# Operations Committee Meeting
# Tuesday, June 7, 2022 at 1:00 PM
# Valley Sanitary District Board Room
# 45-500 Van Buren Street, Indio, CA 92201

Valley Sanitary District is open to the public and board meetings will be conducted in person. In addition to attending in person, members of the public may view and participate in meeting via the following

Zoom link:https://us06web.zoom.us/j/82176808060

Meeting ID:821 7680 8060

To address the Board of Directors during the virtual live session via zoom, please email the Clerk of the Board at hgould@valley-sanitary.org or, alternatively, during the specific agenda item or general comment period (i.e. non-agenda items), please use the "raise your hand" function in zoom in order to be recognized by the Clerk of the Board in order to provide comments in real time.

The Clerk of the Board will facilitate to the extent possible any email requests to provide oral testimony that are sent during the live meeting. Members of the public may provide Oral testimony in person or during the virtual live session and are limited to three minutes each. To address the Board in person please complete speaker request card located at in the Board Room and give it to the Clerk of the Board.

If you are unable to provide comments during the meeting, written public comments on agenda or non-agenda items may be submitted by email to the Clerk of the Board at hgould@valley-sanitary.org. Written comments must be received by the Clerk of the Board no later than 11:00 a.m. on the day of the meeting.

Page

## 1. CALL TO ORDER

1.1. Roll Call

1.2. Pledge of Allegiance

## 2. PUBLIC COMMENT

*This is the time set aside for public comment on any item not appearing on the agenda. Please notify the Secretary in advance of the meeting if you wish to speak*

*on a non-hearing item.*

## 3. DISCUSSION / ACTION ITEMS

3.1. Process Modification for Ammonia Removal Pilot Project Phase 2 — 3 - 6

3.1 Staff Report - Process Modification for Ammonia Removal Pilot Project Phase 2 20220607.pdf

3.1 Attachment A - Selective Plant Process Evaluation Phase 2.pdf

3.2. Project Update: Influent Pump Station Rehabilitation Project — 7 - 8

3.2 Staff Report - Influent Pump Station Rehabilitation Project.pdf

3.2 Attachment A - Influent Pump Station Rehab Project Schedule.pdf

3.3. Lift Station Condition Assessment Report Review — 9 - 34

3.3 Staff Report - Lift Station Condition Assessment Report Review.pdf

3.3 Attachment A - Lift Station Condition Assessment 2022-05-24 DRAFT.pdf

## 4. ADJOURNMENT

Pursuant to the Brown Act, items may not be added to this agenda unless the Secretary to the Board has at least 72 hours advance notice prior to the time and date posted on this notice.

**Valley Sanitary District**
**Operations Committee**
**June 7, 2022**

TO: Operations Committee

FROM: Dave N. Commons, Facility Operations Manager

**SUBJECT:** Facility Process Control Modification to Consistently Remove Ammonia and Total Nitrogen – Phase 2

| | | |
|---|---|---|
| ☐Board Action | ☐New Budget Approval | ☐Contract Award |
| ☒Board Information | ☐Existing FY Approved Budget | ☐Closed Session |

**Executive Summary**
The purpose of this report is to provide additional information regarding VSD's Temporary Process Control Modifications Pilot Study to determine the capability of the current activated sludge treatment process, with only minor modification, to enhance the plant's capability to nitrification and denitrification. This is an explanation of Phase 2 of this study.

**Strategic Plan Compliance**
This item complies with VSD Strategic Plan Objective 3: Excellent Facilities.

**Fiscal Impact**
There is no current fiscal impact of this pilot project.

**Background**
On April 1, 2020, the State of California Colorado River Basin Regional Water Quality Control Board as part of Board Order R7-2020-007 required the VSD to complete within 18-months an Ammonia Technical Study to evaluate the ability of VSD's treatment facility to reduce ammonia discharges into the Coachella Valley Whitewater Storm Water Channel. Normally when the Regional Board requires such a technical study, a pending or potential effluent discharge requirement modifications to the plant's NPDES permit is looming. Phase 1 demonstrated that the current plant could be modified to removal ammonia from the plant effluent. We were able to achieve plant effluent ammonia requirements below 2.0 mg/L most of the time. Since the completion of Phase 1 of the Ammonia Pilot Study, the VSD wanted to evaluate additional process modifications that would provide consistent, reliable, nitrification / denitrification with effluent ammonia levels below 2.0 mg/l or less. During this phase of the project, Aeration Basin No. 4 will be modified into a Single Sludge, Pre-Anoxic process configuration (Modified Ludzak-Ettinger configuration). This requires constructing a temporary internal Nitrate recycle pipeline from the backend end of the aeration basin to

the front of the anoxic selector in Basin No. 4. This is being done by repurposing facility equipment and using temporary plastic pipe to do this job. This phase is committed to developing consistent, reliable, nitrification / denitrification with effluent ammonia levels below 2.0 mg/l or less.

**Recommendation**
No recommendation. Information only.

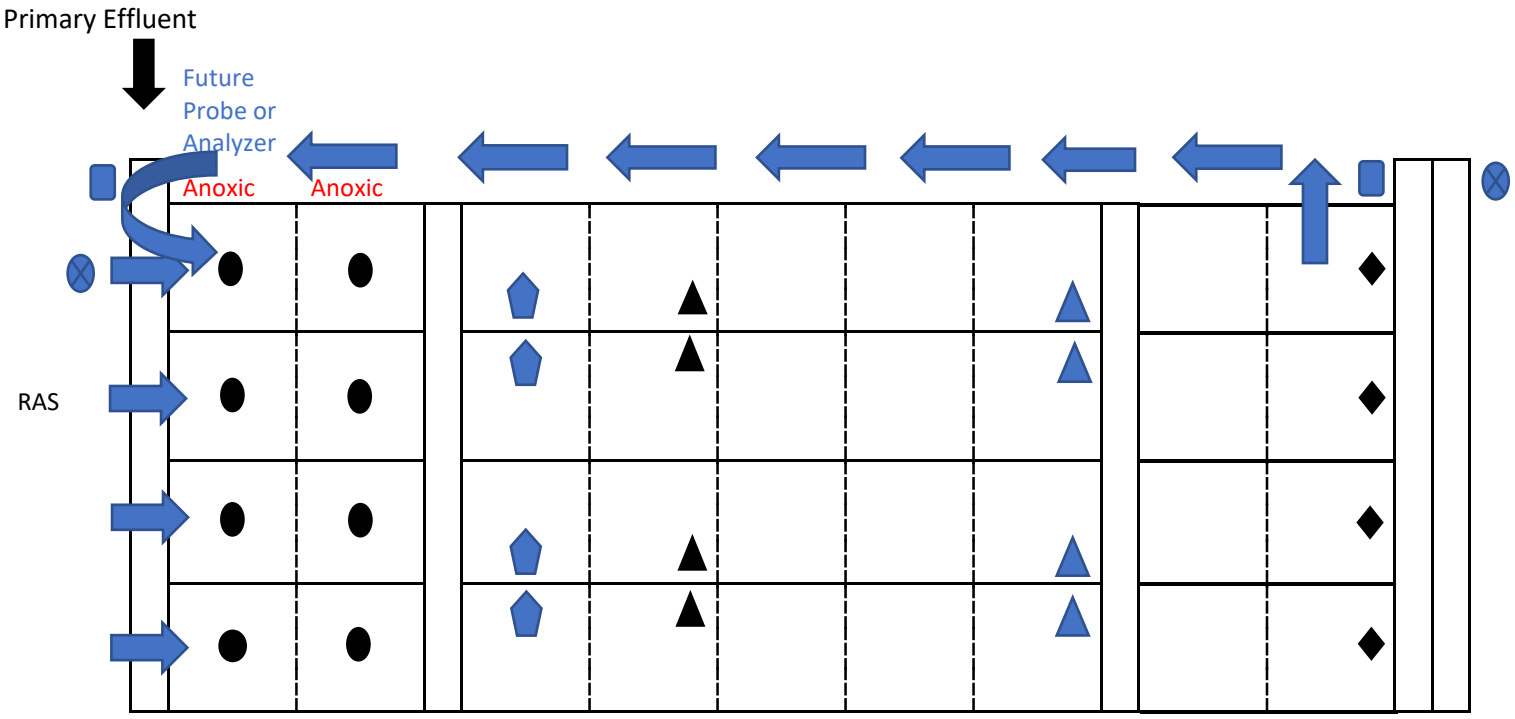
**Attachments**
Attachment A – Pilot Phase 2 Explanation Sheet

05/24/2022

# Selective Plant Process Evaluation – Phase 2

We have run the first phase of our pilot project for approximately 5 months. As stated before, our plan was to test the current plant aeration process to see what modifications could be quickly done to move the plant to complete nitrification/ denitrification with the least cost and the most rapid modification if the SWRCB placed in our NPDES permit the requirement to remove ammonia from our plant effluent. We have determined that modifications can be made to the plant aeration systems to bring about ammonia reductions. We have seen ammonia limits averaging below 2.0 mg/L. Now we must determine what modification will bring about the most consistent and stable operations.

In this phase, we are going to modify Aeration Basin No. 4 to a Single Sludge Pre-Anoxic Zone configuration. We will run a temporary Nitrate recycle pipeline from the last aerobic zone in Aeration Basin No. 4 outside the tank around to the front anoxic selector close to the discharge of the RAS into the tank. This will return the highly nitrate laden water to the anoxic zones in the front of the basin for greater denitrification to take place. From phase 1 testing we know nitrification/ denitrification is taken place in the aeration basin but not as extensively or consistently as we need it. This modification should improve the facility nitrification/ denitrification. We will increase the SRT to greater than 10 – 12 days, set the RAS rate to greater than 100%, and then set the internal recycle rate to between 200 – 400%. While making these process modifications, we will increase the aeration basin dissolved oxygen to >2.0 mg/L base load to improve the nitrification taking place in the aerobic zones of the Aeration Basin No. 4.



SYMBOLS KEY:

Current Anoxic Mixers 

Current DO Probes 

Current ANISE Probes 

Future NH3 Probe  (Possible PO4 Analyzer if must remove Phosphorous)

or Analyzer

Future NISE Probe 

(On RAS Pipeline)

Future DO Probes 

Future SS Probes 

**Study Plan**

1.) Evaluate current data and run background information. Continue monitoring NH3, NO3, pH, Alkalinity, Dissolved Oxygen data. Continue the following:
   a.) Aeration Basins No. 3 and 4 Influent – NH3, NO3, pH/Alkalinity, PO4; RAS Influent – NO3
   b.) Influent to First Aerobic Zone – TSS (MLSS)pH/Alkalinity; Effluent – DO, Microscopic examination
   c.) Final Aerobic Zone Effluent (Before final aerobic zones) – NH3, NO3, PO4
   d.) Plant Influent flow in MGD
   e.) Return and Waste Activated Sludge flow in MGD
   f.) SVI data
   g.) MCRT, days
   h.) Sludge blanket levels in secondary clarifiers

2.) Test other process changes if the above does not resolve NH3 problem:

   Install baffles between zones with mixers in the anoxic zones.

   Check nutrient balance in aeration basin between nitrogen, phosphorous, and potassium to determine if correct.

   Do a DO cross section analyze of the aeration basins to determine the optimum locations to install the DO probes.

3.) Complete a report itemizing any additional instrumentation that is need and any additional process modification that might be needed to develop complete, consistent, and reliable nitrification/ denitrification.

Dave Commons

**Valley Sanitary District**
**Operations Committee**
**June 7, 2022**

TO: Operations Committee

FROM: Ron Buchwald, Engineering Services Manager

**SUBJECT:** Project Update: Influent Pump Station Rehabilitation Project

| | | |
|---|---|---|
| ☐Board Action | ☐New Budget Approval | ☐Contract Award |
| ☒Board Information | ☐Existing FY Approved Budget | ☐Closed Session |

**Executive Summary**
The purpose of this report is to provide a project update and information regarding VSD's Influent Pump Station Rehabilitation Project.

**Strategic Plan Compliance**
This item complies with VSD Strategic Plan Objective 3: Excellent Facilities.

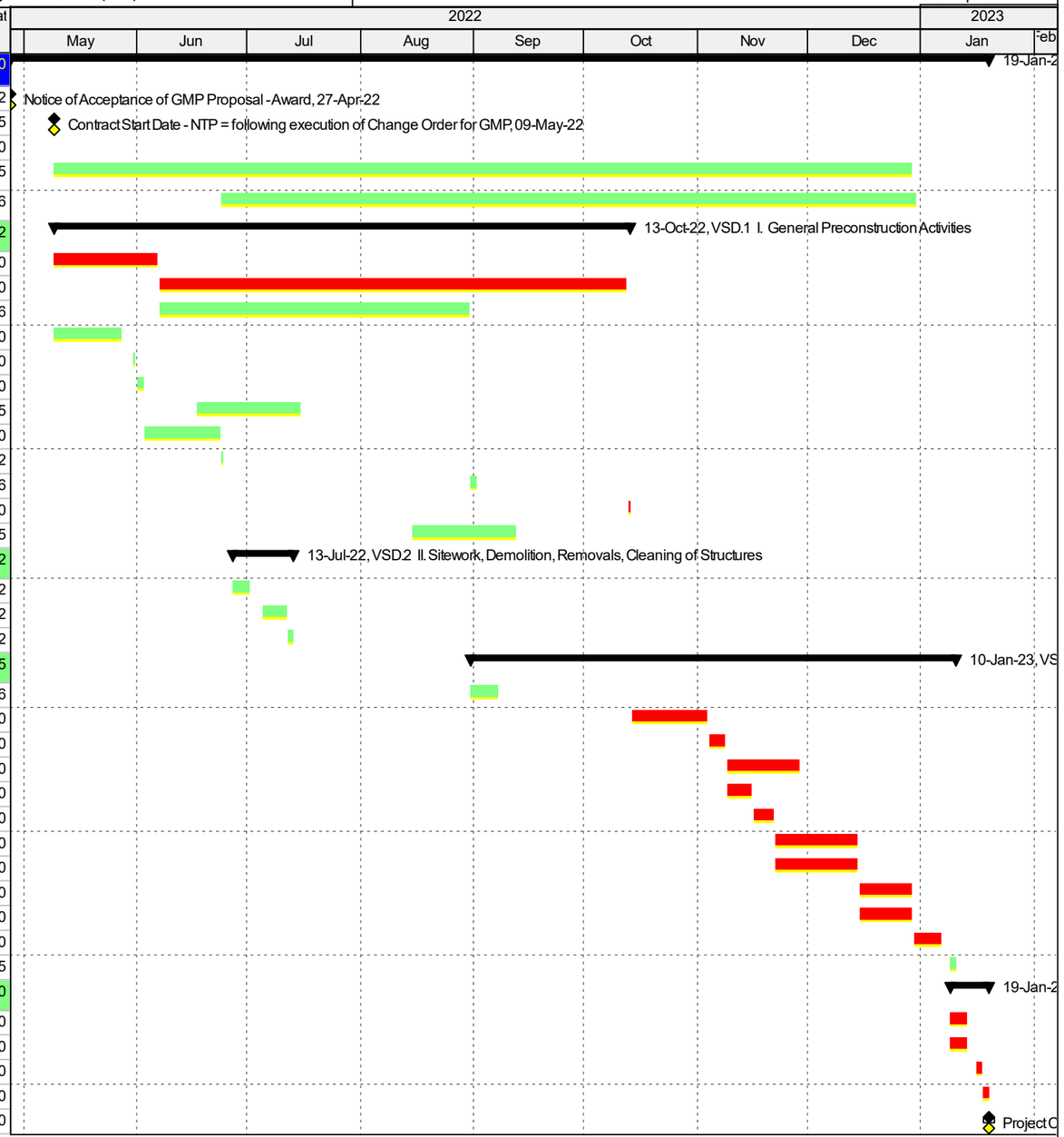
**Fiscal Impact**
The upcoming fiscal year impact of this project is $3,300,000 as shown in proposed CIP budget for FY 2022/23. The total contract price for construction is $2,921,971, the remainder will be used for consulting fees and contingencies.

**Background**
The influent pump station is showing significant signs of deterioration. Internal piping is losing their protective coating, the coating covering the walls is starting to show signs of failure, and gates sealing each pump bay are leaking. VSD awarded the Design/Build project to Downing Construction and Dudek Engineering. The initial project consisted of installing a sewer main by-pass to fully inspect the influent pump station to determine the necessary repairs. The initial design and construction estimate was then completed with a Guaranteed Maximum Price set at $2,921,971. A final award by the Board was approved on April 26, 2022. Downing / Dudek is in the process of acquiring the materials to install the sewer main by-pass around the pump station. The sewer main by-pass is expected to be installed in June and be active continuously for about 6 months. The project is estimated to be completed by the end of January 2023.

**Recommendation**
To receive and file this report.

**Attachments**
Attachment A: Preliminary Project Schedule.

| Activity ID | Activity Name | Original Duration | Start | Finish | Total Float |
|---|---|---|---|---|---|
| **VSD** | **Influent Pump Station Rehab Project** | 185 | 27-Apr-22 | 19-Jan-23 | 0 |
| 1 | Notice of Acceptance of GMP Proposal - Award | 0 | 27-Apr-22 | | 2 |
| 2 | Contract Start Date - NTP = following execution of Change Order for GMP | 0 | 09-May-22 | | 5 |
| 3 | **Anticipated Contract Days of (177) Working Days** | 177 | 09-May-22 | 19-Jan-23 | 0 |
| 4 | DUDEK - Provide Design Solutions throughout Construction | 163 | 09-May-22 | 29-Dec-22 | 5 |
| 5 | XYLEM - Sewer Bypass Operational during Construction Rehab | 190 | 24-Jun-22 | 30-Dec-22 | 16 |
| **VSD.1** | **I. General Preconstruction Activities** | 111 | 09-May-22 | 13-Oct-22 | 62 |
| 400 | Provide Key Submittals and Engineer Review | 20 | 09-May-22 | 06-Jun-22 | 0 |
| 402 | Order Flygt Pump with 18 Week Leadtime | 90 | 07-Jun-22 | 12-Oct-22 | 0 |
| 403 | Order Pipe & Fittings with 12 Week Leadtime | 60 | 07-Jun-22 | 30-Aug-22 | 26 |
| 405 | Submit Sewer Bypass Plan within 15 Days of NTP plus Review | 15 | 09-May-22 | 27-May-22 | 10 |
| 410 | Mobilization & Onsite Staging Area Setup | 1 | 31-May-22 | 31-May-22 | 10 |
| 415 | Demo of 10' Diameter Flattop | 2 | 01-Jun-22 | 02-Jun-22 | 10 |
| 418 | Submit 10' Diameter Flattop Design Submittal and Engineer Review | 20 | 17-Jun-22 | 15-Jul-22 | 85 |
| 420 | Installation of Sewer Bypass System & Electrical | 15 | 03-Jun-22 | 23-Jun-22 | 10 |
| 425 | Test & Monitor Bypass Operation | 1 | 24-Jun-22 | 24-Jun-22 | 62 |
| 450 | Delivery of Pipe/Fitting Materials | 2 | 31-Aug-22 | 01-Sep-22 | 26 |
| 460 | Delivery of Flygt Pump & Accessories | 1 | 13-Oct-22 | 13-Oct-22 | 0 |
| 465 | Construct Precast Flattop | 20 | 15-Aug-22 | 12-Sep-22 | 85 |
| **VSD.2** | **II. Sitework, Demolition, Removals, Cleaning of Structures** | 12 | 27-Jun-22 | 13-Jul-22 | 122 |
| 500 | Clean Structure Bays | 5 | 27-Jun-22 | 01-Jul-22 | 62 |
| 505 | Pumps & Piping Removals | 5 | 05-Jul-22 | 11-Jul-22 | 62 |
| 510 | Demolition of Pipe Supports and Gantry Crane Slabs | 2 | 12-Jul-22 | 13-Jul-22 | 122 |
| **VSD.3** | **III. Concrete Repairs, Linabond, Coatings, & Installations** | 90 | 31-Aug-22 | 10-Jan-23 | 5 |
| 600 | Concrete Repairs @ Tlock Failures | 5 | 31-Aug-22 | 07-Sep-22 | 26 |
| 605 | Linabond Preparation & Application | 15 | 14-Oct-22 | 03-Nov-22 | 0 |
| 610 | Install Golden Harvest Dual Slide Gate | 3 | 04-Nov-22 | 08-Nov-22 | 0 |
| 615 | Rehab Golden Harvest Slide Gates | 12 | 09-Nov-22 | 28-Nov-22 | 0 |
| 620 | Prefit Structure Interior Piping & Accessories | 5 | 09-Nov-22 | 15-Nov-22 | 0 |
| 625 | Exterior Coating for interior Piping & Appurtenances | 4 | 16-Nov-22 | 21-Nov-22 | 0 |
| 630 | Install interior Piping & Appurtenances plus all Pumps | 15 | 22-Nov-22 | 14-Dec-22 | 0 |
| 635 | Complete new installations on manifold piping | 15 | 22-Nov-22 | 14-Dec-22 | 0 |
| 640 | Prepare and finish coat new and existing exposed pipe and appurtenances | 10 | 15-Dec-22 | 29-Dec-22 | 0 |
| 645 | Complete Division 16 - Electrical Work | 10 | 15-Dec-22 | 29-Dec-22 | 0 |
| 650 | Remove Sewer Bypass | 5 | 30-Dec-22 | 06-Jan-23 | 0 |
| 660 | Install 10' Diameter Precast Flattop | 2 | 09-Jan-23 | 10-Jan-23 | 5 |
| **VSD.4** | **IV. Misc. Close-Out Work** | 9 | 09-Jan-23 | 19-Jan-23 | 0 |
| 1010 | Testing and Startup | 5 | 09-Jan-23 | 13-Jan-23 | 0 |
| 1015 | Construct Gantry Crane Pad Restorations | 5 | 09-Jan-23 | 13-Jan-23 | 0 |
| 1025 | Final Cleanup & Restoration | 2 | 16-Jan-23 | 17-Jan-23 | 0 |
| 1045 | Demobilization | 2 | 18-Jan-23 | 19-Jan-23 | 0 |
| 1050 | Project Complete | 0 | | 19-Jan-23* | 0 |




Actual Level of Effort | Actual Work | Critical Remaining Work
Primary Baseline | Remaining Work | Finish Constraint



DOWNING CONSTRUCTION INC.

**Valley Sanitary District**
**Operations Committee**
**June 7, 2022**

TO: Operations Committee

FROM: Ron Buchwald, Engineering Services Manager

**SUBJECT:** Lift Station Condition Assessment Report Review

| | | |
|---|---|---|
| ☐Board Action | ☐New Budget Approval | ☐Contract Award |
| ☒Board Information | ☐Existing FY Approved Budget | ☐Closed Session |

**Executive Summary**
The purpose of this report is to provide the Lift Station Condition Assessment Report prepared by Harris & Associates and provide an update on the project.

**Strategic Plan Compliance**
This item complies with VSD Strategic Plan Objective 3: Excellent Facilities.

**Fiscal Impact**
The upcoming fiscal year impact of this project is $1,228,340 for design and $3,666,667 for construction as shown in proposed CIP budget for FY 2022/23. The total estimated price to rehabilitate the four lift stations is $1,515,800 but is intended to be a multi-year project.

**Background**
In February of this year, Harris & Associates (Harris) along with two subconsultants performed a full inspection of each of VSD's four lift stations. After an analysis of the inspection findings, Harris put together the attached draft Lift Station Condition Assessment Report for our review. Overall, the condition assessment did not find any issues that required immediate action to prevent imminent structural or critical equipment failure. The stations are generally in moderate to good working condition. The major recommendations across the four lift stations involve new wet well linings, new mechanical coatings, and upgrading outdated electrical equipment. The recommended improvements are based on deteriorating asset conditions, outdated equipment with increased failure and safety risk, and assets nearing their useful life. Even though the four lift stations are in moderate to good conditions, there are several recommended repairs to be made to each lift station over the next 2 to 5 years. Calhoun lift station had the highest priority, followed by Carver and Barrymore lift stations in second place and then Vandenburg lift station with the lowest priority. Harris is also looking at relocating the Carver lift station from the roadway to an adjacent parcel as part of a second report.

**Recommendation**
To receive and file this report.

**Attachments**
Attachment A: Lift Station Condition Assessment Report Draft May 24, 2022.

# LIFT STATION CONDITION ASSESSMENTS

## VALLEY SANITARY DISTRICT - DRAFT


**To:** **Ronald Buchwald, PE**
Engineering Services Manager
Valley Sanitary District
(760) 238-5400 Office
(760) 238-5408 Direct

**From:** **Zaheer Shaikh, PE, PMP**
Director, Engineering Services
Regional Manager
Harris & Associates
Zaheer.Shaikh@WeAreHarris.com


**Date:** May 24, 2022

## Executive Summary

The key objectives of the lift station condition assessment were to identify existing structural, electrical, and mechanical deficiencies, and to provide improvement recommendations with planning-level cost estimates for the four active Valley Sanitary District (VSD) lift stations: Barrymore, Carver, Calhoun, and Vandenberg. **T**he assessment included an investigation of the station assets through confined space entry inspection, visual analysis, and nondestructive testing. Harris engaged TJC and Associates, Inc (TJCAA) for their structural and EI&C expertise and V&A Consulting Engineers (V&A) to assist with the condition assessment and perform a corrosion evaluation.

Pump performance and hydraulic capacity were not assessed. However, the three largest stations are equipped with overflow bypass piping to minimize the risk of sanitary sewer overflows (SSOs) and no problems were mentioned during site visits with VSD. The stations do not have backup generators but the overflow bypass piping function as emergency backup.

Overall, the condition assessment did not find any issues that required immediate action to prevent imminent structural or critical equipment failure. The stations are generally in moderate to good working condition. The major recommendations across the four lift stations involve new wet well linings, new mechanical coatings, and upgrading outdated electrical equipment. Recommended improvements are based on deteriorating asset conditions, outdated equipment with increased failure and safety risk, and assets nearing their useful life. Recommended improvements aim to provide a more reliable system and meet VSD's needs for the future. Several maintenance items were identified and should be included in future regular maintenance work. Further structural analysis is recommended at the two older wet well/dry well style stations, and at the electrical building at Calhoun station.

Installing a SCADA system at all four stations is recommended to provide more reliability and real time system knowledge, which can help prevent longer downtimes and support the operations crew's efficiency. Although listed as an individual recommendation at each station in the tables within this memo, SCADA installation can be designed, programmed, and installed system-wide, and is the recommended method, if budget allows. Also recommended at all four stations is performing an arc flash study to ensure compliance with current codes, regulations, and safe work practices.

Table E1 summarizes the total project costs for all recommended construction improvements at each station. Tables listing the individual projects are within the body of this memo. The timeframes listed in Table E1 reflect

a recommended prioritization of work by station. Table E2 includes the total project costs for all recommended construction improvements and the additional recommended arc flash and structural studies. All estimates in Tables E1 and E2 are provided in 2022 dollars for cost comparison across stations. Escalated costs are included in the individual station recommendation tables within this memo.

Calhoun was given the highest priority due to existing mechanical challenges and the existing condition of the wet well coating. VSD stated that they are currently budgeting to purchase new chopper pumps to handle the frequent existing clogging issues. The new pump installation should be coordinated with the new well coating and new discharge pipe improvement recommendations. New wet well coating is recommended to replace the significantly torn and delaminated liner and new discharge piping is recommended to replace the severely corroded existing discharge pipes. Because of the challenges of this work including the wet well size, depth, and required bypass pumping, it is advised to coordinate and complete as one project.

The Carver and Barrymore station recommendations share the second priority level. These older wet well/dry well style stations both have their original electrical and controls equipment, which are now outdated and at higher risk of failure and safety incidents. The wet well liners at both stations were observed in a deteriorating condition and are recommended for replacement. New dry well coating is also recommended. If VSD can relocate the Carver station within the next 2 to 5 years, then many of the Carver recommendations are not needed or could be completed as part of the station relocation project.

Compared with the other stations, Vandenberg is the newest station and has fewer recommended improvements and is listed with the lowest priority level.

Combining the recommended construction projects together at each station into one station rehabilitation project is a suggested option for design and construction efficiency. However, there are alternative options that can be evaluated with the individual station recommendations discussed in this memo, if required for budgeting.

**TABLE E1: Planning-Level Cost Estimate for Recommended Construction Projects**

| Lift Station | Recommended Timeframe | Estimated Cost for Recommended Construction Projects ($, 2022 Dollars)[1] |
|---|---|---|
| **Calhoun** | 0 to 2 years | $ 400,200 |
| **Carver** | 2 to 5 years | $ 471,400 |
| **Barrymore** | 2 to 5 years | $ 445,500 |
| **Vandenberg** | 3 to 5 years | $ 82,200 |

**TABLE E2: Planning-Level Cost Estimate for Recommended Construction Projects and Studies**

| Lift Station | Estimated Cost for Recommended Construction Projects and Studies ($, 2022 Dollars)[1] |
|---|---|
| **Calhoun** | $ 431,700 |
| **Carver** | $ 507,600 |
| **Barrymore** | $ 481,700 |
| **Vandenberg** | $ 94,800 |

[1]Estimated cost is a planning-level project cost estimate and was estimated without detailed plans or drawings. The construction projects estimate in Table E1 are inclusive of material, labor, contractor costs, and project soft costs. A construction sub-total was first estimated with material and labor cost. Unit costs for these items were derived from a combination of recent construction bids, national estimating databases, and engineering judgement. A multiplier of 1.57 was applied to the sub-total to estimate a total construction cost inclusive of sales tax (9%), contractor profit and overhead (15%), contractor front end specs (12%), and contingency (30%-35%). A factor of 1.26 was then applied to the total construction estimate accounting for project management

(6%), design, survey, miscellaneous (10%), and construction management, inspection, material testing (10%). For the studies, the estimated cost includes the cost of service and project management.

# 1. Introduction

Valley Sanitary District (VSD) provides wastewater collection, treatment, and water reclamation services for much of the City of Indio and portions of the surrounding communities within Coachella Valley. Founded in 1925, VSD continues to serve approximately 76,000 people within a service area of approximately 12,768 acres comprising residential, commercial, and industrial customers. The existing sewer infrastructure includes over 254 miles of pipes, four active lift station (LS), eight siphons, and a wastewater treatment plant (WWTP).

VSD is currently implementing a 12-year collection system improvement program to inspect and improve its sewer collection system pipes to ensure continued safe and cost-effective service. Adjacent to this effort, VSD has retained Harris & Associates to perform a condition assessment on four existing sewer lift stations (Figure 1): Barrymore, Calhoun, Carver, and Vanderburg.


FIGURE 1: Lift Station Locations

The two oldest stations, Barrymore and Carver, constructed in the 1960s and 1970s, have a wet well and dry well configuration. The two newer stations, Vandenberg and Calhoun, are submersible style and were built in the 2000s. The newest station at Vandenberg includes a separate valve vault. A summary of the station configurations is provided in Table 1.

The following sections of this memo summarize the condition assessment findings and details the recommended improvements with associated budgetary cost estimates. The detailed structural assessments for each station by TJCAA are attached as appendices.

TABLE 1: Lift Station Summary Table

| Memo Section | Station Name | Location | Year Installed | Lift Station Style | No. of Pumps | Pump Capacity, gpm[1] |
|---|---|---|---|---|---|---|
| 3.1 | Calhoun | Intersection of 49th Ave and Calhoun St | 2005 | Submersible wet well | 2 | 630 |
| 3.2 | Barrymore | Intersection of Barrymore St and Garbo Dr | 1979 | Wet Pit/Dry Pit Style (Prefabricated dry pit) | 2 | 800 |
| 3.3 | Carver | Intersection of 48th Ave and Bataan St | 1967 | Wet Pit/Dry Pit Style (Prefabricated dry pit) | 2 | 320 |
| 3.4 | Vandenberg | Vandenburg Dr and Pic Way | 2007 | Submersible wet well (with valve vault) | 2 | 110 |

[1] Pump information was based on VSD provided data. Pump testing was hydraulic capacity analysis was not performed.

# 2. Approach and Condition Assessment Scope

The scope of the lift station condition assessments consists of the identification and evaluation of mechanical, structural, and electrical, instruments, and controls (EI&C) assets within each of the four stations. This assessment does not address pump performance or hydraulic capacity improvements.

The following list summarizes the approach taken for the lift station condition assessments. Subconsultant reports from TJCAA further detailing their structural analysis is provided in the appendix.

1. Review existing drawings and documents
2. Perform site visits with VSD staff between February 7 and February 9, 2022
    a. Confined space entry of well structures, which required bypass pumping
    b. Visual inspection and site photos
    c. Nondestructive testing on exposed surfaces by V&A Consulting Engineers
    d. Interviews with VSD about concerns, knows issues, and wants
3. Evaluate all observations and findings
4. Recommend improvements based on assessment
    a. TJCAA provided structural and EI&C evaluation and recommended improvements
    b. V&A Consulting engineers provided concrete, metals, and coatings condition assessment
5. Estimate planning-level cost and recommend prioritization for recommended improvements

# 3. Findings and Recommendations

The following section presents the observations, evaluation, and improvement recommendations for each station. A detailed structural assessment for each station was performed by TJC and is attached as Appendix A. The structural recommendations from those reports are summarized and included in the following sections.

## 3.1 Calhoun Lift Station

### *3.1.1 Station Description*

The Calhoun lift station, built in 2005, is a submersible style lift station with an approximate 13-feet diameter precast concrete manhole and a 5-feet x 3-feet access hatch (Figure 2). The station is located within a residential

neighborhood in the northwest corner of the 49th Avenue and Calhoun Street intersection inside a gated lot with concrete masonry unit (CMU) perimeter wall.


**FIGURE 2: Calhoun Lift Station Schematic and Site Photo**

The wet well collects flow from two incoming sewer mains and is then pumped through a 4-inch force main to a manhole in Calhoun Street. Provided drawings showed a 6-inch force main; however, from the site visits the visible piping was 4-inch. The station has two submersible pumps, each with a design capacity of 630 gpm and are operated in a duty/standby configuration. The wet well has a 15-inch PVC emergency overflow as shown on the drawings. The piping configuration is shown in Figure 2.

The electrical and controls equipment is housed in a CMU electrical building. The utility power service equipment is located within the station lot and consists of a pad mounted transformer and meter/main load center panel mounted on the electrical building exterior in a security cage. An enclosure containing the electrical wiring terminations sits just outside the wet well pad in a lockable security cage.

The lift station equipment is fed from a 208 Volt, 3-phase control panel powered from a combination load center which is rated 200A, 208V, 3-phase fed from a 75kVA Imperial Irrigation District (IID) transformer. The wall-mounted control panel, Gorman-Rupp Pumps EPS 2000 Pump Control Panel, is rated 125A and supplies electrical power to two 10-horsepower (hp) submersible pumps and contains the station controls. The pump control system consists of a bubbler (primary) with float (backup) and a radio alarm autodialer. A 3kVA dry type distribution transformer and alarm autodialer are wall mounted adjacent to the control panel (Figure 3).

General station information for the Calhoun Lift Station is summarized is Table2.

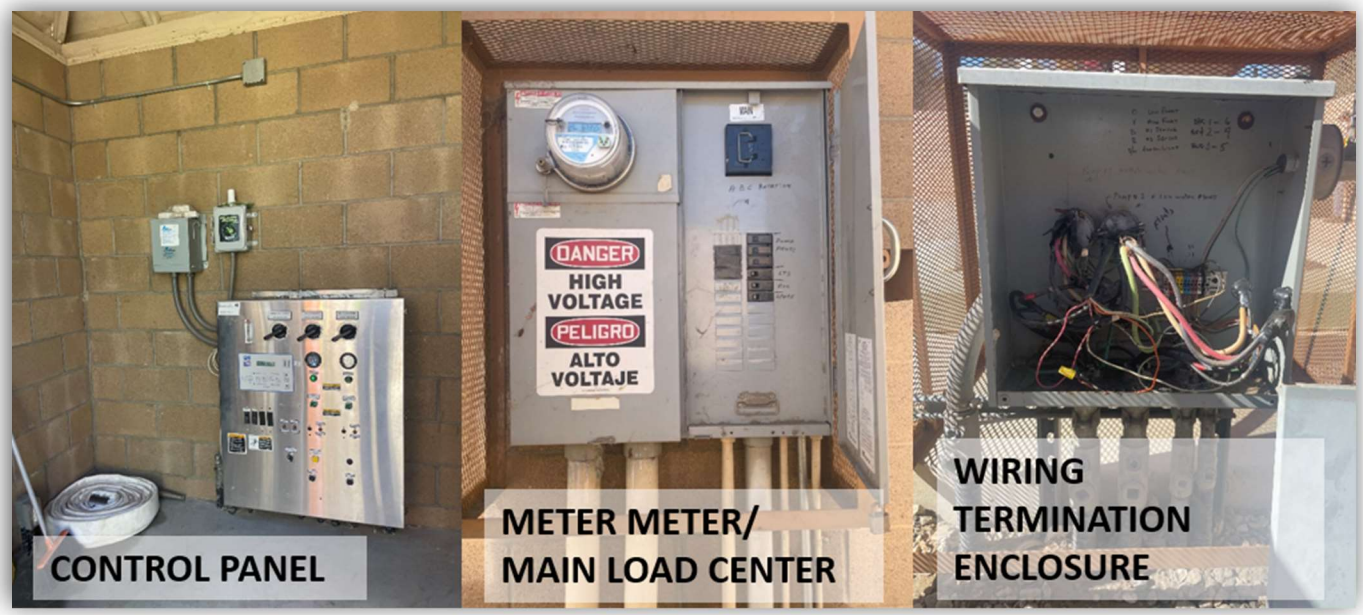



FIGURE 3: Calhoun Lift Station Photos

TABLE 2: Calhoun Lift Station General Information

| Calhoun Lift Station | |
|---|---|
| Year Constructed | 2005 |
| Station Type | Submersible wet well |
| Wet Well | 13-feet diameter wet well with 36-inch diameter access manhole; approximately 35-deep |
| Number of Pumps | Two pumps (duty/standby configuration) |
| Pump Design Capacity and TDH | 630 gpm @ 15 feet (each pump; from VSD provided pump information)<br>Serial number: #1809108 and #1809107 |
| Pump speed | 1150 rpm |
| Motor Hp | 10 hp |
| Phase/Volts | 3/208 |
| Drive type | VFD |
| Pump Manufacturer/Model | Keen K4VB |
| Discharge Diameter | 4-inch (observed during site visits; VSD provided drawings show a 6-inch) |
| Standby power | None; wet well has emergency overflow bypass pipe |
| Level Controls and backup | Bubbler (primary) and float (backup) |
| Alarms | Alarm auto dialer for high wet well and pump trip alerts |
| Control Panel | Above grade control panel within CMU electrical building |
| Valve location | Aboveground |

### *3.1.2 Observations and Findings*

Condition assessment observations by asset group are provided in Table 3. The final table column associates the condition finding with recommended improvements in Table 4.

Overall, the control panel, transformer, autodialer, electrical wiring, and connections at Calhoun are original installation and are in good working condition. Several items were noted for electrical improvements and upgrades. Station structures are also in overall good condition with minimal deficiencies in structural elements.

The major deficiency observed at the station was with the wet well liner, found to be substantially delaminated in numerous locations, in addition to tears and split seams. Concrete scaling was observed behind the liner.

The existing pumps get pugged often from wipes and other items. VSD has submitted new chopper pumps for this station in their future budget. VSD mentioned that the pump does not seal well on the base elbow. This could be caused from a misaligned rail system, which can be readjusted when the new pumps are installed.

**TABLE 3: Calhoun Condition Assessment**

| Category | Asset | Condition Description | Recommendation |
|---|---|---|---|
| Civil/Mechanical/ Structural | **Site (General)** | • Unpaved; not noted issues<br>• CMU perimeter wall and access gate observed in good condition<br>• Coating deteriorated on pad-mounter transformer and minor corrosion | See Item 5, Table 4 |
| | **Site Security** | • Site enclosed by CMU perimeter wall with locked gate access<br>• Camera on building acts as visible deterrent, but is not connected<br>• Exterior lights on electrical building do not work | See Item 6, Table 4 |
| | **Electrical Building** | • 8'x8' Concrete CMU building with timber framed roof in good condition<br>• Ventilation fan and fluorescent interior lights are working<br>• No nesting problem under eaves | See Items 6 and 9, Table 4 |
| | **Above grade piping** | Discharge piping and header in fair condition with minor corrosion | See Item 4, Table 4 |
| | **Wet Well Hoist** | Hoist located on wet well concrete slab and is powered by running an extension cord to the electrical building | The electrical outlet should be 3-ft from wet well hatch opening or should be rated for hazardous location |
| | **Wet Well** | • No ladder defects identified<br>• Access hatch in good condition<br>• Corrosion below bubbler to control panel<br>• Delaminated liner throughout<br>• Factory coating only in lower 6-feet<br>• Liner tears observed at every seam<br>• Medium scaling of concrete below liner | See Item 3, Table 4 |
| | **Pumps and Motors** | • Pumps clog (from wipes and other items); moderate corrosion staining (VSD currently planning to replace with chopper pumps)<br>• Pumps do not seal well on the base elbow<br>• VSD has new chopper pumps in budget<br>• SST guide rails and supports in good condition with minor staining | Coordinate new pump installation with Item 3 in Table 4 |
| | **Piping and valves** | Moderate corrosion on discharge piping | See Item 3, Table 4 |
| **Electrical, Instrumentation, Controls (EI&C)** | **Control Panel** | • Meter/main combination load center in good condition<br>• Control panel does not have main circuit breaker | See Items 1 and 8, Table 4 |

| Category | Asset | Condition Description | Recommendation |
|---|---|---|---|
| | | • Circuit breaker presumed to feed panel does not have visible rating or a trip mechanism<br>• No arc flash warning labels | |
| | **Level Control, alarms, and monitoring** | • No identified issues with level controls<br>• Autodialer designed to alarm on high wet well level and motor overload, but does not alarm on motor overload<br>• Alarm agent is one day behind<br>• No emergency power backup but not necessarily needed due to low SSO potential<br>• No SCADA | See Items 1 and 7, Table 4 |
| | **SSO potential** | Emergency bypass piping at wet well; no identified issues | None |
| | **Conduits** | • Conduit sealant may be old<br>• Wiring, terminations, and intrinsically safe barrier components are disorganized, improperly labeled and there is evidence of corrosion and deterioration | See Item 2, Table 4 |

### *3.1.3 Recommended Improvements*

Table 4 lists the improvement recommendations with associated planning level project cost estimate. Construction project costs are provided separately from the estimated cost for recommended structural and arc flash studies. All projects should be considered within now and the next two years.

Modifications to the main panel, control panel, and autodialer should be performed to improve the functionality of the current control system. The upgrades will ensure the equipment is wired to function as intended. In addition, the control panel should have a main circuit breaker installed locally and the main panel outside should have a tripping mechanism installed at the circuit feeding the control panel. Upgrading the existing termination panel is also recommended and should be placed outside of the classified area boundary, which will improve the reliability of the current arrangement. Per NFPA 820, the wet well and surrounding area is classified as Class I, Div 2 from 3 feet in all directions from any opening, hatch, or vent, and extends 18 inches above. It is recommended that proper signage also be provided as part of this or any lift station upgrade.

Issues such as site security can be addressed by adding an intrusion alarm to the electrical building doors. Installing additional site lighting and security cameras should be considered as overall site improvements and is not included in the lift station recommended improvements estimated cost.

Inside the wet well, the lining and discharge piping need replacement. Both projects should be done with the installation of the new pumps VSD intends to purchase since all will require bypass pumping and will benefit from coordination.

An arc flash hazard analysis should be performed for all equipment operating over 100V to ground in accordance with the National Electrical Code, NFPA 70E (Standard for Electrical Safety in the Workplace), OSHA 29-CFR, Part 1910 Sub part S, and IEEE1584 Standards. Permanent thermal transfer type factory manufactured arc flash warning labels in conformance with NFPA 70E and ANSI Z535 should be provided.

VSD's goal to add SCADA to their facilities is highly recommended. Adding SCADA would require detailed design and would provide the most benefit if SCADA capabilities were added to all four active lift stations at one time.

The interior and exterior lighting fixtures should be replaced with energy efficient LED type fixtures. The estimated cost is based on replacing one pendant-mounted fixture in the electrical building and two wall-

mounted fixtures outside. The exterior lighting should be configured with photocell and motion detection for efficiency and to improve site security. In addition, the wiring to the exterior fixtures should be repaired to make operational.

Structural analysis of the pump control room found potentially non-compliant items from their ASCE/SEI 41 Tier 1 screening and noted lack of basic seismic detailing required for a structure of its size. It is recommended that a more detailed structural analysis be performed on the CMU pump control room. A structural analysis of the CMU pump control building is recommended to determine seismic demands at locations for stiffness (ASCE 41, Tier 3 Systematic Evaluation).

**TABLE 4: Calhoun Recommendations and Cost Estimate**

| No. | Improvement Recommendations | Estimated Cost, $[1] |
|---|---|---|
| **Construction Projects** | | |
| **1** | Install upgrades to main electrical panel, control panel, and autodialer | $ 47,500 |
| **2** | Install new sump termination panel | $ 27,700 |
| **3** | Remove existing liner and install full coating of wet well interior surface and install discharge piping with fusion epoxy coated | $ 266,900 |
| **4** | New coating on above ground piping | $ 1,300 |
| **5** | New coating on pad-mounted transformer enclosure | $ 1,300 |
| **6** | Replace interior fixtures with LED and exterior with LED motion-sensor lighting fixtures at electrical building | $ 6,000 |
| **7** | Install new SCADA system for remote monitoring and controls capability | $ 49,500 |
| | **Total for Items 1-7 (2022 Dollar value)** | **$ 400,200** |
| | **Total (in 2023 dollars)[2]** | **$ 413,600** |
| | **Total (in 2024 dollars) [2]** | **$ 427,500** |
| | **Total (in 2025 dollars) [2]** | **$ 441,900** |
| **Studies** | | |
| **8** | Perform arc flash study and provide labels | $ 12,600 |
| **9** | Perform structural analysis of the CMU control room | $ 18,900 |
| | **Total for Items 1-9 (2022 Dollar value)** | **$ 431,700** |
| | **Total (in 2023 dollars) [2]** | **$ 446,200** |
| | **Total (in 2024 dollars) [2]** | **$ 461,200** |
| | **Total (in 2025 dollars) [2]** | **$ 476,700** |

[1]Estimated cost is a planning-level project cost estimate and was estimated without detailed plans or drawings. The project cost estimate for the listed construction projects is inclusive of material, labor, contractor costs, and project soft costs. A construction sub-total was first estimated with material and labor cost. Unit costs for these items were derived from a combination of recent construction bids, national estimating databases, and engineering judgement. A multiplier of 1.57 was applied to the sub-total to estimate a total construction cost inclusive of sales tax (9%), contractor profit and overhead (15%), contractor front end specs (12%), and contingency (30%-35%). A factor of 1.26 was then applied to the total construction estimate accounting for project management (6%), design, survey, miscellaneous (10%), and construction management, inspection, material testing (10%). For the studies, the estimated cost includes the cost of service and project management.

[2]An annual escalation of 3.36% is assumed.

## 3.2 Barrymore Lift Station

### *3.2.1 Station Description*

The Barrymore lift station, built in 1979, is a pre-packaged Smith & Loveless lift station consisting of a concrete wet well and cylindrical steel dry well (Figure 4). The station is located on an easement within a gated residential

community in the northwest corner of the intersection of Barrymore Street and Garbo Drive in Indio, California. The site is easily accessible from the road and is not enclosed by any fencing.


**FIGURE 4: Barrymore Lift Station Schematic and Site Photo**

The station has two pumps, each with a design capacity of 800 gpm that are operated in a duty/standby configuration. VSD has one backup pump on shelf. These pumps are oversized but are now controlled by VFDs installed about six years ago that lock the pumps at a lower speed. The lift station is controlled by a bubbler system with redundant air compressors. A bubbler system is VSD's preferred method for lift station controls.

The electrical and controls equipment is located primarily in the dry well. Outside of the dry well, the power utility meter and an alarm autodialer are stanchion-mounted in separate cabinets above grade and protected by a lockable security cage.

The lift station equipment is fed from a 240 Volt, 3-phase control panel powered from an Imperial Irrigation District power service. It is equipped with a 100 Amp main circuit breaker that supplies electrical power to two 10-horsepower variable frequency drive-driven pumps, two air compressors, a sump pump, a dehumidifier, a blower, lighting, and station controls (Figure 5).

General station information for the Barrymore Lift Station is summarized is Table 5.


FIGURE 5: Barrymore Lift Station Photos

TABLE 5: Barrymore Lift Station General Information

| Barrymore Lift Station | |
|---|---|
| Year Constructed | 1979 |
| Station Type | Pre-packaged Smith & Loveless below ground lift station<br>Above-ground utility meter and alarm auto-dialer |
| Wet Well | 72-inch diameter cast-in-place concrete wet well with a 36-inch diameter access manhole; 15.5 feet deep |
| Dry Well | 84-inch steel sphere with a 36-inch access tube; 16-feet deep |
| Number of Pumps | Two pumps (1 duty, 1 standby)<br>Serial Numbers: 797307N-3 and 797307N-2<br>VSD has one backup pump on shelf |
| Pump Design Capacity and TDH | 800 gpm @ 32 feet (each pump) |
| Pump speed | 1170 rpm |

| | |
|---|---|
| Motor Hp | 10 hp |
| Control Panel Phase/Volts | 3/240; powered by Imperial Irrigation District |
| Circuit Breaker | 100 amps |
| Drive type | VFD (installed around 2016) |
| Pump Manufacturer/Model | Smith & Loveless 6B3 |
| Discharge Diameter | 6-inch |
| Standby power | None |
| Level Controls and backup | Bubbler system (with redundant air compressors) |
| Alarms | Alarm auto dialer in above grade enclosure |
| Location of station controls | Electrical and pump controls in dry well<br>Utility meter in above grade enclosure |
| Valve location | Dry well |

### *3.2.2 Observations and Findings*

Condition assessment observations by asset group are provided in Table 6. The final table column associates the condition finding with a recommended improvement in Table 7.

The Barrymore Lift Station structure is in overall good condition with minor noted deficiencies in structural elements. However, the electrical equipment is clearly outdated and in need of a complete upgrade to ensure system reliability and functionality. It is recommended to relocate the control panel above grade. Deterioration of the wet well liner was observed and is recommended for replacement.

Because the station is in a publicly accessible neighborhood, the equipment has an increased chance of vandalism and destruction.

**TABLE 6: Barrymore Lift Station Condition Assessment**

| Category | Asset | Condition Description | Recommendation |
|---|---|---|---|
| **Civil/Mechanical /Structural** | **Pavement** | Small crack (approximately 0.06 inch) in exterior concrete slab-on-grade; not indicative of structural issues with station | See Item 12, Table 7 |
| | **Site Security** | Outdoor equipment is not protected by fencing and is accessible to public | See Item 6, Table 7<br><br>(Consider intrusion alarms on cabinets and wells) |
| | **Pumps and Motors** | • Minor wear on coatings and minor surface corrosion at pump and pump base.<br>• Pump were original oversized. VFDs were installed around 2016 and now run pumps at lower speed. Pumps run well now.<br>• Spare pump on shelf | None |
| | **Dry Well** | • Exterior riser in good condition<br>• Minor exterior coating deterioration<br>• No leakage issues<br>• Corrosion floor pits up to 0.07 inch in depth<br>• Walls and ceilings in overall good condition<br>• Ladder in good condition; no defects identified<br>• Broken latch on lid- temporary solution in place<br>• Moderate corrosion observed on sump pump and surrounding submerged area | See Items 6, 9 and 10, Table 7 |

| Category | Asset | Condition Description | Recommendation |
|---|---|---|---|
| | | • Constructed in 1979, the station pre-dates seismic codes and may not have been built to withstand earthquake ground motion<br>• Monthly service and rigging challenging for the wet well/dry well configuration.<br>• Fluorescent lighting fixture | |
| | **Piping and valves** | • Minor wear on coating on inlet piping and valves<br>• Minor coating wear at valve bolts and flanges on discharge piping | None |
| | **Wet Well** | • Rim severely corroded and lid may not fit soon<br>• Overall good condition<br>• Potential areas of hollow concrete sections<br>• Corrosive environmental potential to corrode reinforcing steel bars within concrete structure<br>• Liner begins 4-feet above finished floor<br>• Blisters in liner coating | See Item 4 and 5, Table 7 |
| **Electrical, Instrumentation, Controls (EI&C)** | **Overall** | Control panel, motors, transformer, electrical wiring, and connections are original installation and are reaching their end of life. Equipment condition and function are good, with minimal surface corrosion. | See Item 1 and 2, Table 7 |
| | **Control Panel** | • Exterior control panel in good condition with minimal corrosion<br>• No arc flash warning | See Item 1, 2 and 8, Table 7 |
| | **Level Control, alarms, and monitoring** | • No identified issues with bubbler system<br>• Redundant air compressors present, but no switch to change<br>• No SCADA | See Item 7, Table 7 |
| | **SSO potential** | Minimal risk | None |
| | **Conduits** | Exterior conduits to wet well were recently upgraded and are run exposed at grade | See Items 3 and 11, Table 7 |

### *3.2.3 Recommended Improvements*

Table 7 lists the improvement recommendations and associated cost estimate. The construction projects and costs are listed separately from recommended structural and arc flash studies, and maintenance and monitoring items.

Recommended control panel replacement will maintain all the functionality of the current control strategies. It is recommended to add backup floats for redundancy and to relocate the existing autodialer and other controls wiring in the outdoor panel to the new control panel. It is recommended to relocate the lift station electrical and controls outside of the dry pit to eliminate the requirement for explosion proof gear in the Class I, Div 2 hazardous area. VSD easements should be clearly identified before the design and relocation of the control panel above grade. Concurrently with the control panel upgrade, a sump termination panel is recommended to isolate the electrical equipment terminations from the potentially hazardous atmosphere in the wet well. Per NFPA 820, the wet well and surrounding area is classified as Class I, Div 2 from three feet in all directions from any opening, hatch, or vent, and extends 18 inches above. The sump termination cabinet is a system that simplifies removal of electrical equipment for maintenance when compared to traditional conduit seal fittings. It is recommended that proper signage also be provided as part of this or any lift station upgrade.

An arc flash hazard analysis should be performed for all equipment operating over 100V to ground in accordance with the National Electrical Code, NFPA 70E (Standard for Electrical Safety in the Workplace), OSHA 29-CFR, Part

1910 Sub part S, and IEEE1584 Standards. Permanent thermal transfer type factory manufactured arc flash warning labels in conformance with NFPA 70E and ANSI Z535 should be provided.

VSD's goal to add SCADA to their facilities is highly recommended. Adding SCADA would require detailed design and would provide the most benefit if SCADA capabilities were added to all four active lift stations at one time.

Site security can be addressed by adding intrusion alarms to cabinet doors. Installing a fence or other protective barrier, site lighting, and security cameras could also be considered as overall site improvements. At a minimum, locks and intrusion alarms are recommended on all publicly accessible equipment.

Constructed in 1979, the station pre-dates the codifying of seismic design and construction techniques specific to this type of construction. As a pre-benchmark structure the Barrymore Lift Station may not remain stable under the inelastic deformations caused by the earthquake ground motion prescribed for this structure type and site by the California Building Code. A structural analysis of the entire structure is recommended to determine seismic demands at locations for stiffness (ASCE 41, Tier 3 Systematic Evaluation).

**TABLE 7: Barrymore Lift Station Recommendations and Cost Estimate**

| No. | Improvement Recommendations | Estimated Cost, $[1] |
|---|---|---|
| **Construction Projects** | | |
| **1** | Install new control panel above-grade | $ 227,500 |
| **2** | Install new sump termination panel | $ 29,700 |
| **3** | Install pipe covers over entire length of exposed conduits | $ 2,000 |
| **4** | Remove and replace access wet well rim and cover; provide protective coating to prevent future deterioration due to H2S exposure | $ 22,700 |
| **5** | Remove existing wet well liner and provide full coating of interior surface | $ 87,000 |
| **6** | Clean and recoat pitted floor areas, exterior access riser, and interior riser joint in dry well; repair hatch | $ 22,100 |
| **7** | Install new SCADA system for remote monitoring and controls | $ 49,500 |
| **8** | Replace sump pump | $ 5,000 |
| | **Total for Items 1-8 (2022 Dollar value)** | **$ 445,500** |
| | **Total (in 2023 dollars)[2]** | **$ 460,500** |
| | **Total (in 2024 dollars) [2]** | **$ 476,000** |
| | **Total (in 2025 dollars) [2]** | **$ 494,000** |
| | **Total (in 2026 dollars) [2]** | **$ 508,500** |
| **Studies, Maintenance, and Monitoring** | | |
| **9** | Perform arc flash study and provide labels | $ 12,600 |
| **10** | Perform structural analysis of entire structure (wet well and dry pit) | $ 23,600 |
| **11** | Replace missing conduit elbow cover | In-house |
| **12** | Monitor slab crack | In-house |
| | **Total for Items 1-12 (2022 Dollar value)** | **$ 481,700** |
| | **Total (in 2023 dollars) [2]** | **$ 497,900** |
| | **Total (in 2024 dollars) [2]** | **$ 514,600** |
| | **Total (in 2025 dollars) [2]** | **$ 531,900** |
| | **Total (in 2026 dollars) [2]** | **$ 549,800** |

[1]Estimated cost is a planning-level project cost estimate and was estimated without detailed plans or drawings. The project cost estimate for the listed construction projects is inclusive of material, labor, contractor costs, and project soft costs. A construction sub-total was first estimated with material and labor cost. Unit costs for these items were derived from a combination of recent construction bids, national estimating databases, and engineering judgement. A multiplier of 1.57 was applied to the sub-total to

estimate a total construction cost inclusive of sales tax (9%), contractor profit and overhead (15%), contractor front end specs (12%), and contingency (30%-35%). A factor of 1.26 was then applied to the total construction estimate accounting for project management (6%), design, survey, miscellaneous (10%), and construction management, inspection, material testing (10%). For the studies, the estimated cost includes the cost of service and project management.

[2]An annual escalation of 3.36% is assumed.

### *3.3.1 Station Description*

The Carver lift station, built in 1966, is a pre-packaged Smith & Loveless lift station consisting of a concrete wet well and cylindrical steel dry well (Figure 6). The station is located within the westbound travel lane at the intersection of 48th Avenue and Bataan Street in Indio, California. Access to the wells requires partial lane closure and traffic control. Controls equipment is in the dry well.

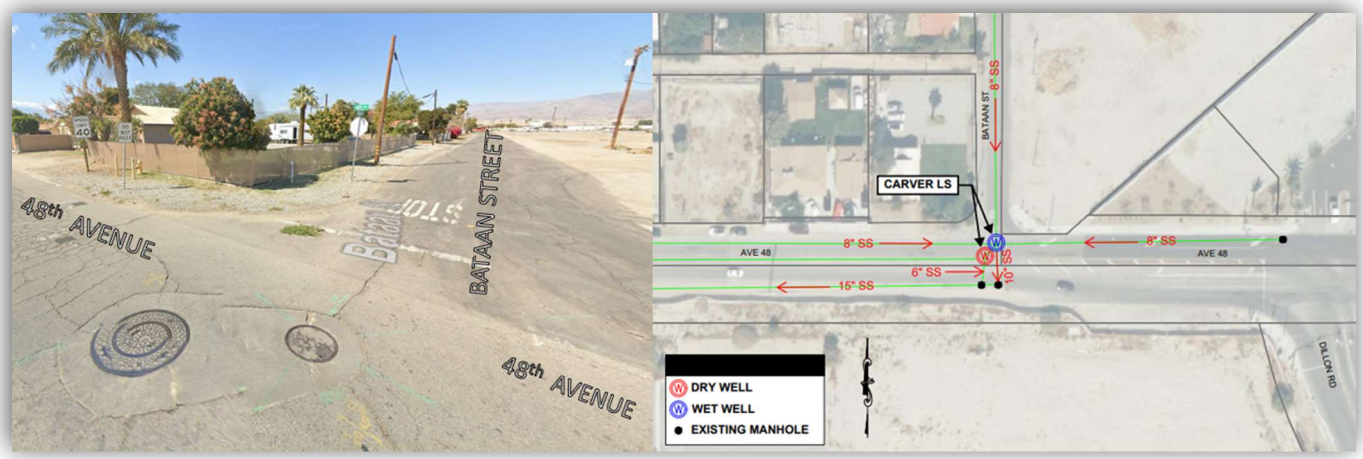



**FIGURE 6: Carver Lift Station Schematic and Site Photo**

The wet well collects flow from three incoming mains on 48th Avenue and Bataan Street. Water is then pumped through a 6-inch force main to a manhole south of the dry well in 48th Avenue. The wet well has a 10-inch overflow that leads to a second manhole south of the dry well in 48th Avenue. The piping configuration is shown on Figure 6.

There are two pumps, each with a capacity of 320 gpm that are operated in a duty/standby configuration. VSD has one backup pump for Carver Lift Station on shelf. The lift station is controlled by a bubbler system with redundant air compressors. The bubbler system is VSD's preferred method for lift station controls.

The lift station equipment is fed from a 240 Volt, 3-phase control panel powered from an Imperial Irrigation District (IID) power service. It is equipped with a 100 Amp main circuit breaker that supplies electrical power to two 5-horsepower pumps, an air compressor, a sump pump, a dehumidifier, a blower, lighting, and station controls. The power utility meter and a 50A main disconnect switch are mounted on a pole on a nearby sidewalk (Figure 7).

General station information for the Carver Lift Station is summarized is Table 8.


FIGURE 7: Carver Lift Station Photos

TABLE 8: Carver Lift Station General Information

| Carver Lift Station | |
|---|---|
| **Year Constructed** | 1966 |
| **Station Type** | Pre-packaged Smith & Loveless below ground lift station |
| **Wet Well** | 48-inch diameter wet well with 36-inch diameter access manhole<br>Approximately 14-feet deep |
| **Dry Well** | 84-inch steel sphere with a 36-inch access tube<br>Approximately 16-feet deep |
| **Number of Pumps** | Two pumps (duty/standby) |
| **Pump Manufacturer/Model** | Smith & Loveless 4B2A*1<br>Serial Numbers #67240786 and 67240785<br>Spare Pump Serial Number: RA-02247-A |

| | |
|---|---|
| **Pump Design Capacity and TDH** | 320 gpm @ 37 feet (each pump; from VSD provided pump info) |
| **Pump speed** | 1200 rpm |
| **Motor Hp** | 5 hp |
| **Phase/Cycle/Volts** | 3/60/230 |
| **Drive type** | Single speed |
| **Discharge Diameter** | 6-inch |
| **Standby power** | None |
| **Level Controls and backup** | Bubbler only |
| **Alarms** | Alarm auto dialer |
| **Control Panel** | Pump controls in dry well; utility meter and disconnect switch located on service pole |
| **Valve location** | Dry well |

### *3.3.2 Observations and Findings*

Condition assessment observations by asset group are provided in Table 9. The final table column associates the condition finding with recommended improvements in Table 10.

The Carver Lift Station structure is in overall good condition with minor observed deficiencies in structural elements. However, the equipment at Carver Lift Station is visibly outdated and in need of a complete upgrade to ensure system reliability and functionality. Due to the exposure to moisture and age, the electrical equipment is at risk for failure.

Although the station is old and the controls are outdated, the bubbler system is reliable and does not give false alarms. The pumps work well despite their 1970s vintage.

Major rain events have led to corrosion due to moisture and rain entering the dry well. Additionally, maintenance and service at this station requires a planned city street lane closure. These are major concerns and is driving VSD's intent to relocate the Carver Lift Station and locate the control panel and associated equipment outside above grade. Additionally, VSD would like to disconnect the existing power utility service and apply for new underground service. Currently the power disconnect switch is publicly accessible on a nearby power pole.

**TABLE 9: Carver Condition Assessment**

| Category | Asset | Condition Description | Recommendation |
|---|---|---|---|
| **Civil/Mechanical /Structural** | **Pavement** | Station within road | None |
| | **Site Security** | Assets underground in road travel lane; access is covered with manhole covers | None |
| | **Pumps and Motors** | • Minor surface corrosion<br>• No identified issues with pumps<br>• VSD has one backup pump on shelf | None |

| Category | Asset | Condition Description | Recommendation |
|---|---|---|---|
| | **Dry Well** | • Access framing has minor offset and moderate corrosion where interior lining has delaminated, and it allows water intrusion<br>• Moderate corrosion on dry around ladder entry system<br>• Minor localized corrosion on walls and ceiling<br>• Moderation corrosion on floor - corrosion pits greater than 0.150 inch<br>• Constructed in 1966, the station pre-dates seismic codes and may not have been built to withstand earthquake ground motion<br>• Lighting fixture is fluorescent | See Item 6 and 8, Table 10 |
| | **Wet Well** | • Cover in fair condition<br>• Liner in lower 6-feet beneath drop in laterals heavily degraded, torn, and retaining water<br>• Moderate corrosion at access framing | See Items 4 and 5, Table 10 |
| | **Piping and Valves** | Minor surface corrosion on influent and discharge piping and valves | None |
| **Electrical, Instrumentation, Controls (EI&C)** | **Overall** | The control panel, motors, transformer, electrical wiring, and connections are original installation and are nearing their end of life. The equipment function is generally good, however there is evidence of surface corrosion and deterioration. | See Items 1 and 2, Table 10 |
| | **Control Panel** | • In dry well and is exposed to moisture<br>• No arc flash warning labels | See Items 1, 2 and 9, Table 10 |
| | **Level Control, alarms, and monitoring** | • No issue with bubbler system<br>• No emergency power backup but not necessarily needed due to low SSO potential<br>• No SCADA | See Item 7, Table 10 |
| | **SSO potential** | Minor risk as there is a 10-inch overflow pipe installed in wet well for emergency bypass | None |
| | **Conduits** | Missing conduit elbow cover at south quadrant | See Item 11, Table 10 |
| | **Other** | Main power service equipment outside and accessible to public | See Item 3, Table 10 |

### *3.3.3 Recommended Improvements*

Table 10 lists the improvement recommendations and associated cost estimate. The construction projects and costs and listed separately from recommended structural and arc flash studies, and maintenance and monitoring items. Majority of the recommendations can be done, preferably together, in 2 to 5 years and as part of an overall station upgrade to submersible style lift station. Additionally, some projects will not be needed if the relocation project can be completed in the next few years, for example, the dry well coating projects.

It is recommended to relocate the lift station electrical and controls outside of the dry pit to eliminate the requirement for explosion proof gear in the Class I, Div 2 hazardous area. Like the Barrymore Lift Station, the control panel replacement will maintain all the functionality of the current control strategies. As with Barrymore, it is recommended to add backup floats for redundancy. A sump termination panel is recommended like the other stations to isolate electrical equipment terminations from the potentially hazardous atmosphere in the wet well. Again, this improvement is intended to be done concurrently with the control panel upgrade. It is also recommended that proper signage also be provided as part of this or any lift station upgrade.

An arc flash hazard analysis should be performed for all equipment operating over 100V to ground in accordance with the National Electrical Code, NFPA 70E (Standard for Electrical Safety in the Workplace), OSHA 29-CFR, Part 1910 Sub part S, and IEEE1584 Standards. Permanent thermal transfer type factory manufactured arc flash warning labels in conformance with NFPA 70E and ANSI Z535 should be provided.

VSD's goal to add SCADA to their facilities is highly recommended. Adding SCADA would require detailed design and would provide the most benefit if SCADA capabilities were added to all four active lift stations at one time.

Constructed in 1966, the station pre-dates the codifying of seismic design and construction techniques specific to this type of construction. As a pre-benchmark structure the Carver Lift Station may not remain stable under the inelastic deformations caused by the earthquake ground motion prescribed for this structure type and site by the California Building Code. A structural analysis of the entire structure is recommended to determine seismic demands at locations for stiffness (ASCE 41, Tier 3 Systematic Evaluation).

**TABLE 10: Carver Lift Station Recommendations and Cost Estimate**

| No. | Improvement Recommendations | Estimated Cost, $[1] |
|---|---|---|
| **Construction Projects** | | |
| **1** | Install new control panel above-grade | $ 227,500 |
| **2** | Install new sump termination panel | $ 29,700 |
| **3** | New underground utility service | $ 49,500 |
| **4** | Remove corrosion on wet well cover rim and provide protective coating to prevent future deterioration due to H2S exposure | $ 4,400 |
| **5** | Remove existing liner and provide full coating of wet well interior surface | $ 75,600 |
| **6** | Clean and recoat pitted floor areas, walls, ceilings, ladder, and connection points in dry well | $ 30,200 |
| **7** | Install new SCADA system for remote monitoring and controls | $ 49,500 |
| **8** | Replace sump pump | $ 5,000 |
| | **Total for Items 1-8 (2022 Dollar value)** | **$ 471,400** |
| | **Total (in 2023 dollars)[2]** | **$ 487,200** |
| | **Total (in 2024 dollars) [2]** | **$ 503,600** |
| | **Total (in 2025 dollars) [2]** | **$ 520,500** |
| | **Total (in 2026 dollars)[2]** | **$ 538,000** |
| **Studies, Maintenance, and Monitoring** | | |
| **9** | Perform arc flash study and provide labels | $ 12,600 |
| **10** | Structural analysis of entire structure | $ 23,600 |
| **11** | Replace missing conduit elbow cover | In-house |
| | **Total for Items 1-11 (2022 Dollar value)** | **$ 507,600** |
| | **Total (in 2023 dollars) [2]** | **$ 524,700** |
| | **Total (in 2024 dollars) [2]** | **$ 542,300** |
| | **Total (in 2025 dollars) [2]** | **$ 560,500** |
| | **Total (in 2026 dollars) [2]** | **$ 579,300** |

[1]Estimated cost is a planning-level project cost estimate and was estimated without detailed plans or drawings. The project cost estimate for the listed construction projects is inclusive of material, labor, contractor costs, and project soft costs. A construction sub-total was first estimated with material and labor cost. Unit costs for these items were derived from a combination of recent construction bids, national estimating databases, and engineering judgement. A multiplier of 1.57 was applied to the sub-total to estimate a total construction cost inclusive of sales tax (9%), contractor profit and overhead (15%), contractor front end specs (12%), and contingency (30%-35%). A factor of 1.26 was then applied to the total construction estimate accounting for project management (6%), design, survey, miscellaneous (10%), and construction management, inspection, material testing (10%). For the studies, the estimated cost includes the cost of service and project management.

[2]An annual escalation of 3.36% is assumed.

## 3.4 Vandenberg Lift Station

### *3.4.1 Vandenberg - Introduction*

The Vandenberg lift station, built in 2007, is a submersible style lift station with a separate underground valve vault. The station is located within a gated residential community, underground in the center of the intersection of Vandenberg Drive and Pic Way (Figure 8). Access requires light traffic control. The electrical and controls equipment is located on the lawn of a private residence. The control panel is a freestanding single-door type stainless steel NEMA 3R rated enclosure mounted on a concrete pad. The utility power service meter/main pedestal is adjacent to the control panel. A metering pedestal for lighting sits behind the main metering pedestal.


**FIGURE 8: Vandenberg Lift Station Schematic and Site Photo**

The Vandenberg station serves six houses and operates once a day on average. The station has two submersible pumps, each with a design capacity 110 gpm and are operated in a duty/standby configuration. The wet well has a single 6-inch inlet pipe and pumps flow through a 4-inch PVC force main.

The lift station equipment is fed from a 240V, 1-phase control panel powered from a 200A Imperial Irrigation District service. The control panel supplies electrical power to two 2-horsepower submersible pumps and contains the station controls. The pump control system consists of a bubbler (primary) with float (backup), a Mercoid pump controller, and a radio alarm autodialer (Figure 9). VSD finds the controls and redundancy at this station favorable and especially likes the ability to control pump rotation.

General station information for the Vandenberg Lift Station is summarized is Table 11.

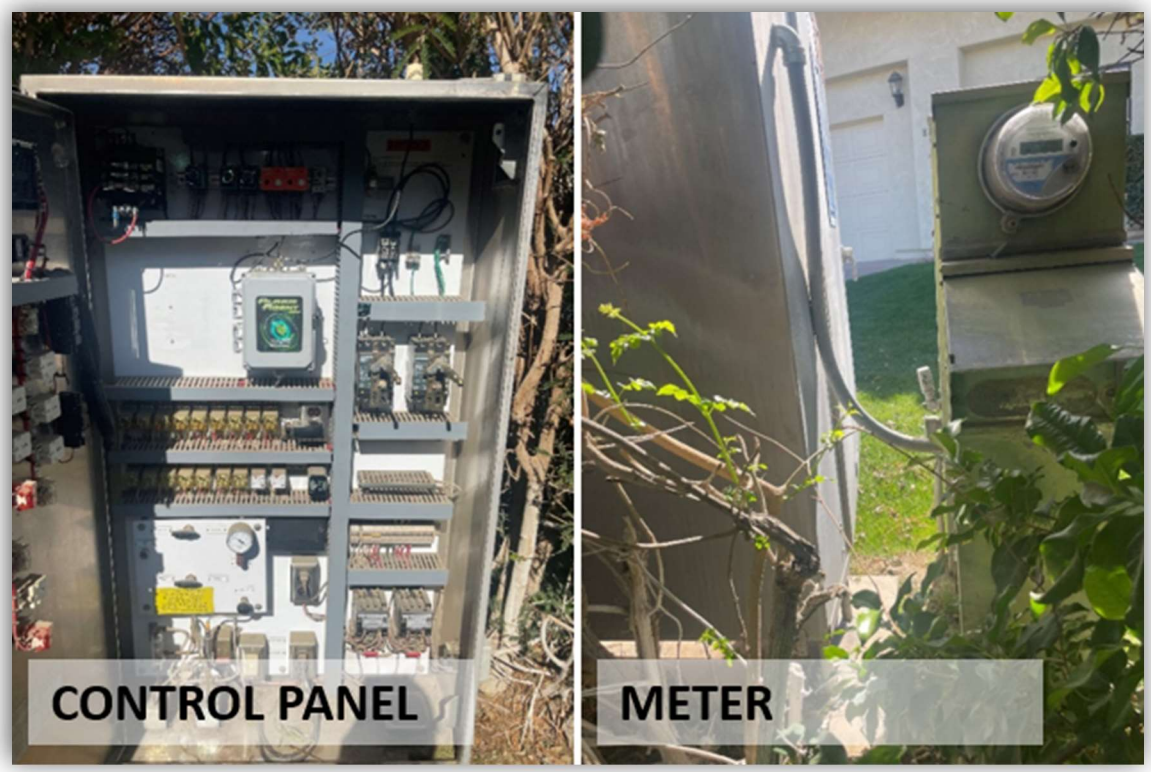



FIGURE 9: Vandenberg Lift Station Photos

TABLE 11: Vandenberg Lift Station General Information

| Vandenberg Lift Station | |
|---|---|
| Year Constructed | 2007 |
| Station Type | Submersible wet well and valve vault |
| Wet Well | 72-inch diameter precast wet well with access hatch; 15-feet deep |
| Number of Pumps | Two pumps (lead-lag) |
| Pump Design Capacity and TDH | 110 gpm @ 20 feet (each pump; based on VSD provided pump information) |
| Pump speed | 1750 rpm |
| Motor Hp | 2 hp |
| Phase/Volts | 1/240 |
| Circuit Breaker | 200 amps |
| Drive type | Constant speed |
| Pump Manufacturer/Model | Goulds 3SD |
| Discharge Diameter | 4-inch |
| Standby power | None; minimal risk for overflow due to small flows |
| Level Controls and backup | Bubbler (primary) and float (backup) |
| Alarms | Alarm auto dialer |
| Control Panel | Above grade control panel on lawn of private residence |
| Valve location | Separate underground concrete vault |

### *3.4.2 Observations and Findings*

Condition assessment observations by asset group are provided in Table 12. The final table column associates the condition finding with recommended improvements in Table 13.

The control panel and all interior components are original installation and are in good working condition. Discharge piping in the wet well is severely corroded and should be replaced to maintain efficient pump operation.

**TABLE 12: Vandenberg Lift Station Condition Assessment**

| Category | Asset | Condition Description | Recommendation |
|---|---|---|---|
| Civil/Mechanical/ Structural | **Pavement** | No identified issue | None |
| | **Station Security** | Station underground in street, however access hatch to wet and valve can be opened with regular tools, and it is a street with little traffic | (Consider intrusion alarms or locks) |
| | **Wet Well** | • Access hatch in good condition<br>• Interior walls and ceiling in good condition<br>• Minor corrosion at top of structure<br>• Minor liner delamination at ceiling | See Item 4, Table 13 |
| | **Pumps and Motors** | • Minor corrosion on pumps<br>• Moderate corrosion at steel supports for SST guide rails | See Item 1, Table 13 |
| | **Piping and valves** | • Influent lateral pipes in good condition<br>• Discharge piping in wet well has severe corrosion | See Item 1, Table 13 |
| | **Valve Vault** | • Access hatch in good condition<br>• Pre-cast walls, floor, ceiling, interior pipes in good condition<br>• No flooding issues<br>• No history of leaks | None |
| Electrical, Instrumentation, Controls (EI&C) | **Control Panel** | • Control panel and interior components are original installation and in good working condition<br>• Interior is dirty (dusty and webs)<br>• Working clearances around control panel and metering pedestals are obstructed by landscaping<br>• No arc flash warning labels | See Items 3, 5, and 6, Table 13 |
| | **Level Control, alarms, and monitoring** | • No issues with bubbler system with redundant air compressors<br>• No issues with autodialer<br>• No emergency power backup but not necessarily needed due to low SSO potential<br>• No SCADA | See Item 2, Table 13 |
| | **SSO potential** | Minimal risk due to small flow; station serves six houses | None |
| | **Conduits** | Electrical cables between wet well and valve box observed to be in good condition | None |

### *3.4.3 Recommended Improvements*

Table 13 lists the improvement recommendations and associated cost estimate. The arc flash study is separated from the wet well and SCADA recommended projects.

It is recommended that the control panel interior be dusted and cleaned on a regular basis to ensure proper functionality and prolong the life of the equipment.

Landscaping should be regularly maintained to provide a clear space around all three electrical panels, minimum 30 inches on the sides and 36 inches in front and a minimum of 6.5 feet horizontally.

As recommended with the other lift stations, performing an arc flash hazard analysis and providing arc flash warning labels will ensure compliance with current codes and regulations as well as safe work practices. An arc flash hazard analysis should be performed for all equipment operating over 100V to ground in accordance with the National Electrical Code, NFPA 70E (Standard for Electrical Safety in the Workplace), OSHA 29-CFR, Part 1910 Sub part S, and IEEE1584 Standards. Permanent thermal transfer type factory manufactured arc flash warning labels in conformance with NFPA 70E and ANSI Z535 should be provided.

Unlike the other three stations, a structural analysis is not recommended at Vandenberg. As the newest station, built in 2007 with no above grade structures, the station was constructed 13 years after seismic design and construction techniques specific to this type of construction were codified. Because of this, no additional structural analysis is recommended.

VSD's goal to add SCADA to their facilities is highly recommended. Adding SCADA would require detailed design and would provide the most benefit if SCADA capabilities were added to all four active lift stations at one time.

**TABLE 13: Vandenberg Lift Station Recommendations and Cost Estimate**

| No. | Improvement Recommendations | Estimated Cost, $[1] |
|---|---|---|
| **Construction Project** | | |
| **1** | Wet well: Replace 4-inch discharge piping with fusion bonded epoxy coated and lined pipe or stainless steel and replace supports for guide rails with stainless steel | $ 32,700 |
| **2** | Install new SCADA system for remote monitoring and controls | $ 49,500 |
| | **Total for Items 1-2 (2022 Dollar value)** | **$ 82,200** |
| | **Total (in 2023 dollars)[2]** | **$ 85,000** |
| | **Total (in 2024 dollars) [2]** | **$ 87,900** |
| | **Total (in 2025 dollars) [2]** | **$ 90,900** |
| | **Total (in 2026 dollars) [2]** | **$ 94,000** |
| **Studies, Maintenance, and Monitoring** | | |
| **3** | Perform arc flash study and provide labels | $ 12,600 |
| **4** | Perform regular maintenance on the control panel interior (dusting and clearing) | In-house |
| **5** | Remove landscaping around electrical and control panels for appropriate clearance | In-house |
| | **Total for Items 1-5 (2022 Dollar value)** | **$ 94,800** |
| | **Total (in 2023 dollars) [2]** | **$ 98,000** |
| | **Total (in 2024 dollars) [2]** | **$ 101,300** |
| | **Total (in 2025 dollars) [2]** | **$ 104,700** |
| | **Total (in 2026 dollars) [2]** | **$ 108,200** |

[1]Estimated cost is a planning-level project cost estimate and was estimated without detailed plans or drawings. The project cost estimate for the listed construction projects is inclusive of material, labor, contractor costs, and project soft costs. A construction sub-total was first estimated with material and labor cost. Unit costs for these items were derived from a combination of recent construction bids, national estimating databases, and engineering judgement. A multiplier of 1.57 was applied to the sub-total to estimate a total construction cost inclusive of sales tax (9%), contractor profit and overhead (15%), contractor front end specs (12%), and contingency (30%-35%). A factor of 1.26 was then applied to the total construction estimate accounting for project management (6%), design, survey, miscellaneous (10%), and construction management, inspection, material testing (10%). For the studies, the estimated cost includes the cost of service and project management.

[2]An annual escalation of 3.36% is assumed.

# 4. Conclusions

Overall, the condition assessment indicated that the four lift stations are in moderate to good condition with identified deficiencies that should be addressed within the next five years. The assessment did not find any issues that needed to be completed immediately to prevent structural or equipment failure. The major improvements include upgrading and relocating electrical equipment, installing a SCADA system, adding new mechanical coatings, and new wet well coatings. Specific upgrades at each station are recommended and some may be added to regular maintenance procedures going forward. Examples are covering exposed conduits with covers to prevent trip hazards, changing lighting fixtures to energy efficient LED types, and providing electric code required working clearances around electrical and control equipment whether by landscaping maintenance or other methods. Arc flash studies for all stations and further structural assessments for three stations are recommended.

The recommended construction projects listed at each station are advised to be done together for design and construction efficiency, if possible. Some projects, like the new SCADA system, should be designed considering the needs at four stations and can be programmed together.

VSD is currently considering relocating the Carver Lift Station. If the relocation project is completed within the next 2 to 5 years, then many of the recommended projects in this memo will not need to be completed.

For station prioritization, the recommendations at Calhoun are recommended to be completed first due to existing mechanical challenges, the existing deteriorated condition of wet well coating, and VSD intent to replace the existing pumps soon. These improvements should be performed together for efficiency and cost savings. The Barrymore and Carver Lift Stations are both Smith & Loveless packaged wet well and dry pit style stations and both have similar recommended improvements. Compared with the other station recommendations and condition, the Barrymore and Carver stations share the next priority level after Calhoun. Vandenberg is the newest station and compared with the other stations, the recommended improvements have the lowest urgency.