the pumps that can be used to assist in lifting out the pumps.</p> <p>Grease/Cleanliness Good</p>	<p>Year Constructed 2001</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:  <ul style="list-style-type: none"> <li>• Interior coating masks condition of concrete, unable to perform definitive evaluation. (RT) (2001 drawings indicate possibly a fiberglass packaged pump station)</li> <li>• Packaged Flygt submersible grinder pump station.</li> <li>• Very low inflow.</li> <li>• Different from what is shown in 2001 drawings – drawings show wet well extending to ground level, looks like instead there is a rectangular concrete box over the wet well.</li> </ul> </p>
<b>Valve Box</b>	<p>Size: 2' x 3' (approx.)</p> <p>Material: Concrete Valve Box</p> <p>Coating: N/A</p> <p>Personnel Accessibility: N/A</p> <p>Equipment Ingress/Egress: N/A</p> <p>Housekeeping Good</p>	<p>Year Constructed</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments: Valve box was not opened.</p>

Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>	Fenced Area: 22' x 34' (approx.)  Note: There is no building or concrete pad.  Personnel Accessibility: Double swing 8' gates  Equipment Ingress/Egress: Double swing 8' gates  Housekeeping Good	Year Constructed 2001/2005	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Prime and standby power are from the Canyon Estates #1 site.</li> <li>• Panel support frame is in poor condition – failed structural push/pull test.</li> <li>• There is a small retaining wall along the southeast side of the site. The dirt on the far side of the wall has eroded as has the soil around the fence post foundation.</li> <li>• No site lighting.</li> <li>• Structural Evaluation                          Site specific spectral response acceleration short period (S<sub>s</sub>) →2.453g                          Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →1.020g</li> </ul>
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment			
<b>Main Pump 1</b>	Type: Grinder Duty: _____gpm_____ft HP: 2 (three phase with Flygt single phase module) Manufacturer: Flygt Model: MP 3085.891 Serial number: 0720024	Year Constructed 2001	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2016 inspection report notes the condition of the guide rails as "OK" and all other pump components as "good".</li> </ul>
	Type: Submersible C1, D1 squirrel cage induction with moisture and over temp sensors and relay. (miniCAS) HP: 2 Voltage: 480/1P Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Moisture sensor and over temp sensors and relay.</li> <li>Need to confirm location of EYS fittings and that they are properly installed.</li> </ul>
	Seals Type: Mechanical	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball (per 2001 dwgs) Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: 2001 drawings show ball check valve in wet well. However based on the site visit there appears to be a swing check valve in the valve box. Veolia confirmed there is no check valve in the wet well.
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Ball Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: PVC Size: 2" (transitions to 2 ½" after valve box)	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: Grinder Duty: _____gpm_____ft HP: 2 (three phase with Flygt single phase module) Manufacturer: Flygt Model: MP 3085.891 Serial number: 0230019 (Note: possible error on inspection sheets, this is the same # as a pump at #PS 3)	Year Constructed 2001	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2016 inspection report notes the condition of the guide rails as "OK" and all other pump components as "good".</li> </ul>
	Type: Submersible C1, D1 squirrel cage induction with moisture and over temp sensors and relay (miniCAS) HP: 2 Voltage: 480/1P Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Moisture sensor and over temp sensors and relay.</li> <li>Need to confirm location of EYS fittings and that they are properly installed.</li> </ul>
	Seals Type: Mechanical	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball (per 2001 dwgs) Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: 2001 drawings show ball check valve in wet well. However based on the site visit there appears to be a swing check valve in the valve box. Veolia confirmed there is no check valve in the wet well.
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Ball Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: PVC Size: 2" (transitions to 2 ½" after valve box)	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
Force Main Piping On Site	Type: PVC Size: 2 ½"  Isolation Valve - None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Hoists		Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Overhead monorail I-beam only – no permanent hoist at this site</li> <li>Monorail footing may be compromised by adjacent soil failure</li> </ul>
Surge /Transient Control	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Seal Water System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Sump Pump System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Heating, Ventilation and Cooling Systems	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Gates	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

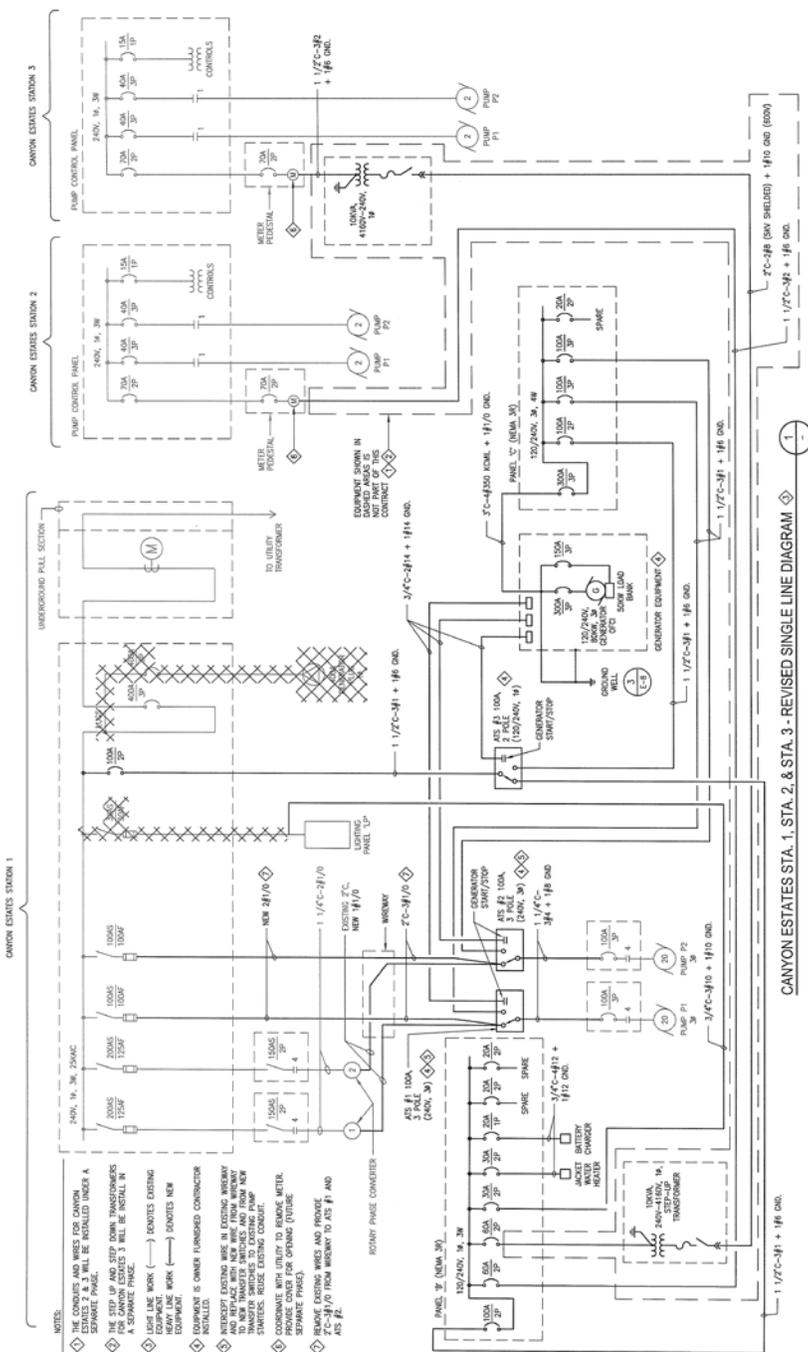
Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> Not Applicable - Off-site standby power generation. <input type="checkbox"/> On-Site Emergency Generator <input type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer _____ Model No. _____ Size (kW) _____ Size KVA _____  Automatic Transfer Switch Amps _____ Manufacturer _____ Model No. _____  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input type="checkbox"/> Yes <input type="checkbox"/> No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Prime and standby power is provided by utility and generator at Canyon Estates #1 Pump Station via two separate panelboard style breakers.</li> </ul>

Electrical and Power System Assessment

Service Size

Amps: No utility service, but 60/2 breaker at Canyon Estates #1 and similar 70/2 main disconnect on site  
Volts: 240 1Ø  
Meter Number: N/A – Power is fed from Canyon Estates #1 PS

- Main breaker is not labeled as required by code.
- Both breakers should be replaced if the service at Canyon Estates #1 is upgraded.



Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Pump control panel NEMA 3R Manufacturer: Flygt	Year Constructed 2001	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Mounted to wood stanchions.</li> <li>Main disconnect is mounted in 4X box on side of control panel.</li> <li>Flygt single phase model with pump relay 2Hp grinders.</li> <li>The EYS (hazardous area) fittings may not be properly filled with hard chico as required by code. This should be verified by Veolia.</li> <li>No arc flash labels.</li> </ul>
	Main Disconnect Load : 45A max Frame Amps: 100/2 Trip Amps: 70A (fed from a 60/2 at Canyon Estates #1)	Year Constructed	
	Main Motor Protector (Pumps 1 and 2) Load: 13A Frame Amps: Square D 2/30 Trip Amps: 30A	Year Constructed	
	Main Load Starter (Pumps 1 and 2) Load: 13A Manufacturer: Square D Model No. 8538-SB02V03S Size: 0 OL B19:5	Year Constructed	

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Electrical and Power System Assessment (cont'd)			
Lighting Panel	Voltage: 120 Amps _____  <u>Note:</u> Integrated into Flygt panel, two 15/1 breakers	Year Constructed 2001	List of Loads Controls, Mission, receptacle, trouble lights  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:   Industry Std. Remaining Life: 5 – 10 years
Lighting	<u>Exterior - Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed N/A	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: • Need site lighting and a light in the wet well.
General, Electrical	Convenience Receptacles	Year Constructed	• One receptacle shown in the pump control panel with 15 A breaker and a second noted, in PLC panel with less than 15 A available..

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Instrumentation / Control Assessment			
Field Instruments	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1-50 ft. (Cal 0-8 ft.)	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Mounted on the exterior of the PLC enclosure and may be subject to vanadalization.
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer: _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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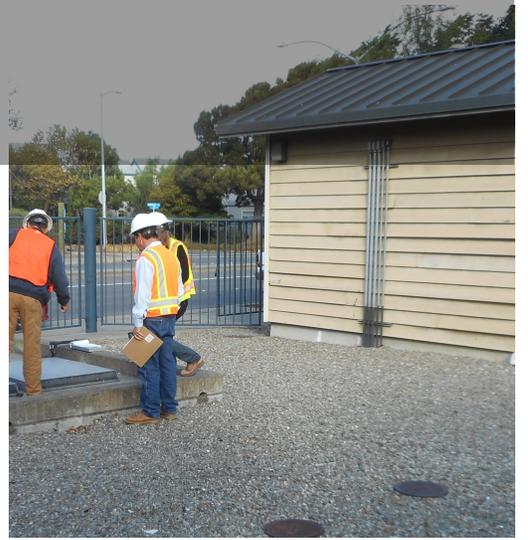
Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC I/O Manufacturer: Allen Bradley Model No. SLC505 I/O Only UPS: Allen Bradley No operator Interface even though shown in SCADA drawings – screen is located in Canyon #1 Electrical Room.	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing, the rest of the equipment in the control panel has been well maintained and updated with a useable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List Level, Hi & Lo level Alarms, Pump run, ready, fail, UPS alarm and on Battery, panel entry and power failure.			
Comments: <ul style="list-style-type: none"> <li>Mission system with temporary mast</li> <li>Unused secondary wood mast with loose cables and no grounding</li> </ul>			

Instrumentation / Control Assessment (cont'd)			
<p>SCADA/Telemetry</p>	<p><input checked="" type="checkbox"/> Data Monitoring  <input type="checkbox"/> Pumping Rate  <input type="checkbox"/> Pressure  <input checked="" type="checkbox"/> Wet well Level  <input checked="" type="checkbox"/> Other: HI &amp; Lo alarms, power fail, UPS, intrusion</p> <p><input checked="" type="checkbox"/> Remote Control  <input type="checkbox"/> Pump On/Off  <input checked="" type="checkbox"/> Other: Run, Fail, Ready</p> <p>Manufacturer _____            Model _____</p> <p>Communication Mode  <input type="checkbox"/> Hardwire/Leased line  <input type="checkbox"/> Fiber Optic  <input type="checkbox"/> Internet  <input type="checkbox"/> Radio  <input checked="" type="checkbox"/> Hardwire RS-485 cable;  <input checked="" type="checkbox"/> Cell</p> <p>SCADA Software: RSView</p> <p>Alarms: No, Autodialer            Backup is Mission system.</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Poor cellular communication. (TB)</li> <li>• All PLC inputs are likely available in SCADA.</li> </ul> <p>Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p>

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**APPENDIX F**  
**Canyon Estates No. 3 Lift Station Assessment Form**





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### Assessment Summary and Recommendations for Canyon Estates #3 Pump Station

Assessment Performed by	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
Assessment Date	September 11, 2017

### Desktop Condition Assessment

Facility Name	Canyon Estates #3 Pump Station
Facility Address/Location	Corner of Wildcat Dr. and Rifle Ranch Rd.
APN#	
Parcel Size	
Status	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

Operations Staff Facility Importance	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently (less than XX hours) <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
Year Originally Constructed	Pump Station: Originally built at a location approximately 100' away. Original site was demolished and backfilled. Pump station at current location constructed in 2001.
Year of Latest Upgrade/Remodel	2005: Power feed changed from utility meter to Canyon Estates #1 PS utilizing a step up transformer at Canyon Estates #1 and a step down transformer at this site. Power feed change also included backup power from generator at Canyon Estates #1 PS. Relocated telemetry panel and installed new level transmitter.
Recent Repairs/Improvements/Maintenance (2013 – 2017)	From Veolia's Richmond Asset and Work History Details.xls 4/5/17   Installed new Mission SCADA radio at Canyon #3 Pump Station. Returned to service. 9/3/15   Pump #2 - there is oil in the stator chamber; seals have failed in pump, purchased rebuild kit and overhauled pump , back to normal operation
Adjacent Land Use	<input checked="" type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input checked="" type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
O&M History Available	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
O & M Manuals Available	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p>Operations Staff Issues of Concern</p>	
<p>Recommended Maintenance Program</p>	<p><input type="checkbox"/> Routine</p> <p><input type="checkbox"/> Special Requirements</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Perform pump/motor maintenance</li><li><input type="checkbox"/> Other _____</li><li><input type="checkbox"/> Other _____</li><li><input type="checkbox"/> Other _____</li></ul>
<p>Additional Comments</p>	

Aerial Photo of Site or Site  
Layout or Site Sketch



On-Site Condition Assessment for Pump Station (Canyon Estates #3)

<p>Summary of Site Assessment and Recommendations.</p>	<p><input type="checkbox"/> Facilities and site are in generally <u>good</u> poor condition (circle one)</p> <p>Are there any recommended site improvements?</p> <p><input checked="" type="checkbox"/> Yes; list recommended improvements:</p> <ul style="list-style-type: none"><li>• Access is an important issue that needs to be addressed.</li><li>• Remove abandoned meter enclosure at road.</li><li>• Ground antenna mast.</li><li>• Replace pump control panel support.</li><li>• Add site and wet well lighting.</li></ul> <p><input type="checkbox"/> No, no site improvements needed</p> <p>Is there space on-site for staging/bypassing, if necessary?</p> <p><input checked="" type="checkbox"/> Yes; limited: Available on adjacent private driveway.</p> <p><input type="checkbox"/> No</p> <p>Are the existing facilities upgradeable?</p> <p><input checked="" type="checkbox"/> Yes, list recommended upgrades to existing facilities:</p> <ul style="list-style-type: none"><li>• Convert to 3 phase power.</li><li>• Upgrade the remote I/O with the PLC/RTU at Canyon Estates No. 1 Pump Station.</li><li>• Provide proper arc flash labels.</li><li>• Ensure EYS fittings are properly installed per code.</li><li>• Install electrical service conduit underground.</li></ul> <p><input type="checkbox"/> No, recommend replacement of existing facilities with the following new facilities:</p>
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Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Valve vault not lockable.	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Panel is shown with intrusion switches on P&ID however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>May pose an odor problem for adjacent house.</li> </ul>

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Building and Grounds Assessment – General		
Potential Site Hazards	Overgrown Trees On/Adjacent to Site	<input checked="" type="checkbox"/> Yes; there are bushes on the outside of the fence that must be maintained to prevent overgrowth onto the site. <input type="checkbox"/> No
	Adjacent Fire Hazards	<input checked="" type="checkbox"/> Yes; Located in residential area, surrounded by vegetation, adjacent to open space. <input type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within rain induced landslide area; within existing landslide distribution area; within earthquake induced study area <input type="checkbox"/> No
	Liquefaction	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Lightening	<input checked="" type="checkbox"/> Yes; mast should be grounded. <input type="checkbox"/> No

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Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input checked="" type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type: Double swing 8' panels  Lockable? Yes	Year Constructed	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Access</b>	Surfacing <input type="checkbox"/> Asphalt <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> All weather gravel <input checked="" type="checkbox"/> Other: Dirt  Parking/Vehicle Access  Number of parking spaces There is an adjacent residence that allows trucks to park in the driveway if required.  Truck Accessible? Yes	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Access to the site is either by parking on the street and walking down a long set of stairs or by getting permission from nearby resident to park in the driveway.</li> <li>Stairs have non-standard riser/tread</li> </ul> 
<b>Water Service</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Overflow from the station will flow downhill into the adjacent open park land.</li> </ul>

Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	Size: 4' Dia. X 8' Deep  Material: Fiberglass  Coating: None  Operating Volume:  Personnel Accessibility N/A  Equipment Ingress/Egress Spring assisted hatch with safety grate I-beam located above the pumps that can be used to assist in lifting out the pumps.  Grease/Cleanliness Good	Year Constructed 2001	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Packaged Flygt submersible grinder pump station.</li> <li>Minor concrete corrosion. Reline approx. 10 years. (TB)?</li> <li>Different from what is shown in 2001 drawings – drawings show wet well extending to ground level, looks like instead there is a rectangular concrete box over the wet well.</li> </ul>
<b>Valve Box</b>	Size: 2' x 3' (approx.)  Material: Concrete Valve Box  Coating: N/A  Personnel Accessibility: N/A  Equipment Ingress/Egress: N/A  Housekeeping Good	Year Constructed 2001	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Flooded valve vault – seasonal. (TB under 'suction piping')</li> </ul> <div style="text-align: center;">  </div>

Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>	<p>Size of Fenced Area: 9' x 17' (approx.)</p> <p>Note: There is no building or concrete pad.</p> <p>Personnel Accessibility: Double swing 8' gates</p> <p>Equipment Ingress/Egress: Double swing 8' gates</p> <p>Housekeeping Good</p>	<p>Year Constructed 2001/2005</p>	<p>Condition: Exterior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Panel support failed push/pull test.</li> <li>• Supports for control panel need fixed - lag screw for control panel is bent, supporting wood is split, kicker to support wood stanchion is wedged into the ground with no positive connection.</li> <li>• Antenna support is compromised. Antenna mast help in place with galvanized bands</li> <li>• No site lighting.</li> <li>• Structural Evaluation Site specific spectral response acceleration short period (S<sub>s</sub>) →2.461g Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →1.023g</li> </ul>
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment			
<b>Main Pump 1</b>	Type: Grinder Duty: _____gpm_____ft HP: 2 (three phase with Flygt single phase module) Manufacturer: Flygt Model: MP 3085.891 Serial number: 0230019	Year Constructed 2001	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2016 inspection report notes that condition of pump components as "good".</li> </ul>
	Type: Submersible C1, D1 squirrel cage induction motor with moisture and over temp sensors and relay (miniCAS) HP: 2 Voltage: 240/3P Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Moisture sensor and over temp sensors and relay.</li> <li>Need to confirm location of EYS fittings and that they are properly installed.</li> </ul>
	Seals Type: Mechanical	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball (per 2001 dwgs) Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: 2001 drawings show ball check valve in wet well. However based on the site visit there appears to be a swing check valve in the valve box. Veolia confirmed there is no check valve in the wet well.
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Ball Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: PVC Size: 2" (transitions to 2 ½" after valve box)	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: Grinder Duty: _____gpm_____ft HP: 2 (three phase with Flygt single phase module) Manufacturer: Flygt Model: MP 3085.891 Serial number: 0230016	Year Constructed 2001	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2016 inspection report notes that condition of pump components as "good".</li> </ul>
	Type: Submersible C1, D1 squirrel cage induction motor with moisture and over temp sensors and relay (miniCAS) HP: 2 Voltage: 240/3P Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Moisture sensor and over temp sensors and relay.</li> <li>Need to confirm location of EYS fittings and that they are properly installed.</li> </ul>
	Seals Type: Mechanical	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball (per 2001 dwgs) Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: 2001 drawings show ball check valve in wet well. However based on the site visit there appears to be a swing check valve in the valve box. Veolia confirmed there is no check valve in the wet well.
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Ball Size: 2 " Manufacturer_____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: PVC Size: 2" (transitions to 2 ½" after valve box)	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment (cont'd)			
Force Main Piping On Site	Type: PVC Size: 2 1/2"  Isolation Valve - None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Hoists		Year Constructed 2001	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Overhead I-beam only – no permanent hoist at this site
Surge /Transient Control	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Seal Water System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Sump Pump System	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Heating, Ventilation and Cooling Systems	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
Gates	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> Off-site standby power generation. <input type="checkbox"/> On-Site Emergency Generator <input type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer _____ Model No. _____ Size (kW) _____ Size KVA _____  Automatic Transfer Switch Amps _____ Manufacturer _____ Model No. _____  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input type="checkbox"/> Yes <input type="checkbox"/> No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Prime and standby power is provided by utility and generator at Canyon Estates #1 Pump Station via two separate panelboard style breakers.</li> </ul>



Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Pump Control Panel NEMA 3R Manufacturer: Flygt	Year Constructed 2001	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Mounted to wood stanchions.</li> <li>Flygt MiniCAS pump protection relays.</li> <li>No arc flash labels.</li> </ul>
	Main Motor Protector Load : 45A Frame Amps: 100/2 Trip Amps: 70A	Year Constructed	
	Main Motor Protector (Pumps 1 and 2) Load: 13A Frame Amps: Square D 2/30 Trip Amps: 30A	Year Constructed	
	Main Load Starter Load: 13A Manufacturer: Square D Model No. 8538-SB02V03S Size: 0 OL B19:5	Year Constructed	

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Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120 Amps _____  <u>Note:</u> Integrated into Flygt panel, two 15/1 breakers	Year Constructed 2001	List of Loads Controls, Mission, receptacle, trouble alarm  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Lighting</b>	<u>Exterior - Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed N/A	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: • Need site lighting and a light in the wet well.
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	• One receptacle shown in the pump control panel with 15 A breaker and a second noted, in PLC panel with less than 15 A available..

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Instrumentation / Control Assessment			
Field Instruments	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1-50 ft. (Cal 0-8 ft.)	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Mounted on the exterior of the PLC enclosure and may be a vanadalization issue.  Industry Std. Remaining Life: 3 - 5 years
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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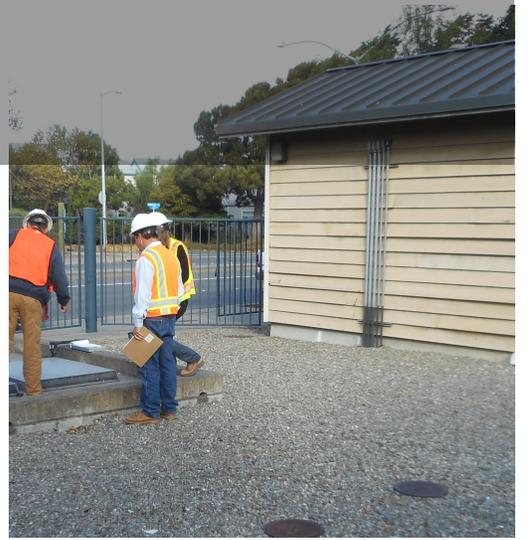
Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC I/O Manufacturer: Allen Bradley Model No. SLC505 I/O Only UPS: Allen Bradley No operator Interface even though shown in SCADA drawings – screen is located in Canyon #1 Electrical Room.	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing, the rest of the equipment in the control panel has been well maintained and updated with a useable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List Level, Hi & Lo level Alarms, Pump run, ready, fail, UPS alarm and on Battery, panel entry and power failure.  Comment: Mission system			

Instrumentation / Control Assessment (cont'd)			
<p>SCADA/Telemetry</p>	<p><input checked="" type="checkbox"/> Data Monitoring  <input type="checkbox"/> Pumping Rate  <input type="checkbox"/> Pressure  <input checked="" type="checkbox"/> Wet well Level  <input checked="" type="checkbox"/> Other: HI &amp; Lo alarms, power fail, UPS, intrusion</p> <p><input checked="" type="checkbox"/> Remote Control  <input type="checkbox"/> Pump On/Off  <input checked="" type="checkbox"/> Other: Run, Fail, Ready</p> <p>Manufacturer _____            Model _____</p> <p>Communication Mode  <input type="checkbox"/> Hardwire/Leased line  <input type="checkbox"/> Fiber Optic  <input type="checkbox"/> Internet  <input type="checkbox"/> Radio  <input checked="" type="checkbox"/> Hardwire RS-485 cable  <input checked="" type="checkbox"/> Cell</p> <p>SCADA Software: RSView</p> <p>Alarms: No Autodialer,            Backup is Mission system</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>Poor cellular communication. (TB)?</li> <li>All PLC inputs are likely available in SCADA.</li> </ul> <p>Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p>

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**APPENDIX G**  
**Ferry Point Lift Station Assessment Form**





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## Assessment Summary and Recommendations for Ferry Point Pump Station

<b>Assessment Performed by</b>	Vivian Housen, Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 11, 2017

### Desktop Condition Assessment

<b>Facility Name</b>	Ferry Point Pump Station
<b>Facility Address/Location</b>	Island at the intersection at Corner of Brickyard Cove Rd. and Dornan Dr.
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently <input type="checkbox"/> Yes <input type="checkbox"/> No (less than XX hours) Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Year Originally Constructed</b>	1962
<b>Year of Latest Upgrade/Remodel</b>	2005: Installed emergency generator and automatic transfer switch, PLC, level transmitter, level float switch and antenna.
<b>Recent Repairs/Improvements/Maintenance (2013 – 2017)</b>	From Veolia's Richmond Asset and Work History Details.xls 1/24/14    When pumps become air bound , need two people to release air due to confined space entry , connect tubing and bring valves up top out of confined space Install peroxide injection piping into line past check valve so not to feed back into wet well causing foaming issues 6/3/14    Replaced sump pump w/ new unit 6/25/16   Generator faulted out took 3 times to start from ATS (over speed shutdown) cleared fault generator started. 9/10/16   Piping for sump pump plugged up and deteriorating badly tried unplugging without success 11/15/16   Pump #1 inoperable-exceeds-F/A current draw at starting - 200amps. 4/27/17   Unclog sump pump located at Ferry point Sanitary Pump Station. 5/5/17    Replace Pump #1 located at Ferry Point Sanitary Pump Station. Also replace power disconnect box located in dry-pit.
<b>Adjacent Land Use</b>	<input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Other: Planned Area <input type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input checked="" type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School



Aerial Photo of Site or  
Site Layout or Site  
Sketch



On-Site Condition Assessment for Pump Station (Ferry Point)

<p><b>Summary of Site Assessment and Recommendations.</b></p>	<p><input type="checkbox"/> Facilities and site are in generally <u>good</u> / poor condition (circle one)</p> <p>Are there any recommended site improvements?</p> <p><input checked="" type="checkbox"/> Yes; list recommended improvements:</p> <ul style="list-style-type: none"><li>• Remove antenna mast.</li><li>• Remove abandoned electrical equipment, replace partially abandoned electrical equipment.</li><li>• Hydrogen peroxide tank should be restrained for wind or seismic (Veolia does not operate this)</li></ul> <p><input type="checkbox"/> No, no site improvements needed</p> <p>Is there space on-site for staging/bypassing, if necessary?</p> <p><input type="checkbox"/> Yes; describe:</p> <p><input type="checkbox"/> No</p> <p>Are the existing facilities upgradeable?</p> <p><input type="checkbox"/> Yes, list recommended upgrades to existing facilities:</p> <p><input checked="" type="checkbox"/> No, recommend replacement of existing facilities with the following new facilities:</p> <ul style="list-style-type: none"><li>• The fix for the leaking suction pipe requires major construction and therefore a simple upgrade is not feasible. Either convert station to submersible station or station will require major rehab to fix suction piping.</li><li>• Upgrade service to 480 V, 3 ph.</li><li>• Upgrade utility service equipment.</li><li>• Replace PLC in existing enclosure.</li><li>• Provide proper arc flash labels.</li><li>• Fix the loose wire running through the vent above the door.</li><li>• Ensure EYS fittings are properly installed per code.</li></ul>
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Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input checked="" type="checkbox"/> MSDS <input checked="" type="checkbox"/> Other: Emergency Shower/Eye Wash <input type="checkbox"/> None	
<b>Fire Protection</b>	<input type="checkbox"/> Automatic Sprinkler <input checked="" type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Locks	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Gate for Hydrogen Peroxide was not secured.	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Upgrade to LED	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Building and panel are shown with intrusion switches on P&ID drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> None Chemical Feed System <input checked="" type="checkbox"/> Chemical: Hydrogen Peroxide <input type="checkbox"/> None Safety <input checked="" type="checkbox"/> Emergency Eye Wash Station <input checked="" type="checkbox"/> Emergency Shower <input type="checkbox"/> None	Year Constructed 2015	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: During the summer, hydrogen peroxide is injected into the wet well to alleviate odor issues downstream of the pump station. The hydrogen peroxide system is maintained by an outside contractor, not Veolia. The hydrogen peroxide chemical tank is located within a fenced area adjacent to the pump station fenced area and the hydrogen peroxide pump is located within the pump station fenced area. The emergency eye wash is located within the pump station fenced area and therefore is not easily accessible for personnel working on the tank in the adjacent fenced area. The tank is not restrained for wind or seismic.

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<b>Building and Grounds Assessment – General</b>		
<b>Potential Site Hazards</b>	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input checked="" type="checkbox"/> Yes; within tsunami inundation area; within FEMA flood zone (100/500) <input type="checkbox"/> No
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential “very high”. <input type="checkbox"/> No

Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input checked="" type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type: Double swing 6' panels  Lockable? Yes	Year Constructed  Was this replaced in 2005? Wooden fence shown on drawings	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input type="checkbox"/> Concrete <input type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces: Street Parking  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Water Service</b>	Size "3/4"  Material _____  Backflow Preventer: Yes	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Storm drain inlet adjacent to building.</li> </ul>

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**Building and Grounds Assessment – Structural – Pump Station**

<b>Wet Well</b>	Size: 4 ft. dia. x 14 ft. deep  Material: Concrete  Coating: Unknown  Operating Volume: ___cf  Personnel Accessibility N/A  Equipment Ingress/Egress Difficult – via 16" dia. manhole (did not field measure, approx. measurement from drawing)  Grease/Cleanliness Could not see far enough into wet well to assess condition	Year Constructed 1962/55	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Manway rims and visible concrete is corroded and there is exposed aggregate.</li> <li>Veolia reported that this wet well historically has damage due to high H2S levels.</li> </ul> <div style="text-align: center;">     </div>
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**Building and Grounds Assessment – Structural – Pump Station**

<b>Dry Well</b>	<p>Size: 7 ft. dia. x 7'-2" deep Material: Concrete</p> <p>Coating: None</p> <p>Personnel Accessibility Confined space entry through 3' ø entry tube via ladder.</p> <p>Equipment Ingress/Egress There are two ceiling mounted 1000 lb capacity chain hoists and also a floor mounted jib crane (310 lb rating)</p> <p>Housekeeping Not available - did not enter the dry well</p>	<p>Year Constructed 1962/55</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:  <ul style="list-style-type: none"> <li>Not inspected – confined space entry.</li> <li>Need to measure steel cam thickness.</li> </ul> </p> <div style="text-align: center;">  </div>
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**Building and Grounds Assessment – Structural - Other**

<b>Control/Electrical Building</b>	<p>Size: 31 ft by 14 ft divided into two separate rooms – area above dry well and separate storage area</p> <p>Material: Wood frame/Wood Siding</p> <p>Coating: Paint</p> <p>Roof type: Asphalt shingles</p> <p>Date of Latest Repair _____</p> <p>Roof Condition: Poor</p> <p>Personnel Accessibility Storage area – two 36” doors Above dry well – one 36” door</p> <p>Equipment Ingress/Egress Storage area – two 36” doors Above dry well – one 36” door</p> <p>Housekeeping Fair</p>	<p>Year Constructed</p> <p>1962</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Superstructure is divided into two rooms. An approximately 16' x 14' room includes the electrical and telemetry panels and also the access to the dry well. The second room serves as a storage area.</li> <li>• Need drawings – when built? 1962 drawings don't show building.</li> <li>• Gutters/downspouts are corroded/non-existent</li> <li>• Roof shingles past expected life.</li> <li>• Abandoned and partially abandoned electrical equipment should be removed or removed and replaced (simplified).</li> <li>• Structural Evaluation Site specific spectral response acceleration short period (S<sub>s</sub>) → 1.512g Site specific spectral response acceleration 1-sec (S<sub>1</sub>) → 0.600g <u>FEMA P-154</u> Probability of collapse 1x10<sup>1.8</sup> (1 in 63 following MCE) <u>ASCE/SEI 41 Tier 1</u> 10 noncompliant conditions identified</li> </ul> <div style="text-align: center; margin-top: 10px;">  </div>
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<b>Other Structures</b>	<p><b>Description:</b> Hydrogen Peroxide Pump Enclosure</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• There is a roll-top plastic enclosure that the hydrogen peroxide injection system is enclosed in within the fenced area of the pump station. There is a large hydrogen peroxide polyethylene storage tank outside of the pump station fenced area but within a fenced area adjacent to the pump station fenced area.</li> </ul>
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Mechanical Systems Assessment			
<b>Main Pump 1</b> <span style="color: red;">Need info</span>	Type: _____ Duty: _____ gpm _____ ft HP: _____ Manufacturer: _____ _____ Model: _____ Serial number: _____ _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type HP: 15 Voltage: 240 V, 3 P Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Need to confirm location of EYS and that they are properly installed.</li> </ul>
	Seals Type _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping Type CIP (?) Size 4"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type CIP (?) Size 6"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: _____ Duty: _____ gpm _____ ft HP: _____ Manufacturer: _____ Model: _____ Serial number: _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type _____ HP _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Seals Type _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping Type CIP (?) Size 4"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor Comments: The pipe is leaking. Veolia hired a contractor to repair the leak and discovered that this pipe was previously repaired and could not be repaired again.
	Discharge Piping Type CIP (?) Size 6"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

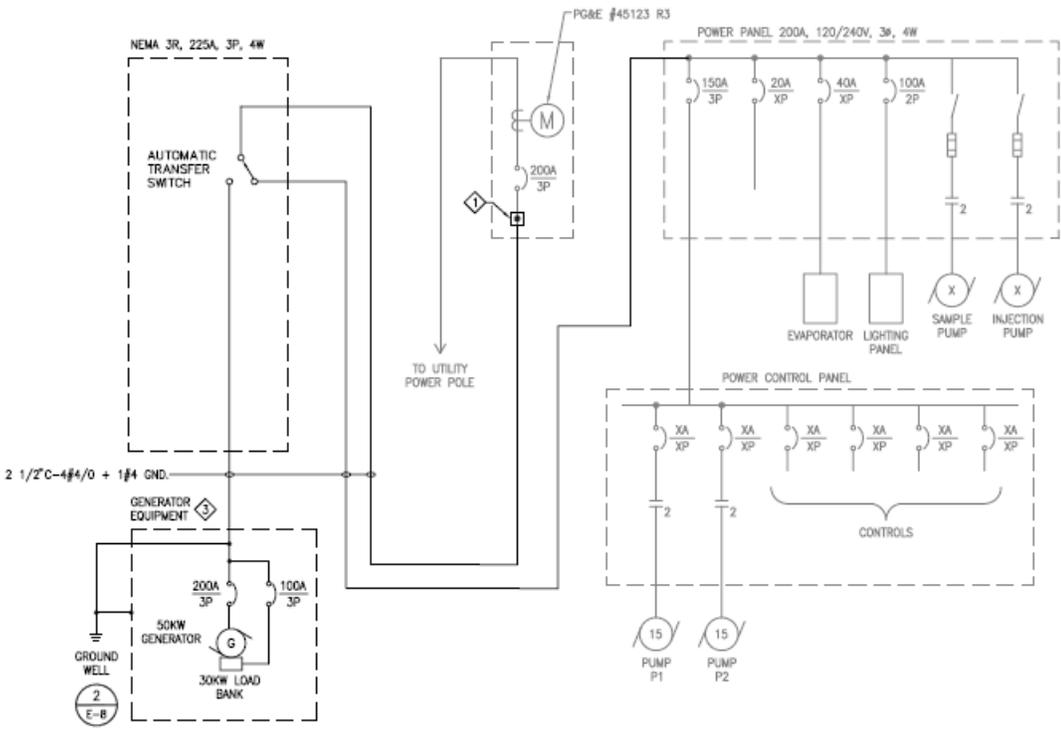
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<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Force Main Piping On Site</b>	Type: CIP Size: 6"  Isolation Valve Type _____ Size _____	Year Constructed   Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments
<b>Hoists</b>	Type: Ceiling Mounted Capacity: 1000 lbs Quantity: 2	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Verify adequacy of 4x6 beam carrying the two 1000 lb. lifting hooks.
<b>Hoists</b>	Type: Floor Mounted Jib Crane Capacity: unknown	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Heating, Ventilation and Cooling Systems</b>	Wall unit for storage and electrical room areas.	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> On-Site Emergency Generator <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Cummins Model No. Size (kW): 50 Size KVA:62.5  Automatic Transfer Switch Amps: 260 Manufacturer: Asco Model No.: 7000 NEMA 3  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Year Constructed 2005/12	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  <ul style="list-style-type: none"> <li>No arc flash labels.</li> <li>Vibration base isolators undersized.</li> </ul>

**Electrical and Power System Assessment**

<b>Service Size</b>	Amps: 200 Volts: 120/240 3Ø Meter Number: 1009919762		Original 1962 unit in poor condition. No arc flash labels.
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Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120/240, 1ø Amps: 50A	Year Constructed 1962 & 2005	<p>List of Loads Lighting, Station Light, Receptacle, BU Controls, Telemetry Control Panel, Jacket Water Heater, Generator Battery Charger, Receptacle</p> <p>Condition: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• The original lighting panelboard should be removed. (may be used for older lights and receptacles)</li> <li>• No arc flash labels.</li> </ul> <p>Industry Std. Remaining Life: 0 &amp; 10 yrs.</p>
<b>Lighting</b>	<p><u>Dry Well Room (Lower Level)</u> Type: ? Condition _____ Adequate Lighting _____</p> <p><u>Dry Well Room (Upper Level)</u> Type: Flourescent Condition _____ Adequate Lighting _____</p> <p><u>Storage Room</u> Type: Flourescent Condition _____ Adequate Lighting _____</p> <p><u>Exterior - Site</u> Type: Wallpak Adequate Lighting: No</p>	Year Constructed 1962	<p>Condition: <input type="checkbox"/> Good   <input type="checkbox"/> Fair   <input checked="" type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Fluorescent strip inside and Wall Pak outside</li> </ul> <p>Industry Std. Remaining Life: 0 yrs.</p>
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed 1962	<p>Industry Std. Remaining Life: 0 yrs.</p>

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Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No.: HydroRanger 200 Range: 1-50 ft. (Cal for 0- 14 ft.)	Year Constructed 2005/12	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 5-7
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

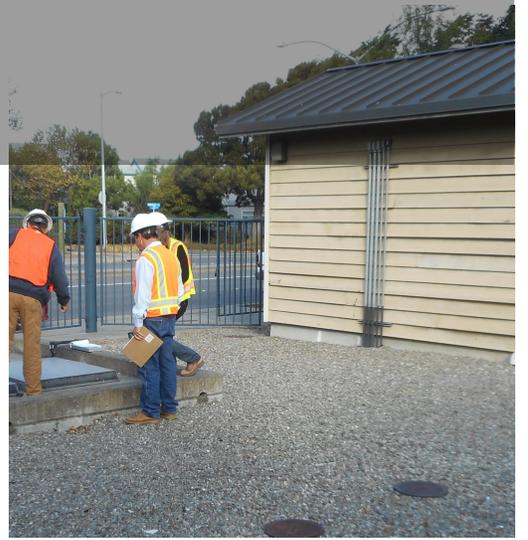
**Veolia Water- City of Richmond**

Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No.: SLC-505 Panelview 600 A-B UPS in separate enclosure	Year Constructed 2005/12	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing. The rest of the equipment in the control panel has been well maintain and updated with a usable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> <li>No arc flash labels.</li> </ul> Industry Std. Remaining Life: 0 years
	Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Generator and Fuel Status, Transfer Switch Position, UPS on Battery, Fuel Leak, Building Intrusion Switch, Power Fail and Panel Intrusion. Also shown but not monitored: high/low battery, low fuel, low oil press, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed.  Comment: Mission Back-up Telemetry (Hi Level Switch)		

Instrumentation / Control Assessment (cont'd)			
<b>SCADA/Telemetry</b>	<input checked="" type="checkbox"/> Data Monitoring <input type="checkbox"/> Pumping Rate <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Wet well Level <input checked="" type="checkbox"/> Other: Hi&Lo level alarms  <input type="checkbox"/> Remote Control <input type="checkbox"/> Pump On/Off <input type="checkbox"/> <input type="checkbox"/> Other _____  Manufacturer: Model:  Communication Mode <input type="checkbox"/> Hardwire/Leased line <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Internet <input type="checkbox"/> Radio <input checked="" type="checkbox"/> Cell Modem  SCADA Software: RS View  Alarms: No autodialer, Back-up is Mission system.	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> </ul> <p>Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p>



**APPENDIX I**  
**Keller Beach Lift Station Assessment Form**





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### Assessment Summary and Recommendations for Keller Beach Pump Station

<b>Assessment Performed by</b>	Vivian Housen, Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 11, 2017

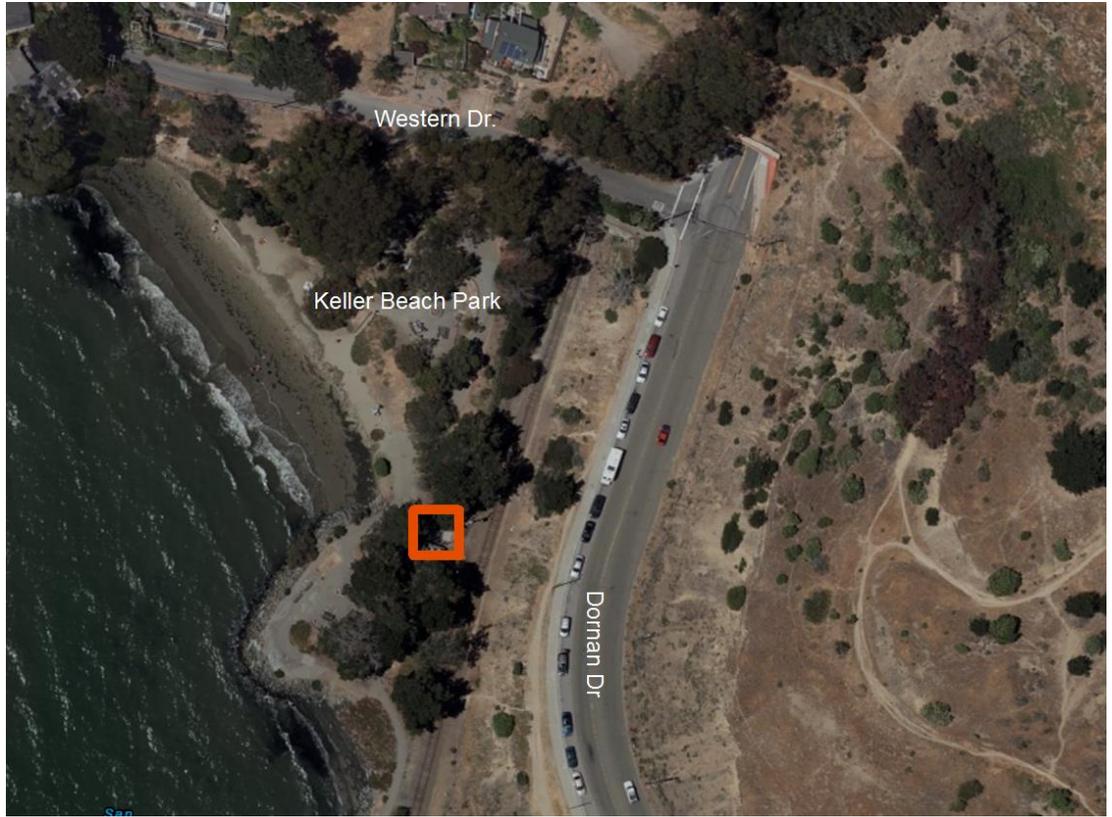
### Desktop Condition Assessment

<b>Facility Name</b>	Keller Beach Pump Station
<b>Facility Address/Location</b>	Keller Beach Park
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (less than 1 hour) Can be out of service for greater than 1 hours <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Year Originally Constructed</b>	Unknown
<b>Year of Latest Upgrade/Remodel</b>	1996: Replaced ejector assembly with submersible pumps, modified wet well to include partition wall and installed valve box with piping, check valves and plug valves and installed service panel and HPS light. 2005: Installed new level transmitter and float switch, telemetry panel and new emergency generator and ATS.
<b>Recent Repairs/Improvements/Maintenance (2013 – 2017)</b>	From Veolia's Richmond Asset and Work History Details.xls None
<b>Adjacent Land Use</b>	<input checked="" type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Other _____ <input type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input checked="" type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p><b>Operations Staff Issues of Concern</b></p>	<p>Staff is concerned about the concrete pad supporting the telemetry and electrical panels. It has been undermined by ground squirrels and there is a substantial gap below the pad.</p>
<p><b>Recommended Maintenance Program</b></p>	<p><input type="checkbox"/> Routine</p> <p><input type="checkbox"/> Special Requirements</p> <p><input type="checkbox"/> Perform pump/motor maintenance</p> <p><input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> Other _____</p>
<p><b>Additional Comments</b></p>	

Aerial Photo of Site or Site  
Layout or Site Sketch



**On-Site Condition Assessment for Pump Station (Keller Beach)**

**Summary of Site Assessment and Recommendations.**

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

Yes; list recommended improvements:

- Remove antenna mast and old radio enclosure.
- Provide permanent mast for cell modem antennas.
- Repair/replace wet well concrete curb, hatch and access ladder.
- Repair undermined concrete slab.
- Install site and wet well manually controlled lighting.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes; A pump could be dropped into the wet well and connected to the forcemain within the valve vault. There is currently a flanged connection with an isolation valve. However the flange is corroded.

No

Are the existing facilities upgradeable?

Yes, list recommended upgrades to existing facilities:

- Replace PLC in existing enclosure.
- Provide proper arc flash labels.
- Ensure EYS fittings are properly installed per code.
- Provide cable management hardware.
- Replace corroded pipe and fittings within valve vault.
- Remove abandoned generator receptacle.
- Install new base isolators for generator if required.
- Correct the mis-labeled main service disconnect breakers in the transfer switch enclosure and the Tesco pedestal to eliminate this safety issues and code violation.

No, recommend replacement of existing facilities with the following new facilities:

Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, and Panels	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Site lighting is from nearby light poles. There is no lighting specifically for the pump station.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Panel is shown with intrusion switch on P&ID drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Building and Grounds Assessment – General		
Potential Site Hazards	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input checked="" type="checkbox"/> Yes, station is in close proximity to beach; w/in Tsunami inundation area; within FEMA flood zone (100/500) <input type="checkbox"/> No
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area; within existing landslide distribution; may be within rain induced landslide zone <input type="checkbox"/> No
	Liquefaction	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No, liquefaction potential “very low”.
	Sanitary Sewer Overflow	<input checked="" type="checkbox"/> Yes. There is particular concern due to the proximity of the station to the beach. Therefore, the alarm set point is very low. The City should have a backup pump readily available for this site and a spill kit onsite. <input type="checkbox"/> No

Building and Grounds Assessment – Site Evaluation			
<p><b>Fencing</b></p>	<p>Type</p> <p><input type="checkbox"/> Wood</p> <p><input type="checkbox"/> Steel</p> <p><input type="checkbox"/> CMU</p> <p><input checked="" type="checkbox"/> Chain Link</p> <p><input type="checkbox"/> Other _____</p> <p>Gate Type: 6' Double panels</p> <p>Lockable? Yes</p>	<p>Year Constructed</p>	<p>Condition:</p> <p>Exterior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Problems with graffiti in this location.</li> </ul> 
<p><b>Access</b></p>	<p>Surfacing</p> <p><input checked="" type="checkbox"/> Asphalt</p> <p><input type="checkbox"/> Concrete</p> <p><input type="checkbox"/> All weather gravel <input type="checkbox"/></p> <p>Other _____</p> <p>Parking/Vehicle Access</p> <p>Number of parking spaces</p> <p>No delineated parking, room for several vehicles on service road</p> <p>Truck Accessible? Yes</p>	<p>Year Constructed</p>	<p>Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Pump station is located at Keller Beach Park. Access is via East Bay Parks service road.</li> </ul>
<p><b>Water Service</b></p>	<p><input checked="" type="checkbox"/> Not Applicable</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p>

Building and Grounds Assessment – Site Evaluation (cont.)

Drainage

Area of Catchment

Condition:  Good  Fair  Poor

Comments:

- A SSO would drain to nearby storm drain.



**Building and Grounds Assessment – Structural – Pump Station**

<p><b>Wet Well</b></p>	<p>Size: 10.5 ft x 10.5 ft x 18.71ft</p> <p>Material: Concrete</p> <p>Coating: None</p> <p>Operating Volume: ____cf</p> <p>Personnel Accessibility: Via ladder through 2'x2' hatch in the NW corner of wet well, ladder is corroded and only extends a few feet into the wet well; may not be structurally sound</p> <p>Equipment Ingress/Egress There is a main wet well hatch approximately 4' x 4' which must be lifted by boom truck.</p> <p>Grease/Cleanliness Good</p>	<p>Year Constructed</p>	<p>Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Invert elevation is -10.94 based on 1996 mechanical drawings. (Note that 1996 drawings show a discrepancy in the elevations between the electrical and mechanical drawings. However, the overall depth is the same)</li> <li>• Ejector pumps were replaced in 1996 with submersible pumps and wet well was modified with the addition of a partition wall and concrete fillets.</li> <li>• Concrete is visually good, surface not friable to touch.</li> <li>• Concrete curb is compromised – must be repaired/replaced.</li> <li>• There is a deteriorating plywood cover adjacent to the main wet well over an abandoned opening in the concrete. This is a safety hazard.</li> <li>• No cable management hardware.</li> <li>• Pump cables don't fit in conduit provided.</li> <li>• Location of the EYS fittings for pump and level sensors is not clear. Abandoned termination boxes in valve vault. Potential safety issue and code violation.</li> </ul> 
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Building and Grounds Assessment – Structural – Pump Station (cont.)

Valve Vault

Size: 7 ft x 7 ft x 4.77 ft

Material: Concrete

Coating: None

Personnel Accessibility:

Via 2 separated Bilco Type  
JD Aluminum hatches

Equipment Ingress/Egress  
Requires truck crane

Housekeeping

There are miscellaneous  
unused wires and cables  
and abandoned conduit that  
should be removed.

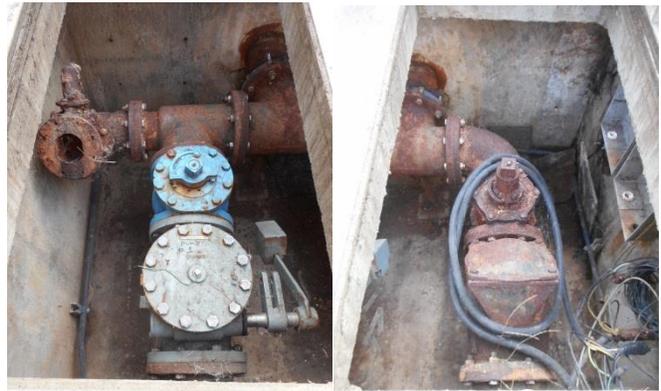
Year  
Constructed

Condition:

Exterior:  Good  Fair  Poor  Not visible/below grade  
Interior:  Good  Fair  Poor

Comments:

- Pipes and conduits are corroded.
- Conduit in valve vault in worse than poor condition – failed.
- Pump cables are terminated with a tape splice in valve vault, not waterproof/tight (other cables are using wire nuts). If the valve vault is a C1, D2 area, it is a code issue. The splices don't meet industry standards.
- Adjacent keystone retaining wall in good/fair condition.



Building and Grounds Assessment – Structural - Other			
<p><b>Control/Electrical Enclosure Area</b></p>	<p>Fenced Area: Approx. 21' x 14'</p> <p>Includes: Concrete pad for telemetry and electrical panel and ATS : 6'-0" x 12'-8"</p> <p>Separate generator pad</p> <p>Balance of surface within fenced area is gravel.</p> <p>Equipment Ingress/Egress Via double swing 6' wide gates</p> <p>Housekeeping Good</p>	<p>Year Constructed 2006/11</p>	<p>Condition:  <input type="checkbox"/> Good   <input checked="" type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:  <ul style="list-style-type: none"> <li>• Concrete pad for panels and ATS has been undermined by ground squirrels.</li> <li>• Need site lighting.</li> <li>• Structural Evaluation  Site specific spectral response acceleration short period (S<sub>s</sub>) → 1.560g  Site specific spectral response acceleration 1-sec (S<sub>1</sub>) → 0.612g</li> </ul> </p> <div style="text-align: center;">  </div>
<p><b>Other Structures</b></p>	<p><input checked="" type="checkbox"/> Not Applicable</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p>

Mechanical Systems Assessment			
<b>Main Pump 1</b> Need information – one Vaughn chopper pump, one Flygt?	Type: Chopper Duty: _____gpm _____ft HP: 15 Manufacturer: Vaughn Model: P2162704/X210TY Serial number: S9152194-001010FS	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • The 2016 inspection report notes the condition of the guide rails as “OK” and all other pump components as “good”.
	Motor Type: Submersible, C1, D1 HP: 15 Voltage: 480 V, 3 P Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Seals Type _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Weight and Lever Swing Arm Size: 8” Manufacturer: Unknown	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Based on exterior condition
	U/S Isolation Valve N/A	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Exterior is corroded however these valves are exercised annually so are in working order.
	D/S Isolation Valve Type: Plug Valve Size : 8” Manufacturer: Unknown	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Based on exterior condition
	Suction Piping Type: DIP Size : 8”	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size : 8”	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: New (1996) DIP connected to existing CIP after 8” wye outside of valve vault

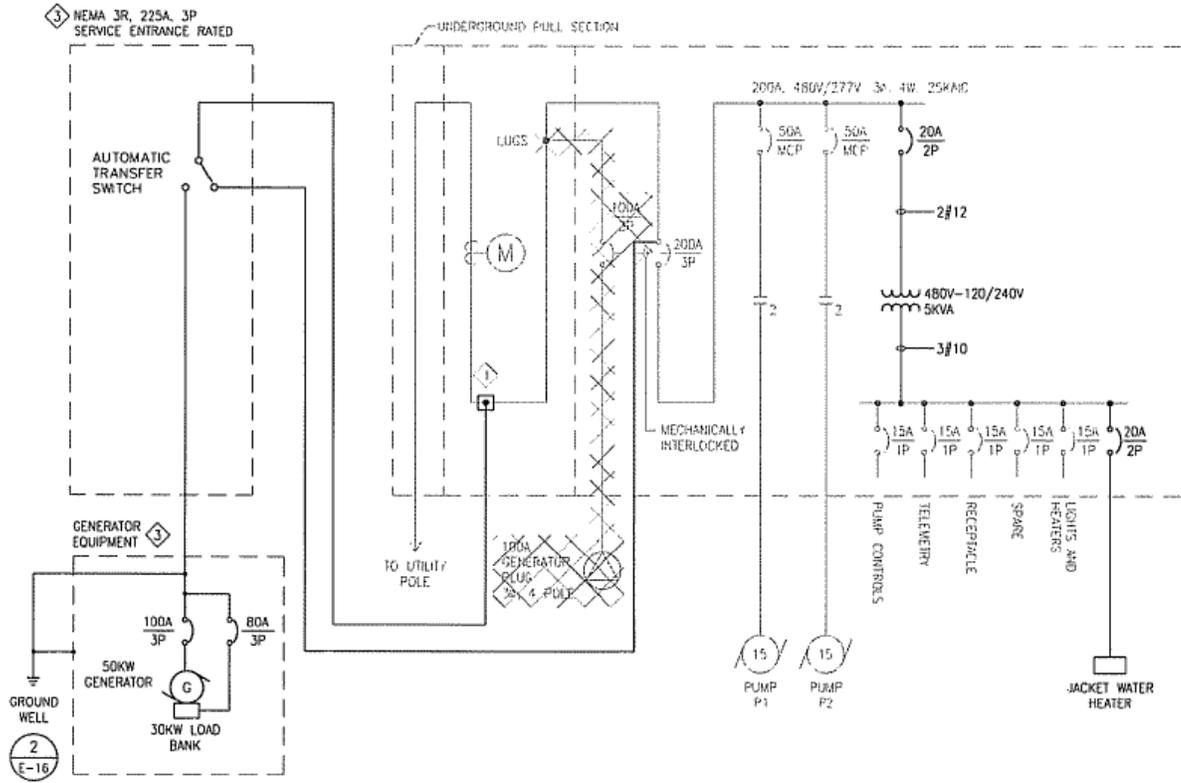
Mechanical Systems Assessment (cont'd)			
Main Pump 2	Type: Submersible Duty: _____gpm_____ft HP: 15 Manufacturer: Flygt Model: NP 3153.091-0633 Serial number: 0770084	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • The 2016 inspection report notes the condition of the guide rails as "OK" and all other pump components as "good".
	Motor Type: C1, D1, Submersible squirrel cage induction with pump relay for over-temp and moisture sensor HP: 15 Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Seals Type: Mechanical		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Weight and Lever Swing Arm Size: 8" Manufacturer: Unknown	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Based on exterior condition
	U/S Isolation Valve N/A	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Exterior is corroded however these valves are exercised annually so are in working order.
	D/S Isolation Valve Type: Plug Valve Size : 8" Manufacturer: Unknown	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Based on exterior condition
	Suction Piping Type: DIP Size : 8"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size : 8"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: New (1996) DIP connected to existing CIP after 8" wye outside of valve vault

Mechanical Systems Assessment (cont'd)			
<b>Force Main Piping On Site</b>	Type: CIP Size: 8"  Isolation Valve See Valve Vault Assessment	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Forcemain is exposed on hillside between railroad tracks and Donlan Road due to erosion of the slope.
<b>Hoists</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Heating, Ventilation and Cooling Systems</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<p><b>Emergency Generator/Auxiliary Engine</b></p>	<p><input checked="" type="checkbox"/> On-Site Emergency Generator</p> <p><input checked="" type="checkbox"/> Diesel  <input type="checkbox"/> Gasoline  <input type="checkbox"/> Natural Gas  <input type="checkbox"/> Other _____</p> <p>Manufacturer Cummins                      Model No. 4BTA3.9-G5                      Size (kW): 50                      Size KVA: 62.5</p> <p>Automatic Transfer Switch                      Amps: 225                      Manufacturer: Cummins                      Model No.:                      PowerCommand                      NEMA 3</p> <p><input checked="" type="checkbox"/> Adaptor for "Plug In" Potable Unit – abandoned in place</p> <p>Onsite Load Bank  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Year Constructed 2005</p>	<p>Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>Demo abandoned generator receptacle (shown demo'd on Boyle 2005 drawings).</li> <li>The transfer switch enclosure has a breaker in it that appears to be the main service disconnect. The old service disconnect breaker in the Tesco pedestal is still labeled as the main service disconnect, when it is not. This is a highly unusual: It is a safety issues and a code violation. The Boyle 2005 as-builts do not properly depict this configuration, adding to the confusion.</li> <li>Vibration base isolators undersized.</li> <li>No arc flash labels.</li> </ul>

**Electrical and Power System Assessment**

<p><b>Service Size</b></p>	<p>Amps : (200 Amps per Boyle Drawings) Volts: 480/277 Meter Number: 1006473169</p>	<p>Pedestal mounted meter in good condition No arc flash labels.</p>
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Electrical and Power System Assessment (cont'd)

<b>Motor Controls</b>	Type: NEMA 3R Pedestal Manufacturer: Tesco	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Labeled as the service disconnect, but probably isn't (safety issue and code violation)</li> <li>• The pedestal and controls have been significantly modified. They are in fair condition, but poorly documented.</li> <li>• A 2 pole transformer breaker was mounted in the old three pole generator breaker space leaving a ½ pole gap on either side of the transformer breaker which is a minor code violation. In addition, it is still labeled "generator breaker" – another code violation.</li> <li>• No arc flash labels.</li> </ul>
	Main Motor Protector Load: 42 Frame Amps: 250 Trip Amps: 200	Year Constructed	
	Main Motor Protector (2) Load: 19 A Frame Amps: 50 Trip Amps: 150/50	Year Constructed	
	Main Load Starter (2) Load: 19A Manufacturer: Cutter Hammer Model No.: AN16GN0 Size: 2	Year Constructed	

Electrical and Power System Assessment (cont'd)			
Lighting Panel	Voltage: 120/240 Amps:40/2	Year Constructed	List of Loads Telemetry, Receptacle, Pedestal Heater and light, level controller (PLC panel not listed but powered from this panel)  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • No arc flash labels.
Lighting	<u>Exterior – Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Need site lighting and wet well lighting. 1996 drawings show HPS 20' high pole light but no switch?
General, Electrical	Convenience Receptacles	Year Constructed	Pedestal only

Instrumentation / Control Assessment			
Field Instruments	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No.: HydroRanger 200 Range: 1-50 ft. (Cal 0-18 ft.)	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 10 years
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No.: SLC 500 Panel View 300 Allen Bradley UPS Mission Back-up Telemetry	Year Constructed 2005/12	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing, the rest of the equipment in the control panel has been well maintained and updated with a useable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> <li>No arc flash labels.</li> </ul> Industry Std. Remaining Life: 0 years
	Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Generator and Fuel status, Transfer Switch Position, , UPS (on battery, fail), Power Fail, Panel Intrusion. Also shown but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed, fuel leak.		

Instrumentation / Control Assessment (cont'd)			
<p><b>SCADA/Telemetry</b></p>	<p><input checked="" type="checkbox"/> Data Monitoring  <input type="checkbox"/> Pumping Rate  <input type="checkbox"/> Pressure  <input checked="" type="checkbox"/> Wet well Level  <input checked="" type="checkbox"/> Other: Hi &amp; Lo alarm  <input type="checkbox"/> Remote Control  <input type="checkbox"/> Pump On/Off  <input type="checkbox"/>  <input type="checkbox"/> Other _____</p> <p>Manufacturer: Model:</p> <p>Communication Mode  <input type="checkbox"/> Hardwire/Leased line  <input type="checkbox"/> Fiber Optic  <input type="checkbox"/> Internet  <input type="checkbox"/> Radio  <input checked="" type="checkbox"/> Cell Modem with two antennas</p> <p>SCADA Software: RS View 32</p> <p>Alarms: No autodialer, Back-up is Mission system.</p>	<p>Year Constructed 2005/12</p>	<p>Condition: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:  <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> </ul> <p>Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p> </p>

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**APPENDIX H**  
**I.C.I. Lift Station Assessment Form**





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## Assessment Summary and Recommendations for ICI Pump Station

<b>Assessment Performed by</b>	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 14, 2017

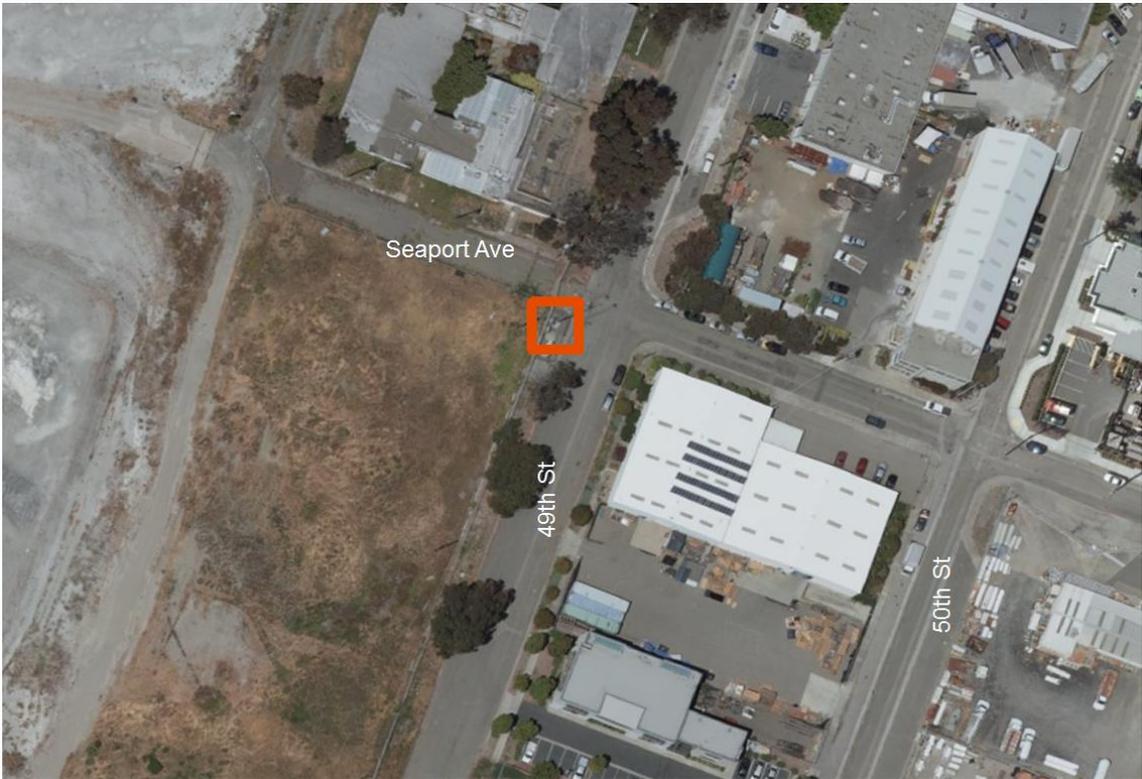
### Desktop Condition Assessment

<b>Facility Name</b>	ICI Pump Station
<b>Facility Address/Location</b>	Corner of Seaport Ave. and S. 49 <sup>th</sup> St.
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (less than 1 hours) Can be out of service for greater than 1 hours <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Year Originally Constructed</b>	1992
<b>Year of Latest Upgrade/Remodel</b>	2005: Included new enclosure for existing generator, new ultrasonic level transmitter and float switch and new antenna.
<b>Recent Repairs/Improvements/Maintenance</b>	From Veolia's Richmond Asset and Work History Details.xls 4/3/15 Phase monitor failed and repaired 7/7/15 Contactor worn, replaced with new 10/4/16 Generator in desperate need of repair ref: Cummings report
<b>Adjacent Land Use</b>	<input type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Other _____ <input type="checkbox"/> Single Family Homes <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Operations Staff Issues of Concern</b>	
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<b>Additional Comments</b>	

Aerial Photo of Site  
or Site Layout or  
Site Sketch



On-Site Condition Assessment for Pump Station (ICI)

Summary of Site Assessment and Recommendations.

Facilities and site are in generally good / fair / poor condition (circle one)

Are there any recommended site improvements?

- Yes; list recommended improvements:
  - Remove antenna mast.
  - Add site lighting and a light in the wet well.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes; blind flange available on discharge piping in vault.

No

Are the existing facilities upgradeable?

- Yes, list recommended upgrades to existing facilities:
  - Corrosion protection for discharge piping in wet well.
  - Replace generator and transfer switch.
  - Ground channel used for cell modem antenna mast.
  - Replace PLC in existing enclosure.
  - Provide proper arc flash labels.
  - Ensure EYS fittings are properly installed per code.
  - Provide proper lateral restraint for pump control panel.

No, recommend replacement of existing facilities with the following new facilities:

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Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Building and panel are shown with intrusion switches on SCADA drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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<b>Building and Grounds Assessment – General</b>		
<b>Potential Site Hazards</b>	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No. Outside tsunami inundation area; outside FEMA flood zone (100/500)
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No, liquefaction potential “very low”.
	Security	<input checked="" type="checkbox"/> Yes; area may be prone to nighttime vandalism. <input type="checkbox"/> No

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Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input checked="" type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type: Double swing 10' gates  Lockable? Yes	Year Constructed	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces Multiple - Street parking  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Water Service</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Overflows will drain to street and to adjacent property which is a hazardous materials site. No storm drains nearby.</li> </ul>

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Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	Size: 6'-4" dia. X 11'-8"  Material: Stainless steel tank (per 1992 drawings)  Coating: None  Operating Volume: _ cf  Personnel Accessibility N/A  Equipment Ingress/Egress Single leaf hatch approx. 48' x 30", no safety grate SST Guide Bars  Grease/Cleanliness Good	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Hatch does not have safety grate.</li> <li>Localized corrosion on hatch</li> </ul>

**Building and Grounds Assessment – Structural – Pump Station**

<p><b>Valve Vault</b></p>	<p>Size: 6' x 5' x 4'</p> <p>Material: Concrete</p> <p>Coating: None</p> <p>Personnel Accessibility                  Double leaf hatch approx. 5' x 5' opening</p> <p>Equipment Ingress/Egress                  Truck mounted crane</p> <p>Housekeeping                  Good</p>	<p>Year                  Constructed</p>	<p>Condition:                  Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade                  Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• Hatch does not have safety grate.</li> <li>• Localized corrosion on hatch</li> </ul>  
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Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>	Fenced Area: Approx. 12' x 32'  Equipment Ingress/Egress Via 10' wide double leaf gates  Housekeeping Good	Year Constructed	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Structural Evaluation</li> <li style="padding-left: 20px;">Site specific spectral response acceleration short period (S<sub>s</sub>) →2.044g</li> <li style="padding-left: 20px;">Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →0.835g</li> </ul>
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment			
<p><b>Main Pump 1</b> <b>Have pumps been changed out yet?</b></p>	Type: _____ Duty: _____ gpm _____ ft HP: _____ Manufacturer: _____ _____ Model: _____ Serial number: _____ _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type _____ HP _____ Voltage _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Confirm the EYS fitting are properly installed.
	Seals Type _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Swing Size: 4" Manufacturer: Matco	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4: Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Some corrosion.
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size: 4"	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Corrosion • There are pressure gauges upstream of the check valve on both discharge lines • There is a blind flange in the valve box downstream of the check and isolation valves.

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Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: _____ Duty: _____ gpm _____ ft HP: _____ Manufacturer: _____ Model: _____ Serial number: _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type _____ HP _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Seals Type _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Swing Size: 4" Manufacturer: Matco	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4" Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Some corrosion.
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP Size: 4"	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Corrosion • There are pressure gauges upstream of the check valve on both discharge lines • There is a blind flange in the valve box downstream of the check and isolation valves .

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<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Force Main Piping On Site</b>	Type: PVC (transitions from DIP to PVC just outside of valve vault) Size: 6"  Isolation Valve None, just isolation valves on each pipe discharge pipe	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Hoists</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Heating, Ventilation and Cooling Systems</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:



Electrical and Power System Assessment			
Service Size	Amps : 40/3P Volts: 480 Meter Number 1006534228		No arc flash labels.

Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Wall Mounted NEMA 3 SS Enclosure Manufacturer: Tesco 100 Amp Main CB	Year Constructed 2002?	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• No arc flash labels.</li> </ul>
	Main Motor Protector (Pumps 1 & 2) Cutler Hammer HCMP Load: 9.5 A Frame Amps: 15/3P Trip Amps: 45	Year Constructed	
	Main Load Starter (Pumps 1 & 2) Load: 9.5 A Manufacturer: Cutler Hammer Model No. AN16DNO Size: 1 O/L 12.4A	Year Constructed	

Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120/240 Amps: 30/2P	Year Constructed 2005	List of Loads Local controls, telemetry, BU controls, local controls, light and receptacle  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:   Industry Std. Remaining Life: 15 years
<b>Lighting</b>	<u>Exterior - Site</u> Type: None Adequate Lighting: No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: • Need site lighting and a light in the wet well.
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	

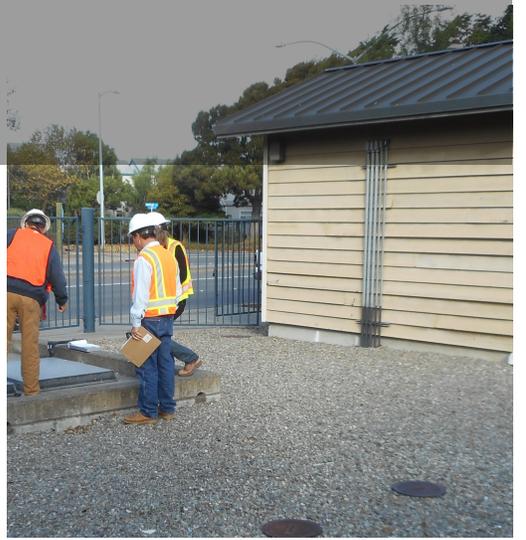
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Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1-50 ft. (Cal 0-11 Ft)	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Unit is mounted too close to the wet well wall – affects readings. Needs to be moved further away.</li> </ul>
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No. SLC500 A-B UPS Panel View 300 Mission system Back-up Telemetry	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing. The rest of the equipment in the control panel has been well maintain and updated with a usable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> <li>No arc flash labels.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Generator and Fuel status, Transfer Switch Position, UPS on Battery, Power Fail and Panel Intrusion. Also shown on drawings, but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed, fuel leak.			

Instrumentation / Control Assessment (cont'd)			
<b>SCADA/Telemetry</b>	<input checked="" type="checkbox"/> Data Monitoring <input type="checkbox"/> Pumping Rate <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Wet well Level <input checked="" type="checkbox"/> Other: Hi & Lo Level <input type="checkbox"/> Remote Control <input type="checkbox"/> Pump On/Off <input type="checkbox"/> <input type="checkbox"/> Other _____ Manufacturer _____ Model _____  Communication Mode <input type="checkbox"/> Hardwire/Leased line <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Internet <input type="checkbox"/> Radio <input checked="" type="checkbox"/> Cell Modem with two antennas  SCADA Software: RSView  Alarms: No autodialer, Back-up is Mission system.	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> </ul> Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.





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### Assessment Summary and Recommendations for Marina Bay Cove Pump Station

<b>Assessment Performed by</b>	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 14, 2017

### Desktop Condition Assessment

<b>Facility Name</b>	Marina Bay Cove Pump Station
<b>Facility Address/Location</b>	Esplanade Drive
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently <input type="checkbox"/> Yes <input type="checkbox"/> No (less than XX hours) Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Year Originally Constructed</b>	Unknown
<b>Year of Latest Upgrade/Remodel</b>	2005 – Project included new generator and automatic transfer switch, relocated pump control panel, new ultrasonic level transmitter, level float sensor and modified existing fence to add 12' access gate. 2017 – Replaced pumps and hatches?
<b>Recent Repairs/Improvements/Maintenance (2013 – 2017)</b>	From Veolia's Richmond Asset and Work History Details.xls 2/3/16 Found pump locked up due to failed lower bearing, used old pump from Nevin and A street, rewired tested and installed
<b>Adjacent Land Use</b>	<input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Other: Planned Development <input type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Apartments <input checked="" type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Operations Staff Issues of Concern</b>	
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<b>Additional Comments</b>	

Aerial Photo of Site or  
Site Layout or Site  
Sketch



**On-Site Condition Assessment for Pump Station (Marina Bay)**

**Summary of Site Assessment and Recommendations.**

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

- Yes; list recommended improvements:
  - Repaint fence – minor corrosion.
  - Site and wet well lighting
  - Remove antenna mast.
  - Provide a permanent grounded mast for the cell modem antenna

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes; adequate space within fenced area for portable pump, however need to have a bypass connection point.

No

Are the existing facilities upgradeable?

- Yes, list recommended upgrades to existing facilities:
  - Provide a new dedicated 480 Volt service.
  - Replace PLC in existing enclosure.
  - Dress up loose communication cables.
  - Provide proper arc flash labels.
  - Ensure EYS fittings are properly installed per code.

No, recommend replacement of existing facilities with the following new facilities:

**Veolia Water- City of Richmond**

Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Panel is shown with intrusion switch on P&ID drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

**Veolia Water- City of Richmond**

<b>Building and Grounds Assessment – General</b>		
<b>Potential Site Hazards</b>	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input checked="" type="checkbox"/> Yes; within tsunami inundation area; outside FEMA flood zone (100/500) <input type="checkbox"/> No
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential “very high”. <input type="checkbox"/> No

**Veolia Water- City of Richmond**

Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input checked="" type="checkbox"/> Steel <input type="checkbox"/> CMU <input type="checkbox"/> Chain Link <input type="checkbox"/> Other:  Gate Type: Double swing 6' gates  Lockable? Yes	Year Constructed  Modified in 2006	Condition: Exterior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Localized corrosion – needs repainted.
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces Street parking – multiple. There is also room on the site for a vehicle  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Water Service</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Across the street from the Bay

**Veolia Water- City of Richmond**

Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	Size: _____ ft by _____ ft by _____ ft Material : Concrete  Coating: None  Operating Volume _____cf  Personnel Accessibility N/A  Equipment Ingress/Egress Single leaf hatch approx. 48' x 30", no safety grate SST Guide Bars  Grease/Cleanliness Fair, some grease present. Veolia states that the grease needs to be pumped out approximately every 2 weeks.	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Do not have drawings from when the pump station was built.</li> <li>Difficult to clean the pumps. Must hoist up using utility vehicle and clean then lower back down</li> <li>Need safety grate on hatch.</li> <li>Grease issue but may be eliminated with new Flygt pumps.</li> <li>No bypassing capability at this station.</li> <li>Some conduits appear to have corroded away to nothing. There is some concern the conduits, EYS and pump cables have not been properly installed for a hazardous area.</li> <li>Wet well has exposed aggregate due to biosulfide corrosion.</li> <li>Underside of slab has friable concrete due to biosulfide corrosion.</li> </ul>
<b>Valve Vault</b>	Size: _____ ft by _____ ft by _____ ft Material _____  Coating _____  Personnel Accessibility  _____  Equipment Ingress/Egress  _____  Housekeeping  _____	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Do not have drawing from when the pump station was built.</li> <li>Valve vault cover was not able to be opened. This is being replaced in the near future.</li> </ul>

Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>	Fenced Area  Equipment Ingress/Egress Via double swing 6' gates  Housekeeping Good	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Interior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: <ul style="list-style-type: none"> <li>• Structural Evaluation</li> <li style="padding-left: 40px;">Site specific spectral response acceleration short period (S<sub>s</sub>) →1.834g</li> <li style="padding-left: 40px;">Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →0.735g</li> </ul>
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

**Veolia Water- City of Richmond**

Mechanical Systems Assessment			
<p><b>Main Pump 1</b>  <span style="color: red;">As of 9/14, Veolia was planning on changing out the pumps within a couple of weeks.</span></p>	Type: _____ Duty: _____ gpm _____ ft HP: _____ Manufacturer: _____ Model: _____ Serial number: _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type _____ HP: 5 Voltage: 480 Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Need to confirm location of EYS and that they are properly installed.</li> </ul>
	Seals Type _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping Type _____ Size _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type _____ Size _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

**Veolia Water- City of Richmond**

<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Main Pump 2</b>	Type: _____ Duty: _____ gpm _____ ft HP: _____ Manufacturer: _____ Model: _____ Serial number: _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type _____ HP: 5 Voltage: 480 Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Need to confirm location of EYS and that they are properly installed.
	Seals Type _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type _____ Size _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping Type _____ <b>Size</b> _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type _____ Size _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Force Main Piping On Site</b>	Type _____ Size _____  Isolation Valve Type _____ Size _____	Year Constructed   Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Hoists</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Heating, Ventilation and Cooling Systems</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

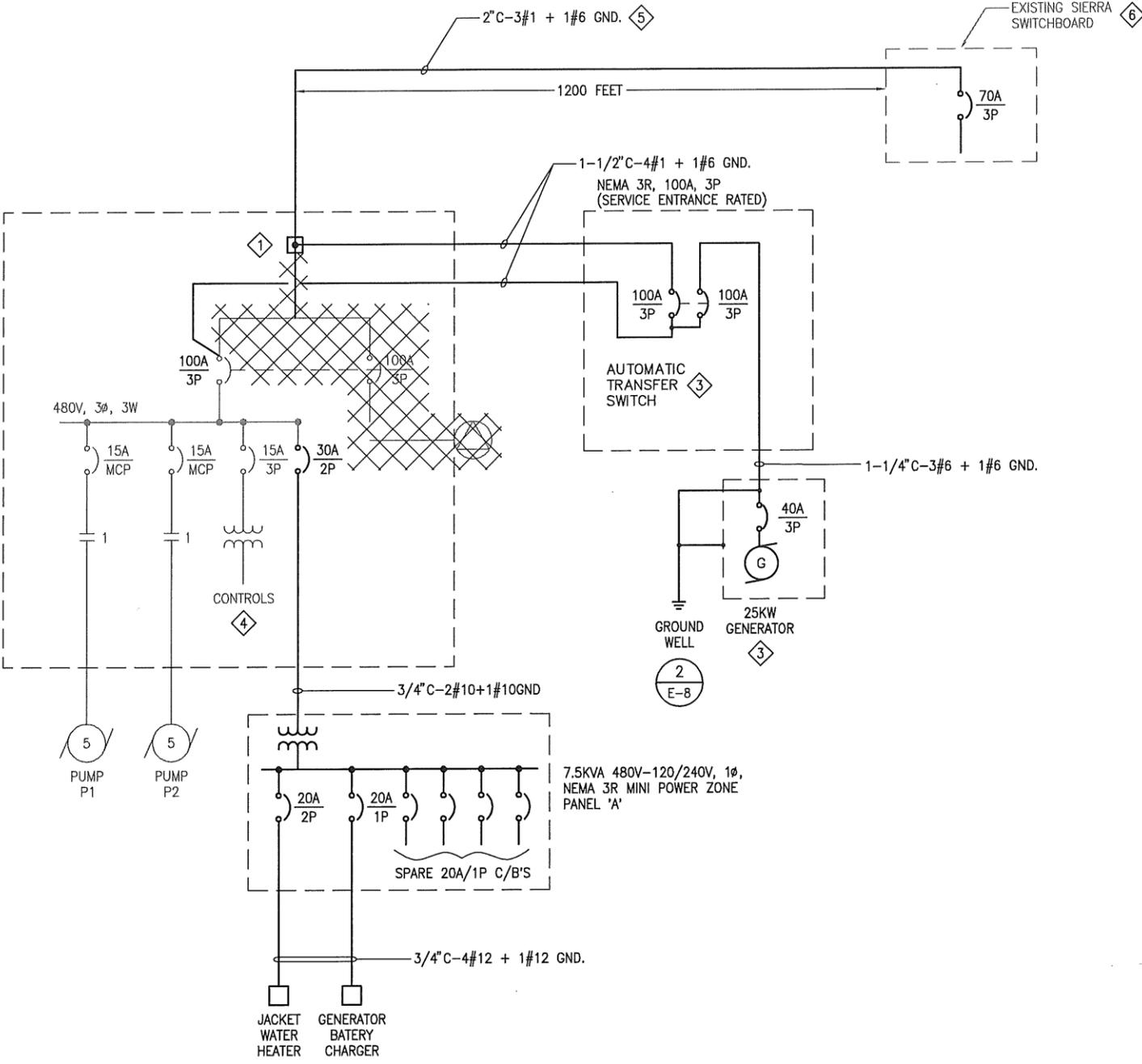
Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> On-Site Emergency Generator <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Cummins Model No. DKAF-5740352 Size (kW): 25 Size KVA: 31  Automatic Transfer Switch Amps: 125 Manufacturer: Cummins Model No. _____  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Vibration base isolators undersized.</li> </ul>

Electrical and Power System Assessment

Service Size

Amps: 100/3P  
Volts: 480  
Meter Number 1008848818

Service point is in the park in a common enclosure over 1000 feet away from the station. The remote equipment is in poor condition and poorly maintained. It appears to be near its end of life. There is a pullbox between the station and the service located in the landscaped area.  
No arc flash labels.



**Electrical and Power System Assessment (cont'd)**

<b>Motor Controls</b>	Type: Pedestal, NEMA 3R Manufacturer: Tesco	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Settings of MCP and O/L indicate a pump larger than 5 HP (maybe 7.5 HP).</li> <li>Liquitronic unit has been removed and cutout blanked, otherwise the pedestal is in good condition.</li> </ul>
	Main Motor Protector (Pumps 1 & 2) Cutler Hammer HMCP Load: 6.5A Frame Amps: 15 Trip Amps: 105	Year Constructed	
	Main Load Starter (Pumps 1 & 2) Load: 6.5A Manufacturer: Cutler Hammer Model No. AN16LDNO Size: 1 O/L 11.6 A	Year Constructed	

Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120 Amps: 20/1P	Year Constructed	List of Loads Jacket water heater, battery charger, controls, light, receptacles, alarm  Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Lighting</b>	<u>Exterior - Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: • Need site lighting and a light in the wet well.
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	

**Veolia Water- City of Richmond**

Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1-50 ft.	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 10 years
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No. SLC505 Ups – Not A-B Panel View 300	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC Obsolete and the UPS is likely to be replaced when batteries need replacing. The rest of the equipment in the control panel has been well maintain and updated with a usable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> <li>The interior base of the panel and the anchor bolts are corroded.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Generator and Fuel Status, Transfer Switch Position, UPS on Battery, Power Fail and Panel Intrusion. Also shown, but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed, fuel leak.  Comment: Mission Back-up Telemetry (Hi Level Switch)			

Instrumentation / Control Assessment (cont'd)			
<p><b>SCADA/Telemetry</b></p> <p><input type="checkbox"/> Not Applicable</p>	<p><input checked="" type="checkbox"/> Data Monitoring</p> <p><input type="checkbox"/> Pumping Rate</p> <p><input type="checkbox"/> Pressure</p> <p><input checked="" type="checkbox"/> Wet well Level</p> <p><input checked="" type="checkbox"/> Other: Hi &amp; Lo Level</p> <p><input type="checkbox"/> Remote Control</p> <p><input type="checkbox"/> Pump On/Off</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/> Other_____</p> <p>Manufacturer_____</p> <p>Model_____</p> <p>Communication Mode</p> <p><input type="checkbox"/> Hardwire/Leased line</p> <p><input type="checkbox"/> Fiber Optic</p> <p><input type="checkbox"/> Internet</p> <p><input type="checkbox"/> Radio</p> <p><input checked="" type="checkbox"/> Cell Modem</p> <p>SCADA Software: RS View</p> <p>Alarms: No autodialer, Back-up is Mission system.</p>	<p>Year Constructed</p>	<p>Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>• All PLC inputs are likely available in SCADA.</li> </ul> <p>Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p>

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**APPENDIX K**  
**Marina Bay Parkway Lift Station Assessment Form**





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## Assessment Summary and Recommendations for Marina Bay Parkway Pump Station

<b>Assessment Performed by</b>	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 14, 2017

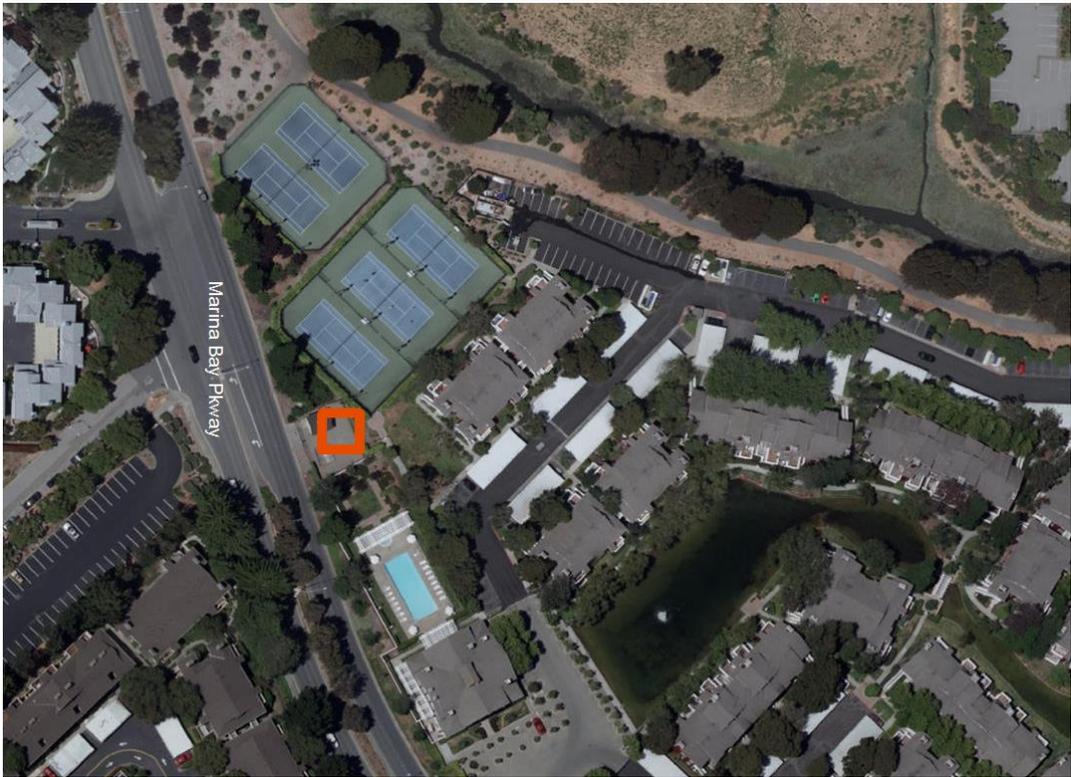
### Desktop Condition Assessment

<b>Facility Name</b>	Marina Bay Parkway Pump Station
<b>Facility Address/Location</b>	Marina Bay Parkway (Near Tennis Courts)
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently (less than XX hours) <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Year Originally Constructed</b>	1987
<b>Year of Latest Upgrade/Remodel</b>	2005 – Included new (third) pump, replaced access hatches with new hatches with safety grates, replaced damaged pump guide bar rails, added level transmitter and float switch.
<b>Recent Repairs/Improvements/Maintenance (2013 – 2017)</b>	From Veolia's Richmond Asset and Work History Details.xls 3/11/17   Replaced UPS battery
<b>Adjacent Land Use</b>	<input checked="" type="checkbox"/> Residential <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Other: Planned Area <input checked="" type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Apartments <input checked="" type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Operations Staff Issues of Concern)</b>	
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<b>Additional Comments</b>	

Aerial Photo of Site or Site  
Layout or Site Sketch



**On-Site Condition Assessment for Pump Station (Marina Bay Parkway)**

**Summary of Site  
Assessment and  
Recommendations.**

Facilities and site are in generally good poor condition (circle one)

Are there any recommended site improvements?

- Yes; list recommended improvements:
  - Site and wet well lighting.
  - Remove antenna mast

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

- Yes; adequate space available within the site:
  
- No

Are the existing facilities upgradeable?

- Yes, list recommended upgrades to existing facilities:
  - Replace PLC in existing enclosure.
  - Provide proper arc flash labels.
  - Provide bypass pumping connection.
  - Commission existing flow meter.
  - Ensure EYS fittings are properly installed per code.
  - Upgrade fixtures to LED when convenient.

No, recommend replacement of existing facilities with the following new facilities:

**Veolia Water- City of Richmond**

Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input checked="" type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Minimal site lighting.	
	Alarm System	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Panel and building are shown with intrusion switches on P&ID drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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<b>Building and Grounds Assessment – General</b>		
<b>Potential Site Hazards</b>	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No. Outside tsunami inundation area; outside FEMA flood zone (100/500)
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential "very high". <input type="checkbox"/> No
	Other _____	<input type="checkbox"/> Yes <input type="checkbox"/> No

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Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input checked="" type="checkbox"/> Steel <input type="checkbox"/> CMU <input type="checkbox"/> Chain Link <input type="checkbox"/> Other:  Gate Type: Two sets of double swing 8' gates.  Lockable? Yes	Year Constructed	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces No easy parking. There is a driveway but no on site parking and there is no street parking in this area on the four lane divided road.  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Matt stated access will be better once they get the new utility truck – Due to the insufficient lifting capacity of the current service utility service truck it cannot remove pumps for service. The new utility truck will have more capacity.</li> </ul>
<b>Water Service</b>	Size 1"  Material: PVC  Backflow Preventer: Yes	Year Constructed 1987	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Overflows would drain to the street and then to storm drain inlet approximately 100 feet south of the site.</li> </ul>

Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	<p>Size: 12'-11" x 14'-0" x 23'-9"</p> <p>Material: Concrete</p> <p>Coating: None</p> <p>Operating Volume: ____cf</p> <p>Personnel Accessibility There are two 3' x 4' hatches and one 5'x4' double leaf hatch, all with hold open arm and safety grate. Access ladder on south side of wet well.</p> <p>Equipment Ingress/Egress Via SST guide bars and the assistance of a utility truck.</p> <p>Grease/Cleanliness Some grease present. Wet well gets hosed down with potable water annually to eliminate grease buildup.</p>	<p>Year Constructed</p>	<p>Condition: Exterior: <input type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor   <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:  <ul style="list-style-type: none"> <li>The 2006 drawings indicate that the 10" discharge pipe elbow within the wet well can be removed for connecting temporary bypass pipe as needed. Manhole in street in front of station can be used for bypassing directly to the pipe after removing the discharge pipe elbow. Need isolation valve between pump and bypass connection</li> <li>Access ladder is corroded.</li> </ul> </p> <div style="text-align: center;">  </div>
<b>Dry Well</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	<p>Condition: Exterior: <input type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor Interior: <input type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p>

Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Building</b>	Size: 15'-4" x 13'-4" x 10'-6"  Material: Reinforced CMU  Coating: Painted Red Cedar wood siding  Roof type: Wood truss with standing seam metal roof  Date of Latest Repair _____  Roof Condition: Good  Personnel Accessibility 6' wide double door with ramp  Equipment Ingress/Egress 6' wide double door with ramp  Housekeeping Good	Year Constructed	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: • Structural Evaluation Site specific spectral response acceleration short period (S <sub>s</sub> ) →1.890g Site specific spectral response acceleration 1-sec (S <sub>1</sub> ) →0.761g <u>FEMA P-154</u> Probability of collapse 1x10 <sup>0.7</sup> (1 in 5 following MCE) <u>ASCE/SEI 41 Tier 1</u> 8 noncompliant conditions identified
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment			
<b>Main Pump 1</b>	Type: Submersible N type impeller Duty: 2100 gpm @ 47 ft <span style="color: red;">(from Boyle Phase 1 specs – assume all 3 are the same)</span> HP: 35 Manufacturer: Flygt Model: NP-3202.090 Serial number: 066018	Year Constructed ?	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • The 2016 inspection report notes the condition of the guide rails as “OK” and all other pump components as “good”.
	Motor Type: Submersible C1, D1 squirrel cage induction motor with Flygt miniCAS relay HP: 35 Voltage: 480/3P Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Need to confirm the EYS are properly installed.
	Seals Type: Mechanical	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Unknown (buried) Size: 10” Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Gate (buried) Size: 10” Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: SST in wet well?/ Buried - DIP Size: 10”	Year Constructed 1987	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Main Pump 2</b>	Type: Submersible N type impeller Duty: 2100 gpm 47 ft HP: 35 Manufacturer: Flygt Model: NP-3202.090 Serial number: 066017	Year Constructed ?	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • The 2016 inspection report notes the condition of the guide rails as "OK" and all other pump components as "good".
	Motor Type: Submersible C1, D1 squirrel cage induction motor with Flygt miniCAS relay HP: 35 Voltage: 480/3P Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Need to confirm the EYS are properly installed.
	Seals Type: Mechanical	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Unknown (buried) Size: 10" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Gate (buried) Size: 10" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: SST in wet well? Buried - DIP Size: 10"	Year Constructed 1987	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Main Pump 3</b>	Type: Submersible N type impeller Duty: 2100 gpm 47 ft HP: 35 Manufacturer: Flygt Model: NP-3202.090 Serial number: 0660016	Year Constructed ?	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • The 2016 inspection report notes the condition of the guide rails as "OK" and all other pump components as "good".
	Motor Type: Submersible C1, D1 squirrel cage induction motor with Flygt miniCAS relay HP: 35 Voltage: 480/3P Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Need to confirm the EYS are properly installed.
	Seals Type: Mechanical	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Unknown (buried) Size: 10" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Gate (buried) Size: 10" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: SST in wet well? Buried - DIP Size: 10"	Year Constructed 1987	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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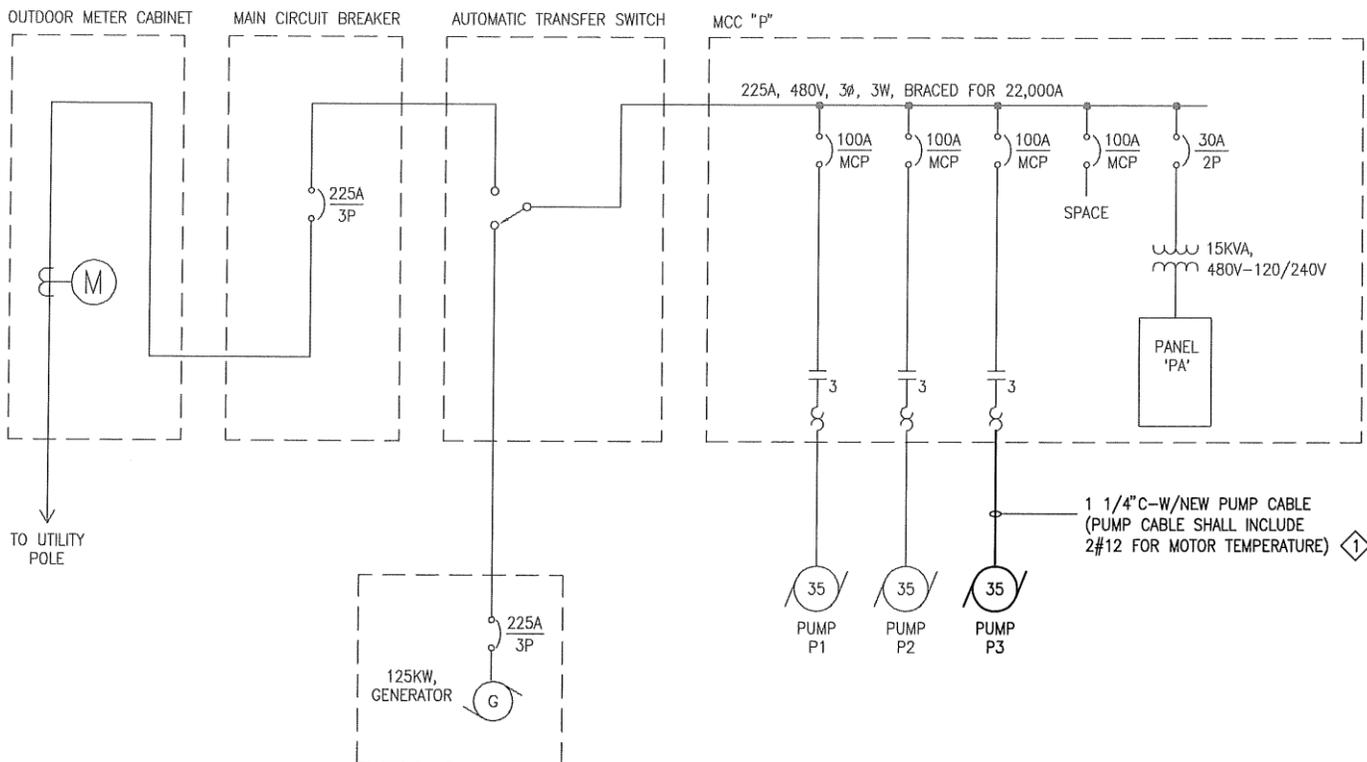
<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Force Main Piping On Site</b>	Type: Polyethylene (after flow meter valve box) Size: 10"  Isolation Valve None, just isolation valves on each pipe discharge pipe	Year Constructed   Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments
<b>Hoists</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	Type: Manufacturer:? Capacity:	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>In flow meter vault. Not listed on Veolia's asset sheet.</li> </ul>
<b>Heating, Ventilation and Cooling Systems</b>	Type: 3 louvered wall vents	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Gates</b>	Valves as noted on pump discharge line – manually controlled.	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> On-Site Emergency Generator <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Cummins Model No. Size (kW): 125 Size KVA: 156  Automatic Transfer Switch Amps: 225 Manufacturer: Onan – Wall mounted Model No. _____  <input type="checkbox"/> Adaptor for “Plug In” Potable Unit  Onsite Load Bank <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Year Constructed 1987	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Vibration base isolators undersized.</li> <li>Generator inside building</li> </ul>

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Electrical and Power System Assessment

Service Size	Amps: 225 Volts: 480/3P Meter Number: 1008847167	No arc flash labels.
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SERVICE : 120/208V, 3φ, 4W		PANEL PA		MOUNTING : IN MCC			
MAIN BREAKER : 50 AT/100 AF		ENCLOSURE : NEMA 1		MAIN BUS : 100 A			
LOCATION : IN MCC "P"				FEEDER :			
CIRCUIT USE	VA	A	P	VA	CIRCUIT USE		
	A φ B φ C φ	1 2 3	1 2 3	A φ B φ C φ			
LIGHTING	500		20		SPARE		
ALARM PANEL		100			ENGINE BLOCK		
RECEPTACLE			600		HEATER		
RECEPTACLE	200				FLOW METER & CHART RECORDER		
BATTERY CHARGER		100			MCC HEATER 50 WATT PER SECTION		
SPARE					SPARE		
SPACE					SPARE		
TOTAL PHASE A	700		750	VA	50	CONN. LOAD = 17.5 A	
TOTAL PHASE B		200		1625	VA	CL - 25% = 4 A	
TOTAL PHASE C			600		2025	VA	SPARE 25% = 4 A
TOTAL CONNECTED LOAD						FEEDER LOAD = 25.5 A	

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Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: 2100, NEMA 1 MLO, 4 section Manufacturer: Eaton (CMC) Main Lugs Only	Year Constructed 1987	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: No arc flash labels.
	Main Motor Protector (For Pumps 1, 2 & 3) Load: 44A Frame Amps: 100 Trip Amps	Year Constructed	
	Main Load Starter (For Pumps 1, 2 & 3) Load: 44A Manufacturer: Westinghouse Model No. A201K3CA Size: 3 FVNR	Year Constructed	

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Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120/240 Amps: 30	Year Constructed 1987	List of Loads Lighting, alarm panel, receptacles, battery charger, PLC controls, heater, generator exhaust fan  Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:   Industry Std. Remaining Life: 10 years
<b>Lighting</b>	Control Building Interior Type: Industrial open type fluorescent fixtures (3 fixtures – each: 2x40W) Condition: Fair Adequate Lighting: Yes  Exterior Type: 50W HPS Wall Pack light w/photocell Condition: Poor Adequate Lighting: No	Year Constructed 1987	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>There is minimal site lighting. Need exterior lighting on south side of building to illuminate wet well area.</li> <li>Need light in wet well.</li> <li>Upgrade fixtures to LED when convenient</li> </ul>
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	Various in building

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Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Seimens Milltronics Model No. HydroRanger 200 Range: 1-50 ft.	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 10 years
	Flow Element Type: Magnetic Manufacturer: Unknown Size: 8" Flow range _____	Year Constructed 1987	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Located in MH on site and shown in drawings. Not listed on Veolia's asset sheet. No flows are being recorded. Sump pump in MH.</li> </ul>
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No. SLC505 Panel View 300 UPS – not A-B	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC Obsolete</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Flow, Generator and Fuel Status, Transfer Switch Position, UPS on Battery, Fuel Leak, Building Intrusion Switch, Power Fail and Panel Intrusion. Also shown, but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed.  Comment: Mission Back-up Telemetry (Hi Level Switch)			

Instrumentation / Control Assessment (cont'd)			
<b>SCADA/Telemetry</b>	<input checked="" type="checkbox"/> Data Monitoring <input type="checkbox"/> Pumping Rate <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Wet Well Level <input checked="" type="checkbox"/> Other: Hi & Lo Alarms <input type="checkbox"/> Remote Control <input type="checkbox"/> Pump On/Off <input type="checkbox"/> <input type="checkbox"/> Other _____ Manufacturer _____ Model _____  Communication Mode <input type="checkbox"/> Hardwire/Leased line <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Internet <input type="checkbox"/> Radio <input checked="" type="checkbox"/> Cell Modem  SCADA Software: RS View  Alarms: No autodialer, Back-up is Mission system.	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> </ul> <p>Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.</p>



**APPENDIX L**  
**Nevin & A Street Lift Station Assessment Form**





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## Assessment Summary and Recommendations for Nevin and A Street Pump Station

<b>Assessment Performed by</b>	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 14, 2017

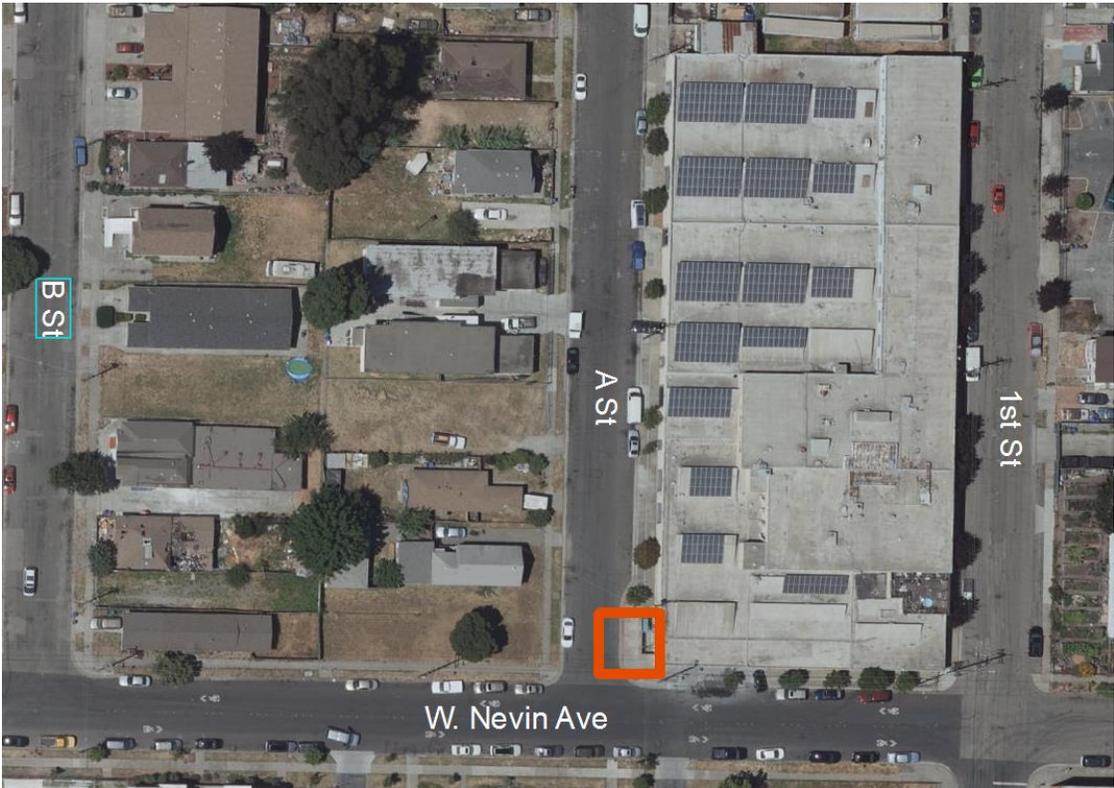
### Desktop Condition Assessment

<b>Facility Name</b>	Nevin and A Street Pump Station
<b>Facility Address/Location</b>	Corner of W. Nevin and A Street
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently (less than XX hours) <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Year Originally Constructed</b>	1996(at current location, replaced lift station located in street)
<b>Year of Latest Upgrade/Remodel</b>	2005 – Included new emergency generator and ATS, new ultrasonic level transmitter, level float sensor and fence enclosure for new electrical equipment and existing panels
<b>Recent Repairs/Improvements/Maintenance (2013 – 2017)</b>	From Veolia's Richmond Asset and Work History Details.xls 1/4/2016   Pulled pump, removed housing, unclogged impeller, and reinstalled
<b>Adjacent Land Use</b>	<input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Other: _____ <input type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Apartments <input type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Operations Staff Issues of Concern</b>	This station experiences high flows during wet weather. Forcemain discharges into nearby manhole. During wet weather events it has flooded the manhole. Needs to be evaluated.
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<b>Additional Comments</b>	

Aerial Photo of Site or  
Site Layout or Site  
Sketch



**On-Site Condition Assessment for Pump Station (W. Nevin and A Street)**

**Summary of Site Assessment and Recommendations.**

Facilities and site are in generally good poor condition (circle one)

Are there any recommended site improvements?

- Yes; list recommended improvements:
  - Site and wet well lighting.
  - Remove two antenna masts.
  - Provide a permanent mast for cell modem antenna.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

- Yes; on the street. There is a 2" SST pipe in valve vault that can be used for bypassing?
- No

Are the existing facilities upgradeable?

- Yes, list recommended upgrades to existing facilities:
  - Replace PLC in existing enclosure.
  - Provide proper arc flash labels.
  - Ensure EYS fittings are properly installed per code.
  - Provide cable management hardware.
  - Properly mount level element.
  - Install new base isolators for generator if required.

No, recommend replacement of existing facilities with the following new facilities:

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Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Trash and drug paraphernalia are tossed over fence into enclosed area.	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Panel is shown with intrusion switch on P&ID drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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<b>Building and Grounds Assessment – General</b>		
<b>Potential Site Hazards</b>	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input checked="" type="checkbox"/> Yes; adjacent auto body shop. <input type="checkbox"/> No
	Adjacent Flood Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No. Outside tsunami inundation area; outside FEMA flood zone (100/500)
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential "moderate". <input type="checkbox"/> No
	Adjacent Building	<input checked="" type="checkbox"/> Yes; adjacent structure may present collapse risk if unreinforced masonry. <input type="checkbox"/> No

Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input checked="" type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type: Double swing 5'? gates  Lockable? Yes	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Frequently experience graffiti in this area.</li> </ul>
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces Multiple - Street parking  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Water Service</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Overflows will drain to street and then to storm drains</li> </ul>

**Building and Grounds Assessment – Structural – Pump Station**

<b>Wet Well</b>	Size: 6' I.D. x 22.7'  Material: Concrete  Coating: None  Operating Volume: ____cf  Personnel Accessibility N/A  Equipment Ingress/Egress Single leaf hatch approx. 48' x 30", no safety grate SST Guide Bars  Grease/Cleanliness Good	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Minor corrosion on hatch but hatch needs replaced for safety grate inclusion anyway.</li> <li>Minor area of exposed aggregate but overall in good condition.</li> </ul> 
<b>Valve Vault</b>	Size: 5.5' I.D. x 6.6'  Material: Concrete  Coating: None  Personnel Accessibility Single leaf hatch approx. 48" x 30"  Equipment Ingress/Egress Truck mounted crane  Housekeeping Fair	Year Constructed 1996	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>2" tee and SST pipe downstream of isolation valve</li> <li>Hatch needs safety grate.</li> <li>Needs cable management hardware.</li> <li>Evidence that concrete has been patched at pipe penetration in the past - possibly to fix leak at pipe penetration</li> </ul> 

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Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>	Fenced Area: Approx. 17' x 5'-6"  Equipment Ingress/Egress Via double swing 5' gates  Housekeeping Fair – graffiti and litter is an issue in this area	Year Constructed	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Structural Evaluation                             <ul style="list-style-type: none"> <li>Site specific spectral response acceleration short period (S<sub>s</sub>) →1.833g</li> <li>Site specific spectral response acceleration 1-sec (S<sub>1</sub>) →0.734g</li> </ul> </li> </ul>
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment			
<b>Main Pump 1</b>	Type: Submersible C Type Duty: 500 gpm _____ ft HP: 5 Manufacturer: Flygt Model: NP-3102.090-0993 Serial number: 1230073	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>The 2006 drawings show 15 hp motors, however preventative maintenance inspection reports shows 5 hp.</li> <li>The 2016 inspection report notes the condition of the guide rails as "OK" and all other pump components as "good".</li> <li></li> </ul>
	Motor Type: Submersible C1, D1 squirrel cage induction with pump relay for over-temp and moisture sensor (miniCAS) HP: 5 Voltage: 480/3P Manufacturer: Flygt	Year Constructed 2006	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: All EYS fittings appear to be damaged by corrosion. <div style="text-align: center;">  </div>
	Seals Type: Mechanical	Year Constructed 2006	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size : 6" Manufacturer _____	Year Constructed 2006	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Surface rust</li> </ul>
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 6" Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Surface rust</li> </ul>

Mechanical Systems Assessment (cont'd)			
<b>Main Pump 1 (cont.)</b>	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: SST in wet well/DIP through Valve Vault Size: 6"	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Pipe is corroded where it enters through the valve vault wall.</li> </ul>
<b>Main Pump 2</b>	Type: Submersible C Type Duty: 500 gpm _____ft HP: 5 Manufacturer: Flygt Model: NP-3102.090-0993 Serial number: 1230073	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• The 2006 drawings show 15 hp motors, however preventative maintenance inspection reports shows 5 hp.</li> <li>• The 2016 inspection report notes the condition of the guide rails as "OK" and all other pump components as "good".</li> <li>•</li> </ul>
	Motor Type: Type: Submersible C1, D1 squirrel cage induction with pump relay for over-temp and moisture sensor (miniCAS) HP: 5 Voltage: 480/3P Manufacturer: Flygt	Year Constructed 2006	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: All EYS fittings appear to be damaged by corrosion.
	Seals Type: Mechanical	Year Constructed <b>2006</b>	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size : 6" Manufacturer _____	Year Constructed  2006	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Surface rust</li> </ul>
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 6" Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Surface rust</li> </ul>

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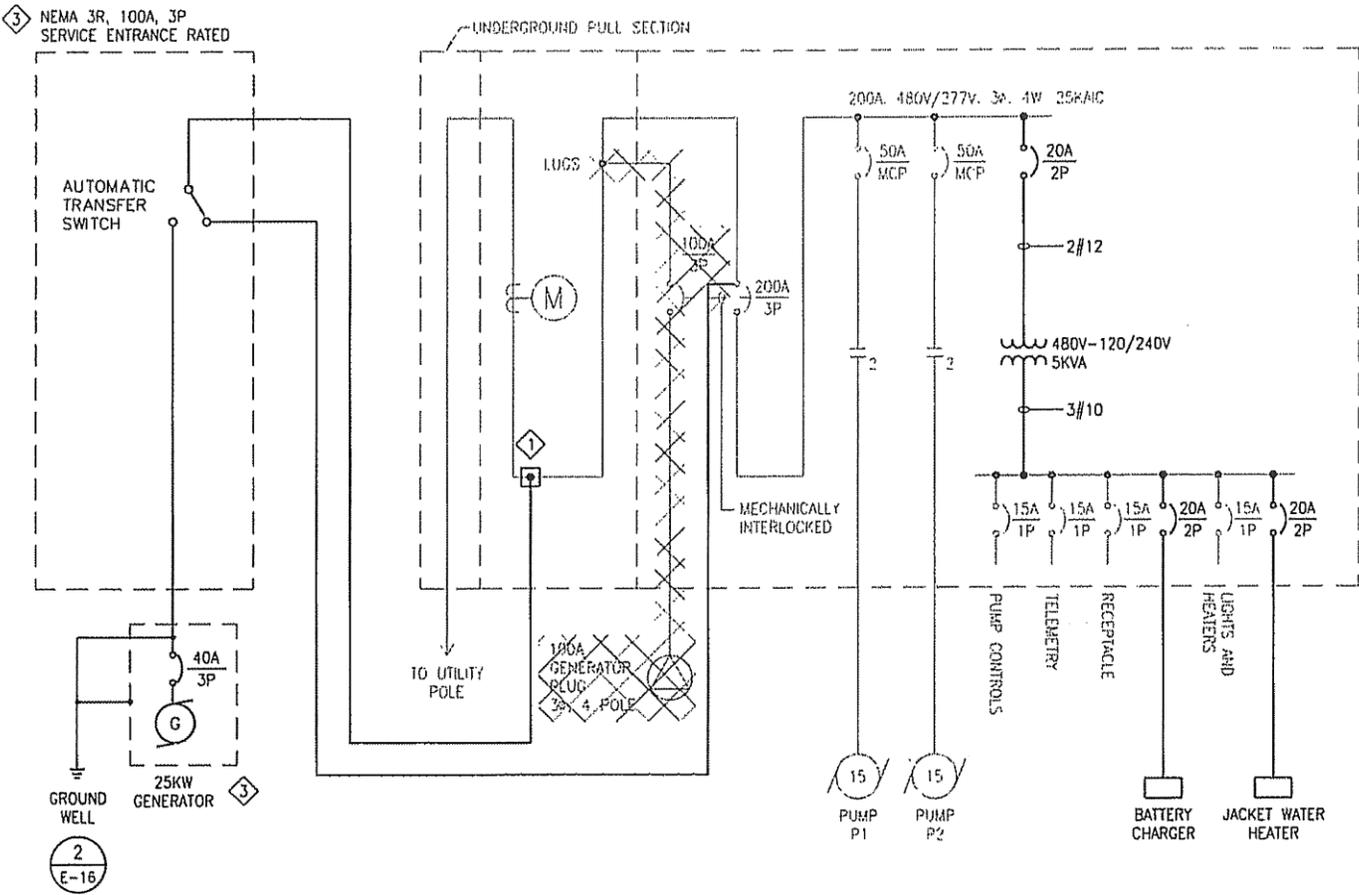
<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Main Pump 2 (cont.)</b>	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: SST in wet well/DIP through Valve Vault Size: 6"	Year Constructed	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Pipe is corroded where it enters through the valve vault wall.
<b>Force Main Piping On Site</b>	Type: HDPE per plans however based on site visit photo looks to be DIP Size: 6"  Isolation Valve None, just isolation valves on each pipe discharge pipe	Year Constructed 2006  Year Constructed 2006	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments Short – discharges to nearby manhole in street.
<b>Hoists</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Heating, Ventilation and Cooling Systems</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> On-Site Emergency Generator <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Cummins Model No. Size (kW): 25 Size KVA: 31.2  Automatic Transfer Switch Amps: probably 100 A with service rated breaker Manufacturer: Cummins Model: PowerCommand  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Quiet Site enclosure</li> <li>Vibration base isolators undersized.</li> </ul> Boyle drawings are confusing as to which breaker is "the service disconnect".

Electrical and Power System Assessment

Service Size	Amps: 100/3P Volts: 480 3 P, 4 wire Meter Number 1006473173
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Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Pedestal, NEMA 3 Manufacturer: Tesco	Year Constructed 1996	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• Phase failure relay.</li> <li>• LB fitting on the back side is missing a cover.</li> <li>• The pedestal has a generic arc flash label. Needs proper labeling</li> <li>• A 2 pole transformer breaker was mounted in the old three pole space leaving a gap on either side of the transformer breaker which is a minor code violation.</li> <li>• It is not clear that the breaker labeled "service disconnect" is the service disconnect – a safety issue and code violation.</li> </ul>
	Main Motor Protector (For pumps 1 & 2) Load: 6.5 A Frame Amps: 15 Trip Amps: 105	Year Constructed 1996	
	Main Load Starter Load: 6.5 A Manufacturer: Cutler Hammer Model No. AN16DN0 Size: 1 O/L 1837A	Year Constructed 1996	

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Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage 120/240 Amps: 20/2P  Transformer: NEMA 3R Jefferson 5 kVA	Year Constructed	List of Loads Pump controls, telemetry, receptacle, lights and heaters, battery charger, jacket water heater  Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Missing plate</li> </ul>
<b>Lighting</b>	<u>Exterior - Site</u> Type: None Adequate Lighting: No  <u>Wet Well</u> Type: None Adequate Lighting: No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: <ul style="list-style-type: none"> <li>• Need site lighting and a light in the wet well.</li> </ul>
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	

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Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1-50 ft. (cal 0-22 ft)	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 10 years
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No. SLC505 A-B UPS Panel View 300 Mission System is BU	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing. The rest of the equipment in the control panel has been well maintain and updated with a usable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> <li>Control panel is missing a bolt.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Generator and Fuel status, Transfer Switch Position, UPS (on battery, fail), Power Fail, Panel Intrusion. Also shown but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed, fuel leak.  Comment: Mission Back-up Telemetry (Hi Level Switch)			

Instrumentation / Control Assessment (cont'd)			
<b>SCADA/Telemetry</b>	<input checked="" type="checkbox"/> Data Monitoring <input type="checkbox"/> Pumping Rate <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Wet well Level <input checked="" type="checkbox"/> Other: Hi & Lo Level <input type="checkbox"/> Remote Control <input type="checkbox"/> Pump On/Off <input type="checkbox"/> <input type="checkbox"/> Other _____ Manufacturer _____ Model _____  Communication Mode <input type="checkbox"/> Hardwire/Leased line <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Internet <input type="checkbox"/> Radio <input checked="" type="checkbox"/> Cell Modem  SCADA Software: RSView  Alarms:  Autodialer Backup? No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> </ul> Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.

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**APPENDIX M**  
**Port Lift Station Assessment Form**





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### Assessment Summary and Recommendations for Port Pump Station

<b>Assessment Performed by</b>	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 11, 2017

### Desktop Condition Assessment

<b>Facility Name</b>	Port Pump Station
<b>Facility Address/Location</b>	Rosie the Riveter Homefront National Historical Park
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently <input type="checkbox"/> Yes <input type="checkbox"/> No (less than XX hours) Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Year Originally Constructed</b>	Unknown
<b>Year of Latest Upgrade/Remodel</b>	2005: Entire wet well was replaced with new system including pumps, guide bars, safety hatch, discharge piping, vent pipe with carbon filter, level transmitter and float switch. Replaced exhaust fan and duct, installed mag flowmeter and gas detectors on both levels of station. Also installed new lighting in wet well and at grade level (inside), replaced power equipment with new pump control power pedestal including new pump control and telemetry panels and ATS. Installed new generator. Note: The location of the generator and electrical equipment is not as shown on the 2005 drawings. Instead it is located in an enclosed area on the north side of the building.
<b>Recent Repairs/Improvements/Maintenance (2013 – 2017)</b>	From Veolia's Richmond Asset and Work History Details.xls 4/24/17    Unclog sump pump 9/3/15    Pump is tripping out on overload; troubleshot and found that phase monitor was faulty , replaced phase monitor and system is back to normal operation
<b>Adjacent Land Use</b>	<input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Other _____ <input type="checkbox"/> Single Family Homes <input checked="" type="checkbox"/> Industrial (Water) <input type="checkbox"/> Apartments <input type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Operations Staff Issues of Concern</b>	
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<b>Additional Comments</b>	

Aerial Photo of Site or Site  
Layout or Site Sketch



On-Site Condition Assessment for Pump Station (Port Pump)

Summary of Site Assessment and Recommendations.

Facilities and site are in generally good / poor condition (circle one)

Are there any recommended site improvements?

- Yes; list recommended improvements:
  - Remove antenna mast.
  - Provide lighting at the door and for the fenced area.

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

- Yes; describe: surrounding the pump station and there is an influent manhole on the west side of the pump station that a portable pump can be dropped into and flow routed to the bypass connection within the pump station

No

Are the existing facilities upgradeable?

- Yes, list recommended upgrades to existing facilities:
  - Replace gas monitors.
  - Replace PLC in existing enclosure.
  - Provide proper arc flash labels.
  - Commission existing flow meter.
  - Ensure EYS fittings are properly installed per code.
  - Install new base isolators for generator if required.

No, recommend replacement of existing facilities with the following new facilities:

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Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input type="checkbox"/> Automatic Sprinkler <input checked="" type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Security</b>	Security of Doors, Windows, & Locks	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Located within locked pump station building.	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Interior Security Lighting	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Building and panel are shown with intrusion switches on P&ID drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input checked="" type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other: <input type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed 2006/11	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Orenco Carbon Filter on 3" PVC vent pipe on exterior of building</li> </ul>

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<b>Building and Grounds Assessment – General</b>		
<b>Potential Site Hazards</b>	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input checked="" type="checkbox"/> Yes; within tsunami inundation area; within FEMA flood zone (100/500) <input type="checkbox"/> No
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area, outside rain induced landslide area. <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential “very high” <input type="checkbox"/> No

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Building and Grounds Assessment – Site Evaluation			
<b>Fencing</b>	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input type="checkbox"/> CMU <input checked="" type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type: Single leaf  Lockable? Yes	Year Constructed 2006	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Encloses standby generator and electrical panels only.</li> </ul>
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt <input type="checkbox"/> Concrete <input type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces There is plenty of available parking in close proximity to the PS.  Truck Accessible? Yes	Year Constructed	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Site is located in secure area of Richmond Port Automobile Receiving Area.</li> </ul>
<b>Water Service</b>	Size _____  Material _____  Backflow Preventer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Overflow from the PS would be directed to a nearby storm drain.</li> </ul> 

Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	<p>Size: 7' dia. x 13'-5"</p> <p>Material: FRP</p> <p>Coating: None</p> <p>Operating Volume: ____cf</p> <p>Personnel Accessibility Access into area outside of FRP tank via ladder in 2'x2' opening</p> <p>Equipment Ingress/Egress Through double leaf safe-hatch in conjunction with ceiling mounted hoist or floor mounted jib crane</p> <p>Grease/Cleanliness Good</p>	<p>Year Constructed</p>	<p>Condition:                      Exterior: <input checked="" type="checkbox"/> Good    <input type="checkbox"/> Fair    <input type="checkbox"/> Poor                      Interior: <input checked="" type="checkbox"/> Good    <input type="checkbox"/> Fair    <input type="checkbox"/> Poor                      Comments:                      • New round FRP wet well tank was installed within a rectangular room below grade. The wet well room is accessed through a 2' x 2' opening in the northwest corner of the room via a ladder. Confined space</p> <div style="text-align: center;">  </div>

<b>Building and Grounds Assessment – Structural – Pump Station (cont.)</b>			
<p><b>Building</b> (No separate Dry Well or Valve Vault – Single building – lower level is submersible pump station and, ground level is a single open room)</p>	<p>Size: 12'-6" x 12'-6" Lower level 13'-5" H Ground level: ?</p> <p>Material: Concrete</p> <p>Coating: Interior – none Exterior - stucco</p> <p>Personnel Accessibility Double leaf doors</p> <p>Equipment Ingress/Egress See Wet Well Description</p> <p>Housekeeping Good</p>	<p>Year Constructed</p>	<p>Condition: Exterior: <input type="checkbox"/> Good   <input checked="" type="checkbox"/> Fair   <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good   <input type="checkbox"/> Fair   <input type="checkbox"/> Poor</p> <p>Comments:</p> <ul style="list-style-type: none"> <li>The rating of the interior space is questionable– probably C1, D2, but could be C1, D1. The entire ground level could be considered an extension of the lower level: ladder opening has no hatch. The way the conduit is run (no EYS?) is not ideal. The space seems like it is designed and built to a semi C1, D2 (labeled as such on Boyle 2005 drawings) and probably should be C1, D1.</li> <li>Conduits through the wall (from 2005) were not grouted in (poor workmanship).</li> <li>Exterior of north, south and east wall is coated with stucco, West wall has no coating. Stucco on east wall has de-bonded along bottom 2'.</li> <li>Concrete is in good condition.</li> <li>Structural Evaluation               <ul style="list-style-type: none"> <li>Site specific spectral response acceleration short period (<math>S_s</math>) → 1.653g</li> <li>Site specific spectral response acceleration 1-sec (<math>S_1</math>) → 0.651g</li> <li><u>FEMA P-154</u></li> <li>Probability of collapse <math>1 \times 10^{0.8}</math> (1 in 6 following MCE)</li> <li><u>ASCE/SEI 41 Tier 1</u></li> <li>Incomplete assessment without as-built drawings</li> </ul> </li> </ul>

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Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>	Fenced Area adjacent to Wet Well Building Size: Approx. 12' x18'  Includes: Concrete pad for pump control power pedestal and separate generator pad within fenced area. Balance of surface within fenced area is gravel.  Personnel Accessibility Double swing 6' gates  Equipment Ingress/Egress Double swing 6' gates  Housekeeping Good	Year Constructed	Comments:
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

<b>Mechanical Systems Assessment</b>			
<b>Main Pump 1</b>	Type: Submersible C Type Duty: 300 gpm @ 10 ft HP: 3 Manufacturer: Flygt Model: CP 3085.092-0475 Serial number: 0620039	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Condition of all components is good and the impeller is in excellent condition according to 2016 preventative maintenance inspection report.
	Motor Type: Submersible C1, D1 squirrel cage induction with panel door mounted Flygt miniCAS pump relay for over-temp and moisture sensor HP: 3 Voltage: 480/3P Manufacturer: Flygt	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Seals Type: Mechanical	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size: 4" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: According to the Boyle mechanical drawings the valve is located within the wet well but the electrical drawings show it outside of the FRP wet well. Consultant did not enter this area to assess condition.
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: There is not a separate isolation valve for each pump, only a single isolation valve on FM before exiting the building.
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: PVC Size: 6"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Piping located on lower level outside of FRP wet well. Consultant did not enter this area to assess condition.

Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: Submersible C Type Duty: 300 gpm @ 10 ft HP: 3 Manufacturer: Flygt Model: CP 3085.092-0475 Serial number: 0620038	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • Condition of all components is good and the impeller is in excellent condition according to 2016 preventative maintenance inspection report.
	Motor Type: Submersible C1, D1 squirrel cage induction with panel door mounted Flygt miniCAS pump relay for over-temp and moisture sensor HP: 3 Voltage: 480/3P Manufacturer: Flygt	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Seals Type: Mechanical	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size: 4" Manufacturer: Unknown	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: According to the Boyle mechanical drawings the valve is located within the wet well but the electrical drawings show it outside of the FRP wet well. Consultant did not enter this area to assess condition.
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: There is not a separate isolation valve for each pump, only a single isolation valve on FM before exiting the building.
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: PVC Size: 6"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: Piping located on lower level outside of FRP wet well. Consultant did not enter this area to assess condition.

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Mechanical Systems Assessment (cont'd)			
<b>Force Main Piping On Site</b>	Type: PVC Size: 6"  Isolation Valve Type: Plug Size: 6"	Year Constructed  Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments • Piping located on lower level outside of FRP wet well. Consultant did not enter this area to assess condition.
<b>Hoists</b>	Type: Ceiling mounted monorail hoist Capacity: ½ ton	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Hoists</b>	Type: Floor mounted jib crane Capacity: Unknown	Year Constructed Unknown	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Heating, Ventilation and Cooling Systems</b>	Type: Exterior mounted explosion proof exhaust fan Manufacturer: Unknown	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: • 12" FRP pipe duct from lower level, exhausts to outside
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> On-Site Emergency Generator <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Cummins Model No. DKAE5740H2 Size (kW): 20 Size KVA: 25  Automatic Transfer Switch Amps: 70 Manufacturer: ASCO Model No. 300 Series  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input type="checkbox"/> Yes <input type="checkbox"/> No	Year Constructed 2006	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Generator outer enclosure paint is failing (rust bubbles)</li> <li>Vibration base isolators may be undersized.</li> <li>No arc flash labels.</li> </ul>

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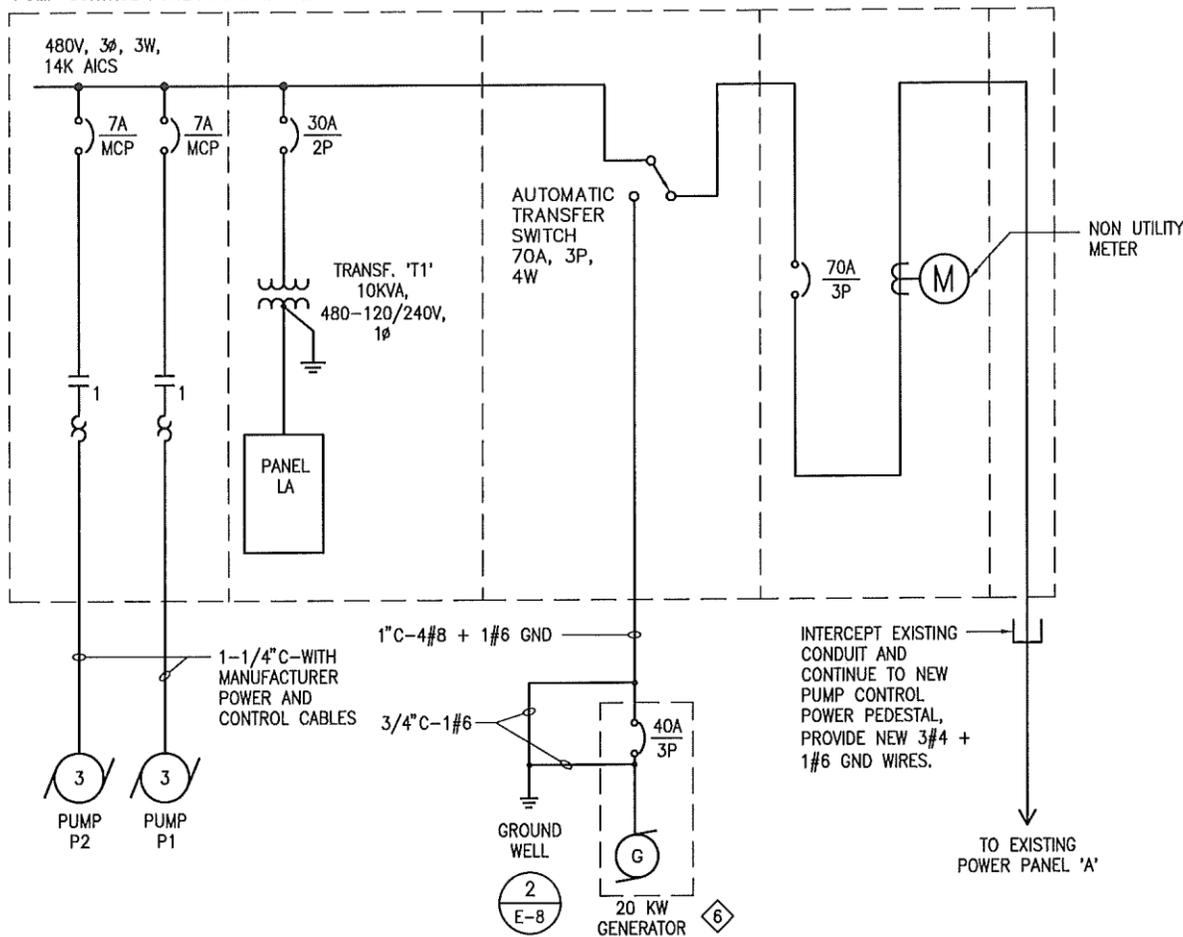
Electrical and Power System Assessment

Service Size

Amps: 70  
Volts: 480/277, 3Ø, 4W  
Meter Number 84846322

No arc flash labels.

PUMP CONTROL POWER PEDESTAL 'MSA'



NAMEPLATE LA  
BUS:AMPS 100A VOLTS 120/240V, 1Ø, 3W

	VA		OUTLETS		20A, 1P		OUTLETS		VA		
	A	B	LITG	REC	10KAICS	UON	LITG	REC	A	B	
LIGHTING	320		4		1	20	2		1000		GENERATOR JACKET WATER HEATER
RECEPTACLES		360	2		3	4			1000		GENERATOR JACKET WATER HEATER
CONTROLS	300			1	5	6			500		GENERATOR BATTERY CHARGER
GAS DETECTOR PANEL		200		1	7	8		1	500		EXHAUST FAN
RECEPTACLE	180			1	9	10			200		BACK UP CONTROLS
SPARE					11	12					SPARE
BUSSED SPACE					13						BUSSED SPACE
BUSSED SPACE					15	16					BUSSED SPACE
BUSSED SPACE					17	18					BUSSED SPACE
TOTAL LOAD	800	560							1700	1500	TOTAL LOAD

4.6 kW + .25 x 1.15 kW 5.75 kW 240 VOLTS 1PH= 24 AMPS.

Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Pedestal Manufacturer: Tesco 24-000 SS	Year Constructed 2002	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Flygt pumps with miniCAS mounted on panel door.</li> <li>No Meyers hubs on conduits entering the back of the pedestal (conduit and nuts are rusting).</li> <li>No arc flash labels.</li> </ul>
	Main Motor Protector (Pumps 1 and 2) Load: 4 A Frame Amps: 7 Trip Amps 56 A	Year Constructed	
	Main Load Starter(Pumps 1 and 2) Load: 4A Manufacturer: Cutler-Hammer Model No.: AN16DN0 Size: 1 O/L 4-56A	Year Constructed	

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Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120/240 Amps: 100  Pedestal mounted standard	Year Constructed 2005	List of Loads Lighting, Generator jacket water heater, B-U controls, gas detector panel, receptacles, telemetry , exhaust fan, generator battery charger  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• No arc flash labels.</li> </ul> Industry Std. Remaining Life: 10 years
<b>Lighting</b>	<u>Interior</u> Type: Class 1, Division 1 Adequate Lighting: Yes	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:  Industry Std. Remaining Life: 10 years
	<u>Exterior</u> Type: None Adequate Lighting: No	Year Constructed N/A	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: <ul style="list-style-type: none"> <li>• Need exterior lighting both by the door and for the fenced area.</li> </ul>
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	

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Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HyroRanger 200 Range: 1-50 ft.	Year Constructed 2005	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Flow Element Type: Magnetic Manufacturer: Endress+Hauser Model No. _____ Size: 6" Flow range _____	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Meter located on lower level outside of FRP wet well. Consultant did not enter this area to assess condition.</li> <li>Display module is mounted in telemetry panel but has never been connected</li> </ul>
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection (2 units) Manufacturer: MSA Model No. Ultima	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Tesco/Hoffman Enclosure T-31582 NEMAX SS</li> <li>There are multiple alarms for H2S at this station. Should replace with vacuum type system.</li> </ul> Industry Std. Remaining Life: 1 year

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Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No. SLC505	Year Constructed 2005	Condition: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC Obsolete</li> <li>No arc flash labels.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Flow, Generator and Fuel Status, transfer switch position, UPS on battery, fuel leak, building intrusion switch, power fail, panel intrusion, flood switch, and gas monitor status/alarms. Also shown but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed.			

Instrumentation / Control Assessment (cont'd)			
<b>SCADA/Telemetry</b>	<input checked="" type="checkbox"/> Data Monitoring <input type="checkbox"/> Pumping Rate <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Wet well Level <input checked="" type="checkbox"/> Other: Hi & Lo Level <input type="checkbox"/> Remote Control <input type="checkbox"/> Pump On/Off <input type="checkbox"/> <input type="checkbox"/> Other _____ Manufacturer _____ Model _____  Communication Mode <input type="checkbox"/> Hardwire/Leased line <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Internet <input type="checkbox"/> Radio <input checked="" type="checkbox"/> Cell Modem  SCADA Software: RS View  Alarms: No autodialer, Back-up is Mission system.	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> </ul> Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.



**APPENDIX N**  
**Sunset Pointe Lift Station Assessment Form**





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## Assessment Summary and Recommendations for Sunset Pointe Pump Station

<b>Assessment Performed by</b>	Tom Bergin (VWHA), Mark Jaudalso (VWHA), Marie Rossen (VWHA), Richard Thow (TJCA), Sam Terry (ECS Engineering)
<b>Assessment Date</b>	September 14, 2017

### Desktop Condition Assessment

<b>Facility Name</b>	Sunset Point Pump Station
<b>Facility Address/Location</b>	Corner of Peninsula Dr. and Waterview Dr.
<b>APN#</b>	
<b>Parcel Size</b>	
<b>Status</b>	<input checked="" type="checkbox"/> Active <input type="checkbox"/> Standby <input type="checkbox"/> Inactive

<b>Operations Staff Facility Importance</b>	Critical to overall system operations <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service intermittently (less than XX hours) <input type="checkbox"/> Yes <input type="checkbox"/> No Can be out of service for greater than XX hours <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Year Originally Constructed</b>	1995
<b>Year of Latest Upgrade/Remodel</b>	2005: Included new generator, replaced meter panel, pump control panel and telemetry panel with new pad mounted pump control pedestal including automatic transfer switch, added level transmitter and float switch
<b>Recent Repairs/Improvements/Maintenance</b>	From Veolia's Richmond Asset and Work History Details.xls 11/3/15   Installed new transducer and calibrated 4/27/17   Unclog submersible pump #1 located at Sunset Pointe Pump Station
<b>Adjacent Land Use</b>	<input checked="" type="checkbox"/> Residential <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Other: Planned Area <input checked="" type="checkbox"/> Single Family Homes <input type="checkbox"/> Industrial <input type="checkbox"/> Apartments <input type="checkbox"/> Park <input type="checkbox"/> Condos <input type="checkbox"/> School
<b>O&amp;M History Available</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>O &amp; M Manuals Available</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Operations Staff Issues of Concern</b>	
<b>Recommended Maintenance Program</b>	<input type="checkbox"/> Routine  <input type="checkbox"/> Special Requirements <input type="checkbox"/> Perform pump/motor maintenance <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<b>Additional Comments</b>	

Aerial Photo of Site or  
Site Layout or Site  
Sketch



On-Site Condition Assessment for Pump Station (Sunset Point)

Summary of Site Assessment and Recommendations.

Facilities and site are in generally good poor condition (circle one)

Are there any recommended site improvements?

- Yes; list recommended improvements:
- Site and wet well lighting
  - Bollards

No, no site improvements needed

Is there space on-site for staging/bypassing, if necessary?

Yes; but would interfere with exit gate. Entrance gate would need to remain open to enable cars to pass both ways into this gated community.

No

Are the existing facilities upgradeable?

- Yes, list recommended upgrades to existing facilities:
- Replace PLC in existing enclosure
  - VFDs should be protected by CBs (not MCPs).
  - Provide proper arc flash labels.
  - Ensure EYS fittings are properly installed per code.
  - Determine need for base isolators for generator.

No, recommend replacement of existing facilities with the following new facilities:

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Facility Assessment – Other			
<b>Safety Equipment</b>	Health & Safety Equipment	<input type="checkbox"/> First Aid Kit <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> MSDS <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None	
<b>Fire Protection</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Automatic Sprinkler <input type="checkbox"/> Fire Extinguisher <input type="checkbox"/> Other _____	Year Constructed	<b>Fire Protection</b>
<b>Security</b>	Security of Doors, Windows, & Panels	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Security of Hatches & Vaults	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
	Perimeter Fences & Gates	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: Pump station and associated electrical panels are not enclosed. Off-site generator is enclosed by a gate and CMU wall.	
	Interior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A	
	Exterior Security Lighting	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> N/A Comments: No site lighting.	
	Alarm Systems	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: Panel is shown with intrusion switch on P&ID drawings however Veolia confirmed switches are not operational.	
	Other _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A	
<b>Odor Control</b>	Treatment Type <input type="checkbox"/> Activated Carbon <input type="checkbox"/> Wet Scrubber _____ <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> None Chemical Feed System <input type="checkbox"/> Chemical _____ <input checked="" type="checkbox"/> None Safety <input type="checkbox"/> Emergency Eye Wash Station <input type="checkbox"/> Emergency Shower <input checked="" type="checkbox"/> None	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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<b>Building and Grounds Assessment – General</b>		
<b>Potential Site Hazards</b>	Overgrown Trees On/Adjacent to Site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Fire Hazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Adjacent Flood Hazards	<input checked="" type="checkbox"/> Yes, within Tsunami inundation area; outside FEMA flood zone (100/500) <input type="checkbox"/> No
	Landslide Hazards	<input checked="" type="checkbox"/> Yes; within earthquake induced landslide study area; outside rain induced landslide zone, outside existing landslide distribution; <input type="checkbox"/> No
	Liquefaction	<input checked="" type="checkbox"/> Yes, liquefaction potential “very high”. <input type="checkbox"/> No

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Building and Grounds Assessment – Site Evaluation			
<b>Fencing (At generator site)</b>	Type <input type="checkbox"/> Wood <input type="checkbox"/> Steel <input checked="" type="checkbox"/> CMU <input type="checkbox"/> Chain Link <input type="checkbox"/> Other _____  Gate Type: Single leaf ornamental iron  Lockable? Yes	Year Constructed 2005	Condition: Exterior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Access</b>	Surfacing <input checked="" type="checkbox"/> Asphalt (PS) <input checked="" type="checkbox"/> Concrete (Generator) <input type="checkbox"/> All weather gravel <input type="checkbox"/> Other _____  Parking/Vehicle Access  Number of parking spaces PS: Street parking within gated community Generator: Service access road, space for 1-2 vehicles  Truck Accessible? Yes	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Water Service</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Drainage</b>	Area of Catchment  _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>• Overflows would drain to the street and then to storm drain inlet approximately 30 feet away.</li> </ul>

Building and Grounds Assessment – Structural – Pump Station			
<b>Wet Well</b>	Size: 5 ft. dia. X 16 ft.  Material: Concrete  Coating: None  Operating Volume: ____cf  Personnel Accessibility N/A  Equipment Ingress/Egress Single leaf hatch approx. 48' x 30", no safety grate SST Guide Bars  Grease/Cleanliness Fair	Year Constructed	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• Reentrant corner cracks at hatch.</li> </ul>
<b>Valve Vault</b>	Size: ____ft by ____ft by ____ft  Material: Concrete  Coating: None  Personnel Accessibility N/A  Equipment Ingress/Egress Via utility truck  Housekeeping Fair	Year Constructed 1995	Condition: Exterior: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Not visible/below grade Interior: <input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>• Pipe penetrations enlarged with sledge hammer.</li> <li>• Piping has extensive corrosion.</li> </ul> <div style="text-align: center;">  </div>

Building and Grounds Assessment – Structural - Other			
<b>Control/Electrical Area</b>		Year Constructed	Comments: <ul style="list-style-type: none"> <li>Control panels are located on adjacent concrete pad, no fencing</li> </ul>
<b>Other Structures</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment			
<b>Main Pump 1</b> As of 9/14, new Flygt pumps were recently installed. Need info.	Type: Submersible Duty: _____ gpm _____ ft HP: _____ Manufacturer: Flygt Model: _____ Serial number: _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type _____ HP: 5 Voltage: likely 240 V, 3 P Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Need to confirm location of EYS and that they are properly installed.</li> <li>VFD used to convert single phase to three phase</li> </ul>
	Seals Type _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size: 4" Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4: Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP? Size: 4"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Mechanical Systems Assessment (cont'd)			
<b>Main Pump 2</b>	Type: _____ Duty: _____ gpm _____ ft HP: _____ Manufacturer: _____ Model: _____ Serial number: _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Motor Type _____ HP _____ Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>Need to confirm location of EYS and that they are properly installed. <b>Ask Veolia</b></li> <li>VFD used to convert single phase to three phase</li> </ul>
	Seals Type _____		Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Check Valve Type: Ball Size: 4" Manufacturer: Flygt	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	U/S Isolation Valve N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	D/S Isolation Valve Type: Plug Size: 4: Manufacturer _____	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Suction Piping N/A	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Discharge Piping Type: DIP? Size: 4"	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

<b>Mechanical Systems Assessment (cont'd)</b>			
<b>Force Main Piping On Site</b>	Type _____ Size _____  Isolation Valve Type _____ Size _____	Year Constructed _____  Year Constructed _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Hoists</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Surge /Transient Control</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Seal Water System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Sump Pump System</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Heating, Ventilation and Cooling Systems</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
<b>Gates</b>	<input checked="" type="checkbox"/> Not Applicable	Year Constructed _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

Mechanical Systems Assessment (cont'd)			
<b>Emergency Generator/Auxiliary Engine</b>	<input checked="" type="checkbox"/> Off-Site Emergency Generator (located in nearby park) <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gasoline <input type="checkbox"/> Natural Gas <input type="checkbox"/> Other _____ Manufacturer: Onan Model No. DGCA-5740686 Size (kW): 33.5 Size KVA: 33.5  Automatic Transfer Switch Amps: 230 Manufacturer: ASCO Model No. Series 300  <input type="checkbox"/> Adaptor for "Plug In" Potable Unit  Onsite Load Bank <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>Generator is installed remotely, over 1000 ft from the pump station.</li> <li>Generator is 120/240 V single phase.</li> <li>Generator is not installed on base isolators. Verify adequacy of concrete to handle vibration.</li> </ul>



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Electrical and Power System Assessment (cont'd)			
<b>Motor Controls</b>	Type: Pedestal, NEMA 3R Manufacturer: Tesco	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>VFDs are used to convert single phase to three phase. Pumps are shown as 5 HP several places, but VFDs appear to be sized for 3 HP (may have been 5 HP single phase when original, but replaced by 3 HP three phase units). Conversion done by Veolia.</li> <li>The 2005 Boyle as-built drawings do not reflect existing conditions. Major modifications completed in 2016.</li> <li>No arc flash labels.</li> </ul>
	Main Motor Protector (Pumps 1 & 2) Cutler Hammer HMCP Load: 12.5/28A Frame Amps:70 Trip Amps: 210	Year Constructed	
	Main Load VFD (Pumps 1 and 2) Load: 12.5/28A Manufacturer: Allen Bradley Model No. Powerflex 40 228 AO12N104 Size: 12A output (3 hp)	Year Constructed 2006	

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Electrical and Power System Assessment (cont'd)			
<b>Lighting Panel</b>	Voltage: 120/240 Amps: 30/2P	Year Constructed 2006	List of Loads Lighting, station lights, pedestal heater, telemetry, generator battery charger, generator heater, receptacles.  Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:   Industry Std. Remaining Life: 15 years
<b>Lighting</b>	<u>Exterior</u> Type: None at either site Adequate Lighting: No	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A Comments: • Need site lighting at PS and generator site and a light in the wet well.
<b>General, Electrical</b>	Convenience Receptacles	Year Constructed	In pedestal only

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Instrumentation / Control Assessment			
<b>Field Instruments</b>	Level Element Type: Ultrasonic Manufacturer: Siemens Milltronics Model No. HydroRanger 200 Range: 1-50 ft.	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Flow Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Pressure Element <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Vibration Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Bearing Temp Sensor <input checked="" type="checkbox"/> Not Applicable	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:
	Gas Detection <input checked="" type="checkbox"/> Not Applicable	Manufacturer _____ Model No. _____	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments:

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Instrumentation / Control Assessment (cont'd)			
<b>Controller</b>	Type: PLC Manufacturer: Allen Bradley Model No. SLC505 A-B UPS Panel View 300	Year Constructed 2006	Condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor Comments: <ul style="list-style-type: none"> <li>PLC is obsolete and the UPS is likely to be replaced when batteries need replacing. The rest of the equipment in the control panel has been well maintain and updated with a usable life of 7-15 years. Some components will be obsolete before the end of their expected useful life.</li> <li>Control panel has corroded and missing anchor bolts.</li> </ul> Industry Std. Remaining Life: 0 years
Input/Output List  Pump Run, Fail, Seal Fail, Hi and Lo Level, Level, Generator and Fuel Status, Transfer Switch Position, UPS on Battery, Power Fail and Panel Intrusion. Were VFD inputs and outputs added? Also shown but not monitored: high/low battery, low fuel, low oil pressure, low-low oil pressure, not in auto, overcrank, fail, high water temp, over speed, fuel leak.  Comment: Mission Back-up Telemetry (Hi Level Switch)  We need to add information regarding the PLC enclosures to all forms, plus a photo to show the location of the new PLC (over the old).			

Instrumentation / Control Assessment (cont'd)			
<b>SCADA/Telemetry</b>	<input checked="" type="checkbox"/> Data Monitoring <input type="checkbox"/> Pumping Rate <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Wet well Level <input checked="" type="checkbox"/> Other: Hi & Lo Alarms <input checked="" type="checkbox"/> Remote Control <input type="checkbox"/> Pump On/Off <input type="checkbox"/> <input type="checkbox"/> Other _____ Manufacturer _____ Model _____  Communication Mode <input type="checkbox"/> Hardwire/Leased line <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Internet <input type="checkbox"/> Radio <input checked="" type="checkbox"/> Cell Modem  SCADA Software:  _____  Alarms:  Autodialer Backup?	Year Constructed	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor  Comments: <ul style="list-style-type: none"> <li>All PLC inputs are likely available in SCADA.</li> </ul> Note: SCADA evaluation is not within the scope of this project, observations provided here for discussion only.



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