COMMUNITY WATER CENTER

PAJARO – SUNNY MESA – SPRINGFIELD AREA REGIONAL CONSOLIDATION PROJECT

PRELIMINARY ENGINEERING REPORT - DRAFT

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April 19, 2024

Community Water Center

PAJARO – SUNNY MESA – SPRINGFIELD AREA REGIONAL CONSOLIDATION PROJECT

April 19, 2024

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ACRONYMS

AACE	American Association of Cost Engineers
ACOE	United States Army Corps of Engineers
ACP	Asbestos cement pipe
ADD	Average daily demand
APN	Assessor's Parcel Number
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
bgs	Below ground surface
Caltrans	California Department of Transportation
CART	Color alternatives review table
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
County	Monterey County
DDW	California Department of Drinking Water
District	Pajaro/Sunny Mesa Community Services District
ENR	Engineering News-Record
ESHA	Environmentally Sensitive Habitat Area
GPD	Gallons per day
GPM	Gallons per minute
HDD	Horizontal directional drilling
HDPE	High density polyethylene
kW	Kilowatt(s)
LAFCO	Local Agency Formation Commission
m	Meter
MCL	Maximum contaminant level
MH	Mobile home
mg/l	Milligrams per liter
MDD	Maximum daily demand
MLWS	Moss Landing Water System
MS4	Municipal Separate Storm Sewer System
MSL	Mean sea level
NEPA	National Environmental Policy Act
OSHA	Occupational Safety and Health Administration
PHD	Peak hourly demand
ppb	Parts per billion
ppm	Parts per million
PSI	Pounds per square inch
PSMCSD	Pajaro/Sunny Mesa Community Services District
PSMS	Pajaro – Sunny Mesa – Springfield
PVC	Polyvinyl chloride
ROW	Right-of-way
RWQCB	Regional Water Quality Control Board
SFR	Single family residence
SMWC	Springfield Mutual Water Company
Springfield	Springfield Mutual Water Company
SUG	Seismic Use Group
SW-1	Springfield Well No. 1
SW-2	Proposed Springfield Well No. 2
SW-3	Proposed Springfield Well No. 3
SWRCB	California State Water Resources Control Board
SWS	Springfield Water System
TDH	Total dynamic head

TDS	Total dissolved solids
U.S.	United States
VFD	Variable frequency drive

Section 1. Executive Summary

1.1. Background and Existing Systems

MNS Engineers, Inc. (MNS) was retained by the Community Water Center as part of a technical assistance work plan funded by the State Water Board to prepare this Engineering Report (Report) to identify alternatives, recommend a proposed solution, and provide a basis for detailed design to improve the potable water supply system for the North of Moss Landing (NOML) area and to substantially improve the resiliency and reliability of the Pajaro Water System (PWS) and Sunny Mesa Water System (SMWS).

The NOML area contains 88 identified households with 34 houses sourcing water from two state small water systems and ten local small water systems; and 54 individual households reliant on private domestic wells. These water sources have extensive quality, sustainability, and reliability issues. This Report builds on previously completed work to determine the best alternative for a regional consolidation with water service areas in the surrounding area and provide a basis for future detailed design.

The regional consolidation will substantially benefit the water service areas in the surrounding areas. Water service in the surrounding area is provided by three public water systems owned and operated by the Pajaro/Sunny Mesa Community Services District (District) including the Pajaro Water System, the Sunny Mesa Water System, and the Springfield Water System (SWS).

The PWS has approximately 463 active connections, 358 are residential and 105 are commercial/Industrial. The SMWS has approximately 268 active connections, including 257 residential connections and 11 commercial connections. The SWS, currently involved in a design and construction project to expand the service area and improve the system, will serve 161 residential connections and 2 commercial/Industrial connections.

1.2. Problem Description

The PWS, SMWS, SWS, and the NOML each have significant risks with respect to water quality, water supply reliability, and vulnerabilities to failure.

The PWS is vulnerable to a water system failure as only one of its two supply sources is compliant with potable drinking water standards. A failure of this source of supply would result in non-potable water as the only source of supply. In addition, the system is vulnerable to loss of service due to flood events.

The SMWS has two active wells, both of which exceed the former and proposed maximum containment levels (MCLs) for Hexavalent Chromium concentrations of 10 μg/l.

SWS, at the completion of a planned future improvement project, will have one source of supply which is compliant with potable drinking water standards. A failure of this source of supply would result in non-potable water as the only source of supply.

Drinking water wells in the NOML area have elevated levels of multiple contaminants including nitrate and 123-TCP, and three of the small water systems are currently out of compliance for exceeding arsenic and/or nitrate MCLs Compliance orders have been issued by the County of Monterey Health Department to the SWS—in 2017 regarding nitrate and in 2019 regarding 1,2,3-TCP.

1.3. Consolidation Analysis

Prior work to study the NOML area and surrounding water systems considered several alternatives including a physical consolidation with the SWS, a regional physical consolidation with the PWS, SMWS, and SWS, creation of a new community water system, replacement of existing domestic wells, wellhead treatment, and point of use/point of entry treatment. A regional consolidation was determined to be the preferred solution for providing water service to the NOML area due to the increased reliability and sustainability of a consolidation with a public agency with the technical and managerial capacity to operate and maintain a consolidated system. Regional consolidation provides substantial benefits for the four areas considered in this study and addresses the identified risks with respect to water quality, water supply reliability, and vulnerabilities to failure.

1.4. Alternatives Analysis

A multi-system consolidation is the selected solution to enhance regional water supply reliability, availability, and to serve the North of Moss Landing area. Based on a previous Alternatives Analysis by Corona Environmental Consulting and community support for proceeding with this solution, no other alternatives are considered in this Report. Two alternatives were identified with respect to how the physical consolidation would occur. These alternatives are discussed in Section 5.

1.5. Selected Project

The regional consolidation will create a new public water system. The PWS, SMWS, and SWS will cease to exist, with each of the water system service areas being designated as separate pressure zones within the new water system. The consolidated system will be owned and operated by the District with existing staff.

The consolidation relies on existing infrastructure within the PWS, SMWS, and SWS, with additional infrastructure to interconnect the systems and to provide service to the NOML area. Required project elements to achieve the consolidation include:

- Iron/Manganese Water Treatment Plant at Pajaro Well No. 1.
- Approximately 12 miles of transmission and distribution pipelines including associated appurtenances such as valves, fire hydrants, blow off valves, air release valves, and water sampling stations
- Service connections to 88 existing residences in the North of Moss Landing Area.
- One Transmission Booster Pump Station.
- Water Storage Facility for the Bluff/Jensen Zone, with Chemical Dosing facilities and a booster pump station to maintain pressure in the Bluff/Jensen Zone.
- Modifications to the existing PWS including fill modifications to the PWS storage tanks and rehabilitation of one of the PWS's 600,000-gallon storage tanks.
- Abandonment of excess infrastructure in the North of Moss Landing Area
- Destruction of Existing Springfield Mobile Home Park Well
- Destruction of Existing Sunny Mesa Wells No. 1 and No. 2.
- Replacement of water meters in the PWS and SMWS to radio read meters.

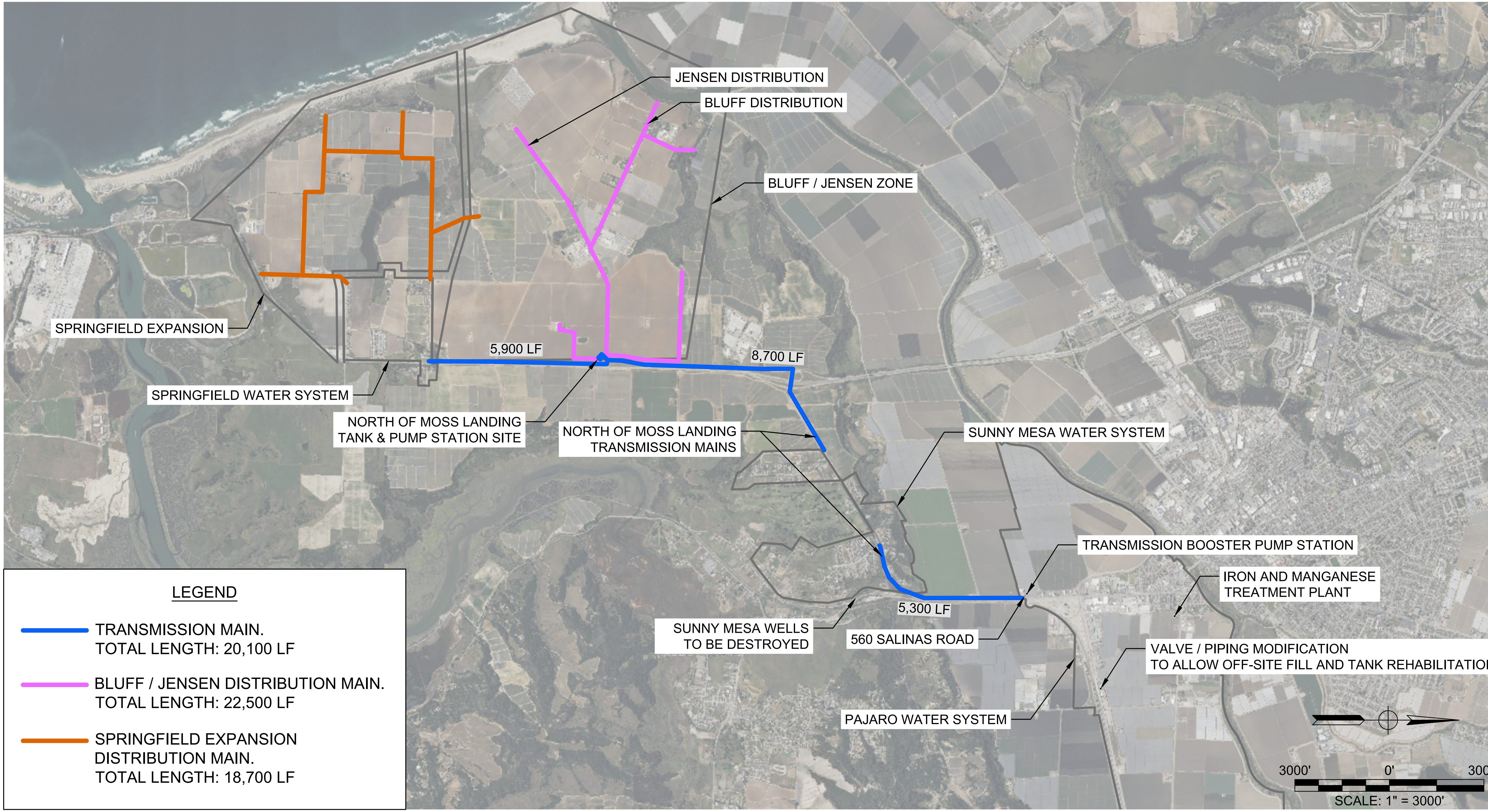
Physical locations of the proposed infrastructure, and a proposed hydraulic profile of the consolidated system are shown on Figure 1-1 and Figure 1-2, respectively.

1.6. Land Acquisition

The Project includes acquisition of permanent easements and/or real property acquisition in several areas including the Transmission Booster Pump Station Site, the Bluff/Jensen Tank and Pump Station Site, and transmission and distribution pipelines outside of public roadways.

1.7. Capital Costs.

An estimate of total project costs has been developed. In addition to construction costs, various additional expenses anticipated to be incurred as part of the Project have been estimated based on an assumed percentage of construction costs, summarized in Table 1-1.



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PROPOSED CONSOLIDATION VICINITY

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 1-1

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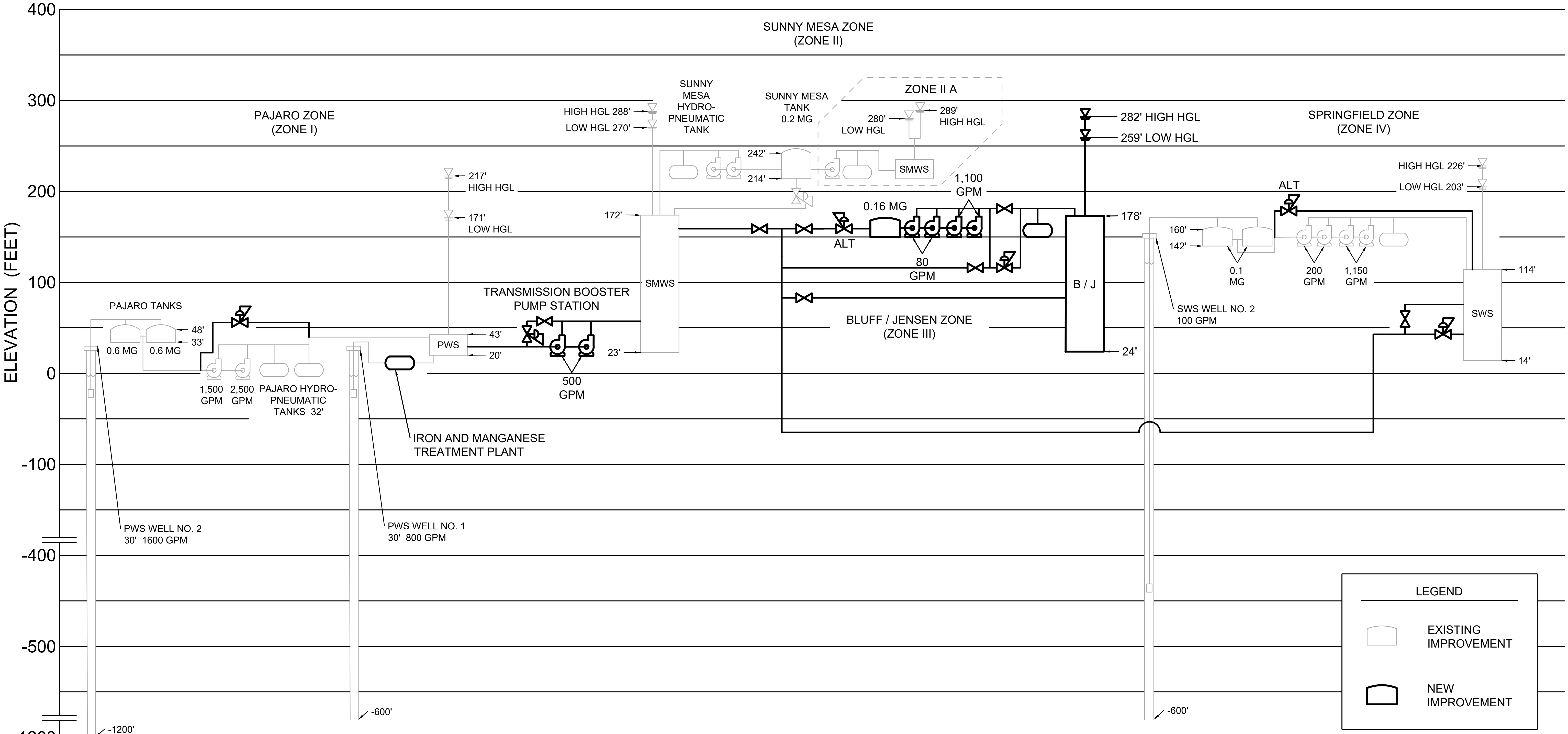

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PROPOSED SYSTEM HYDRAULIC PROFILE

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 1-2

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Table 1-1: Estimated Total Project Costs

Project Element	Estimated Percentage of Construction Costs	Estimated Cost
Construction Costs	-	$42,500,000
Construction Survey	1%	$425,000
Utility Relocation	1%	$425,000
Engineering Design	10%	$4,250,000
Design Survey	1%	$425,000
Geotechnical Engineering	1%	$425,000
Construction Management and Inspection	12%	$5,100,000
Environmental Compliance and Project Permitting	3%	$1,275,000
Right-of-Way Engineering	1%	$425,000
Right-of-Way Acquisition	1%	$425,000
District Administration	2%	$850,000
Total		**$56,525,000**

1.8. Proposed Schedule

A conceptual implementation schedule has been developed for the Project including planning, design, permitting, bidding, and construction. The Project is anticipated to be complete by late-2027, provided sufficient funding is available to maintain continuous forward progress.

1.9. Comprehensive Response to Climate Change

The populations within the four areas considered in this study are susceptible to existing and future climate induced vulnerabilities including flood risks, water supply reliability, water supply sustainability, and increased fire risk. The proposed regional consolidation addresses these risks and vulnerabilities though adaptation and mitigation.

1.10. Permits

A variety of permits from various agencies are anticipated to be required for the Project. In addition to compliance with the California Environmental Quality Act (CEQA), anticipated permits for the Project construction include:

- Caltrans Encroachment Permit
- County of Monterey Encroachment Permit
- County of Monterey Public Health Department Well Destruction Permit
- California Coastal Commission Coastal Development Permit
- Monterey Bay Air Resources District Permit to Construct and Permit to Operate
- California Department of Fish and Wildlife Lake and Streambed Alteration Agreement
- U.S. Fish and Wildlife Service Section 7 or 10 Incidental Take Permit
- State Water Resources Control Board Permit Amendment
- U.S. Army Corps of Engineers and Regional Water Quality Control Board Section 401 and 404 permits
- City of Watsonville Industrial Wastewater Discharge Permit
- State Water Resources Control Board Permit

In addition to these permits, preparation of a Stormwater Pollution Prevention Plan (SWPPP) will be required for Project construction.

Section 2. Background Project Information

2.1. Project Overview, Prior Work, and Goals

MNS Engineers, Inc. (MNS) was retained by the Community Water Center, as part of a technical assistance work plan funded by the State Water Board, to prepare this Preliminary Engineering Report (Report or PER). The intent of this PER is to identify alternatives, recommend a proposed solution, and provide a basis for detailed design to improve the potable water supply systems for the North of Moss Landing (NOML) area, the Pajaro Water system (PWS), and the Sunny Mesa Water System (SMWS), areas with extensive water supply quality, sustainability, and reliability issues, in the context of regional water supply reliability.

The purpose of this Report is to build on prior work to determine in more detail the best alternative for a regional consolidation and provide a basis for future detailed design. This Report analyzes details such as source capacity, storage capacity and hydraulics which were not previously analyzed. It discusses how a regional consolidation would benefit each of the constituent water systems and notes the water supply and quality issues of each.

The following prior works are included in Appendix A.

- "Hudson Landing Road [HLR] Community Feasibility Study", Engineers Without Borders – Community Engineering Corps, December 7, 2016
- "Final Preliminary Engineering Report - Sunny Mesa and Vega Road Hexavalent Chromium Projects", MNS Engineers, December 21, 2016
- "Final Preliminary Engineering Report – Springfield Water System Improvements", MNS Engineers, February 14, 2020
- "Feasibility Study for Long-Term Drinking Water Solutions for the Unincorporated Area North of Moss Landing", Corona Environmental Consulting, LLC, November 18, 2021

The regional consolidation will not only benefit the NOML area, but provide a regional benefit to water supply reliability, security, and sustainability. Water service in the surrounding area is provided by three public water systems owned and operated by the Pajaro/Sunny Mesa Community Services District (District) including the Pajaro Water System, the Sunny Mesa Water System, and the Springfield Water System (SWS).

2.2. District Background

The District has been in operation since 1986. It was created by the Monterey County Local Agency Formation Commission (LAFCO) with the consolidation of the Pajaro Community Services District, the Sunny Mesa Water District, and Monterey County Service Area No. 73. The District is a public agency governed by a five-member Board of Directors.

The District provides potable water service, fire protection, parks, streetlights, and sanitary sewer services to thousands of residents in northern Monterey County (County). The District provides these services from the Pajaro River in the north to Moss Landing in the west and to the Highway 101 corridor in the south. It is the only public agency which provides public potable water services in the Pajaro, Elkhorn, and Prunedale areas.

The District's water systems are regulated by the California State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) and the Monterey County Environmental Health Department.

2.3. Types of Drinking Water Systems and Regulatory Oversight

Potable water systems are categorized and regulated based on the number of connections or consumers. Service connections include all dwelling units (i.e., single family homes, apartments, caretaker's unit, and senior units) and parcels which use potable water for domestic and non-agricultural purposes.

Water systems serving 2 to 14 connections are considered local and state small water systems. A water system is considered a public water system when water is conveyed to 15 or more service connections or regularly serves at least 25 individuals daily for at least 60 days per year (California Health and Safety Code (CH&SC), Division 104, Part 12, Chapter 4 (California Safe Drinking Water act). Article 1 Section 116275(h)).

Public water systems are regulated by the SWRCB DDW. The Monterey County Health Department, Environmental Health Bureau (EHB) division of Drinking Water Protection Services (DWPS) has a delegation agreement with the SWRCB to regulate public water systems that service less than 200 connections. Systems with more than 200 connections are regulated by the SWRCB DDW.

Private domestic wells are not regulated by DDW. Domestic well water is typically used by single family homeowners for private use and consumption. It is the responsibility of the well owner to ensure their domestic water is safe for consumption.

A summary of types of water systems and regulatory oversight is provided in Table 2-1.

Table 2-1: Types of Water Systems and Their Regulatory Oversight

Type of Water Systems	Description	Regulatory Oversight
Private Domestic Well	1 connection; Typically used by single family for private use and consumption	It is the responsibility of the well owner to ensure that their domestic water is safe.
Local Small Water System	2 to 4 connections	Monterey County DWPS; Monterey County Code (Chapter 15.04)
State Small Water Systems	5 to 14 connections or regularly serves <26 individuals daily for more than 60 days per year	Monterey County DWPS; Monterey County Code (Chapter 15.04), California Code of Regulations (Section 64211).
Public Water System	>14 connections or regularly serves >24 individuals daily for at least 60 days per year	<200 Connection oversight by Monterey County DWPS >200 Connections oversight by DDW

2.4. Existing Facilities

The North of Moss Landing Water System Consolidation Project study area encompasses a region of northern Monterey County, along the Pacific Ocean. Water service in the study area is provided by three public water systems owned and operated by the District, including the PWS, the SMWS, and the SWS, as well as state and local small systems and private domestic wells in the NOML area. Each of these four areas are described in the following sections.

The Pajaro Valley Water Management Agency is the groundwater sustainability agency (GSA) which has purview over groundwater resources in the study area.

2.4.1. Pajaro Water System

The PWS provides water to approximately 6,500 people in the community of Pajaro and the surrounding area located on the south bank of the Pajaro River, south of the City of Watsonville as shown in Figure 2-1. The PWS has approximately 463 active connections, 358 are residential and 105 are commercial/Industrial. The PWS serves single- and multi-family residential, agricultural, institutional, irrigation, fire, and commercial customers. Maps of the existing PWS distribution system are not available.

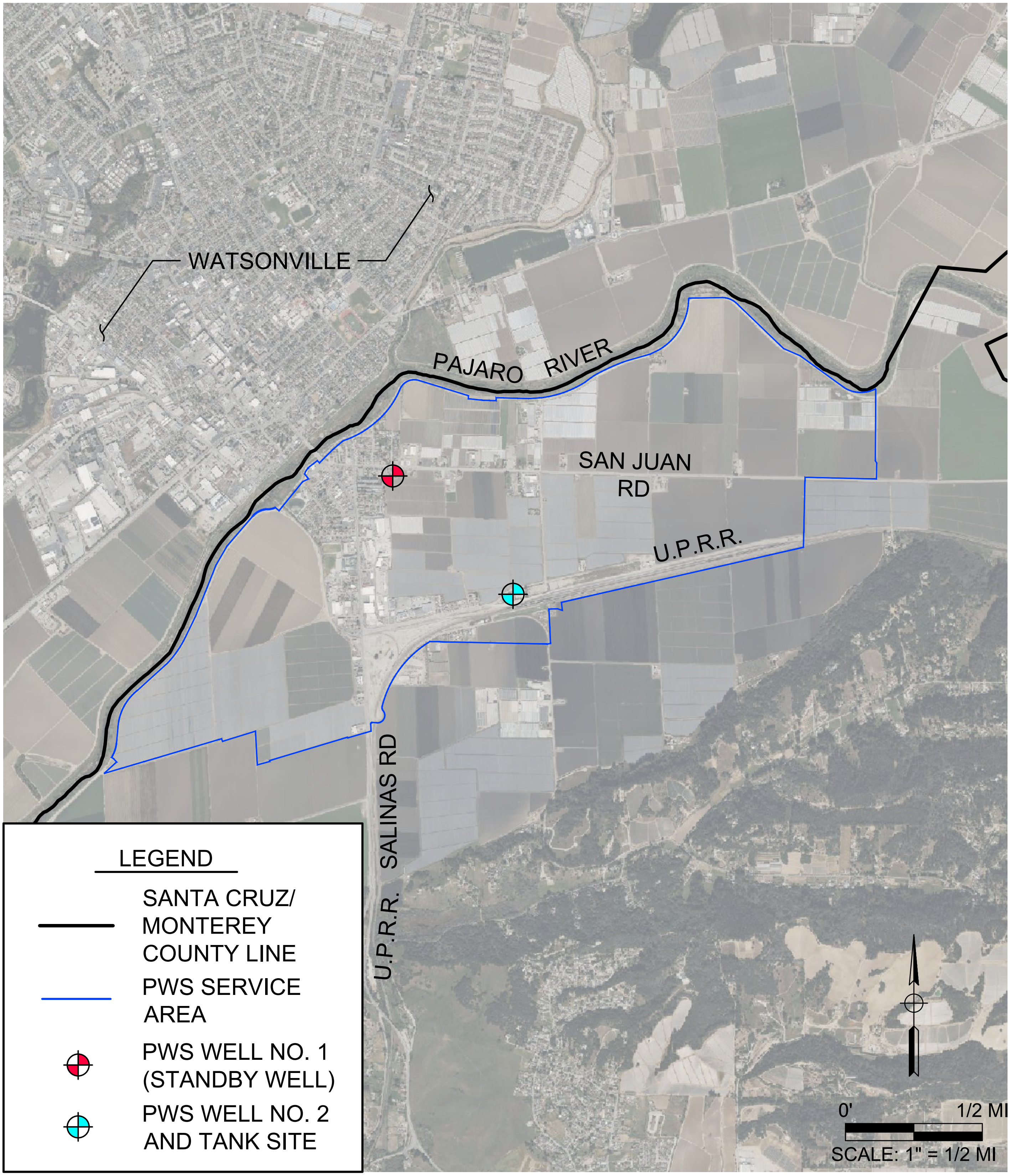

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FIGURE 2-1
PAJARO WATER SYSTEM SERVICE AREA MAP
PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

The PWS currently consists of:

- One primary groundwater well (Pajaro Well No. 2) with a capacity of 1,600 gallons per minute (GPM) located along Railroad Avenue near the intersection with Allison Road; sodium hypochlorite is injected into the wellhead discharge piping for disinfection;
- One above-ground 600,000-gallon welded steel water storage tank, located at the Pajaro Well No. 2 site;
- One above-ground 600,000-gallon bolted steel storage tank; located at the Pajaro Well No. 2 site;
- A booster pump system utilizing two hydropneumatic tanks; located at the Pajaro Well No. 2 site;
- One standby well (Pajaro Well No. 1) with a capacity of 800 GPM, located at the District office at 136 San Juan Road;
- A network of potable water distribution piping and appurtenances.

PWS Well No. 1 discharges directly into the distribution system. Iron and manganese concentrations from Well No. 1, at 666 µg/ml and 308 µg/ml respectively, exceed MCLs. For this well to be incorporated into normal operations, a chlorination system would be required, as well as treatment for iron and manganese.

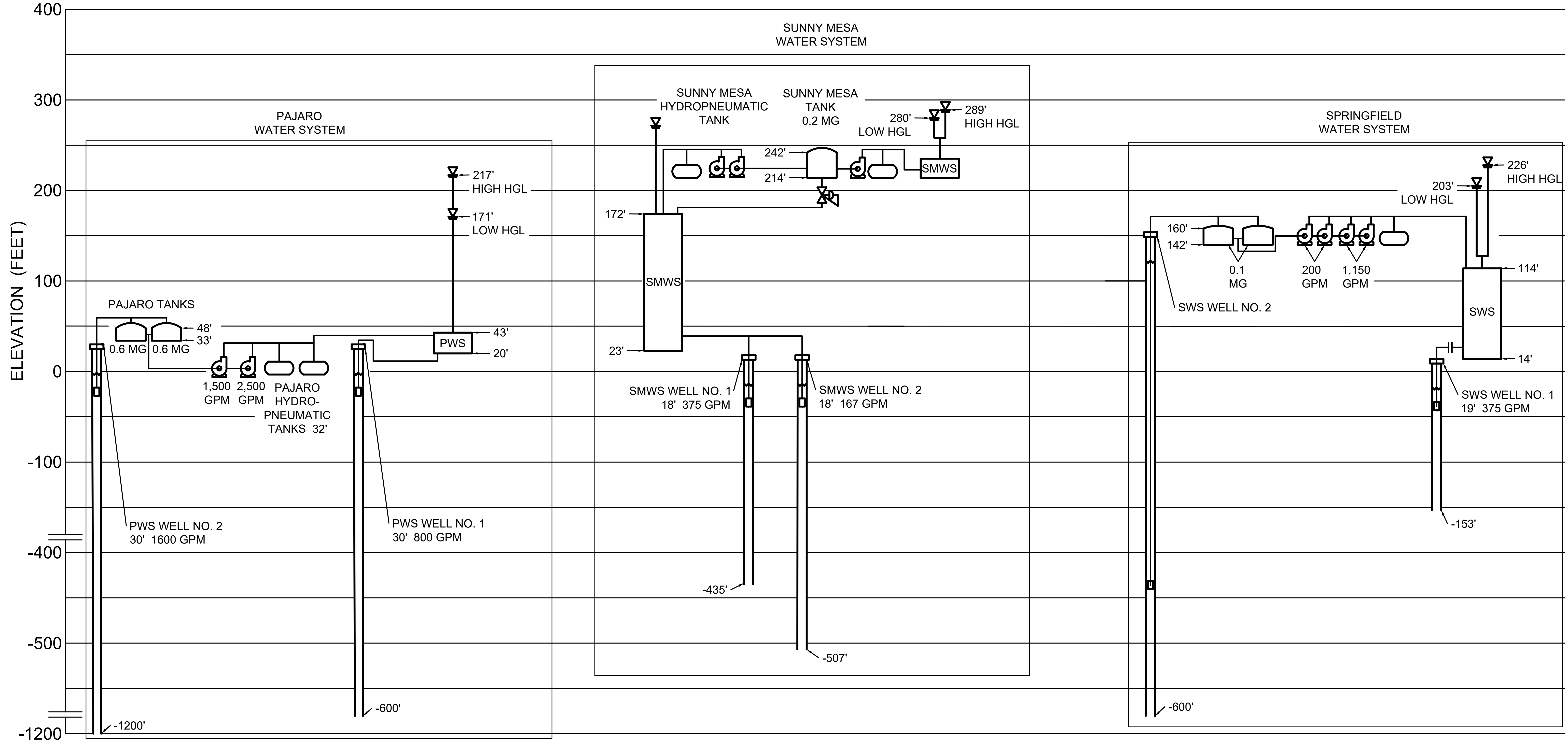
Water quality data for PWS Well No. 1 and No. 2 are included as Appendix B.

Pajaro Tank No. 1, the 600,000-gallon welded steel tank, was inspected in August 2019 by Inland Potable Services, Inc. The exterior was reported to be in generally good condition, and the interior was reported to be in fair condition, with some modifications recommended including interior blast and recoating. The inspection report is included as Appendix C. After the completion of the 2019 inspection, epoxy repairs to the bottom of the tank were made in 2020 to address potential imminent leaks.

The PWS distribution system is comprised of a single pressure zone with operating pressures ranging from 60 to 80 pounds per square inch (psi), maintained by the booster pump system with two hydropneumatic tanks with capacities of 8,000 and 15,000 gallons, and two canned vertical turbine pumps with capacities of 1,500 GPM and 2,500 GPM.

The hydraulic profile for the existing PWS is indicated in Figure 2-2.

The water distribution piping network is primarily composed of polyvinyl chloride (PVC) pipes with diameters ranging from four to ten inches. Most service laterals are copper, with the remainder constructed of polyethylene. All connections are metered. The PWS also includes 66 backflow prevention devices, owned by water service customers, which are tested annually by the customer or the District, and one air gap. There are 96 valves throughout the system ranging from six to ten inches which are exercised annually. The system includes dead-ends in nine locations, which are flushed biannually or more frequently in response to water quality issues or complaints.



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EXISTING SYSTEM HYDRAULIC PROFILE

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 2-2

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2.4.2. Sunny Mesa Water System

The SMWS provides water to approximately 880 people in the unincorporated community of Royal Oaks, bounded by Highway 1 to the west, Salinas Road to the north, Elkhorn Road to the east, and Elkhorn Slough to the south. The SMWS has approximately 268 active connections, including 257 residential customers and 11 commercial customers. The SMWS service area is shown in Figure 2-3.

The SMWS consists of two wells, a 200,000-gallon storage tank, and a water distribution system with a hydropneumatic tank. The wells are located on a District-owned parcel, also known as the SMWS well site, near the intersection of Elkhorn Road and Hudson Landing Road (APN 117-121-003). The two wells pump directly into the distribution system, which feeds the storage tank through a pressure control valve.

SMWS Well No. 2 produces 167 GPM and is typically utilized alone during the winter season when demand is low. SMWS Well No. 1 produces 375 gpm and is used to supplement higher demands in the summer season. The District installed a sand removal system for Well No.1 after observing problems with sand in the discharge water. The operating pressure at the well site is approximately 125 psi. Sodium hypochlorite is injected into the distribution system downstream of the Well No. 2 discharge following the conjunction with the discharge from SMWS Well No. 1.

Data for monthly samples of SMWS Well No. 1 between March 2014 and August 2017 show Hexavalent chromium (chrome-6) concentrations ranging from 9.6 to 18.0 µg/L and averaging 15 µg/L – in excess of the currently proposed chrome-6 MCL of 10 µg/L. SMWS Well No. 2 also exceeds the proposed chrome-6 MCL, with measured concentrations ranging from 7.1 to 15.0 µg/L and averaging 12 µg/L in the same time period. Water produced by the SMWS wells meet all other MCLs and regulatory action levels. Water quality testing data for SMWS Well No. 1 and No. 2 is included in Appendix B.

The above-ground welded steel storage tank was installed in 1985 and has a 200,000-gallon capacity. It is located at the top of Stone Ridge Estates at the end of Silver Stone Street. The tank is located at the highest point in the distribution system, approximately 190 feet above the well site elevation. Both wells are controlled by a float switch in the storage tank.

A booster pump station, including a 7,500-gallon hydropneumatic tank and two 15 horsepower (hp) booster pumps, provides additional pressure to the distribution system when the wells are not operating. The booster pump station operates within a pressure range of 28 to 32 psi. A 50-hp fire pump will activate upon a drop in pressure in the hydropneumatic tank. Additionally, a small pump and hydropneumatic tank system located at the SMWS tank site provides water to three homes on Silver Stone Street, which are at an elevation above which can be served by the booster pump station.

The booster pump station maintains the pressure in the main pressure zone between 42 and 115 psi. The distribution lines are mainly PVC pipe ranging from six to twelve inches in diameter; a small length of asbestos cement (AC) pipe is included in the system. Service laterals are mostly copper and are all metered. The SMWS contains nine backflow prevention devices, owned by water service customers, which are tested annually by the customer or the District. The system has 33 valves ranging from six to twelve inches which are exercised annually. Four dead-ends with blow-offs are flushed at least annually. One bacteriological sample is taken from the system monthly.

The hydraulic profile for the existing SMWS is indicated in Figure 2-2.

In addition to the consolidation evaluated in this report, another area directly adjacent to the southeast of the SMWS along Hudson Landing Road (HLR) may consolidate with the District via the SMWS in the future. The HLR area is bounded by Hudson Landing Road and the Union Pacific Railroad, observable in Figure 2-3. In the HLR study (Engineers Without Borders – Community Engineering Corps, 7 December 2016), it is recommended that HLR be consolidated with the District. No design work to consolidate or connect these systems is being considered at this time; however, accommodation to provide sufficient supplies and storage volumes should be available for a future consolidation via the SMWS.

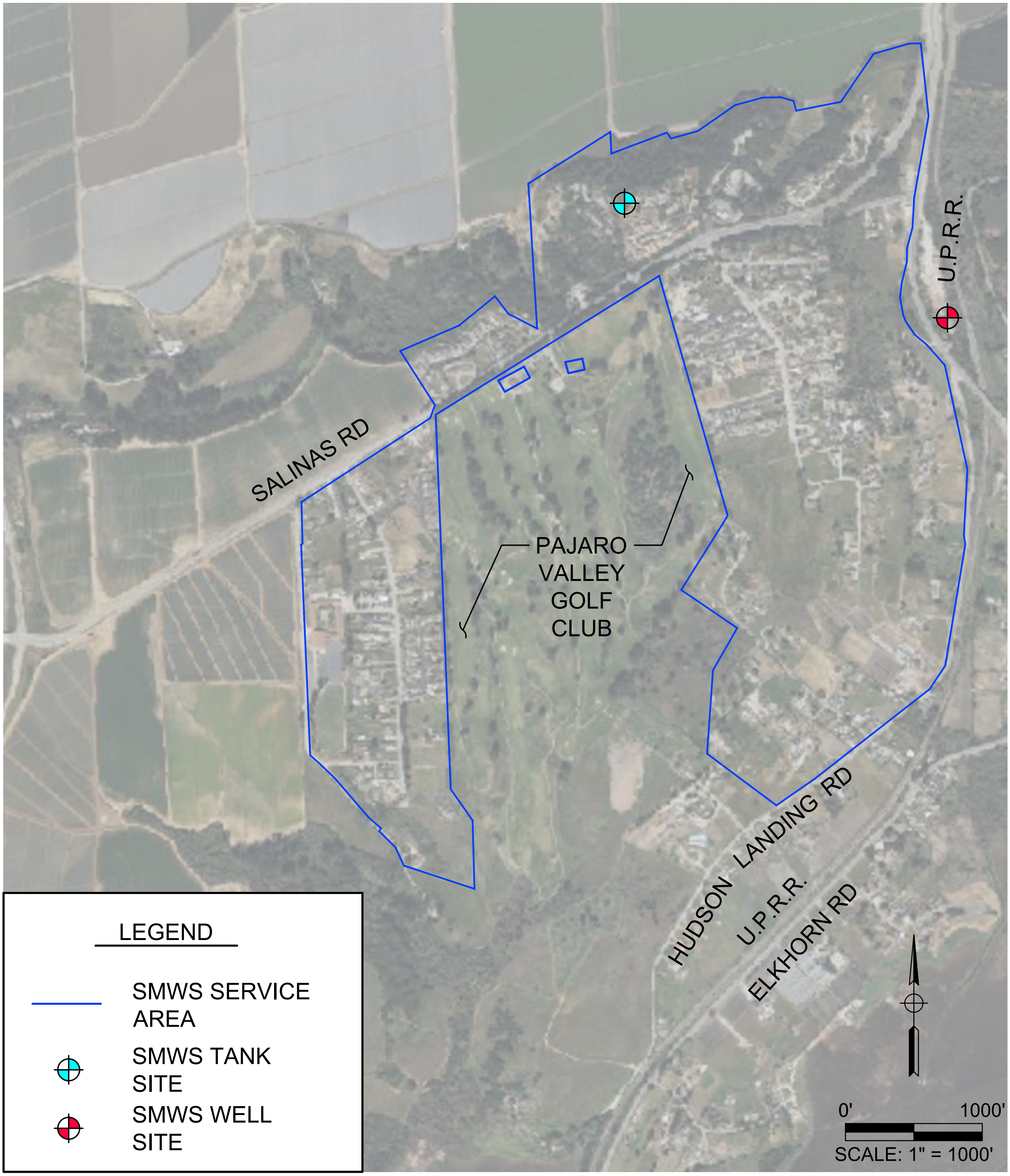

FIGURE 2-3
SUNNY MESA WATER SYSTEM SERVICE AREA MAP
PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

2.4.3. Springfield Water System

The District acquired the Springfield Mutual Water Company in 2005. The water system, renamed to the SWS, currently serves approximately 34 residences along Struve Road. The existing SWS is fed by a single shallow well, designated as Springfield Well No. 1 (SW-1). SW-1 has documented water quality problems for several contaminants, including nitrates exceeding up to five times the MCL established by the State of California. Since the acquisition, the District has been working to improve the water quality delivered to residents.

A design project is currently in progress to improve and expand the SWS, including a water system consolidation. This project is anticipated to start construction in early 2025. For the purposes of this Report, it is assumed the design will be fully implemented in accordance with the current design prior to the start of construction of this Project.

As part of the design, a new well was drilled, Springfield Well No. 2 (SW-2), which will provide a new source of supply to serve the expanded SWS. Sampling indicates water produced by SW-2 meets current water quality requirements and is a suitable source of supply for the system. It is possible that over time, the well may no longer produce water suitable for municipal consumption—whether through aquifer contamination, saltwater intrusion, or the development of additional or more stringent drinking water standards. However, because the well extends into deeper and older sources of groundwater, the well may continue to be suitable for many decades. Should quality of the well water degrade over time, the well site provides ample room for future treatment improvements.

Also under design is distribution system infrastructure to serve existing SWS customers, 22 individual residences on Springfield Road, and the adjacent Moss Landing Mobile Home Park (MHP) which includes 105 mobile home sites currently served by a single private well. The planned service area is indicated in Figure 2-4.

SW-2, drilled in 2018 at the Moss Landing Middle School site, is located within an easement owned by the District on the northeast corner of the Moss Landing Middle School property. As part of the SWS project, the existing well serving the MHP will transition to being owned by the District and will remain to serve as an emergency back-up source of supply for the SWS, while the existing SW-1 will be destroyed. A physical separation between the MHP well and the improved water system will be created to prevent future supply of contaminated water to the system. The MHP well has documented concentrations of Nitrate above the MCLs. Water quality in the well is sampled quarterly, with measured concentrations of Nitrate between 1.1 and 13.3 mg/l, measured between 2016 and 2023. Once the SWS acquires a backup source with contaminants below MCLs, the MHP well should be destroyed.

The SWS design project includes various improvements at the SW-2 site including a new submersible well pump, piping, valves, and appurtenances; electrical and communication improvements; chlorination facilities; two new 110,000-gallon bolted steel water storage tanks; a permanent emergency back-up generator; a new booster pump station including a hydropneumatic tank and four pumps to provide fully redundant domestic and fire service; and civil site improvements including fencing and security improvements, hardscape, a new building to house the associated equipment, and miscellaneous other site improvements.

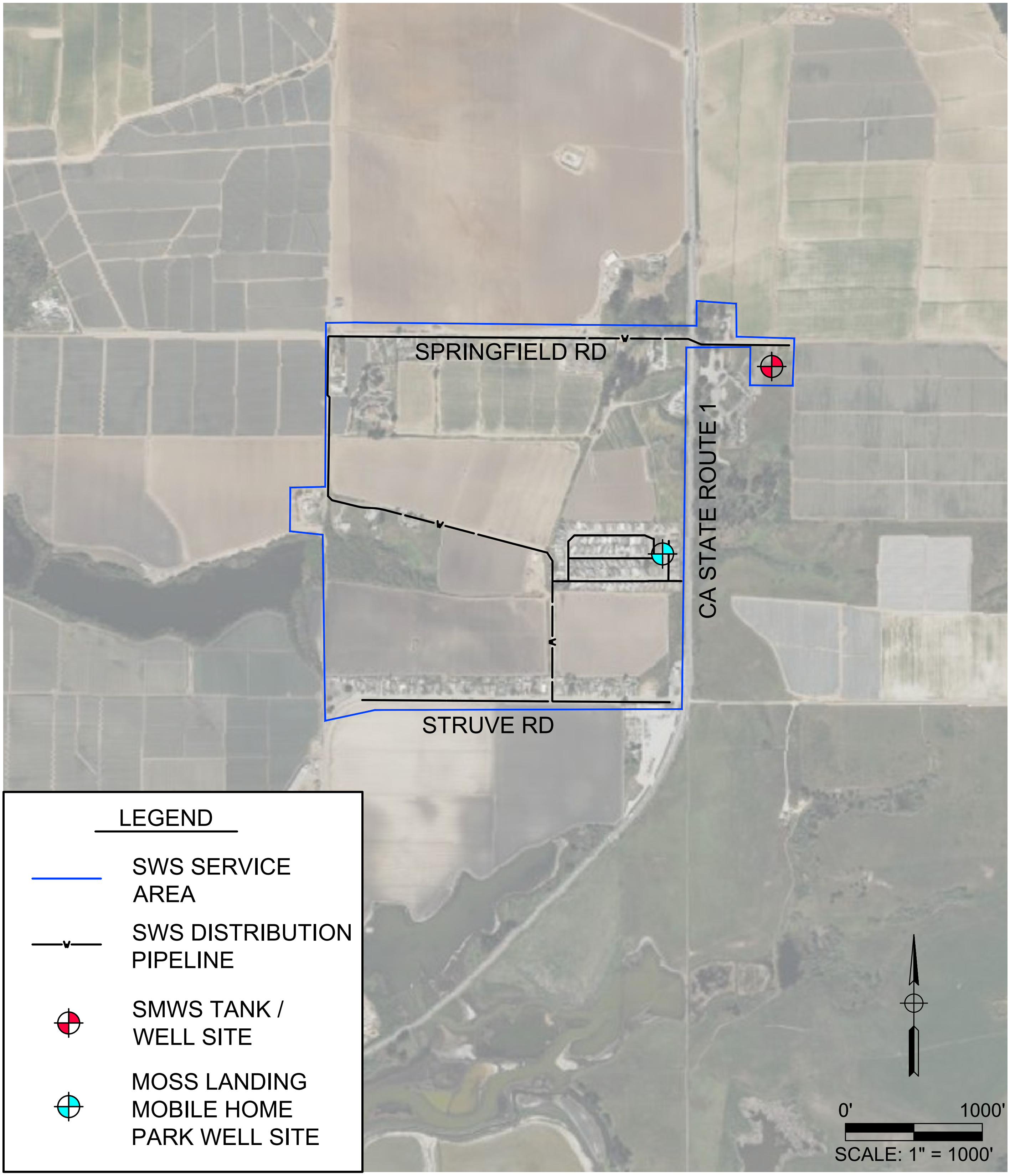

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FIGURE 2-4

SPRINGFIELD WATER SYSTEM SERVICE AREA MAP

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

The existing SWS distribution system will be replaced, and new distribution system piping will be constructed to serve the additional customers and to connect to the Moss Landing Middle School well site. Approximately 12,500 linear feet of new 6- and 8-inch water mains will be constructed in Springfield Road, Struve Road, and across private property and unnamed roads through easements. New distribution system piping will include valves, fire hydrants, air release valves, blow-offs, sampling stations, and other appurtenances as appropriate. Water service laterals will be replaced from the existing distribution mains to each residence currently receiving water from the system, and individual water meters will be provided for each new service connection. Water services for new SWS water service connections where other sources of supply will remain on site will include a backflow prevention device to reduce risk of cross connection and contamination. These backflow prevention devices will be owned by the customer and tested annually by the customer or the District. Customers not served by the existing SWS or MHP water systems will be provided with new service laterals and meters to each residence.

The hydraulic profile for the SWS currently in design is indicated in Figure 2-2.

2.4.4. Area North of Moss Landing

The NOML area contains 88 identified households with 34 houses sourcing water from two state small water systems and ten local small water systems documented in Table 2-2; and 54 individual households reliant on private domestic wells. The NOML households are clustered into two distinct areas as indicated in Figure 2-5: those proximate to Bluff and Jensen Roads in the north of NOML, and those west of the SWS area in the south. For the purposes of this Report, these areas are referred to as the Bluff/Jensen area and Springfield Expansion area, respectively.

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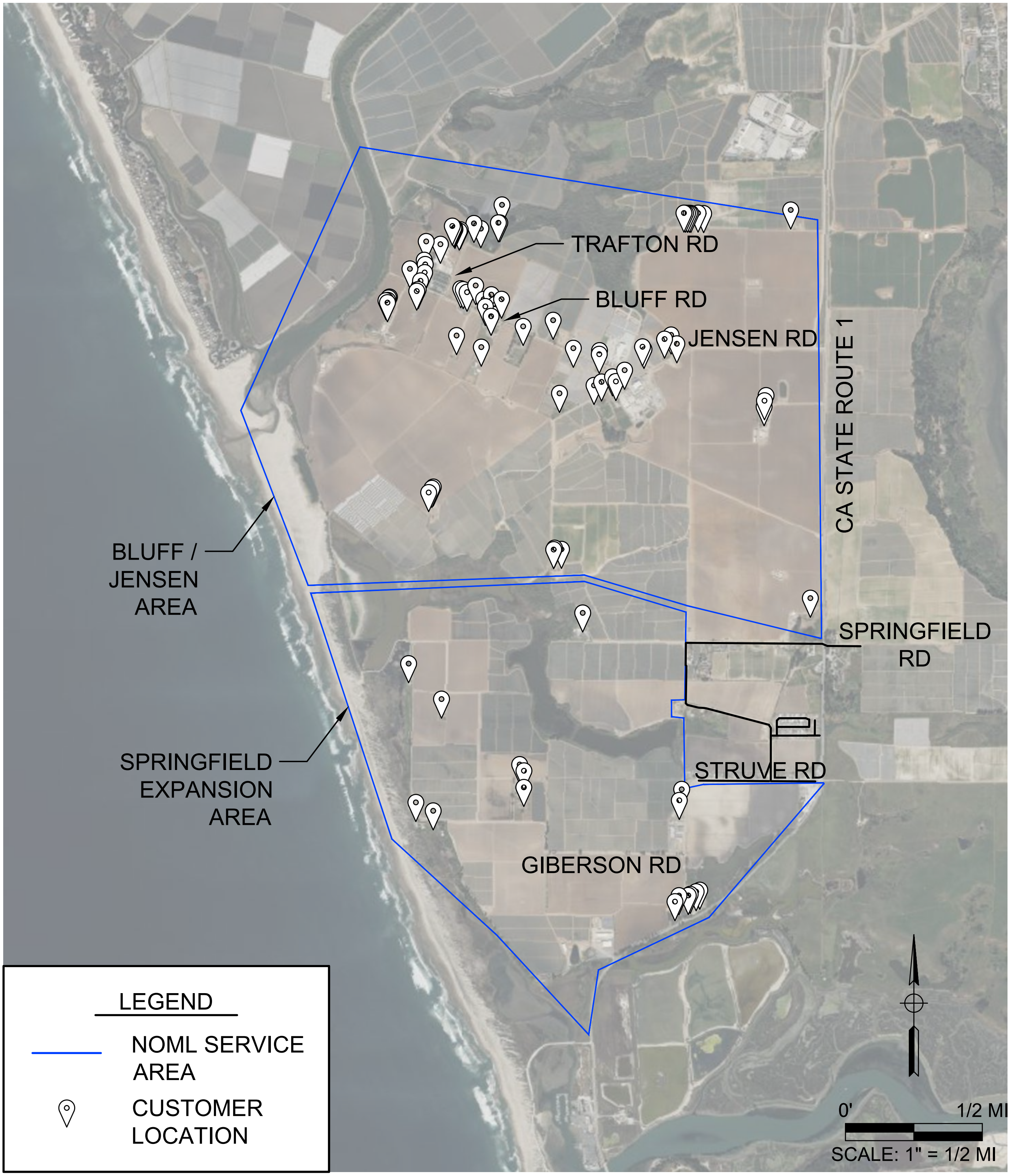


MNS

FIGURE 2-5
AREA N. OF MOSS LANDING SERVICE AREA MAP
PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

MNS

Table 2-2: Local Small Water Systems and State Small Water Systems in the North of Moss Landing Area

System Name	Water System Type	Service Connections	Estimated Population Served
Bluff Road Water System No. 2	Local Small	3	20
Bluff Road Water System No. 3	State Small	6	13
Bluff Road Water System No. 4	Local Small	3	4
Jensen Road Water System No. 1	State Small	6	34
Jensen Road Water System No. 2	Local Small	4	16
Salinas Road Water System No. 14	Local Small	3	12
Springfield Road Water System No. 1	Local Small	2	21
Springfield Road Water System No. 2	Local Small	2	8
Springfield Road Water System No. 3	Local Small	2	10
Springfield Road Water System No. 4	Local Small	5	35
Trafton Road Water System No. 4	Local Small	2	8
Trafton Road Water System No. 7	Local Small	4	6

While several of the systems listed in Table 2-2 include commercial buildings in addition to residences, it is not anticipated that connected businesses will wish to participate in the Project, as the State is unwilling to fund improvements to serve commercial developments. Watsonville Produce, one of these commercial buildings, is working to design and install a treatment system to address a compliance order. Currently, no existing systems are known to have assets that could provide benefit to the Project, but this may change through investigation during detailed design.

Many of the wells in the NOML area have elevated levels of multiple contaminants including nitrate and 123-tri-chloro-propane (123-TCP) and three of the small water systems are currently out of compliance for exceeding arsenic and/or nitrate MCL. Due to the proximity of these wells to the Pacific Ocean, they are also highly susceptible to seawater intrusion.

2.5. Water System Demand

Demands for each of the sub-areas within the study area, including average daily demand (ADD), maximum month daily demand (MMDD), maximum daily demand (MDD) and peak hour demand (PHD) are documented in this section. Where daily demand data is not available, MDD is estimated by applying a factor of 1.5 to MMDD in accordance with the California Code of Regulations (CCR) Title 22 §64554. A factor of 1.5 is further applied to MDD to estimate a peak hour demand (PHD).

2.5.1. Pajaro Water System Demand

Data regarding delivered water quantities for the PWS was provided by the District based on customer billing data. Pumped water quantities are estimated to be approximately 10% higher than delivered water quantities due to leaks and other losses in the system. Estimated monthly pumped water quantities for the PWS are shown in Table 2-3.

Table 2-3: PWS Pumped Water Per Month, 2015 - 2022

Month	Pumped Volume (gallons)							
	2015	2016	2017	2018	2019	2020	2021	2022
January	6,358,000	5,628,700	6,288,436	7,034,940	5,857,588	6,147,812	5,669,840	6,052,068
February	5,996,716	6,146,316	5,478,352	6,218,124	5,782,040	5,948,844	5,528,468	5,922,664
March	7,494,212	6,431,304	6,562,952	6,392,408	5,757,356	6,595,864	6,931,716	6,716,292
April	7,823,332	6,711,056	6,230,092	7,801,640	6,945,928	6,897,308	7,090,292	6,290,680
May	7,424,648	8,195,088	8,829,392	8,719,436	7,319,928	7,080,568	7,473,268	7,703,652
June	9,609,556	8,852,580	8,730,656	8,242,212	8,388,820	8,796,480	9,012,652	7,678,220
July	10,162,328	9,368,700	9,468,932	9,604,320	9,205,636	8,774,788	8,463,620	8,034,268
August	9,519,796	9,853,404	10,041,900	9,287,168	8,738,136	9,402,360	8,695,500	8,504,012
September	8,827,896	8,465,116	8,607,984	8,342,444	8,542,908	8,971,512	7,981,160	7,930,296
October	8,931,120	7,851,756	8,536,924	8,978,992	8,338,704	8,376,852	7,096,276	7,754,516
November	7,563,776	6,791,092	7,332,644	7,415,672	6,447,760	7,462,048	6,696,844	6,571,928
December	6,193,440	5,995,968	6,588,384	6,093,208	6,797,076	6,453,744	6,052,068	5,954,828

MMDD is 310,000 GPD, MDD is 500,000 GPD (measured in July 2016), and PHD is 750,000 GPD, each rounded to the nearest thousand. Per District data, there are 471 connections in the PWS. On a per-connection basis, the MMDD, MDD and PHD are 658 GPD/connection, 1,062 GPD/connection, and 1,592 GPD/connection, respectively. Per District data, water demand in the PWS is comprised of 27% Single Family, 32% Multi-family, 38% Commercial and 3% Institutional/Governmental.

2.5.2. Sunny Mesa Water System Demand

Data regarding delivered water quantities was provided by the District for the SMWS as shown in Table 2-4.

Table 2-4: SMWS Pumped Water Per Month, 2015 - 2022

Month	Pumped Volume (gallons)							
	2015	2016	2017	2018	2019	2020	2021	2022
January	1,446,632	1,271,600	1,451,120	1,758,548	1,484,780	1,508,716	1,452,616	1,445,136
February	1,715,912	1,605,956	1,237,940	1,685,244	1,337,424	1,668,788	1,282,072	1,615,680
March	1,949,288	1,404,744	1,454,112	1,595,484	1,399,508	1,801,184	1,721,896	1,859,528
April	2,321,044	1,611,940	1,335,928	1,905,904	1,988,932	1,786,972	2,115,344	1,691,228
May	1,873,740	2,727,208	2,344,980	2,654,652	2,363,680	2,592,568	2,360,688	2,508,792
June	2,635,952	2,725,712	2,682,328	3,016,684	2,558,908	3,395,172	3,084,752	2,615,008
July	2,433,992	2,567,136	2,830,432	2,897,004	2,946,372	2,977,040	2,540,956	2,347,972
August	2,867,084	2,643,432	2,417,536	2,909,720	3,006,212	2,940,388	2,570,876	2,721,224
September	2,528,988	2,457,180	2,230,536	2,333,012	3,018,180	2,663,628	2,404,072	2,226,796
October	2,253,724	2,047,276	2,457,180	2,517,768	2,715,240	2,290,376	2,028,576	2,006,136
November	1,826,616	1,456,356	1,721,896	2,056,252	2,086,920	1,954,524	1,510,212	1,653,828
December	2,161,720	1,295,536	1,522,180	1,552,100	1,746,580	1,697,960	1,329,196	1,395,020

MMDD, rounded to the nearest thousand is 110,000 GPD, MDD is 250,000 GPD (observed in 2015), and PHD is 375,000 GPD. Per California Division of Drinking Water (DDW), there are 269 connections in the SMWS. On a per-connection basis, the MMDD, MDD and PHD are 407 GPD/connection, 929 GPD/connection and 1,394 GPD/connection, respectively. Per 2020 Census data again, the population served by SMWS is 957. On a per-capita basis, the MMDD, MDD and PHD are 114 GPD/capita, 261 GPD/capita and 392 GPD/capita, respectively. These results are summarized in Table 2-5.

Table 2-5: SMWS MMDD and MDD, 2015 – 2022

	Flow (GPD)		
Per	MMDD	MDD	PHD
SMWS	110,000	250,000	375,000
Connection	407	929	1,394
Capita	114	261	392

Per District data, water demand in the SMWS is comprised of, by demand, 93% Single Family, 1% Multi-family, 2% Commercial and 4% Institutional/Governmental.

To account for a potential future consolidation of the SMWS with additional residences on HLR, additional demand is included. It is assumed that per-capita demand in the HLR area is equal to per-capita residential demand in the SMWS. The demands in both HLR and the SMWS are overwhelmingly due to single-family residences. The MDD of 261 GPD per capita for the SMWS is applied to HLR to calculate the MDD for the HLR service area as indicated in Table 2-6. Per the HLR study, the area consists of approximately 80 households. The HLR was documented to have 3.24 persons per household in the 2010 US Census.

Table 2-6: Demand Calculations for HLR

Variable	Value	Units
MDD per Capita	261	GPD/capita
Persons per Unit	3.24	
MDD per Unit	846	GPD/unit
Units	80	
MDD	67,700	GPD
PHD Multiplier	1.5	
PHD	101,000	GPD

2.5.3. Springfield Water System Demand

Usage data was collected from a single water meter measuring total well production from SW-1. Individual connections in the SWS are not currently metered. Existing system demands were reviewed for the period from the start of 2011 through April 2018. A summary of the monthly water use for the system is shown in Table 2-7. The highest monthly demand during this period occurred during September of 2017.

Table 2-7: Well SW-1 Water Pumped Per Month (gallons), 2011 - 2018

	2011	2012	2013	2014	2015	2016	2017	2018
January	573,716	471,988	454,784	569,976	531,828	552,099	563,992	617,848
February	513,876	381,480	418,132	471,240	487,696	433,990	429,726	449,548
March	509,388	372,504	463,012	534,820	584,936	620,092	685,168	628,320
April	554,268	397,188	454,784	536,316	557,260	504,152	476,326	570,724
May	639,540	467,500	673,948	605,132	523,600	514,624	706,112	-
June	559,504	546,788	552,024	682,924	604,384	676,416	774,928	-
July	597,652	588,676	667,964	657,492	534,072	606,852	721,072	-
August	602,888	586,432	634,304	594,660	585,684	670,806	620,765	-
September	548,284	523,600	699,380	513,876	634,304	699,305	878,975	-
October	499,664	628,320	540,056	559,504	526,667	560,925	734,536	-
November	454,036	442,068	537,812	550,378	412,597	624,580	640,288	-
December	428,604	485,452	609,620	520,758	455,532	526,966	576,708	-

The MMDD is therefore 29,300 GPD. MDD is 43,900 GPD, and PHD is 65,900 GPD. Per District data, there are 34 connections along Struve Road served by SW-1. On a per-connection basis, the MMDD, MDD and PHD are 862 GPD/connection, 1,293 GPD/connection and 1,938 GPD/connection, respectively.

The MHP has 105 individual units. The MHP is currently provided bottled water by the District, but water usage data for the MHP was not available for the preparation of this Report. As a basis for estimating demands, a search of publicly available documentation was conducted to identify typical mobile home water demands. A demand per mobile home unit was estimated based on a study of 2003 to 2006 average water use for four (4) mobile home parks in the Santa Clara Valley Water District. The average daily demand (ADD) for each mobile home was calculated based on the 2003 to 2006 average yearly demand. Using the Santa Clara Valley Water District study, an ADD of 211 gallons per day per mobile home unit was estimated based on a connection weighted average of the four parks. The ADD of 211 gallons per day per mobile home unit was adopted to estimate demands for the MHP. ADD has been multiplied by 1.5 to estimate MMDD, and further multiplied by 1.5 to estimate MDD in accordance with CCR Title 22 §64554. MDD has been multiplied by 1.5 to estimate PHD. The MMDD, MDD and PHD on a per-unit basis are therefore 317 GPD/unit, 475 GPD/unit and 713 GPD/unit respectively. The MMDD, MDD and PHD for the MH Park altogether are therefore 33,200 GPD, 49,800 GPD and 74,700 GPD, respectively.

The expanded SWS design project currently under way also includes 22 individual residences along Springfield Road. 2020 U.S. Census data was taken for the census block that contains these residences to calculate the average number of persons per housing unit. This census data is summarized in Table 2-8.

Table 2-8: 2020 Census Data Springfield Road Vicinity

2020 Census Block Monterey County, California	Population	Housing Units	Persons/Unit
Block 3017, Block Group 3, Census Tract 101.01	466	116	4.02

Although neither flow per housing unit nor flow per capita data is available for the 22 houses on Springfield Road, it is assumed that flow per capita for these residences is similar to that in SMWS nearby; the demands in both areas are overwhelmingly due to single-family residences. SMWS MDD of 261 GPD per capita is applied to calculate the MDD and PFD for the 22 Springfield residences as indicated in Table 2-9.

Table 2-9: Demand Calculations for Springfield Road

Variable	Value	Unit
MDD per Capita	261	GPD/capita
Persons per Unit	4.02	
MDD per Unit	1,049	GPD/unit
Units	22	
MDD	**23,088**	**GPD**
PHD Multiplier	1.5	
PHD	**34,632**	**GPD**

The demand totals for the entirety of SWS are summarized in Table 2-10.

Table 2-10: Demand Calculations for SWS

Community	MMDD (GPD)	MDD (GPD)	PHD (GPD)
Struve Road Residences	29,300	43,900	65,900
MHP	33,200	49,800	74,700
Springfield Road Residences	10,100	23,100	34,600
SWS	**72,600**	**116,800**	**175,200**

2.5.4. North of Moss Landing Area

MDD and PHD for the NOML are estimated by calculating the demands for its constituent Bluff/Jensen area and Springfield Expansion area, then taking their sums.

2020 U.S. Census data was taken for the census blocks that comprise the vicinity of the Bluff/Jensen service area to calculate the average number of persons per housing unit. The Bluff/Jensen service area does not entail the entirety of these census blocks, but it is assumed that the persons per unit for the vicinity is representative of the Bluff/Jensen area. This census data is summarized in Table 2-11.

Table 2-11: 2020 Census Data for Bluff / Jensen Vicinity

2020 Census Block Monterey County, California		Housing Units	Persons/ Unit
Block 3006, Block Group 3, Census Tract 101.01	122	32	
Block 3010, Block Group 3, Census Tract 101.01	45	14	
Block 3014, Block Group 3, Census Tract 101.01	136	40	
Total	**303**	**86**	**3.52**

Although neither flow per housing unit nor flow per capita data is available for the Bluff/Jensen area, it is assumed that flow per capita in Bluff/Jensen is similar to that for SMWS nearby. The demands in Bluff/Jensen and SMWS are both overwhelmingly due to single-family residences. SMWS MDD of 261 GPD per capita is applied to the Bluff/Jensen area to calculate its MDD and PHD as indicated in Table 2-12. Average day demand (ADD) for Bluff/Jensen is also calculated here for consideration in Section 6.8.6.2 “Stored Water Quality.” It is assumed here that MDD is 2.25 times ADD so that ADD is calculated by dividing MMDD by 2.25.

Table 2-12: Demand Calculations for Bluff / Jensen Area

Variable	Value	Units
MDD per Capita	261	GPD/capita
Persons per Unit	3.52	
MDD per Unit	919	GPD/unit
Units	68	
MDD	**62,487**	**GPD**
ADD Divisor	2.25	
ADD	**27,772**	**GPD**
PHD Multiplier	1.5	
PHD	**93,730**	**GPD**

2020 U.S. Census data was taken for the census blocks that comprise the vicinity of the Springfield Expansion service area to calculate the average number of persons per housing unit. The Springfield Expansion service area does not entail the entirety of these census blocks, but it is assumed that the persons per unit for the vicinity is representative of the Springfield Expansion area. This census data is summarized in Table 2-13.

Table 2-13: 2020 Census Data for Springfield Expansion Vicinity

2020 Census Block Monterey County, California	Population	Housing Units	Persons /Unit
Block 2013, Block Group 2, Census Tract 146.01	31	8	
Block 2023, Block Group 2, Census Tract 146.01	23	6	
Block 3017, Block Group 3, Census Tract 101.01	466	116	
	520	**130**	**4.00**

Although neither flow per housing unit nor flow per capita data is available for the Springfield Expansion area, it is assumed that flow per capita in the Springfield Expansion is very similar to that for SMWS nearby. The demands in the Springfield Expansion and SMWS are both overwhelmingly due to single-family residences. SMWS MDD of 261 GPD per capita is therefore applied to the Springfield Expansion to calculate its MDD and PHD as indicated in Table 2-14.

Table 2-14: Demand Calculations for Springfield Expansion

Variable	Value	Units
MDD per Capita	261	GPD/capita
Persons per Unit	4.00	
MDD per Unit	1,044	GPD/unit
Units	20	
MDD	**20,885**	**GPD**
PHD Multiplier	1.5	
PHD	**31,327**	**GPD**

The demand totals for the entirety of NOML are summarized in Table 2-15

Table 2-15: Demand Calculations for NOML

Area	MDD (GPD)	PHD (GPD)
Bluff/Jensen	62,500	93,700
Springfield Expansion	20,900	31,300
NOML	**83,400**	**125,000**

2.6. Operations and Maintenance Practices and Abilities

This section discusses the operation and maintenance practices and abilities of the various areas considered in the Report.

2.6.1. PWS, SMWS, and SWS Areas

The PWS, SMWS, and SWS are owned and operated by the District. The District currently owns and operates nine individual water systems in northern Monterey County. The District has 6 full time staff with water system operator certifications; most operators are certified for both distribution and treatment at various levels. These operations staff operate and maintain the District's systems in accordance with applicable standards and regulations. The District has indicated a desire and the ability to manage, operate and maintain a consolidated water system serving the areas assessed in this Report.

2.6.2. NOML Area

The NOML areas are comprised of state small water systems, local small water systems, and individual households with private water systems. Operation and maintenance practices vary widely between the different systems and individual users. It is unlikely individuals currently operating the existing water systems in the area have the ability or desire to implement and adequately serve a regional water supply solution for the NOML area.

Section 3. Problem Description

3.1. Problem Description Overview

This section discusses water supply reliability and vulnerabilities for the areas included in the Report study area.

3.1.1. Pajaro Water System

The PWS is significantly vulnerable to a water system failure. The existing system has one source of supply which is compliant with potable drinking water standards. A failure of this source of supply would result in non-potable water as the only source of supply.

In addition, the system is vulnerable to loss of service due to flood conditions. This vulnerability was observed in early 2023 when flood conditions caused a failure of the water system, resulting in an extended loss of service for the community, and boil water orders when system operation was restored.

3.1.2. Sunny Mesa Water System

The SMWS serves 256 residential connections and has two active wells, SMWS Well No. 1 and SMWS Well No. 2, both of which exceed the former and proposed MCLs for chrome-6 concentrations of 10 µg/L. SMWS Well No. 1 has experienced a casing failure and is offline. SMWS Well No. 2 failed due to flooding events in 2023 but has been restored to service. SMWS Well No. 2 remains susceptible to failure by flooding due to its location and is nearing the end of its useful operating life.

3.1.3. Springfield Water System

The expanded SWS, when complete, will have one source of supply which is compliant with potable drinking water standards. A failure of this source of supply would result in non-potable water as the only source of supply.

3.1.4. North of Moss Landing Area

Drinking water wells in the NOML area have elevated levels of multiple contaminants including nitrate and 123-TCP. Additionally, three of the state small systems are currently out of compliance for exceeding arsenic and/or nitrate MCLs.

Section 4. Consolidation Analysis

4.1. Prior Work

A detailed consolidation analysis for the study area was completed in Corona's Feasibility Study (Corona Environmental Consulting, LLC, November 18, 2021). To address the problem of providing safe and reliable water to NOML, the Study considered several alternatives including a physical consolidation with the SWS, a regional physical consolidation with the PWS, SMWS, and SWS, creation of a new community water system, replacement of existing domestic wells, wellhead treatment, and point of use/point of entry treatment.

The Corona Feasibility Study compared the considered alternatives with respect to capital cost, 20-year operation and maintenance, as well as solution reliability and sustainability. A regional consolidation was determined to be the preferred solution for providing water service to the NOML area due to the increased reliability and sustainability of a consolidation with a public agency with the technical and managerial capacity to operate and maintain a consolidated system. Additionally, grant funding would likely only be available to create a new community water system if physical consolidation is not feasible.

Consolidation of the NOML with only the SWS was considered, however, due to the lack of available supplies in the SWS and the need for an additional reliable source of supply, the regional system consolidation was determined to provide additional water supply security and reliability due to the location and supplies provided by the existing PWS wells. The regional consolidation will also have benefits for the SMWS and PWS with enhanced water supply reliability and improved water quality.

The ability to implement this regional consolidation is contingent on the successful completion of the Springfield Project, and the design of the Springfield Project is currently in progress and is nearing completion. The regional consolidation must also supply enough water to NOML to meet fire code requirements.

4.2. Advantages/Disadvantages

A regional consolidation will yield substantial benefits to the areas included in the Study. Key advantages include:

- The consolidated system will be operated by an experienced public utility, which will likely improve long-term sustainability.
- Utilizing inland sources of supply, rather than wells near the Pacific Ocean will reduce vulnerability to seawater intrusion.
- Consolidating multiple systems with established sources of supply will accelerate implementation of the Project and avoids the need to identify and develop new sources of supply.
- Consolidating multiple systems will provide supply and operational redundancies for all systems involved, improving water supply reliability.
- The additional infrastructure will have relatively low estimated operation and maintenance costs over the life of the improvements.
- Treating water produced by PWS Well No. 1 will provide a reliable source of supply for the consolidated system.
- The regional consolidation will allow abandonment or destruction of the existing SMWS wells, reducing vulnerabilities to chrome-6 in the community.

- The regional consolidation will provide a secondary source of supply for the SWS, compliant with drinking water regulations.

Disadvantages and challenges associated with the regional consolidation include substantial initial investment to design, permit, and construct the required infrastructure. In addition, the consolidation requires acquisition of various easements for construction of proposed infrastructure.

4.3. Consolidation Conclusion

Regional consolidation provides substantial benefits to the four areas considered in this study. Although the capital cost to develop and implement the proposed project is high, the regional consolidation provides many clear benefits over other considered alternatives and is the recommended solution to enhance regional water supplies.

Section 5. Alternative Analysis

5.1. Description

As discussed in Section 4, a regional consolidation project between the PWS, SMWS, SWS, and the NOML areas will provide the greatest benefit to NOML residents, the District and its customers. A discussion of the process to develop the proposed approach to this consolidation is discussed in this section, as well as alternatives considered in development of the conceptual design.

5.2. Design Criteria

To develop a basis for development of alternatives, several design criteria were considered in development of a long-term reliable approach to achieving the goal of a water system consolidation. Key considered criteria include water supply, water quality, storage volumes, water service pressure, and system redundancy/reliability. These criteria are discussed in detail in the following sections.

5.2.1. Water Supply

For the consolidated system to have a long-term reliable source of supply, all service connections should have a minimum of two sources of supply. Additionally, the system should be able to reliably serve peak hour system demands, as well as maximum daily demand with an acceptable factor of safety. The system also must provide fire flows consistent with California Fire Code requirements.

5.2.2. Water Quality

Water provided to customers must meet all applicable state and federal water quality requirements for primary and secondary water quality standards. The consolidated system will utilize free chlorine in the form of sodium hypochlorite for disinfection to match existing system chemistry. Residence times in storage tanks and pipelines should be considered to avoid loss of chlorine residual due to excessive residence time.

5.2.3. Water Pressure and Delivery

Water should be provided to customers at an operating pressure of between 35 and 120 psi at each residence. If system pressure exceeds 80 psi, a pressure reducing valve may be required to reduce pressure prior to entering each residence.

The system shall be sized to provide domestic as well as fire flow requirements in accordance with California Fire Code. In accordance with the 2022 California Fire Code, a minimum fire flow rate of 1,000 GPM for a period of one hour is required for one- and two-family residential dwellings, not equipped with automatic sprinkler systems, with a building area of up to 3,600 square feet. The District has confirmed 1,000 GPM is an acceptable fire flow rate but has requested a two-hour supply be provided due to the rural nature of the study area.

5.2.4. Water Storage

Sufficient water storage will be provided in each pressure zone to serve maximum daily demands as well as fire service demands.

5.2.5. Water Conveyance

New distribution system piping will include valves, fire hydrants, air release valves, blow-offs, sampling stations, and other appurtenances as appropriate. Transmission and distribution piping will be constructed of polyvinylchloride (PVC) C900 pipe, except trenchless construction, where fusible PVC C900 or high density polyethylene pipe (HDPE) would be used. Fire hydrants will be located approximately every 500 linear feet in residential areas, at dead ends of the distribution system, and in other strategic locations throughout the system. Fire hydrants will not be provided in areas where there are no existing residences or structures.

Main line valves will be provided at selected fire hydrants, at intersections in the distribution system, and approximately every 1,000 linear feet throughout the distribution system. Main lines will be separated from existing sewage and storm drain lines according to California Code of Regulations Title 22, §64554.

5.2.6. System Reliability

The system should be designed to maximize operational flexibility. This includes maximizing the ability to move water between pressure zones and storage tanks, eliminating system elements threatened by, or with a history of failure, and providing back-up power to maintain service during a power outage or other emergencies.

5.2.7. Water Service Laterals

Water service laterals will be installed from the new main to the existing residence and will include new water meters at the property line for each new customer. New services will be installed in accordance with District standards; separate water meters will be provided for each individual service connection.

5.3. System Consolidation Concept Development

To provide a foundation for development of conceptual and alternative designs for the consolidation, several analyses were conducted including a review of the relative geographic locations of the PWS, SMWS, SWS, and North of Moss Landing areas, review of the relative system hydraulics and desired operational flexibility, and water quality supply reliability and availability.

5.3.1. Geographic Analysis

The four areas to be consolidated are generally aligned from north to south along the coastline of the Pacific Ocean. The PWS is the furthest north, followed by the SMWS, then Bluff/Jensen area, and the SWS to the south. It is approximately four miles from the southern terminus of the PWS to the northern edge of the SWS.

Due to the geographic separation of the areas to be consolidated, multi-mile pipelines will be required to connect the systems together. Pipelines will be required to convey water between the PWS, SMWS, SWS, and North of Moss Landing areas. It is assumed these pipelines will be installed within existing public or private roads to minimize construction impacts. The study area is relatively rural, with limited roadways between the systems. The primary roadway between the systems is State Highway One, which is a very busy throughfare owned and operated by the California Department of Transportation (Caltrans). To reduce construction costs and avoid challenges with long-term maintenance costs, pipelines will be installed outside Caltrans rights of way to the maximum extent feasible. In addition, the District has requested pipelines be installed in road shoulders to minimize traffic control requirements during future maintenance activities.

5.3.2. System Hydraulic Analysis

For the Bluff/Jensen area, due to the relatively low system demand, concerns exist regarding water age in long pipelines resulting in a loss of chlorine residual. As a result, minimizing pipe diameters in transmission pipelines to reduce the quantity of water stored in pipelines will assist in preserving water quality. With smaller pipelines, providing fire service directly from the SMWS is hydraulicly infeasible. As a result, water storage is required in the Bluff/Jensen area to meet fire service requirements and to provide a location for chlorine dosing in proximity to end users. This additional storage requirement requires the Bluff/Jensen area to comprise a separate pressure zone from other areas in the consolidated system, and hereinafter will be called the Bluff/Jensen Zone. Utilizing a combination of water from the SMWS and water stored in the Bluff/Jensen area was not considered to avoid excessive operational complexity. The PWS, SMWS, and SWS will also become separate pressure zones within the consolidated system.

Existing and anticipated water system/pressure zone information for each area is documented in Table 5-1.

Table 5-1: Elevations and Pressures per Pressure Zone

Pressure Zone/System	Service Connection Elevation Range (Low/High) (ft)	HGL (Low/High) (ft)	Service Pressure (Low/High) (psi)
Pajaro Water System (Zone I)	20 / 43	171 / 217	55 / 85
Sunny Mesa Water System (Zone II)*	23 / 172	270 / 288	42 / 115
Bluff/Jensen Zone (Zone III)	24 / 178	259 / 282	35 / 112
Bluff/Jensen Tank	150 / 170	270 / 288	43 / 60
Springfield Water System (Zone (IV)	14 / 114	203 / 226	39 / 92

*Note: The Sunny Mesa Water System (Zone II) has a sub zone which serves three homes, designated as Zone IIa.

To maximize operational redundancy and operational flexibility, provisions in the conceptual design should be incorporated to allow water to be moved to and from each system. Due to the general north to south orientation of the systems as described in Section 5.3.1, each system should be able to exchange water with the next system to the north and south, respectively. This water should be able to move both directions between the PWS and SMWS, between the SMWS and the Bluff/Jensen Zone, and between the Bluff/Jensen Zone and the SWS. Additionally, water will be able to be moved directly from the SMWS to the SWS.

To move water between the PWS and the SMWS, a pipeline will be required, as well as a booster pump station to overcome the pressure differential between the two systems. An isolation valve and pressure reducing valve at the booster pump station site will allow water to move from the SMWS to the PWS.

To move water from the SMWS to the Bluff/Jensen Zone, a pipeline will be required along Salinas Road, Hilltop Road, and Jensen Road to a new storage tank site near the intersection of Bluff Road and Jensen Road. The hydraulic grade line (HGL) of the SWMS is higher than elevation of the proposed tank site; as a result, water can be moved from the SMWS to the Bluff/Jensen Zone storage tank by gravity. A pump station will be required to maintain system pressure in the Bluff/Jensen Zone due to the relative elevation of the proposed Bluff/Jensen storage tank, and residences to be served. To transfer water from the Bluff/Jensen Zone to the SMWS, the Bluff/Jensen pump station will be used.

To move water from the SMWS to the SWS, a pipeline will convey water to the SWS. The HGL of the SWMS is higher than elevation of the SWS; as a result, water can be moved from the SMWS to the SWS by gravity.

To move water from the Bluff/Jensen Zone to the SWS, the HGL of the Bluff/Jensen Zone will be higher than the HGL of the SWS; as a result, water can be moved from the Bluff/Jensen to the SWS storage tank via a pipeline and the Bluff/Jensen Pump Station. To move water from the SWS to the

Bluff/Jensen Zone, the HGL of the SWS is higher than the proposed elevation of the Bluff/Jensen storage tank; as a result, water can be moved from the SWS to the Bluff/Jensen storage tank through the same pipeline, operating in reverse direction.

5.4. Alternative Development

Consolidation alternatives and concepts are developed in this section.

As discussed in Section 4, a multi-system consolidation is the selected solution to enhance regional water supply reliability, availability, and to serve the North of Moss Landing area. No other alternatives are considered.

As discussed in Section 5.3, the hydraulic elements required to achieve the consolidation are generally clear and have limited flexibility to consider substantial alternatives.

As discussed in Section 5.3.3, there are limited water supplies available to serve the consolidated system. To address water supply reliability for the PWS, treatment of Pajaro Well No. 1 is recommended. To address water supply reliability for the SMWS, the system could be entirely served by the two PWS wells, or, as an alternative, water from the existing SMWS wells could be blended with water from the PWS to address water quality issues.

Alternative 1A: Sunny Mesa Well No. 1 and Well No. 2 would be destroyed, and the well site vacated. All supplies for the SMWS would be provided from the PWS from Pajaro Well No. 1 and Pajaro Well No. 2. The transmission pipeline from the Transmission Booster Pump Station would discharge directly to the SMWS, connecting at the intersection of Salinas Road and Fruitland Avenue.

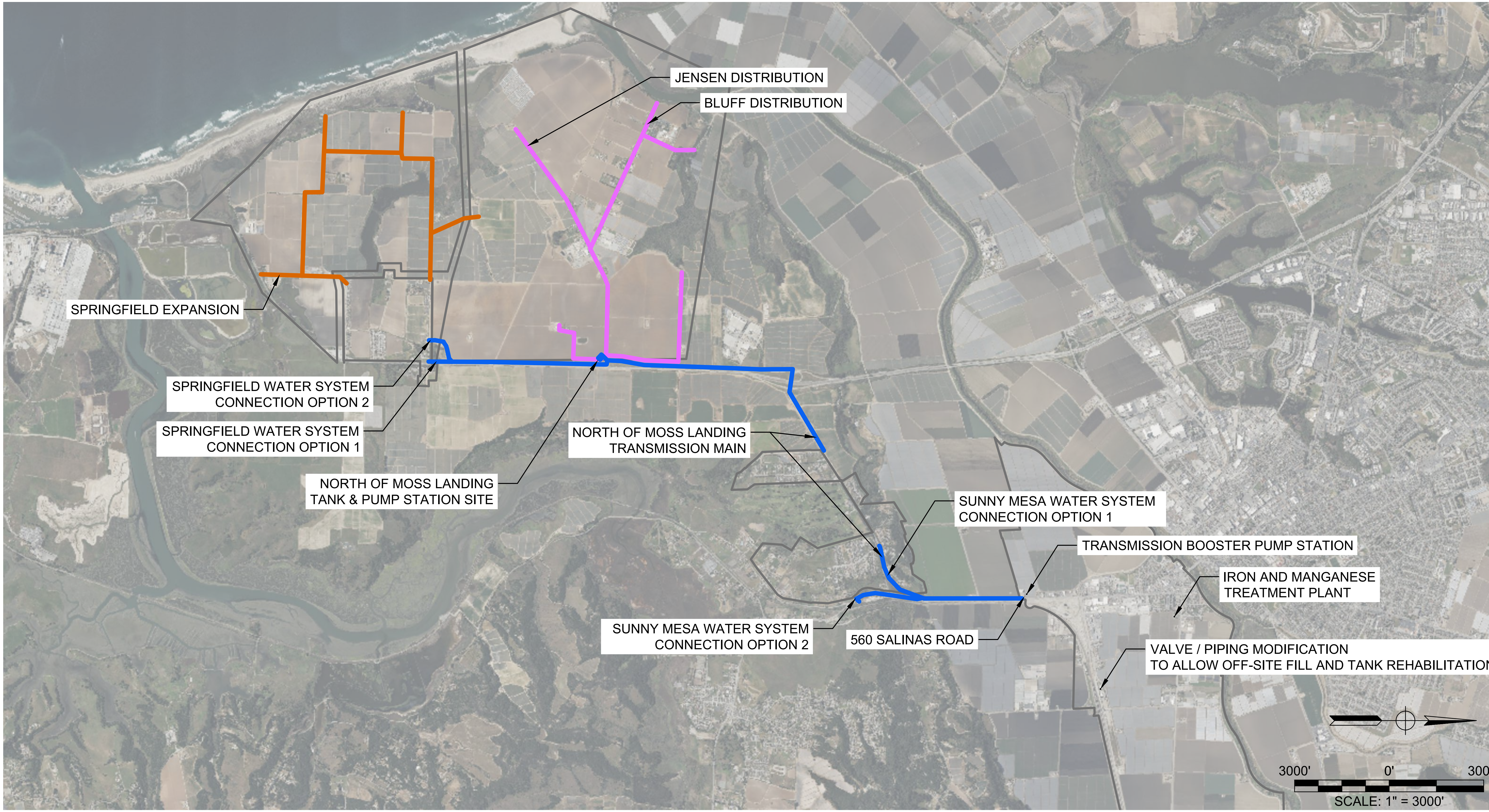
Alternative 1B: Sunny Mesa Well No. 1 and Well No. 2 would be kept in service. The transmission pipeline from the Transmission Booster Pump Station would discharge to the SMWS well site on Hall Road, where water would be blended with the water produced from Sunny Mesa Well No. 1 and Sunny Mesa Well No. 2 to achieve a blended water with chrome-6 concentrations below the pending MCL, but above the proposed public health goal for chrome 6 of 0.02 µg/L

With limited available alignments for pipelines due to the rural nature of the study area, there are limited alternatives associated with pipeline alignments. One alternative pipeline alignment has been identified near the connection point to the SWS, north of Springfield Road.

Alternative 2A: Includes a pipeline alignment parallel with Highway One to a connection point to the SWS at the intersection of Springfield Road and Highway One. This alignment traverses undisturbed vegetated land.

Alternative 2B: Includes a pipeline alignment which traverses through private property along an unnamed farm road to a connection point with the SWS approximately 700 feet west of the intersection of Springfield Road and Highway One.

Figure 5-1 shows the general proposed system configuration, as well as the two identified alternatives.



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ALTERNATIVES VICINITY

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 5-1

MARCH 2024

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In summary, the required infrastructure to achieve the proposed consolidation includes:

- Iron/Manganese Water Treatment Plant at Pajaro Well No. 1.
- Approximately 12 Miles of transmission and distribution pipelines including associated appurtenances such as valves, fire hydrants, blow off valves, air release valves, and water sampling stations.
- Service connections to 88 existing residences in the North of Moss Landing Area
- One Transmission Booster Pump Station.
- Water Storage Facility for the Bluff/Jensen Zone, with Chemical Dosing facilities and a booster pump station to maintain pressure in the Bluff/Jensen Zone.
- Modifications to the existing PWS including fill modifications to the PWS storage tanks and rehabilitation of one of the PWS 600,000-gallon storage tanks.
- Abandonment of Excess Infrastructure in the North of Moss Landing Area

5.5. Environmental Impacts

Denise Duffy and Associated (DDA) was retained to prepare an environmental constraints analysis of the Project and identified alternatives. The environmental constraints analysis is provided as Appendix D. Alignments for some pipelines in the NOML area and the preliminary site for the Bluff/Jensen Tank and Pump Station site were revised following preparation of the environmental constraints analysis; these revised locations are not anticipated to change the environmental impacts and recommendations.

DDA recommends preparation of an Initial Study and Mitigated Negative Declaration (IS/MND) for compliance with the California Environmental Quality Act (CEQA). If federal funds are anticipated to be utilized for the Project, cross cutter documents should be included in the analysis for compliance with the National Environmental Policy Act (NEPA). Various permits will also be required from multiple agencies to address potential impacts to sensitive plant and animal species, and a coastal development permit from the California Coastal Commission (CCC). A Cultural assessment identified potential impacts to known archaeological sites in the Project area. Work in areas in the areas of known cultural resources will require mitigation during construction to minimize impacts.

The results of the environmental constraints analysis do not alter the recommendations of this Report. Anticipated timelines and costs associated with environmental permitting for the project are included in the environmental constraints analysis.

5.6. Land Requirements

The Project will require acquisition of real property for temporary construction easements as well as permanent easements or ownership in several locations. Selection of the preferred alternatives is not anticipated to be significantly impacted by required land acquisition requirements. Alternative 1A/B does not alter Project land acquisition requirements. Alternative 2A/B requires a minor change to the alignment of one easement on a single private property parcel. A detailed discussion on required land acquisition is included in Section 6-8.

5.7. Construction and Site Conditions

This section discusses site considerations associated with the identified alternatives.

5.7.1. Alternative 1A/B - Sunny Mesa Water System Well Site

In early 2023, due to severe storm events, the SMWS well site was inundated with flood waters, resulting in loss of water service to the SMWS for an extended period. Following restoration of system service, no improvements to the site have been made, and the site is susceptible to future failure.

Alternative 1A would allow abandonment of existing facilities at the SMWS well site, and potential destruction of the existing wells, eliminating risks associated with chrome-6 at these sources. Following completion of the work, the site could remain the property of the District, or be sold. Alternative 1B would require the existing wells remain in service.

5.7.2. Alternative 2A/B – Pipe Alignment

The Alternative 2A alignment would traverse a relatively steep vegetated slope parallel to highway One. Construction of the pipeline would require vegetation removal and construction of an access road for pipe installation.

The Alternative 2B alignment would traverse private property along an unnamed farm road.

5.8. Cost Estimate

Relative to the overall scale and scope of the projects, the relative change in cost due to the selection of the identified alternatives is not anticipated to impact alternative selection.

5.9. Advantages and Disadvantages

This section discusses the advantages and disadvantages associated with the identified alternatives.

5.9.1. Alternative 1A/B - Sunny Mesa Water System Well Site

Destruction of the existing SMWS wells would be a loss of a source of supply for the consolidated system. Due to the potential flood inundation of the SMWS well site, continuing to rely on the site as a source of supply is a substantial risk to the long-term reliability of the regional consolidation. The casing of SMWS Well No. 1 has failed, and SMWS Well No. 2 is nearing the end of its expected useful life. In addition, both SMWS wells have a history of chrome-6 contamination. While blending the discharge from the SMWS wells with water from the PWS could reduce chrome-6 concentrations to below the proposed MCL of 10 parts per billion (ppb), concentrations would still be above the public health goal of 0.02 ppb, which would not alleviate health concerns or monitoring requirements; rising concentrations of chrome-6 in these wells could be an issue in the future. The District has expressed a preference for the SMWS wells to be eliminated from the system and is comfortable operating the consolidated system without these supplies. DDW has also expressed an interest in destruction of wells with known contamination issues.

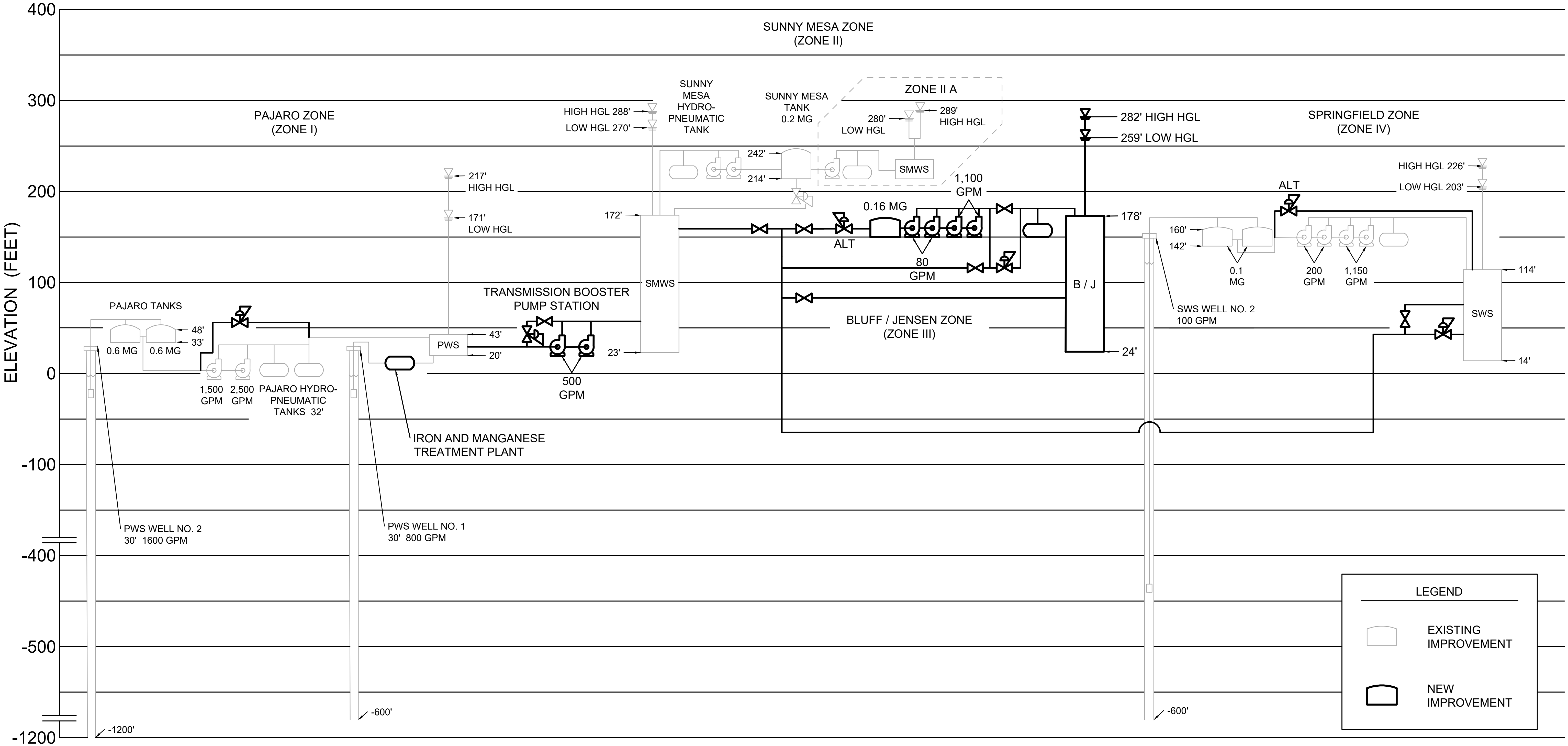
5.9.2. Alternative 2A/B – Pipe Alignment

Both alternative 2A and 2B appear to be viable. Alternative 2B is anticipated to have a slight advantage over Alternative 2A, as a result of reduced environmental impacts. Alternative 2A may be preferrable to the private property owner, as the alignment will be less impactful to the value and functionality of the property.

5.10. Alternative Selection

Alternative 1A is the selected alternative for supply for the SMWS. This alternative will result in reduced long-term operation and maintenance costs for the District, as well as reduced operational and public health risks.

For the purposes of this study, Alternative 2A is assumed to be preferred. This selection can be adjusted during future phases of the Project if needed based on identified environmental impacts and easement negotiation with the private property owner. The proposed hydraulic profile of the consolidated water system is provided as Figure 5-2.



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PROPOSED SYSTEM HYDRAULIC PROFILE

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 5-2

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Section 6. Selected Project

6.1. Description

This section provides a description of the selected project. As discussed in Section 5, a regional consolidation is the selected project.

6.1.1. Pressure Zones

Due to the need for partitioning the regional consolidation into pressure zones as detailed in Section 5.3.2, the Bluff/Jensen area will consist of its own pressure zone, and the Springfield Expansion shall be regarded as consolidated into the SWS as the SWS pressure zone. The PWS, SMWS, and SWS will also become separate pressure zones within the consolidated system. These zones, also identified as I, II, III and IV, are indicated in Figure 5-2.

6.1.2. Infrastructure Element Overview

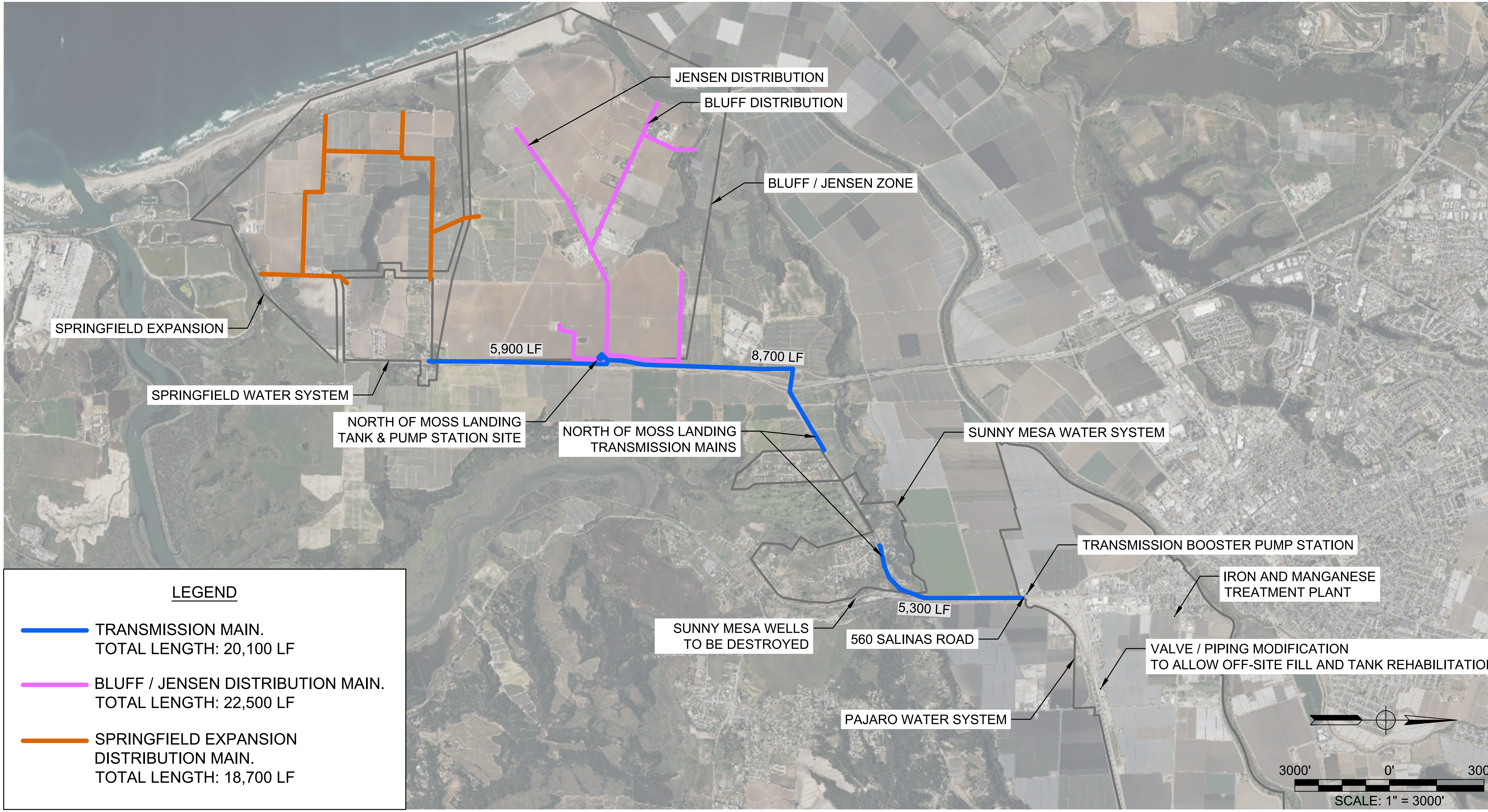
The regional consolidation will consist of the following infrastructure elements indicated in Figure 5-2 and Figure 6-1:

- Iron/Manganese Water Treatment Plant at Pajaro Well No. 1.
- Approximately 12 Miles of transmission and distribution pipelines including associated appurtenances such as valves, fire hydrants, blow off valves, air release valves, and water sampling stations.
- Service connections to 88 existing residences in the North of Moss Landing Area, plus in-line tees with capped and closed gate valves will allow for future connection of commercial properties.
- One Transmission Booster Pump Station.
- Water Storage Facility for the Bluff/Jensen Zone, with Chemical Dosing facilities and a booster pump station to maintain pressure in the Bluff/Jensen Zone.
- Modifications to the existing PWS including fill modifications to the PWS storage tanks and rehabilitation of one of the PWS 600,000-gallon storage tanks.
- Abandonment of Excess Infrastructure in the North of Moss Landing Area.
- Destruction of Existing Springfield Mobile Home Park Well
- Destruction of Existing Sunny Mesa Well No. 1 and No. 2.
- Replacement of water meters in the PWS and SMWS to radio read meters.

Detailed discussion on the design basis for these proposed facilities is provided in Section 6.8.

6.2. Schematic and Map of System's Proposed Facilities

As shown in Figure 6-1, regional consolidation will be achieved by construction of a new transmission booster pump station and associated transmission main to connect the PWS and the SMWS in the north.



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PROPOSED CONSOLIDATION VICINITY

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 6-1

MARCH 2024

Additional transmission mains will interconnect the SMWS with the Bluff/Jensen area and SWS in the south. These transmission pipelines will provide water to a new water storage and pumping facility in the Bluff/Jensen Zone and convey water to the SWS. A new distribution network in the Bluff/Jensen Zone, and an expansion of the SWS distribution system will provide service to the NOML area.

An iron and manganese treatment plant at the District's Pajaro Well No. 1 site will be constructed. The treatment plant will consist of electrical upgrades, a pressure filter treatment vessel, piping, valves and appurtenances, and other improvements to form a secure municipal site. Hardening existing facilities and installing new elevated facilities will occur to protect against loss of service due to flooding. The District is actively working to address risks associated with flooding of existing facilities by replacing damaged equipment at higher elevations.

6.3. Justification

As discussed in Section 4, the regional consolidation provides substantial benefits for the four areas considered in this study. Although the capital cost to develop and implement the proposed project is high, regional consolidation provides many clear benefits over other considered alternatives and is the recommended solution to enhance regional water quality, reliability, and sustainability.

6.4. Operations and Maintenance Challenges

Implementation of the proposed improvements for the regional consolidation are not anticipated to incur any significant operational challenges for the District. The regional consolidation will eliminate the need to continue operation of the SMWS well site and will enhance overall system operation reliability and flexibility. The District will need to operate new facilities including an iron and manganese treatment plant as well as the Bluff/Jensen water storage facility and pump station. An increase in operational efforts will also result from additional required meter reading and billing associated with new customers. The new distribution system is expected to be classified as a D2 system, which is the same as the existing PWS distribution system.

The addition of an iron and manganese treatment plant for the existing Pajaro Water System treatment plant will not likely change the treatment classification of the system. The existing system is classified as a T1 system and is expected to remain at this level following the addition. The District's existing T1 certified class operators will likely not require additional certification to maintain the new treatment system.

To minimize the operational impacts of the regional consolidation, new facilities will be designed to match the operation of other District facilities. New customer meters will be equipped with radio read meters to minimize the effort associated with reading meters. To offset the added operation and maintenance activities of the added service areas, all existing meters in the PWS and SMWS will be retrofit with radio read meters.

Implementation of the proposed improvements for the regional consolidation are not anticipated to result in substantial maintenance challenges for the District. The constructed facilities will be designed in accordance with current standards for reliability. Maintenance of the SMWS wells will no longer be required. The proposed improvements will also upgrade the condition of the PWS storage facility, further reducing maintenance requirements. To minimize maintenance requirements for the iron and manganese treatment plant as well as the Bluff/Jensen water storage facility, improvements should be designed for exposure to a marine environment to minimize corrosion.

6.5. Local Planning

The proposed improvements are within unincorporated areas of the County, as well as within the Jurisdiction of the CCC. The County administers the requirements of the CCC through the County's Local Coastal Program for projects not requiring full CCC approval. The 2010 Monterey County General Plan (General Plan) was reviewed to determine if the Project is consistent with local planning requirements.

The General Plan establishes that the Project area falls within the North County Land Use Plan. As noted in Section NC-5.2, water development projects that can offer a viable water supply to water deficient areas in North County shall be a high priority. The intent of the Project is to serve existing residences within the study area. The Project is not intended to serve new development. Any future development is subject to approval of the County.

The proposed project is believed to be consistent with the goals of County planning.

6.6. Green/Resilience Evaluation

The project elements included in the regional consolidation are intended to provide the greatest operational reliability and sustainability for the community. The regional consolidation provides greater resiliency for the community against the threat of climate change and other threats as discussed in Section 9. Costs associated with the proposed improvements are discussed in Section 7.

6.7. Consolidation Structure

The consolidated water system will be owned and operated by the District. The District will continue to operate as a special district. The PWS, SMWS, and SWS will cease to exist, and a new public water system will be formed, with each of the service areas being designated as separate pressure zones within the new water system.

Supplemental information forms for each of the consolidating public water systems (systems with 15 or more connections) are included in Appendix E.

6.8. Technical Aspects

This section includes technical information related to each of the required infrastructure elements required to achieve the regional consolidation.

Complete plans and specifications will be required for construction of the proposed Project; these documents have not yet been developed. The contract documents will be suitable for public bid.

6.8.1. Demand and Source Capacity Analysis

The demand and capacity analysis performed for preparation of the design package is included in this section.

6.8.1.1. Consolidated System Demand

The consolidated water system is expected to have a total of 981 connections, with the potential for future consolidations or buildouts to bring this total over 1,000.

Development of system demands are discussed in Section 2.5. Because of the potential for a future consolidation of HLR with the SMWS, the SMWS demands are re-calculated here in Table 6-1.

Table 6-1: Demand Calculations for Expanded SMWS

Area	MDD (GPD)	PHD (GPD)
SMWS	250,000	375,000
HLR	67,700	101,000
Expanded SMWS	**317,700**	**476,000**

"Expanded SMWS” is hereinafter referred to as “SMWS.”

Because the Springfield Expansion would be consolidated with the SWS, the SWS demands are re-calculated here in Table 6-2.

Table 6-2: Demand Calculations for Expanded SWS

Area	MDD (GPD)	PHD (GPD)
SWS	116,800	175,200
Springfield Expansion	13,700	20,500
Expanded SWS	**130,500**	**195,700**

"Expanded SWS" is hereinafter referred to as "SWS."

The total demands of the proposed Regional Consolidation compared with its water sources are provided in Table 6-3. MDDs are multiplied by 1.5 to estimate peak hour demands (PHD).

Table 6-3: Regional Consolidation Demand Calculations

Zone	Name	MDD (GPD)	MDD (gpm)	PHD (GPD)	PHD (gpm)
I	PWS	500,000	347	750,000	521
II	SMWS	317,700	220	476,000	331
III	Bluff-Jensen	62,500	43	93,700	65
IV	SWS	130,500	91	195,700	136
	Totals (rounded)	**1,010,700**	**701**	**1,515,400**	**1,053**

6.8.1.2. Source Capacity

Following implementation of the proposed improvements, the system will include three sources of supply including PWS Wells No. 1 and No. 2, as well as SWS Well No. 2.

As shown in Table 6-4, the system will include sufficient redundancy and capacity to serve peak demands of the consolidated system with a substantial factor of safety.

Table 6-4: Regional Consolidation Demands vs. Sources

Zone	Name	MDD (gpm)	PHD (gpm)	Well System Name	Well System Capacity (gpm)
I	PWS	347	521	No. 1	800
				No. 2	1,600
II	SMWS	220	331		
III	Bluff/Jensen	43	65		
IV	SWS	91	136	SW-2	100
	Totals	**701**	**1,053**		**2,500**

The proposed system is anticipated to meet the maximum day demand with its highest-capacity source (PWS Well No. 2) offline, per CCR Title 22, § 64554.

Transmission main booster pumps and Bluff/Jensen service pumps will be sized to ensure sufficient conveyance of water throughout the Regional Consolidation as indicated in Table 6-4.

6.8.2. Iron and Manganese Treatment System

The Pajaro Well No. 1 was constructed in 1982. The well was drilled to a depth of 160 feet below ground surface, with screened interval from 122 to 172 feet. The well includes a 50-foot sanitary seal and is believed to be a suitable source of supply for the system once treatment is provided. An inspection of the existing well was performed on November 3, 2023. The Well inspection report is provided as Appendix F and documents substantial plugging of the perforations in the well casing. A rehabilitation effort on the existing well should be included in the project to improve well production.

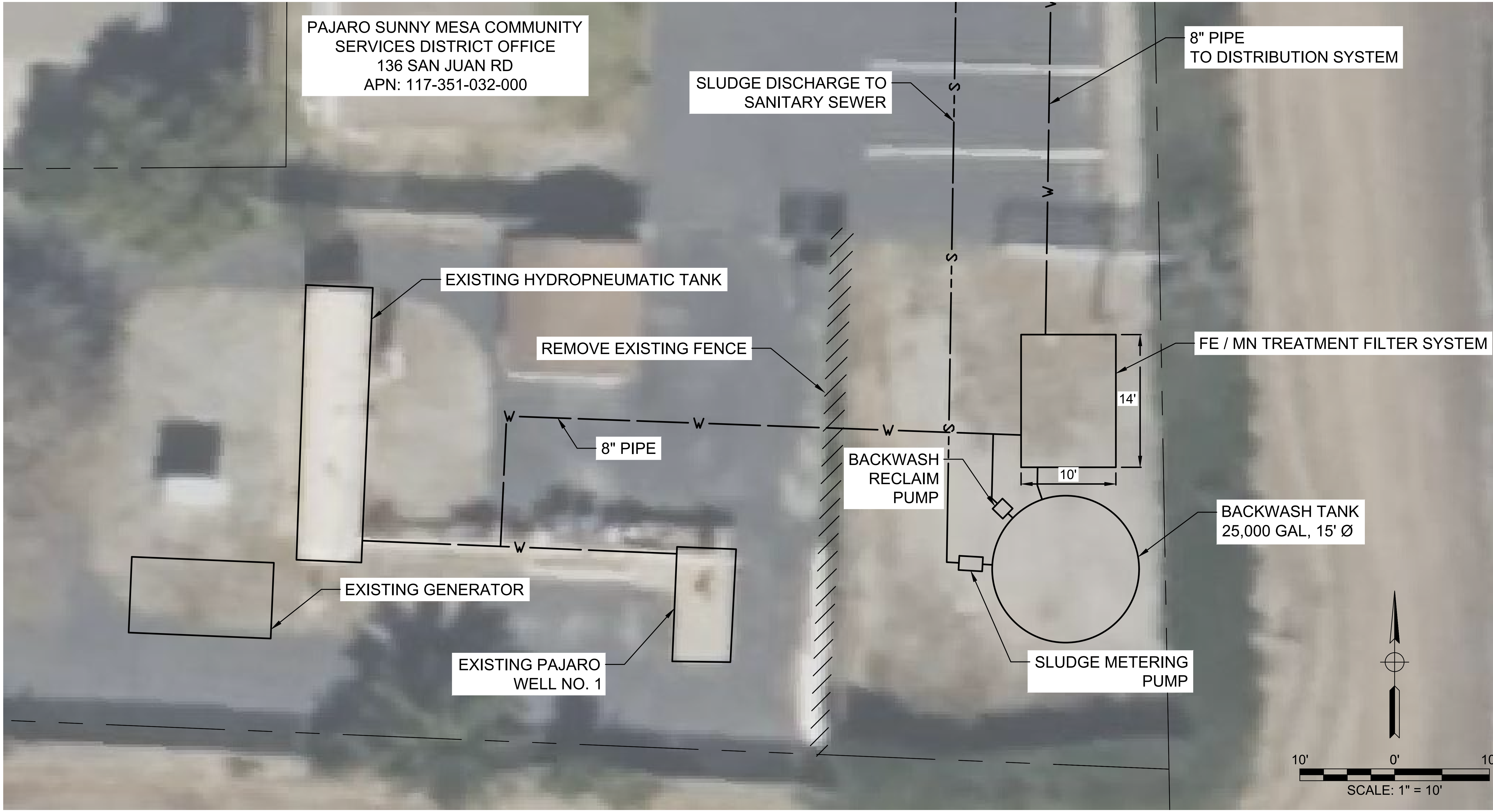
To address the excessive iron and manganese concentrations in the water produced by PWS Well No. 1, an iron and manganese treatment system will provide an additional source of supply for the PWS compliant with drinking water quality requirements. The Treatment System will be located at the PWS Well No. 1 site, east of the PWS Well No. 1. A preliminary layout of the system is shown in Figure 6-2.

The Treatment System consists of a pressure filter containing a combination of anthracite and greensand filtration media. Iron and manganese will be oxidized catalytically by the manganese oxide coating on the greensand in the presence of a chlorine oxidant, filtered by the anthracite and greensand, and backwashed to waste. A likely candidate system is a compact, package system consisting of a horizontal, 3-cell pressure vessel; filtration media; face piping and motorized valves; chemical feed equipment; instrumentation; and a PLC-based control panel. The advantage of three filtration cells in one vessel is that product water from two cells will backwash the third cell so no external backwash supply reservoir is required, allowing the system to fit within the existing site. An external recycle pump will transfer sludge tank supernatant to the treatment system. An external backwash tank will collect backwash water in which waste solids will settle. A sludge pump will evacuate settled solids from the backwash tank periodically to the sanitary sewer. Preliminary calculations indicate chlorine requirements to be approximately 17.5 gallons per day (12.5% Sodium hypochlorite). Budgetary quotes from candidate vendors estimate system backwash waste volumes of 17,300 gallons per day.

6.8.3. PWS Tank Rehabilitation and Piping Modifications

The existing 600,000-gallon welded steel water storage tank was constructed in the 1980s. An inspection of the existing storage tank was conducted in 2019 by Inland Potable Services, Inc. The inspection report documents the condition of the existing tank. The results of this inspection indicate the existing tank has been adversely impacted by corrosion. While in overall good condition, significant deficiencies were noted. The tank vents and hatches are corroded and there is corrosion on the interior and exterior of the tank, especially along the roof beams and the dollar plate where the roof beams are connected to the center support column. Rehabilitation of this tank is included in the Project so it can remain in service for an extended period of time. The entire interior and exterior of the tank will be sandblasted and recoated, structural steel repaired, and the degraded appurtenances repaired or replaced. A new #24 mesh screen will be installed at the opening of the overflow, and the float cables and guidelines will be reattached or replaced.

Additionally, at this site, modifications are required to allow filling of the existing storage tanks from an off-site source, primarily the PWS Well No. 1. A connection is necessary from the distribution system to a new tee on the tank inlet for the existing 600,000-gallon bolted steel tank. A combination altitude and back pressure sustaining valve, such as a Cla-Val 210-09, would be provided on the inlet tee to allow water into the PWS storage tanks and maintain system pressure without over-filling the PWS tanks. A remote actuated gate valve would be provided, which would only allow flow from the distribution system into the PWS storage tank when opened. Operation of this valve would be tied to operation of PWS Well No. 1.



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PAJARO WELL #1 SITE GENERAL ARRANGEMENT

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 6-2

MARCH 2024

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6.8.4. Pipelines

Various pipelines are required to achieve the regional consolidation as shown in Figure 6-1. Hydraulic modeling was completed for each transmission pipeline to determine pipe sizing. New distribution system piping will include valves, fire hydrants, air release valves, blow-offs, sampling stations, and other appurtenances as appropriate. Distribution pipes are assumed to be a minimum of 6” diameter where service to fire hydrants is provided. Additional hydraulic modeling during detailed design is required to confirm distribution pipe sizing. All pipelines installed as part of the project are anticipated to be installed by open trench construction methods except as specifically noted, with an anticipated trench width of 24 to 30 inches and minimum depth of cover of 36-inches in public rights of way and private roadways. Greater bury depths may be required in easements in agricultural areas to protect the pipe from damage.

A summary of the pipelines required is provided in Table 6-5.

Table 6-5: Summary of Pipelines Required

Pipeline	Length of Pipe (LF)		
	10" PVC	6" or 8” PVC	6" HDPE
Transmission Booster Pump Station Supply Pipeline	200	-	-
PWS to SMWS Transmission Main	5,300	-	-
SMWS to NOML/Bluff/Jensen Split Transmission Main	-	8,700	-
Springfield Transmission Main	-	5,900	-
NOML Distribution System Piping	-	22,500	-
SWS Distribution System Expansion Piping	-	17,100	1,600
Totals	**5,500**	**54,200**	**1,600**

A description of each pipeline segment is provided in the following sections.

6.8.4.1. Transmission Booster Pump Station Supply Pipeline

To convey water from the existing PWS to the Transmission Booster Pump Station, a 10-inch pipeline will connect to the existing termination of the PWS at 560 Salinas Road. The Transmission Booster Pump Station Supply Pipeline will run south in the paved ROW of Salinas Road for approximately 150 feet, then turn westward to enter the northeast corner of the of the property adjacent to, and immediately south of, the aforementioned property, currently an agricultural field. This northeast corner would serve as the site of a new Transmission Booster Pump Station. This site could be alternatively located along Salinas Road to the south.

6.8.4.2. PWS to SMWS Transmission Main

To convey water from the Transmission Booster Pump Station to the PWS, the Transmission Main would exit from the Transmission Booster Station and resume its southerly travel in the ROW of Salinas Road, approximately 2,940 feet to the fork between Salinas Road and Elkhorn Road. It would follow the curve of Salinas Road first southerly then west-southwesterly where it would tie in the existing SMWS distribution piping at Fruitland Avenue.

6.8.4.3. SMWS to NOML/Bluff/Jensen Split Transmission Main

To convey water from SMWS to the NOML Pump Station and Tank site, approximately 2,600 feet southwest of the intersection of Fruitland Avenue and Salinas Road at the intersection of Bay Farms

Road and Salinas Road, the Transmission Main will tie into SMWS distribution piping and resume its westerly travel within the southern shoulder of the road ROW of Salinas Road to the tee formed by Salinas Road at Hilltop Road. Immediately before this tee, the Transmission Main will traverse approximately 820 feet of Caltrans ROW in California State Highway 1 (also known as Cabrillo Highway) including Highway 1 running north-south and its on and off ramps to Salinas Road. This crossing will be installed within an existing utility opening within the bridge over Highway 1. The existing bridge has two utility openings, one designated as existing, the other designated as existing for future utilities with dimensions of 24 inches wide by 18 inches high.

The Transmission Main will then turn to run southerly in the paved ROW or unpaved shoulder of Hilltop Road approximately 5,830 feet to where Hilltop Road terminates at a tee with Jensen Road. Here, the Transmission Main will enter the Bluff/Jensen Tank and Pump Station Site, while a branch will continue south to the SWS.

6.8.4.4. Springfield Transmission Main

The southerly branch of the Transmission Main, hereafter called the Springfield Transmission Main, would follow southerly along an unnamed farm road that runs parallel to and 40 feet to the west of Highway 1, approximately 5,070 feet to the residential property of Adam Ramirez in the northwest corner of the intersection Springfield Road and Highway 1.

At the connection to the SWS distribution system, installation of a manual flushing point is required to allow aged water to be purged prior to discharge into the SWS. It is anticipated that the Springfield Transmission Main will be operated as a back-up supply. If the Springfield Transmission Main is used as a primary source of supply, additional automatic controls should be provided to allow for fill/draw cycles of the Springfield storage tanks.

6.8.4.5. NOML Distribution System Piping

From the Bluff/Jensen Tank and Pump Station Site, distribution piping will branch in four general directions as depicted in Figure 6-1 to convey water to residences.

Dead ends within NOML distribution system piping will need to be flushed on a regular schedule to maintain water quality.

6.8.4.6. Existing NOML Infrastructure

Existing water system infrastructure in the NOML area will be abandoned or will continue to provide non-potable supplies, as the existing private and state small water systems are small and unsuitable for a consolidated municipal potable water system. At the discretion of their owners, private wells could remain as non-potable sources of supply. Any property with a non-potable well onsite would require installation of a backflow prevention device on the potable service lateral per the upcoming SWRCB Cross-Connection Control Policy Handbook. Any well to be destroyed would require a Well Destruction Permit from the County. Construction management will be by the District.

6.8.4.7. SWS Distribution System Expansion Piping

The expansion to the Springfield Water System will tie into the west end of the Springfield Distribution System at Springfield Road in the north and at Struve Road in the south as depicted in Figure 6-1. Pipelines will be constructed within Struve Road, Giberson Road, and unnamed farm roads. A trenchless crossing under McClusky Slough using 6-inch HDPE pipe installed by horizontal directional drilling construction will be required.

Dead ends within SWS distribution system piping will need to be flushed on a regular schedule to maintain water quality.

6.8.4.8. Service Connections and Future Commercial Connections

In addition to the water transmission and distribution mains, private water service laterals would be installed from the distribution mains to the individual residential connections in Bluff/Jensen and Springfield Expansion.

Connection points, consisting of an in-line tee with a capped gate valve, would be included in the Project to provide a point of future connection for commercial properties.

6.8.5. Transmission Booster Pump

Per Figure 5-2 "Proposed System Hydraulic Profile," the purpose of the Transmission Booster Pump Station would be to convey water from PWS (Zone I) to SMWS (Zone II), and Bluff/Jensen (Zone III) and SWS (Zone IV) via Zone II at a head sufficient for entry into Zone II. From Table 6-4, the sum PHD of Zones II, III and IV is 532 gpm. A design flow for the pump station is 700 gpm apiece in a duty-standby (installed spare) configuration. The recommended pump type is a vertical multi-stage pump for optimum efficiency. Accounting for hydraulic grade line (HGL) differentials between Zones I and II, and major and minor losses through approximately 10,600 feet of pipe between these zones, the duty point for the booster pumps is 172 ft TDH at 700 gpm. The booster pump motors are 40 hp each.

The Transmission Booster Station would consist of a packaged and enclosed duplex pump station; back-up generator; and other improvements to form a secure municipal site. An area of approximately 700 square feet is anticipated to be required for this Booster Station as shown in Figure 6-3.

6.8.6. Bluff/Jensen Tank and Pump Station

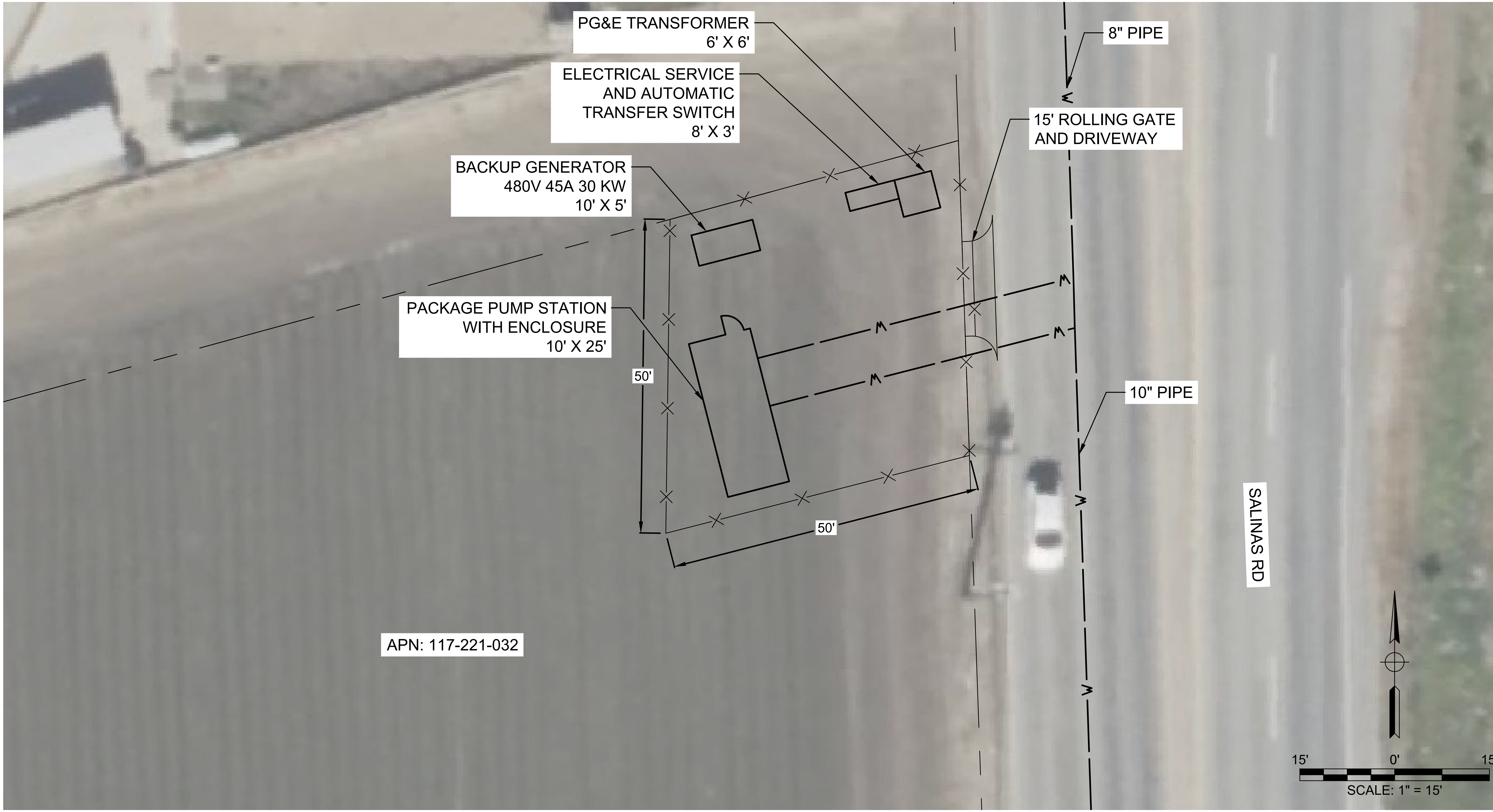
Per Figure 5-2 "Proposed System Hydraulic Profile," the purpose of the Bluff/Jensen Tank and Pump Station is to 1) convey service water from the Transmission Main into Bluff/Jensen (Zone III) at zone operating pressure, and 2) provide fire flow to the zone. The pump station should also have the ability to transfer water from the Bluff/Jensen tank to the SMWS (Zone II).

The location of the Bluff/Jensen Tank and Pump Station is not fixed and may be adjusted to another location along the transmission main pipeline alignment, depending on environmental constraints and where property may be acquired. The tank and pump station site is anticipated to consist of a potable water storage tank, pumps, hydropneumatic pressure tank, back-up generator, tank mixing and chlorine residual control system, and other improvements to form a secure municipal site as shown in Figure 6-4 below. A small building would house chemical feed equipment and electrical and controls equipment. An area of approximately 15,000 square feet is anticipated to be required for the site.

Bolted steel is the recommended material for construction for the storage tank. This material was selected due to its resiliency, the minimization of risk associated with field applied coatings, and the cost of construction. The storage tank feeds both the service pumps and the fire pumps.

The PHD of the Bluff/Jensen Zone (Zone III) is 65 gpm. Design flow for the candidate service pumps is 80 gpm apiece, 5 hp, in a duty-standby (installed spare) configuration, allowing a 23% flow safety margin. Pump type would be canned vertical turbine, for optimum efficiency, utilizing static surcharge from the upstream storage tank. The high flow pumps would be nominally 1,100 gpm apiece, 60 hp, in a duty-standby (installed spare) configuration.

In parallel with the pumps would be a hydropneumatic tank, approximately 4,000 gallons, that would serve for flow equalization to minimize pumps cycling.



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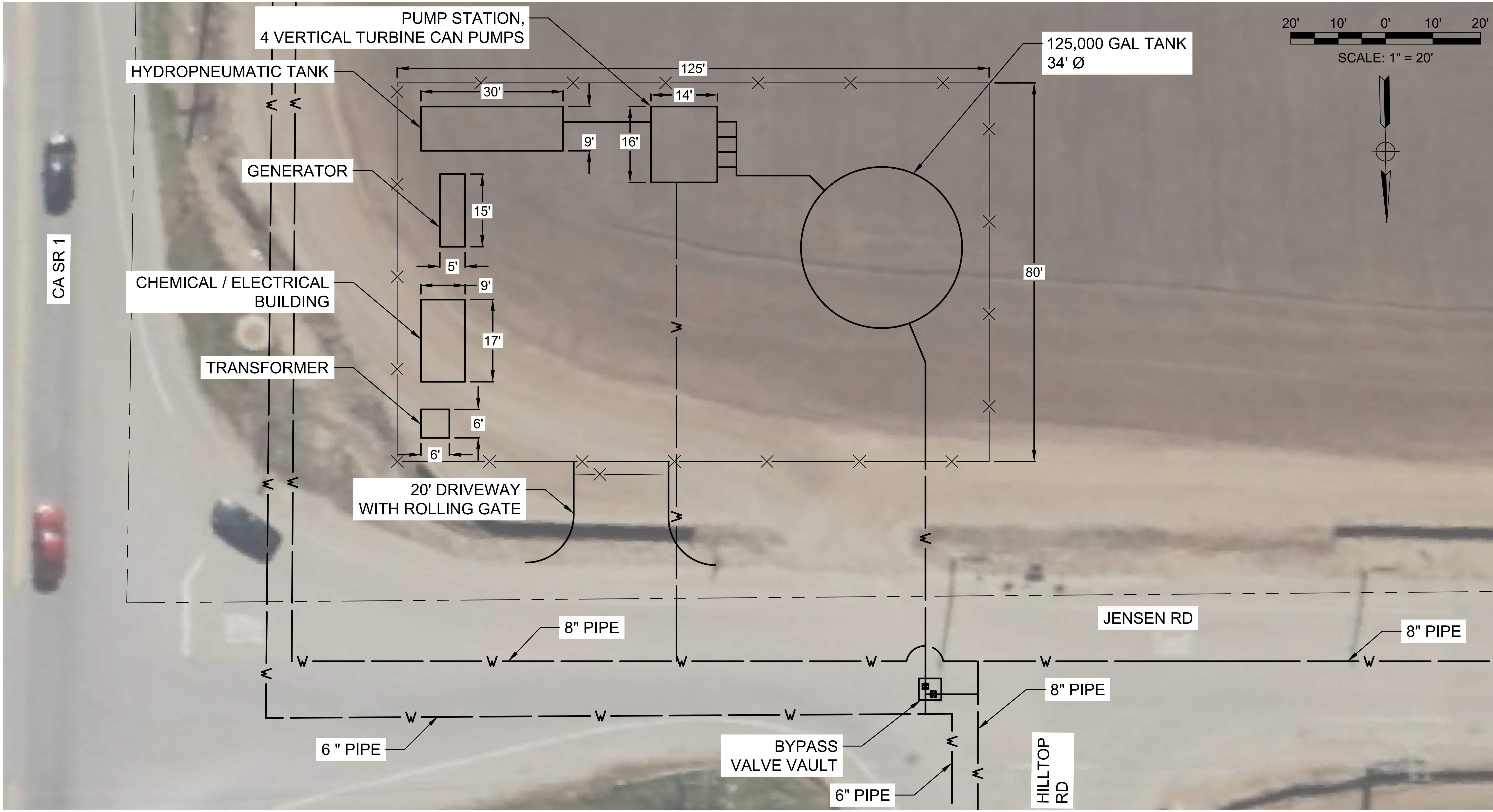
TRANSMISSION BOOSTER PUMP STATION GENERAL ARRANGEMENT

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 6-3

MARCH 2024



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BLUFF / JENSEN PUMP STATION
GENERAL ARRANGEMENT

PAJARO - SUNNY MESA - SPRINGFIELD AREA REGIONAL CONSOLIDATION

FIGURE 6-4

MARCH 2024

6.8.6.1. Water Storage Volume

For calculation of the Bluff/Jensen storage tank volume, it is assumed that the District would require a two-hour supply be provided as applied to the SWS. In accordance with the 2022 California Fire Code Appendix B, a minimum fire flow rate of 1,000 GPM for a period of one hour is required for one- and two-family residential dwellings, not equipped with automatic sprinkler systems, with a building area of up to 3,600 square feet.

Determining the volume of water storage is a balance between multiple factors. Industry standards and fire protection requirements dictate the minimum water storage volume required for a potable water system. The minimum storage required is determined by the following equation:

$$SSR = NFF + MDD - PC$$

Where:

SSR	=	Storage Supply Required (gallons)
NFF	=	Needed Fire Flow (120,000 gallons)
MDD	=	Maximum Daily Demand (62,000 gallons)
PC	=	Production Capacity (conveyance capacity from SMWS (Zone II) to Bluff/Jensen Tank, calculated to be 300 GPM x 2 hours = 36,000 gallons)

Based on this calculation, the minimum SSR is 146,000 gallons, and the recommended Bluff/Jensen storage tank size would be 150,000 gallons.

As water resides in a storage tank, chlorine residuals decay. If chlorine residuals drop sufficiently, water quality issues can develop. It is the District's goal to maintain a minimum of 3 days' average daily demand in storage for the Bluff/Jensen zone.

6.8.6.2. Stored Water Quality

Based on the anticipated ADD for the Bluff/Jensen zone of 27,500gallons per day, the residence time in a tank with a capacity of 150,000 gallons would be approximately 5.5 days, which could increase significantly during periods of lower demand. This exceeds the District's target of three days of storage capacity.

Due to the extended residence time for the Bluff/Jensen tank, there is a significant risk of stratification and loss of chlorine residual. To avoid water quality issues, a permanent active storage mixing and sodium hypochlorite dosing system will be included in the design of the facility to actively monitor and maintain the chlorine residual in the tank. An integral tank mixing, monitoring, and chemical dosing system, such as the Tank Shark, manufactured by PSI Water Technologies, is recommended for this application.

6.8.7. Springfield Mobile Home Park Well Destruction

The Springfield MHP well, which would remain as a backup water supply for the SWS as part of the SWS project (Section 2.4.3), will be destroyed as part of the PSMS Consolidation Project. The well will be destroyed in accordance with the California Department of Water Resources (DWR) Bulletin No. 74-81 and No. 74-90, and County Public Health Department requirements by a California State C-57 licensed contractor.

6.8.8. Sunny Mesa Well Destruction

Sunny Mesa Well No. 1 and Well No. 2 will be destroyed as part of the Project. The existing SMWS wells will be destroyed in accordance with the California Department of Water Resources (DWR) Bulletin No. 74-81 and No. 74-90, and County Public Health Department requirements by a California State C-57 licensed contractor.

Other existing above grade infrastructure at the Sunny Mesa well site will be demolished and removed. Below ground piping will be removed or abandoned in place.

6.8.9. Water Meter Replacement

Existing water meters in the PWS and SMWS will be replaced with radio read meters with the goal of reducing District operations workload, accommodating operational effort associated with new customers and infrastructure resulting from the regional consolidation. The PWS has approximately 463 active connections and the SMWS has approximately 268 active connections. A total of 731 meters will be replaced.

6.8.10. System Controls and SCADA

When complete, each site will be included in the Project included in the Project will be independently functional. The Transmission Booster Pump Station and the Bluff/Jensen Booster Pump Station and Tank site will each be controlled with a local Programmable Logic Controller (PLC). Other facilities will rely on existing controls.

At a minimum, new communication capabilities will be required between the SWMS (Zone II) tank site and the Transmission Booster Pump Station, as well as between the PWS (Zone I) tank site and PWS No. 1 for system operation. This communication could be by radio, cellular communication, or internet.

The District does not currently have a Supervisory Control and Data Acquisition (SCADA) system and has requested that one be included in the design for the Project, including a centralized base station computer, communications equipment, alarms, and other provisions. The system will include cloud-based remote access to the system. Additional retrofits to the Springfield Water System and Sunny Mesa Tank Site will be required to integrate these components into the SCADA system. The design of the SCADA system will be incorporated into the detailed design of the Project.

6.8.11. Operational Flexibility

The proposed improvements have been established to maximize operational flexibility to move water through the system and between pressure zones. Valving and controls are included to provide the ability to move water between all four pressure zones.

Water is transferred from the Zone I to the Zone II by the Transmission Booster Pump Station. A bypass line around the Transmission Booster Pump Station equipped with an isolation valve and pressure reducing valve will allow Zone II to maintain service pressure in Zone I while supplies are available.

Water is transferred from the Zone II to the Bluff/Jensen storage tank by gravity. Under normal operating conditions, the Bluff/Jensen Booster Pump Station will maintain pressure in the Zone III. If the Bluff/Jensen Booster Pump Station is out of service, the pump station and tank can be bypassed, and pressure in Zone III maintained directly from the Zone II; however, this operational approach cannot provide fire flows.

Water can be transferred from the Bluff/Jensen storage tank to Zone II and Zone IV by the Bluff/Jensen Booster Pump Station.

Water is transferred from the Zone II to the Zone IV by gravity, through a pressure reducing valve. Water from the Zone IV can be transferred to the Bluff/Jensen storage tank, through a control valve. Water from the Zone IV can be transferred to the Zone II via the Bluff/Jensen Tank and Bluff/Jensen Booster Pump Station.

6.9. Land Acquisition

This section discusses the ROW requirements for the Project. The Project includes acquisition of permanent easements and/or real property acquisition in several areas. Additional temporary access easements may be required for construction of the proposed Project including staging areas for storage of equipment and materials during construction. Parcel maps of the areas with approximate proposed easement location shown are included in Appendix G.

6.9.1. Transmission Booster Pump Station Site

Easement or real property acquisition is required for the transmission booster pump station. The transmission booster pump station has preliminarily been sited on parcel 117-221-035. A site with dimensions of 50-feet by 50-feet is suitable for the proposed facilities, and could alternatively be sited on parcel 117-211-001, or 117-211-001.

6.9.2. Bluff/Jensen Tank and Pump Station Site

Easement or real property acquisition is required for the Bluff/Jensen Tank and Pump Station site. This has preliminarily been sited on parcel 117-022-002. If another site nearby would be easier to acquire, the site could be relocated, such as on parcel 117-021-010. A site with dimensions of 80-feet by 125-feet is suitable for the proposed facilities.

6.9.3. Pipeline Easements

A variety of pipeline easements will be required for the proposed transmission and distribution pipelines.

In the Bluff/Jensen Zone, easements for distribution pipelines will be required. The preliminary alignments included in this report would require easements on parcels 117-021-008, 117-021-013, 117-022-002.

For the transmission main between Bluff/Jensen Zone and the SWS, easements will be required on parcels 117-022-002, 412-023-011, and 412-023-012.

For the SWS Distribution System Expansion, easements will be required on parcels 412-32-013 and 412-032-014.

The need for additional easements may arise during detailed design for proposed pipelines.

6.10. Estimated Useful Life

Projected useful life of assets included in the proposed project are based on “Depreciation Procedures for Small Water and Sewer System Utilities,” published by the California Public Utilities Commission, July 2000, and “PVC Pipe Longevity Report” published by Utah State University, May 2014. The anticipated useful lives of these assets are provided in Table 6-6.

Table 6-6: Estimated Useful Life of Proposed Project Infrastructure

Project Element	Estimated Useful Life (Years)
PWS Well No. 1 Fe-Mn Treatment System	30
Transmission and Distribution Pipelines	100
Transmission Booster Pump Station	25
Concrete Building	50
Bluff/Jensen Pump Station	25
Bluff/Jensen Storage Tank	50
Services	50
Meters	20
Hydrants	50

Section 7. Capital and Annual Maintenance Costs

This section discusses the costs associated with construction of the proposed improvements.

7.1. Construction Cost Opinion

Preliminary construction cost opinions have been developed for each Project element and are shown in Table 7-1. Detailed calculations of capital and annual maintenance costs are included in Appendix H. The Project is anticipated to be at least partially funded from federal sources, requiring compliance with federal funding requirements, including Buy American requirements for steel products.

Table 7-1: Future Phases Construction Cost Estimate Summary

Project Element	Estimated Construction Cost
PWS Well No. 1 Fe-Mn Treatment System	$2,000,000
PWS Tank Rehabilitation and Piping Modification	$1,390,000
Transmission/Conveyance Pipeline	$29,350,000
Transmission Booster Pump Station	$1,180,000
Bluff-Jensen Pump Station	$3,370,000
Bluff-Jensen Service Connections	$2,520,000
Springfield Service Connections	$820,000
Springfield MHP Well Destruction	$400,000
Sunny Mesa Wells Destruction	$720,000
PWS and SMWS Meter Replacements	$750,000
Totals	**$42,500,000**

7.2. Total Implementation Costs

An estimate of total Project costs has been developed. In addition to construction costs, various additional expenses anticipated to be incurred for implementation have been estimated based on an assumed percentage of construction costs. The estimated total project costs are summarized in Table 7-2. District administration includes legal review, project management, permitting fees, public outreach, etc.

Table 7-2: Estimated Total Project Costs

Project Element	Estimated Percentage of Construction Costs	Estimated Cost
Construction Costs	-	$42,500,000
Construction Survey	1%	$425,000
Utility Relocation	1%	$425,000
Engineering Design	10%	$4,250,000

Project Element	Estimated Percentage of Construction Costs	Estimated Cost
Design Survey	1%	$425,000
Geotechnical Engineering	1%	$425,000
Construction Management and Inspection	12%	$5,100,000
Environmental Compliance and Project Permitting	3%	$1,275,000
Right-of-Way Engineering	1%	$425,000
Right-of-Way Acquisition	1%	$425,000
District Administration	2%	$850,000
Total		**$56,525,000**

Costs have been developed based on a timeline with the midpoint of construction occurring 36 months from completion of this Report with an assumed annual inflation rate of 4%.

7.3. Operation and Maintenance Costs

Detailed calculations of capital and annual maintenance costs for are included in Appendix H. These are summarized in Table 7-3.

Table 7-3: Annual Operation and Maintenance Costs

Project Element	Description	Cost ($/mo)	Cost ($/yr)
Pajaro Well #1 Treatment	Chemical	$6,042	$72,508
Pajaro Well #1 Treatment	Electrical	$61	$738
Transmission Pipeline	Maintenance	$0*	$0*
Transmission Booster Pump Station	Electrical	$557	$6,688
Bluff/Jensen Pump Station	Electrical	$77	$926
Bluff/Jensen Connections	Maintenance	$0*	$0*
Springfield Connections	Maintenance	$0*	$0*
Total		**$6,738**	**$80,860**

* Maintenance costs associated with added facilities are anticipated to be fully offset by reductions in existing operational requirements for meter reading, SMWS well operation, and other improvements. As a result, the net increase in operational costs attributed to maintenance is $0.

Section 8. Proposed Schedule

8.1. Schedule Overview

A conceptual implementation schedule has been developed for the Project including planning, design, permitting, bidding and construction. The graphic schedule is provided as Appendix J. Based on the prepared schedule, the Project is anticipated to be complete by early-2028.

8.2. Assumptions

The following assumptions have been made in development of the implementation schedule:

- Funding for professional services and construction for each subsequent step will be obtained concurrently with other work and be in place and approved prior to those required steps occurring in the schedule.
- 30% design plans will be used as the basis for environmental permitting and compliance.

Section 9. Comprehensive Response to Climate Change

9.1. Vulnerability

The populations within the four areas considered in this study are susceptible to existing and future climate induced vulnerabilities. Specific vulnerabilities for each system are discussed as follows.

9.1.1. PWS

Flood conditions in early 2023 resulted in a loss of service to the PWS, and no substantial adaptations were implemented to reduce this risk. Higher intensity storms in the future induced by climate change have the potential to increase these potential impacts. The PWS currently only has one well which meets primary and secondary water quality requirements. A failure of PWS Well No. 1 would require the system to be served with water including concentrations of iron and manganese above the MCL for these contaminants. One of the storage tanks within the PWS is severely degraded. A catastrophic failure of this facility could cause loss of life and property.

9.1.2. SMWS

Flood conditions in early 2023 resulted in a loss of service to the SMWS due to flooding at the SWMS well site, and no substantial mitigations were implemented to reduce this risk. Higher intensity storms in the future induced by climate change have the potential to increase these impacts. The SMWS wells produce water with elevated concentrations of chrome-6, and do not currently have treatment to address this issue.

9.1.3. North of Moss Landing

The North of Moss Landing area is susceptible to drought conditions, resulting in declining groundwater levels. These declining groundwater levels could result in existing wells going dry, or increase seawater intrusion, resulting in further water quality degradation. Additionally, a long history of local farming in the area is anticipated to result in continued groundwater quality degradation. Finally, a lack of a centralized water system in this area exposes the community to vulnerabilities associated with lack of fire protection water supply availability; fire risks are anticipated to be exacerbated over time as a result of climate change.

9.1.4. SWS

The SWS lacks redundancy to address failures with their single operational well. This recently completed well is anticipated to provide a high-quality source of supply for the system but is believed to draw water from a finite source of supply that may degrade over a period of decades. The MHP well, which will serve as an emergency backup source of supply, is recommended to be destroyed as part of this project.

9.2. Adaptation

Adapting to climate change is a critical factor embedded in the decision to consolidate the four areas into a single water system. The consolidation will yield multiple benefits to eliminate vulnerabilities for each system, as well as system wide benefits through increased system storage and expanded operational flexibility/reliability. The best way for the District to serve its customers and protect the community from the harsh conditions of drought, fire and severe flooding is to consolidate the four areas as discussed in this Report.

9.2.1. PWS

Installation of an iron and manganese treatment system on PWS Well No. 1 will provide a second source of supply for the system in compliance with drinking water requirements, increasing system reliability. While PWS Well No. 1 and PWS Well No. 2 are relatively close geographically, they withdraw water from different aquifers at different depths. While unanticipated, if changes in water quality and/or supply availability at one of the PWS wells are observed, similar impacts would not be expected at the other well site due to the separate aquifer source.

To mitigate flood risks at this site, during detailed design, the proposed treatment system at the PWS Well No. 1 site and associated facilities will be reviewed for their ability to withstand flood conditions. Facilities susceptible to flood damage will be designed at increased elevations, or other provisions included to harden against flood induced failure.

Rehabilitation of the severely degraded storage tank will reduce the likelihood of catastrophic failure.

9.2.2. SMWS

Eliminating the existing SMWS wells as source of supply, and primarily relying on water from the PWS will eliminate vulnerabilities associated with the existing wells.

9.2.3. North of Moss Landing

Expanding the service area of the SWS and creating a new pressure zone for the Bluff/Jensen area will eliminate vulnerabilities associated with existing domestic wells in the area. The expanded service area will also improve water supply availability for combating fire hazards.

9.2.4. SWS

The consolidation will provide a second source of supply for the system in compliance with drinking water requirements, increasing system reliability.

9.3. Mitigation

The proposed improvements are anticipated to assist in mitigation of climate change through a variety of pathways.

Metering improvements throughout the NOML and SWS areas will result in a reduction in water use, as these connections are not currently metered. The use of radio read meters in the SWMS and PWS will simplify identification of leaks and waste, allowing for further reductions in water use. Reducing water use will reduce energy and chemical use associated with producing water, reducing greenhouse gas emissions.

The improved water system will utilize modern equipment with increased efficiencies compared to existing antiquated systems, reducing overall energy use to provide water service. The system consolidation will also eliminate requirements for existing treatment systems in the NOML area, reducing energy use, chemical use, and associated travel to service existing systems.

Due to current water quality concerns, many of the customers in the consolidated service areas utilize bottled water for consumption. With the improved water quality provided by the consolidated systems, bottled water will be eliminated, reducing associated energy use and travel.

Section 10. List of Permits

This section documents the anticipated Project permitting requirements.

10.1. Permitting Requirements

Required permits from various agencies required for Project construction are documented in the following sections.

10.1.1. California Environmental Quality Act (CEQA)

The Project will be required to comply with the CEQA. The District will retained a consultant to develop an IS/MND environmental document in support of the Project. If federal funds are anticipated to be used for construction, compliance with the National Environmental Policy Act (NEPA) will also be required.

10.1.2. Caltrans Encroachment Permit

The water transmission main crosses Highway 1 at Salinas Road, which is Caltrans ROW. For this crossing, Caltrans requires an encroachment permit and easement be obtained prior to the start of construction. The design of the pipeline crossing will comply with Caltrans standards.

10.1.3. County of Monterey Encroachment Permit

For water mains constructed within the public ROW, an encroachment permit will be required from Monterey County. Traffic control and roadway reconstruction will comply with Monterey County standards.

10.1.4. County of Monterey Public Health Department Well Destruction Permit

A permit from the County of Monterey Public Health department is required prior to work to destroy SMWS Well No. 1 and Well No. 2.

10.1.5. Coastal Development Permit

The Project is located within the Coastal Zone, regulated by the CCC. A coastal development permit will be required to authorize construction of the proposed improvements.

Additionally, the banks of McClusky Slough may be considered coastal wetlands or Environmentally Sensitive Habitat Area (ESHA) by the CCC.

10.1.6. California Department of Fish and Wildlife

The crossing under McClusky Slough is anticipated to have potential impacts to riparian habitat, which is listed as sensitive habitat by the California Department of Fish and Wildlife (CDFW). A Lake and Streambed Alteration Agreement may be required.

10.1.7. U.S. Fish and Wildlife Service

The Project has the potential to impact federally regulated endangered species. A Section 7 or 10 Incidental Take Permit will likely be required.

10.1.8. U.S. Army Corps of Engineers and RWQCB

McClusky Sough is anticipated to be considered jurisdictional waters of the U.S. and be regulated by the U.S Army Corps of Engineers (ACOE). As a result, Section 401 and 404 permits from the ACOE and Regional Water Quality Control Board (RWQCB) will be required.

10.1.9. Monterey Bay Air Resources District Permit to Construct/Operate

The proposed back-up generators at the Transmission Booster Pump Station site and at the Bluff/Jensen Pump Station will require permitting as new sources of air pollution by the Monterey Bay Air Resources District. This requires two permits for each generator, a Permit to Construct and a Permit to Operate.

10.1.10. City of Watsonville Industrial Wastewater Discharge Permit

Operation of the iron and manganese treatment plant for the PWS Well No. 1 will yield a waste stream consisting of an iron and manganese sludge. This sludge will be discharged to the public sewer system in the community, which is the Pajaro County Sanitation District Collection System owned and operated by the County. This collection system discharges to the City of Watsonville. For such discharges, the City of Watsonville will likely require an industrial wastewater discharge permit to be obtained. Any ongoing charges associated with the permit will be determined by the County as the owner and operator of the wastewater collection system in the area.

10.1.11. State Water Resources Control Board Permit

The consolidated water system will have greater than 200 connections, and will be regulated by the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW).

Because the Project calls for creating a new water system, DDW likely will require a permit application be filed. This application includes submittals prior to the start of construction and extensive technical reports, including an Operations, Monitoring, and Maintenance Plan (OMMP) associated with the proposed iron and manganese treatment plant. After the system is constructed, information on the completed system will need to be submitted. DDW staff will also likely require an in-person inspection of the new facilities prior to finalization of the permit and placing the system into service.

10.1.12. Stormwater General Permit

The Project is anticipated to disturb and replace greater than one acre, and as a result, preparation of a Stormwater Pollution Prevention Plan (SWPPP) will be required. Construction of the project will be required to comply with the stormwater protection requirements and reporting requirements associated with the SWPPP. The majority of Project disturbance is attributed to pipeline construction; as a result, a permit for construction as a linear underground project (LUP) under the Construction General Permit is anticipated to cover pipeline construction and construction at the other sites included in the Project.

10.1.13. Post-Construction Stormwater Requirements

This Project is both inside and outside of the Monterey County Phase II Municipal Separate Storm Sewer System (MS4) permit area. Specifically, the work within Pajaro at the PWS Well No. 1 site, and a portion of the transmission pipeline between the PWS and the SMWS are within the MS4 permit area. If the project includes development or redevelopment of 5,000 square feet or more of developed impermeable space, the project must comply with current Monterey Regional Stormwater Management Program Design Standards.

Linear utility work is exempt from Post-Construction Stormwater Requirements, and the disturbance at the PWS Well No. 1 site is anticipated to be less than 5,000 square feet. As a result, this Project is not subject to compliance with Post-Construction Stormwater Requirements.

Section 11. Appendices

11.1. Appendix A – Prior Works

11.1.1. Hudson Landing Road [HLR] Community Feasibility Study

Engineers Without Borders – Community Engineering Corps, December 7, 2016

SALINAS VALLEY WATER SUPPLY PROJECTS

HUDSON LANDING ROAD (HLR) COMMUNITY

Monterey County, California

FEASIBILITY STUDY

Prepared for:

Environment Justice Coalition for Water

229 Pajaro Street, Suite 204

Salinas, CA 93901

Prepared by:

Engineers Without Borders –Community Engineering Corps (EWB-CECorps)

HLR Project Team

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Lindsey Geiger, EIT

7 December 2016

FEASIBILITY STUDY
Salinas Valley Water Supply Projects
Hudson Landing Road Community
Monterey County, California

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EXECUTIVE SUMMARY

Environment Justice Coalition for Water is working with EWB-CEC to conduct feasibility studies and preliminary engineering for the Salinas Valley Water Supply Projects. The Hudson Landing Road (HLR) community project is a water quality and quantity improvement project to assist one of eight underserved and limited resources communities in Monterey County, California. The goal of the project is to provide safe drinking water to a community of approximately 80 residences. The proposed alternatives will be long-term sustainable and at the most cost effective to the community. All proposals described in this report will be evaluated for compliance with the all applicable safe drinking water codes. This Feasibility Study Report will be developed into grant applications and later resulted in design and implementation.

Summary of Alternatives

Alternative	Summary
Alternative 1: Treatment for individual residential wells	Each wellhead would be fitted with a treatment package. Each would be tailored to the specific contaminants to be removed to meet the water quality requirements.
Alternative 2: Treatment for select wells	Same as Alternative 1 but only select wells will be treated to meet community's needs. A distribution system is needed.
Alternative 3: Installation of new deep well	Install new wells within the HLR community and treat the water from the well to meet the water quality requirements. A distribution system is needed.
Alternative 4: Blending of water from select wells	Several wells that tested satisfactory would be blended with other wells that do not have satisfactory water quality.
Alternative 5: Interconnect with the municipal water system	The community water demand will be part of the Pajaro/Sunny Mesa Community Service District service area. A distribution system is needed.

Recommended Alternative

The long term and reasonable option for the residents of the Hudson Landing Road community is the installation of a water distribution system interconnected with the Pajaro/Sunny Mesa Community Service District (CSD). Inter-connect with the municipal water system is the only viable option for this community at this time. CSD is a central managing authority to maintain and monitor the system and to collect reasonable revenues to keep the system well maintained and up to date with ever changing regulations and standards. Alternative 5 of this report is the recommended option.

1. INTRODUCTION

Project Background

Community Engineering Corp (CECorps) is working with eight small, underserved and limited resources communities in the Salinas River Valley in California at the request of the partner NGO, the Environmental Justice Coalition for Water. The CECorps project teams are helping the communities to identify and evaluate solutions to water supply and sanitation problems. A project team (Team) was assigned to work with the Hudson Landing Road community.

Scope of Work

The following is the proposed scope of work by EJCW:

- Gather Community-specific Information
- Evaluate Three Primary Solutions:
    1. Consolidation (Tie-in to Nearby Existing System)
    2. Well Improvements or New Well
    3. Wellhead Treatment
- For Each Potential Solution:
    1. Draft Potential Layout for Community-specific Application
    2. Develop preliminary equipment and/or sizing of solution components
    3. Develop ballpark planning budget estimates for each potential solution
    4. Identify the advantages and disadvantages for each potential solution
- Compare Solution Alternatives
- Identify the Preferred Solutions

Site Visit

The Team conducted a site visit in July of 2016 to assess the community and conduct the resources inventory (See Appendix 1 – Site Visit Notes). A meeting was held with EJCW to discuss the work plan. Afterward a meeting was also held with a community representative, Terry Martinez (319 Hudson Landing Rd.), to discuss the ongoing water problems.

2. DESCRIPTION OF COMMUNITY

Hudson Landing Road (HLR) community is an unincorporated community in North Monterey County. The HLR community is located one mile west of Las Lomas, California. HLR is at the headwaters of the Elkhorn Slough and Preserve which is a very biologically productive and environmentally sensitive seawater estuary. This is a rural community situated in an active agricultural area with predominately row crops such as strawberries and confined livestock operations (cattle, sheep, goats, & poultry). HLR is made up of approximately 80 households (3.24 persons per household, 2010 US Census) and the residents are likely to be agricultural workers or workers in the agricultural industry.

3. DESCRIPTION OF WATER QUALITY PROBLEMS

When agricultural fertilizers applied to fields, Nitrates easily leach into soil and ultimately into water aquifers. Also, the HLR community has concentrated belowground sewage disposal fields, Nitrate-rich seepage from septic systems is a significant contributor to the problem of groundwater pollution. HLR's close proximity to these activities is most likely the cause of these contamination and health code issues.

The HLR community is served primarily by individual domestic wells with several locations where multiple residents are served from a single well, forming a small water system. The well water primarily use for food preparation and personal hygiene as well as landscape irrigation. Operation and Maintenance (O&M) is not being performed on a regular basis or none at all for the treatment systems (possibly due to cost). One resident reported of disintegrating fabrics with laundered clothing. Due to the lack of treatments and contaminations, bottled water is the only viable option at this time with grant assistance from EJCW. These systems are a significant financial burden on the community.

A number of the multi-resident wells are currently out of compliance with Monterey County regulations related to nitrates in their water supply. The nitrates levels found are upward of 3 times the allowable for drinking water. In addition, the water is potentially being influenced by other contaminants (e.g. Chromium-6 (Cr-6) and seawater intrusion).

4. GOALS and OBJECTIVES

The primary goal of the overall program is to develop plans that provide the community with a clean, safe, and affordable potable water supply that meets all Federal and State of California drinking water standards. The goals and objectives of this report focus on three items of work:

1. Assess existing site conditions and compile all available data.
2. Analyze the information and provide alternatives to EJCW and the HLR community that will be sustainable and achievable.
3. Assist the community identify and evaluate solutions to water supply.

5. SITE CONDITION

Topography

Topography of the project site and adjacent areas is shown below. The data is derived from a

USGS 7.5-minute quad Map and Google Map service. The community is at relative elevation 10 feet, the sounding hills are at relative elevation 110 feet, and the highest ground is at elevation +300 feet to the northeast. (See Figure 1)

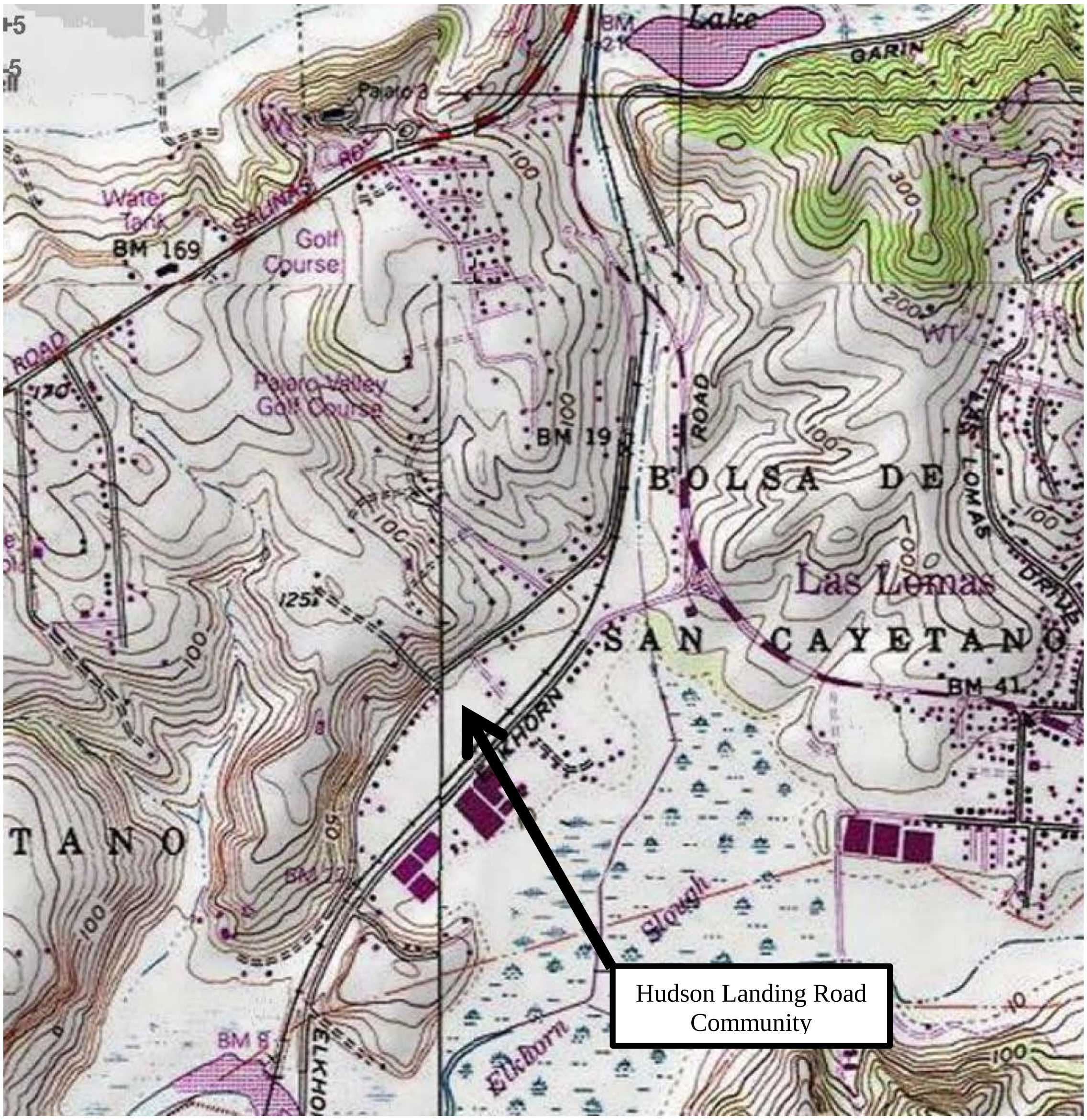

Figure 1 – Topography Map, Hudson Landing Road area

Landscape

The HLR community is at the head of the Elkhorn Slough Estuary with freshwater enters Elkhorn Slough from Carneros Creek. The community is bordered by Hall Road to the east, Elkhorn Road to the southwest, and a golf course to the northwest on top of the hill overlooking the community (See Figure 2). The landscape is intermittent mix of houses with pastures and row crops.

Figure 2 – Aerial View, Hudson Landing Road area

Landscape Geologic Setting and Soils

The Elkhorn Slough Estuary is a tidal estuary that opens to the Pacific Ocean in northern Monterey County, just south of Watsonville. The area is characterized by old sand dunes, tidal wetlands along Elkhorn Slough, and inter dune areas that have a seasonal high water table. Much of the housing development has occurred on a soil mapped as wetland (map unit symbol – Af) along Hudson Landing Road.

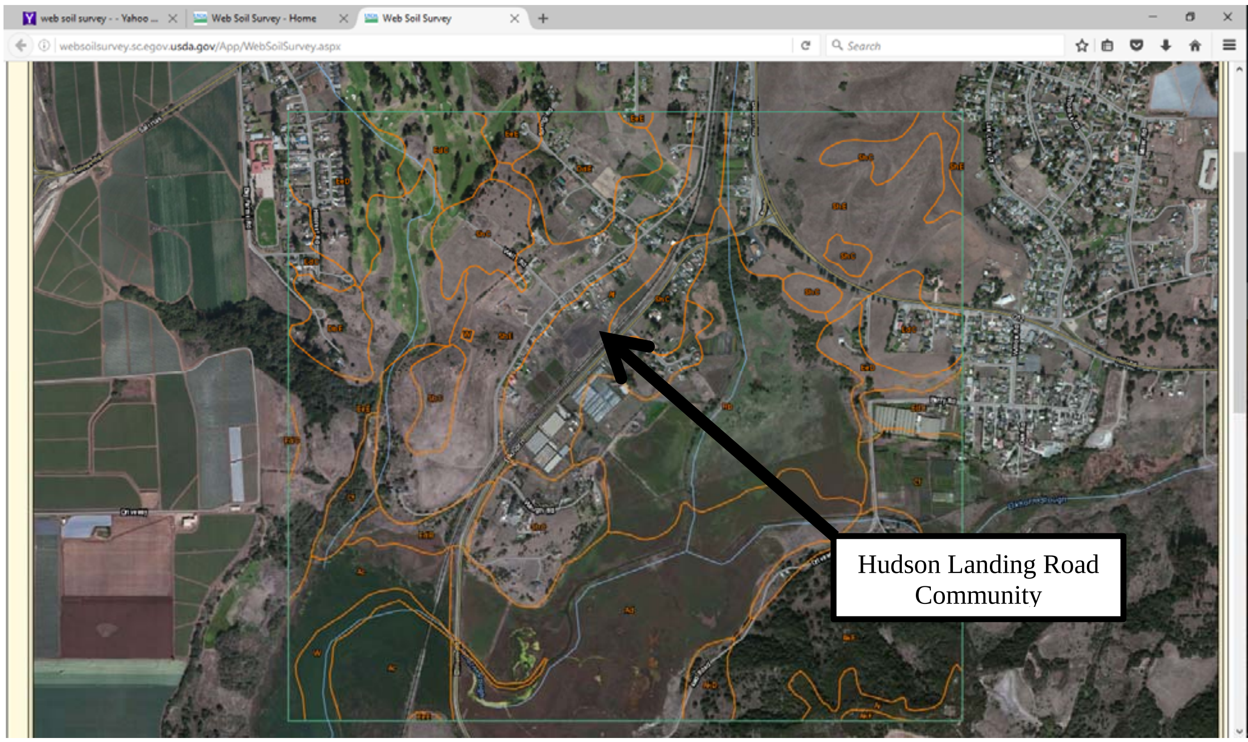

Figure 3 – NRCS Web Soil Survey Map, Hudson Landing Road area

Geology and Groundwater

The Aromas Sand Aquifer consists of an upper and lower sand unit that yields water to wells in the area. These sands are exposed in the uplands east of the project area, but are below the ground surface in the Hudson Landing area. The sand units are described in the well logs in the Hudson Landing area and are the principal water-bearing strata in many of the local wells. The geologic map below is an excerpt from USGS publication:

GEOLOGIC MAP OF THE MONTEREY 30'x60' QUADRANGLE
AND ADJACENT AREAS, CALIFORNIA
Compiled by
David L. Wagner[1], H. Gary Greene[2], George J. Saucedo[1]
and Cynthia L. Pridmore[1]
2002
Digitized by
Sarah E. Watkins[1], Jason D. Little[1] and Joseph J. Bizzarro[2]

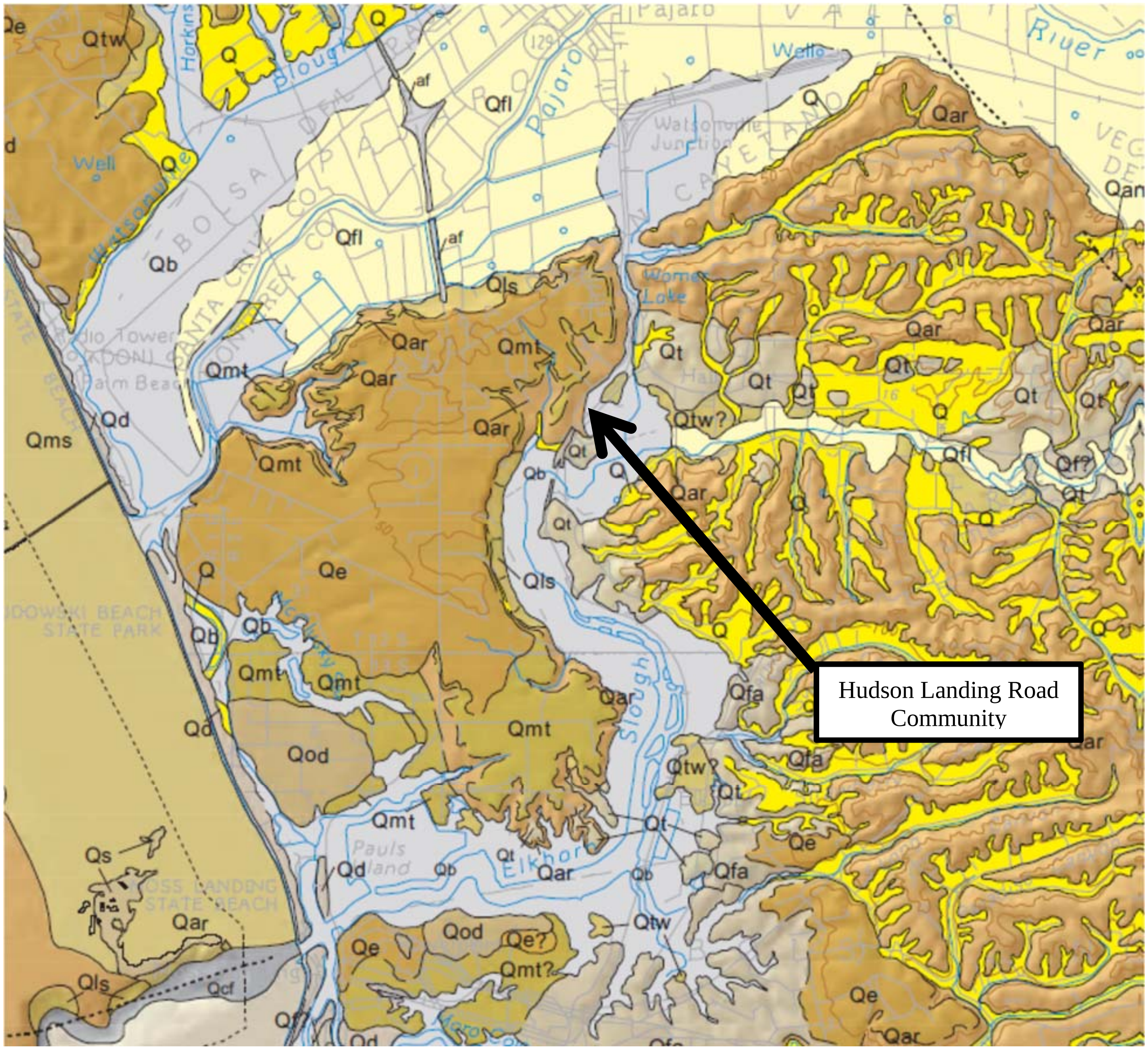

Figure 4 – Geologic Map, Elkhorn Slough Estuary

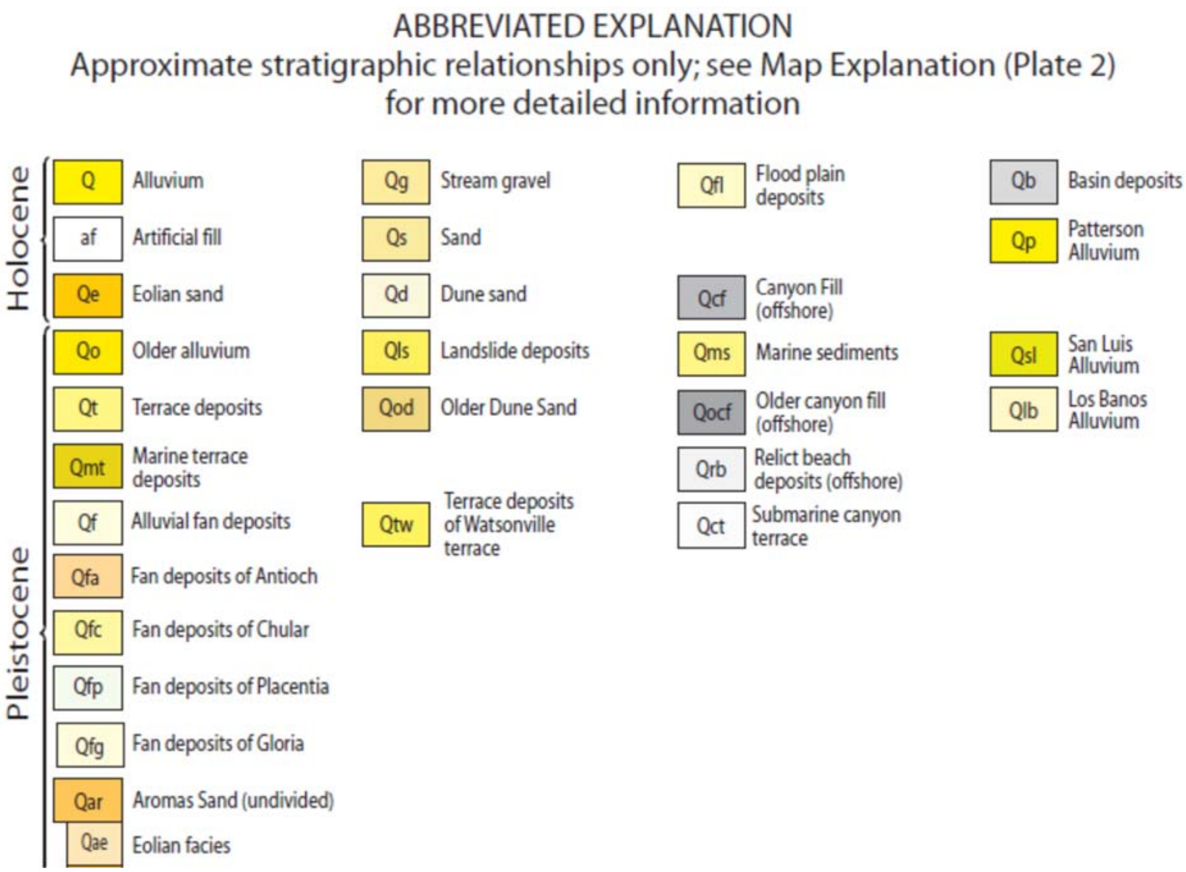

Figure 5 – Legends, Geologic Map

Water Quality

As part of this study, two wells are scheduled to be tested for water quality parameters. A comprehensive testing was performed at well HL WS#8 and a second test is planned for well HL WS#1 (See Appendix 3: Wells Location Map). The laboratory results for well HL WS#8 confirmed a high Cr-6 level of 22, or twice the Maximum Contaminant Level. All other parameters are within the allowable limits (See Appendix 4: Well Test Data). Appendix 4 is to be updated upon well HL WS#1 test completion.

6. PROJECT EVALUATION AND ANALYSIS

As stated previously, a number of wells are currently out of compliance. Many of these wells have a long history of nitrate (NO_3) contamination. These marginal systems are a serious health risk to the users and a significant financial burden on the community.

Another serious water quality problem is the recently discovered Chromium-6 (Cr-6) which is naturally present in the geological formations of the area. The local municipal water utility, Pajaro/Sunny Mesa Community Service District, confirmed the existence of Cr-6 and is implementing a treatment process for two of their wells located just north of HLR across from Elkhorn Road.

In addition, there is evidence that there is some seawater intrusion affecting some wells. The close proximity of the community to the salt water slough is the likely cause (Figure 3).

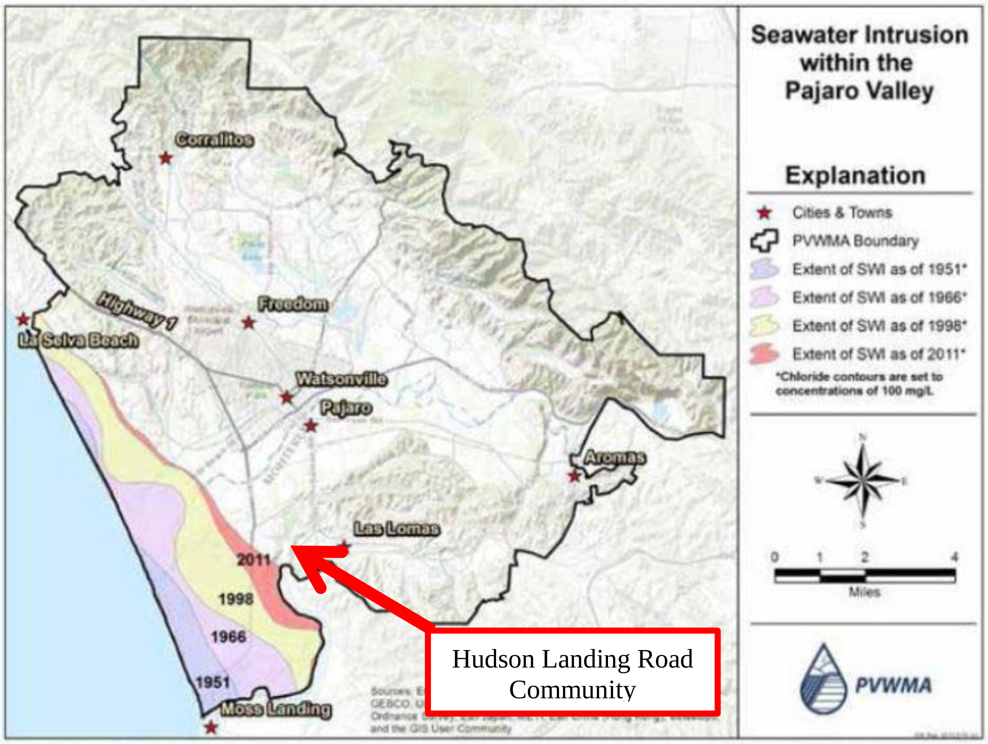

Figure 6 – Seawater Intrusion Map (Source: Pajaro Valley Water Management Agency, 2/2014)

There are serious ongoing and long-term problems with continued use of the wells in the HLR community for human consumption. There are other constituents that are being tested for safe drinking water that have not been included in Monterey County periodic testing that are regulated or tentatively set for regulation. Treatment solutions for individual wells or for select community wells are evaluated and identified as part of this study, but in order for any ongoing maintenance and monitoring to be successful with these options, there must be a single administrative entity to manage the system. No continued well use alternative can succeed with the assumption that individual residents would perform the required functions. Interviews with residents confirmed that they may initially be conscientious in checking their water quality and changing filters as needed, but these tasks soon become low priority and eventually are abandoned. It is unreasonable to expect continuous monitoring by residents of the ever changing drinking water standards and requirements of clean water regulations. The residents are friendly and communicative with one another, but in spite of decades of dealing with serious well problems, there has been no continuous, effective effort to address these issues on a community-wide basis.

The Pajaro/Sunny Mesa Community Services District (CSD) provides the water services to the Watsonville area & areas adjacent to the Hudson Landing Road community. In 2006, a detailed water engineering feasibility study was prepared for the CSD with regard to the HLR community being incorporated into the CSD (See Appendix 6: 2006 Engineer's Report for Hudson Landing Assessment District). It is understood that the proposed cost allocation and the overall magnitude of the costs prevented the implementation of the study recommendations in the past. Two primary benefits for the community if the community interconnect with the municipal water system are:

1. Being a municipal water purveyor, CSD must meet Federal & State ongoing clean water standards as they change.
2. CSD is in the process of implementing a treatment process for Cr-6 for their wells near the HLR intersection.

A community of 80 households will not likely be able to keep pace with the maintenance of their system or the ever changing standards. Connection to the municipal network is the only viable long term solution.

7. PROJECT ALTERNATIVES

Five water treatment alternatives were considered for this study. The alternatives are listed below.

Alternative	Summary
Alternative 1: Treatment for all wells	Each wellhead would be fitted with a treatment package. Each would be tailored to the specific contaminants to be removed to meet the water quality requirements.
Alternative 2: Treatment for select wells	Same as Alternative 1 but only select wells will be treated to meet community's needs. A distribution system is needed.
Alternative 3: Installation of new deep wells	Install new wells within the HLR community and treat the water from the well to meet the water quality requirements. A distribution system is needed.
Alternative 4: Blending of water from select wells	Several wells that tested satisfactory would be blended with other wells that do not have satisfactory water quality.
Alternative 5: Interconnect with the municipal water system	The community water demand will be part of the Pajaro/Sunny Mesa Community Service District service area. A distribution system is needed.

Table 1 - Summary of Alternatives

Alternative 1 through 4 required additional well testing. This will provide a more accurate estimates of the treatment methods and cost.

A storage tank is needed for Alternative 2 due to a minimum flow condition for the proposed treatment system. The proposed treatment facility requires a minimum of 25 gallons per minute (gpm) flow and without a storage tank demands less than 25 gpm would be difficult to treat.

The capital and O&M costs for Alternative 2 is significantly higher than Alternative 1 is due to Alternative 2 involves construction of a distribution system comprising of 9,650 linear feet of 6-inch pipe.

Alternative 4 cost estimate is not being considered at this time due to the high degree of uncertainty with the water quality of existing wells and marginal benefits compare to other alternatives.

Alternative 2-5 would require a distribution system in order to service all 80 residents (See .0Appendix 7: Conceptual Water Distribution System Layouts).

Alternative	Total Cost ($)	Annual O & M	Potential for Grant/Loan*
Alternative 1: Treatment for all wells	$1,275,300	$166,725	Not likely
Alternative 2: Treatment for select wells	$3,191,049	$434,109	Not likely
Alternative 3: Installation of new deep well	$2,899,285	$156,780	Likely
Alternative 4: Blending of water from select wells	NA	NA	NA
Alternative 5: Interconnect with the municipal water system	$4,089,771	NA	Likely

Table 2 – Cost Comparison of Alternatives

* Funding determinations based on previously funded USDA projects and discussion with the USDA field representative in the USDA Santa Maria field office.

<u>Alternative 1</u> – Wellhead treatment for all wells

There are approximately 50 active wells in the study area. At several locations, there are multiple connections to these wells and several households use the water from these sources. There are seven properties at the end of Fruitland Road connected to a single well. There is one property near the intersection of Hudson Landing and Elkhorn Roads that has four connections to their well. There are several other locations where there are multiple users on one well. Since many of the wells are located on private property and there was no access for the Team, the exact number of connections could not be precisely determined; therefore this analysis will assume that there are 50 individual wells to be considered. For this alternative, each wellhead would be fitted with a treatment package of filters and chemicals. Each would be tailored to the specific constituents to be removed.

Since the contaminants vary from well to well as do the concentrations, it is highly unlikely that one specific package would satisfy every location. The cost per well for testing is $2,500 or $125,000 for all 50 well sites. It is estimated that the unit cost for the individual treatment packages would be approximately $10,000 or $500,000 for 50 locations. The total cost for testing and implementation of the system is $1,275,399. In addition, the annual maintenance costs are estimated to be approximately $2,084 per household for 80 residents. The cost summary is shown in Appendix 8 – Alternative 1. The pros and cons are as follows:

Pros:

- the treatment system could be implemented in a relatively short time frame
- there would be very limited engineering design costs
- residents would maintain their independent control over their water source
- residents would have relatively minor cost increases for their system maintenance

Cons:

- each well would have to be tested to determine the specific treatment regiment
- this option would be an interim program, pushing any long term permanent solution into the future
- it is unlikely that the community would be eligible for a cost-share loan/grant since this option is not a long term solution
- while the new costs associated with this option would be relatively small in comparison with the other alternatives, there is still be an increase above their current costs
- without a single authority to maintain and monitor the 50 wells, there is no guarantee that the wells will be operated in accordance with clean water requirements
- each property owner would be bill for the principle and interest on the loan for the system
- no fire protection would be included since there is no distribution system

<u>Alternative 2</u> – Wellhead treatment for select wells

This option would require the testing of several wells to establish 2 new locations to tap for a distribution system serving all residents. The seven households at the end of Fruitland Road would continue to use their existing well, but a treatment package would be installed. It would be included in the management authority.

For the three wells serving properties on Hudson Landing Road, Wells Road, and Spring Road, a distribution network of approximately 9,650 linear feet of pipe would have to be designed and installed.   Treatment packages would also be required for these three wells. The cost summary is shown in Appendix 8 – Alternative 2. The pros and cons are as follows:

Pros:

- this option would necessitate the establishment of an administrative authority to maintain and monitor the system, thus giving the residents a role in monitoring the operation
- residents would have a more secure water supply above their existing system and Alternative 1

Cons:

- while this option is an improvement over Alternative 1, this is most likely not a long term solution - it has limitations on addressing changing water quality conditions and clean water requirements
- a detailed engineering design would be required
- the implementation period could be longer because of the testing and evaluation process to select the candidate wells
- processing of agreements with the property owners whose wells were selected could be prolong
- there would be an ongoing maintenance and operations fee
- each property owner would be bill for the principle and interest on the loan for the system
- this is a more expensive option because of the need for a distribution system
- no fire protection would be included since the pumping systems would be designed to accommodate domestic use only
- it is unlikely that this alternative would qualify for cost-share funding based on previously funded USDA projects (see page 14 Table 2, *Note)

Alternative 3 – Installation of new deep wells

Deep wells offer the advantage of eliminating nitrate and fecal intrusion from ground and surface water, but there is still the potential for seawater intrusion and the presence of Cr-6, both of which would require a treatment package if and when these constituents were present. A distribution system of approximately 13,110 linear feet of pipe would be required to serve the entire community, including the seven properties at the end of Fruitland Road.   The cost summary is shown in Appendix 8 – Alternative 3. The pros and cons are as follows:

Pros:

- this alternative would necessitate the establishment of an administrative authority to maintain and monitor the system, thus giving the residents a role in monitoring the operation

- this alternative could offer a longer term solution with the establishment of an administrative authority to manage the system. Since individual wells would not be the source of the community's potable water, an operating entity would be required to provide the service
- residents would have a more secure water supply above their existing system and Alternatives 1 and 2

Cons:

- it is unlikely that this alternative would qualify for cost-share funding based on previously funded USDA projects (see page 14 Table 2, *Note), therefore, the 20-year conventional loan would most likely be required
- no fire protection would be included since the pumping system would be designed to accommodate domestic use only
- there would be an ongoing maintenance and operation fee
- each property owner would be bill for the principle and interest on the loan for the system
- new well drilling sites would have to be acquired and water quality established

Alternative 4 – Blending of water from select wells

This is a high-bred alternative with the assumption that several wells would test satisfactory to blend with other wells that do not have satisfactory water quality. Similar to Alternatives 2 and 3, a distribution system would be required to serve the entire community. The selected wellheads would require treatment packages. While this alternative offers an improvement over existing conditions, it is only marginally better in the sense of a long term solution. This is a costly alternative to achieve marginal benefits. The Team will not provide a cost estimate for this alternative at this time.

Alternative 5 – Interconnect with the municipal water system

Of the four previous alternatives, this is the most secure system because the community would receive water treated by the municipal utility, Pajaro/Sunny Mesa Community Service District. The alternative is the most beneficial to the area, providing high quality water that meets all Federal and state drinking water standards and requirements. The Service District is the authority to manage and maintain the system. Treatment is closely monitored. This alternative is very similar to the system studied and proposed in 2006 for the Service District. A larger area of coverage with additional properties is included in this alternative with a distribution system of 13,110 linear feet. It is the most costly alternative of the five considered by the Team, but the project has a very good potential of being funded with a cost-share loan/grant. The cost summary is shown in Appendix 8 – Alternative 5. The pros and cons are as follows:

Pros:

- no new administrative authority would have to be established
- a fire protection system is included
- it is likely that the project would be eligible for cost-share funding based on previously funded USDA projects (see page 14 Table 2, *Note)
- a municipal water system is superior to all the other alternatives
- while the domestic uses will be satisfied by the system, residents will still be able to use their wells for landscaping and cleaning purposes

Cons:

- this is the most costly alternative considered
- there will be a monthly water bill that included the principle and interest payments on the system loan
- a comprehensive engineering design would be required
- several easements across private property would have to be acquired
- the implementation period could be longer due to agreements, contracting, and design

8. RECOMMENDED ALTERNATIVE

The only viable long term option for the residents of the Hudson Landing Road community is the installation of a water distribution system interconnected with the Pajaro/Sunny Mesa Community Service District.

Treatment of individual wellheads (Alternative 1) is not practical given the lack of a unified neighborhood organization that could properly maintain and monitor 50 wells. Even a contract service would be costly and problematic without a central authority to insure payments. The alternatives for wellhead treatment at select wells (Alternative 2), installation of new wells (Alternative 3), or blending water from select wells (Alternative 4) would have the same issues related to the system O&M due to the lack of an administrative authority or system manager to insure proper maintenance and monitoring. Probably the most negative aspect of Alternative 2, 3, and 4 is the fact that they would require a water distribution system very similar to the network studied in Alternative 5 (Note: Alternative 1 does not require a distribution system). There would be no infrastructure cost saving and it is unlikely that the cost-share entity would provide funding for system with such tentative long term viability.

Therefore, Alternative 5, interconnect with the municipal water system, is the only long term option for this community. There will be a central managing authority to maintain and monitor the system and to collect reasonable revenues to keep the system well maintained and up to date with ever changing regulations and standards. Alternative 5 is the recommended option.

9. FUNDING SOURCES

Selection of the water distribution system Alternative 5 connecting to the Pajaro/Sunny Mesa Community Service District is the most expensive option of those considered, but for a long term standpoint, it is the only approach that ensures a safe and acceptable potable water supply for the families along Hudson Landing Road and adjacent residential properties. This was the same conclusion of the comprehensive CSD study conducted in 2006 for this area. However, the recommendations were never implemented primarily due to the lack of acceptable funding options. Over the last decade, cost for all types of utility design and construction has risen significantly. While a detailed project design will be necessary to obtain permits and to implement the project, at this time, the Team estimated that the design, permitting, and implementation for this project will be approximately $4,089,771. The following is the breakdown of costs assuming interest rates of 2% and 3% over a 30-year period and no cost-sharing:

- Monthly payments for $4,089,771 @ 3% is about $17,243/month or $216/month/household
- Monthly payments for $4,089,771 @ 2% is about $15,117/month or $189/month/household

Considering the moderate to low income levels of the majority of the households in the HLR community, it is evident as to why the earlier study recommendations were not implemented. Depending on the household income survey that will be conducted before the end of 2016 by EJCW, there is a good chance that this community will be eligible for some alternative funding for a portion of the project costs.

There are multitude of other possible funding sources that are available to the community through either grants or loan. Potential funding sources are:

- California Department of Public Health (CDPH)
- State Water Resources Control Board (State Water Board)
- Department of Water Resources (DWR)
- California Infrastructure and Economic Development Bank (I-Bank)
- United States Department of Agriculture (USDA)
- US Department of Housing and Urban Development (HUD)
- U.S. Economic Development Administration (EDA)
- Rural Community Assistance Corporation (RCAC)
- The Housing Assistance Council (HAC)
- Cooperative Bank (CoBank)

Funding Scenarios

The Team has limited working knowledge of funding options. Hence, only the known options will be discussed here.

There are several US Department of Agriculture (USDA) water related programs for rural areas such as Northern Monterey County. The two most likely programs to fit the conditions in the HLR community are the Water and Waste Disposal Loan and Grant Program and/or the Emergency and Imminent Community Water Assistance Grant. In other California communities such as Salmon Creek in Sonoma County, the USDA provided 100% of the project funds in the form of 50/50, loan and grant.

Two other supplemental funding possibilities are: 1) State of California's Proposition 1- Water Bond 2014 and 2) through Monterey County government in the form of assistance with the loan document preparation and the associated legal fees.

While it is unknown at this time how much the State or County might be willing to assist financially, the following breakdown of 50% cost share with USDA loan/grant assistance for 2% and 3% over 30 years shows a substantial decrease in the impact on the residents even without a financial value for State and County assistance.

- Monthly payments for $2,044,886 @ 3% = $8621/month or $108/month/household
- Monthly payments for $2,044,886 @ 2% is about $7,558/month or $94/month/household

These cost estimates are only part of the monthly costs that the residents would be required to pay. Since they are currently paying only the electric costs for pumping from their wells, any new expenses would be viewed as substantial. There would be a monthly meter charge (a water availability charge) and the cost of the water they use. Most likely, residents who have wells will continue to use the water for landscaping, and cleaning (exterior washing) which will result in a lower than average household usage.

Upon acceptance of Alternative 5 proposal by the Pajaro/Sunny Mesa Community Service District, the Hudson Landing Road community will be asked to vote to pursue cost-share funding for the design and implementation of a new distribution water system for the.

10. REFERENCES

1. Engineer's Report for Assessment District, 2006
2. Well Logs of the Hudson Landing Road Community, 2016
3. Feasibility Study - San Lucas County Water District Water Supply Project, 2015
4. California Nitrate Project, 2012

LIST OF APPENDICES

- Appendix 1: Site Visit Notes
- Appendix 2: Site Photos
- Appendix 3: Wells Location Map
- Appendix 4: Well Test Data
- Appendix 5: Geology Opinion
- Appendix 6: 2006 Engineer’s Report for Hudson Landing Assessment District
- Appendix 7: Conceptual Water Distribution System Layouts
- Appendix 8: Cost Estimates

APPENDIX 1

Site Visit Notes

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Summary from Saurabh Shekhar

Project: Hudson Landing Road Potable Water Project – Site Assessment Trip Notes

Date: July 7 and 8, 2016

Day 1 – July 7, 2016

9:00 – 10:30 Engineers Without Borders (EWB) members, Saurabh Shekhar (SS) and Thomas O'Kane (TK) and Environmental Justice Coalition for Water (EJCW) staff, Heather Lukacs (HL) and Daisy Gonzalez (DG) meet at neighborhood café. The meeting included introductions and discussions regarding background on Hudson Landing Project. EJCW presented their history of work within this community and neighboring communities. [People present – SS, KK, HL, and DG]

10:35 – 11:45 Drove around the Hudson Landing Road project area. [People present – SS, KK, HL, and DG]

1:00 – 1:30 Interviewed one of the active residents, Terry Martinez who lives on 319 Hudson Landing Road. Her well is contaminated with nitrate and currently she is receiving bottled water as part of another Grant program headed by EJCW. Ms. Martinez & her granddaughter discussed the history of the neighborhood & the continuing water quality issues - the Martinez family uses their well water to bathe, for brushing teeth plus outdoor landscape watering. She presented all document related to her well and notices she received regarding assessment fees for connecting to Pajaro/Sunny Mesa Community Services District.

She showed us her new septic field and indicated it was installed to code in the past two years. Her well is located inside a shed. She has a 500 gallon storage tank adjacent to her well where she stores rainwater during the wet season. [People present – SS, KK, HL, and DG]

1:30 – 1:40 Ms. Martinez's granddaughter, Katrina, agreed to accompany us in our afternoon visual survey of the neighborhood. We walked along Hudson Landing Road and attempted to identify all the wells permitted by Monterey County Department of Public Health. Apart from the permitted wells, there were few lots that were served by individual private wells. We identified few of other private wells (4-6 nos.). Heather spoke with another one of the residents, Jason Cluster, who lives on 193 Hudson Landing Road. He indicated that he does not believe he has high nitrate levels and is using his well-water for all indoor uses. [People present – SS, KK, HL, and DG]

4:00 – 5:00 EWB members, Saurabh Shekhar and Thomas O'Kane discussed items regarding the field trip and brainstormed alternatives and additional information needs for the Project. [People present – SS, KK]

Day 2 – July 8, 2016

9:00 – 11:30 Discussion at EJCW's office. We exchanged notes on information needs and discussed alternatives to be addressed as part of this scope of work. [People present – SS, KK, HL, and DG]

Summary from Tom

Phuc - sorry that you could join us on Thurs. (7 July) & Fri. (8 July) for our site visit to Hudson Landing Rd. - we missed having you present - it was a very successful couple of days – Heather & Daisy gave Saurabh & me a through briefing on the background of conditions, the residents, previous actions, & some of the possibilities for solutions - we spent the morning covering this wide range of topics - they had set an interview for us w/one of the most active residents, a Terry Martinez (319 Hudson Landing Rd.).

Ms. Martinez & her daughter discussed the history of the neighborhood & the continuing water quality issues - the Martinez family still use their well water to bathe, for cooking, & for brushing teeth plus outdoor landscape watering - they added that they do not maintain their water filtering system (no reason was given why they discontinued - maybe too costly) - they advised us that a neighbor has discontinued doing her laundry because she told Ms. Martinez that the fabrics had begun to disintegrate - most importantly, she had the original well drilling log from 1972 that gives much detail, including the various strata that the well passes through - it is 89' deep passing through several significant sand & gravel lavers bordered by clay - her property is below an active strawberry farm; the land of which is fairly steep sloping towards the road & her property - I am sure there is significant runoff during heavy storm events.

She showed us her new septic field that was install to code & the proper distance from her well (we did not see the permit on any signoff by Monterey County, it is does appear to be downstream from her well site & a satisfactory distance away) - she has a 500 gal. storage tank adjacent to her well where she stores rainwater during the wet season.

Her daughter agreed to accompany us in our afternoon visual survey of the neighborhood (it is important to note that Daisy has already been in direct contact w/many of the residents of the neighborhood as part of the bottled water program - only 6 families are participants at this time) - we only had access to a very few properties because most are behind fences & many had no trespassing signs prominently displayed (I was a little uncomfortable walking through this neighborhood or any neighborhood w/out some form of identification such as a badge to show residents that we are legitimate - understand that no one objected to our being there, but we should be identified) - we could access a couple of well sites, but most were in enclosures & beyond the signs - this is still an active agricultural area w/a number of residents having livestock - several of these residences are above Hudson Landing Rd. & the properties along the road - a couple of the well inspection reports that we viewed on Fri. showed coliform in the results - not surprising - we also drove to the adjacent neighborhood at the top of the hill where the municipal water system ends & where there is a well serving some 13 properties above Hudson Landing Rd.

On Fri., we met at Heather's office in the City of Salinas to review many of the files that she has made available to all of us - there are some well installation logs included to give further information on the geology of the area - we reviewed an outline that Saurabh & I had developed on Thurs. that will form the basis of our work program - Heather has compiled quite a comprehensive file - I have not delved into it very far yet - we finished up about noon on Fri.

I will begin a draft work program to distribute for comments the next day or 2 – Tom

From Heather-

Hi Tom, Thanks for the great notes about the CEC team visit. Two quick clarifications/corrections -

First, Mrs. Martinez and her granddaughter Katrina do not cook or drink with the water from their well. They did report using the water for the other uses you mentioned.

Second, EJCW provides bottled water to 3 households in the Hudson Landing Rd.

Daisy, please correct/modify either point above (or any other points made in Tom's email). Heather

1) Geology - geotracker, county planning department, well logs (goal: new well location, depth, screening, permitting)
    a) North Monterey County Hydro-Geological Reports (1995)
    b) Search for Well logs in Monterey County Small Water System Files
    c) Pajaro Valley Water Management Agency
        i) Well logs and water level information for 2 deep wells located at the end of Hudson Landing Rd.
        ii) Heather sent request for all well logs within Hudson Rd. Area on 7/8/16
2) Community Service District - Possible call with Don Rosa? Best time 11am-1pm.
    a) Total demand for their water systems, average usage, where there customers may have their own wells for outdoor use
    b) Confirm standard rate structure would apply in this case
    c) Information about their nearby wells (depth, well logs)
    d) Line sizes nearby and average pressures of possible tie-in locations
    e) Source capacity concerns during drought or in general
    f) Formation costs, bond costs?
3) Well testing
    a) Decide which is the best well to do this testing
        i) CEC team to discuss with Phoc possibility of testing 1 of 2 deep wells and also 263 Hudson Landing Rd. (Hilda Sanchez or Lopez)
    b) Opportunity for nearby university students to do the sampling (Heather to call, probably during academic year - Fall semester or Winter semester)
        i) Need to include Chromium, Nitrates, and Arsenic (at least)
4) Precise well locations - is this needed?
5) Location and depth of septic fields
    a) County record of septic systems
6) Well depths
    a) Look in Monterey County Small Water System Files
7) Fire Department requirements
    a) Ask Kansas City team - Heather connected Hudson Landing team via to another CEC team who should have notes on fire flow and other requirements
    b) Contact info for fire Chief or fire marshall
8) Current system costs for providing bottled water (Daisy)
    a) Other interim solutions - link to Residential Treatment Devices including list of nitrate treatment systems approved by the state of California
9) Funding options
    a) USDA, SRF, Prop 1 - if they qualify for USDA, they could get a grant
    b) Sonoma County covered bond cost, cost for attorney, and public works manager time (~$100,00)
    c) Example of grant application, final report, budget for Salmon Creek - Tom to share?
10) Updated unit prices for capital costs
    a) Tom has connection in Santa Rosa, possibly connect to other team

11) Monterey County - monitoring of surface contaminants or runoff from properties (pesticides, etc.)?
    a) Possible university project sampling runoff
12) Total number of households
    a) 58 dwellings based on 2006 engineer's report
    b) Add 16 houses for * houses that were left out of engineer's report
    c) Add 6 new dwellings based on walking survey on 7/7/16 with CEC team
        i) Add 1 house for 211 Hudson Landing Rd for total of 4 houses
        ii) Add 1 house to 171 Hudson Landing Rd for a total of 2 houses
        iii) Add 1 house for 263 Hudson Landing Rd for a total of 2 houses
        iv) Add 1 house to 55 Spring Rd. for a total of 2 houses
        v) Add 1 house to 149 Hudson Rd. for a total of 1 house
        vi) Add 1 house to 151 Hudson Rd. for a total of 1 house

Alternatives

1. Waterline extension from Pajaro Sunny Mesa CSD
    a. Information on water quality can be found at SDWIS California, search by water system name: "Sunny Mesa" or Water System Number
2. Deeper well(s): Drill/install 1-2 new deep wells, separate stand alone district
3. Treatment facility - better to have one centralized treatment facility with centralized distribution system
    a. Need to include estimate of costs for certified treatment operator, daily/continuous monitoring, and safe/legal disposal of waste (off-site) in addition to general capital and O&M costs
4. Blending - new distribution system, connecting existing wells

APPENDIX 2

Site Photos

by Saurabh Shekhar and Thomas O'Kane

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Photo 1 – End or Spring Road

Photo 2 – Resident at 250 Hudson Landing Road

Photo 3 – Pajaro Sunny Mesa CSD wells

Photo 4 – Strawberry Field in the HLR community

Photo 5 – Private Well site

Photo 6 – Existing water system. Hudson Landing road

APPENDIX 3

Wells Location Map

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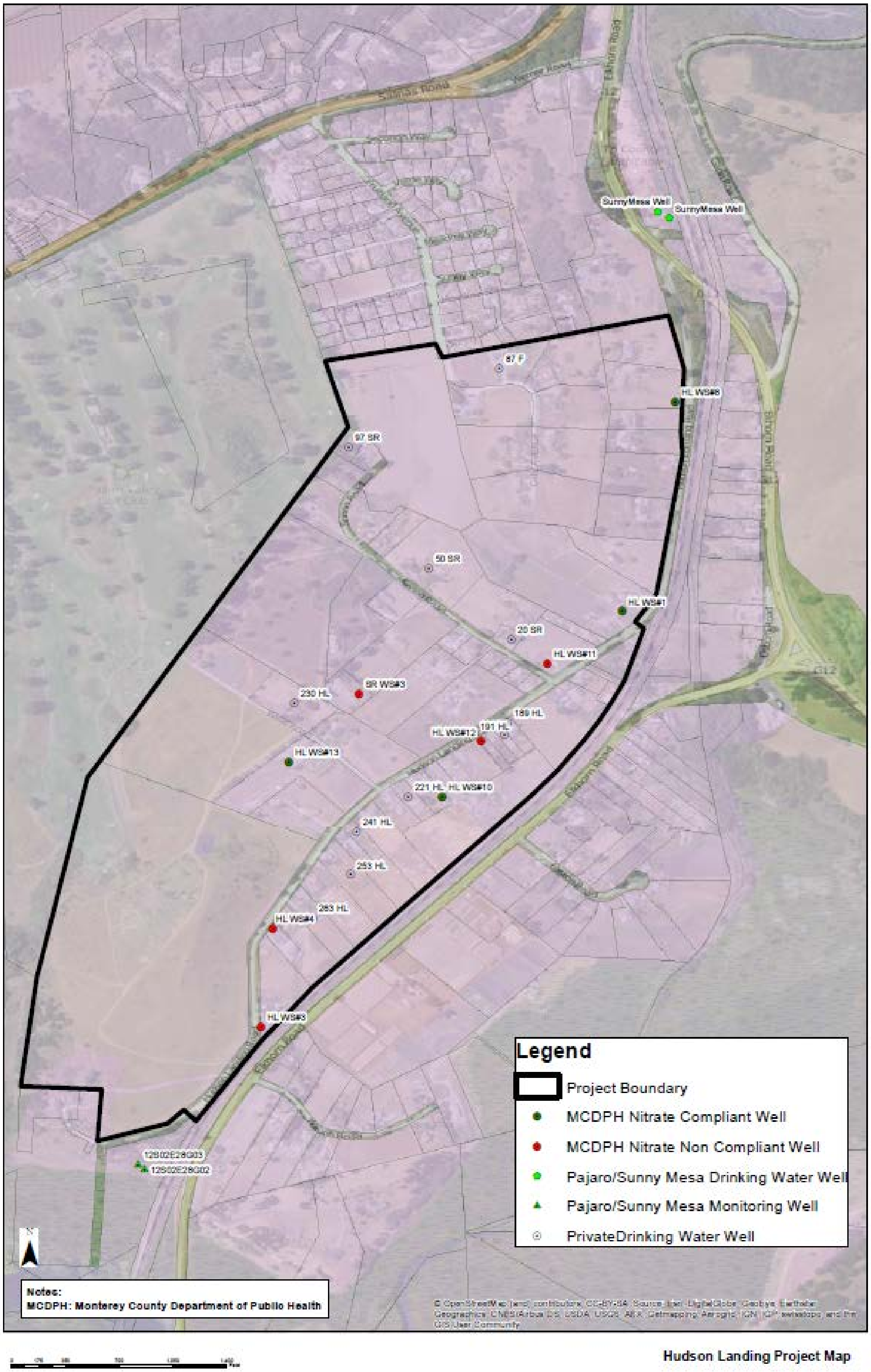
Wells Location



APPENDIX 4

Well Test Data

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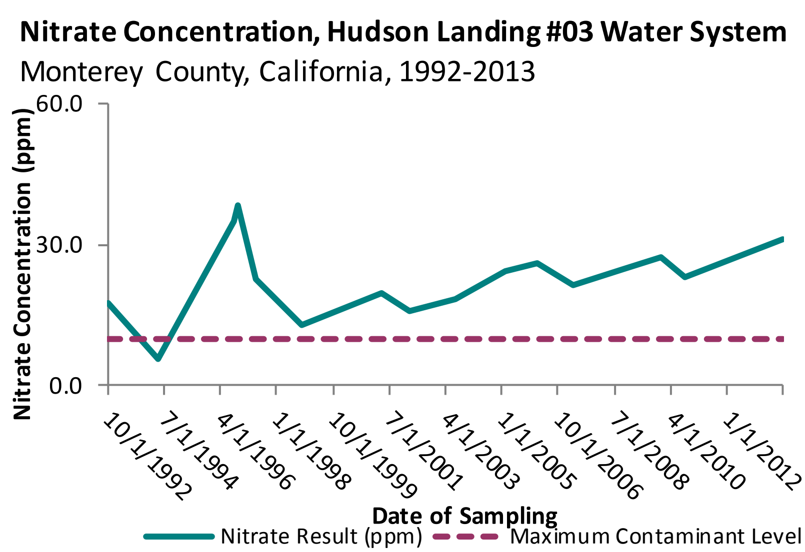
Nitrate Sampling History – Well HL WS#3

Name:	Hudson Landing 03		
Nitrate Sampling History			ID# 2700918
Nitrate Maximum Contaminant Level = 10 ppm			
Date	Sample Address	Nitrate Result (ppm)	Maximum Contaminant Level
10/2/1992	YT	17.4	10
4/1/1994	319 YT	5.4	10
9/30/1996	319 OT	34.8	10
10/29/1996	319 YT	38.4	10
5/29/1997	319YT	22.6	10
10/28/1998	319 YT	12.7	10
4/17/2001	319 YT	19.4	10
2/26/2002	319 YT	15.8	10
7/22/2003	319 OT	18.5	10
2/3/2005	319 YT	24.4	10
2/1/2006	319 YT	26.0	10
3/21/2007	319 YT	21.5	10
10/27/2008	319 YT	24.6	10
12/1/2009	319 YT	27.1	10
9/8/2010	319 YT	22.8	10
9/25/2013	319 YT	30.9	10



Well HL WS#8 Test Results

Engineers Without Borders USA
Lauren Butner
1031 33rd St, Suite 210
Denver, CO 80205
Lauren.Butner@EWB-USA.org

Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS
www.MBASinc.com
ELAP Certification Number: 2385

Page 1 of 2 Friday, August 12, 2016

Lab Number: AB51003

Collection Date/Time:	7/27/2016	14:52	Sample Collector:	WEIDNER-HOLLAND, MASON	Client Sample #:	
Submittal Date/Time:	7/27/2016	16:17	Sample ID	HUDSON LANDING WS #8	Coliform Designation: Special	

Sample Description: Hudson Landing WS #8, Well

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Aggressivity Index	Calculation		**11.8**				8/2/2016	MW
Alkalinity, Total (as CaCO3)	SM2320B	mg/L	**178**		10		7/28/2016	BS
Aluminum, Total	EPA200.8	µg/L	**Not Detected**		10	1000	7/28/2016	SM
Antimony, Total	EPA200.8	µg/L	**Not Detected**		1.0	6	7/28/2016	SM
Arsenic, Total	EPA200.8	µg/L	**Not Detected**		1	10	7/28/2016	SM
Barium, Total	EPA200.8	µg/L	**26**		10	1000	7/28/2016	SM
Beryllium, Total	EPA200.8	µg/L	**Not Detected**		1	4	7/28/2016	SM
Bicarbonate (as HCO3-)	SM2320B	mg/L	**217**		10		8/1/2016	MP
Biochemical Oxygen Demand	SM5210B	mg/L	**Not Detected**		2		7/29/2016	LJ/MP
Bromide	EPA300.0	mg/L	**Not Detected**	IA	0.4		7/28/2016	HM
Cadmium, Total	EPA200.8	µg/L	**Not Detected**		0.5	5	7/28/2016	SM
Calcium	EPA200.7	mg/L	**33**		0.5		8/1/2016	MW
Carbonate as CaCO3	SM2320B	mg/L	**Not Detected**		10		8/1/2016	MP
Chloride	EPA300.0	mg/L	**38**		4.0	250	7/28/2016	HM
Chlorine Residual (Field Test)	SM4500-Cl G	mg/L	**Not Detected**		0.05	4.00	7/27/2016	MWH
Chromium VI	EPA 218.6	µg/L	**22**	E	0.2	10	8/9/2016	BSK
Chromium, Total	EPA200.8	µg/L	**26**		2	50	7/28/2016	SM
Color, Apparent (Unfiltered)	SM2120B	Color Units	**Not Detected**		3	15	7/28/2016	MP
Copper, Total	EPA200.8	µg/L	**Not Detected**		4	1300	7/28/2016	SM
Cyanide	QuikChem 10-20	µg/L	**Not Detected**		5	200	8/1/2016	LRH
E. Coli (Quantitray)	SM9223B	MPN/100mL	**<1**		1		7/27/2016	MW
Fluoride	EPA300.0	mg/L	**0.3**		0.4	2.0	7/28/2016	HM
Hardness (as CaCO3)	SM2340B/Calc	mg/L	**177**		10		8/2/2016	MW
Hydroxide	SM2320B	mg/L	**Not Detected**		10		8/1/2016	MP
Iron	EPA200.7	µg/L	**Not Detected**		10	300	8/1/2016	MW
Langlier Index, 15°C	SM2330B		**-0.12**				8/4/2016	SM
Langlier Index, 60°C	SM2330B		**0.48**				8/4/2016	SM
Lead, Total	EPA200.8	µg/L	**Not Detected**		5	15	7/28/2016	SM
Magnesium	EPA200.7	mg/L	**23**		0.5		8/1/2016	MW
Manganese, Total	EPA200.7	µg/L	**Not Detected**		10	50	8/1/2016	MW
MBAS (Surfactants)	SM5540C	mg/L	**Not Detected**		0.05	0.50	7/28/2016	HM
Mercury, Total	EPA200.8	µg/L	**Not Detected**		0.5	2	7/28/2016	SM

mg/L: Milligrams per liter   ug/L : Micrograms per liter   PQL : Practical Quantitation Limit   MCL: Maximum Contamination Level
H = Analyzed ouside of hold time   E = Analysis performed by External Laboratory; See Report attachments.   T = Temperature Exceedance

Lab Number: AB51003

Collection Date/Time: 7/27/2016 14:52 Sample Collector: WEIDNER-HOLLAND, MASON Client Sample #:

Submittal Date/Time: 7/27/2016 16:17 Sample ID HUDSON LANDING WS #8 Coliform Designation: Special

Sample Description: Hudson Landing WS #8, Well

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nickel, Total	EPA200.8	µg/L	Not Detected		10	100	7/28/2016	SM
Nitrate as NO3	EPA300.0	mg/L	3		4.0	45	7/28/2016	HM
Nitrate as NO3-N	EPA300.0	mg/L	0.6		0.4	10	7/28/2016	HM
Nitrate+Nitrite as N	EPA300.0	mg/L	0.6		0.40		7/28/2016	HM
Nitrite as NO2-N	EPA300.0	mg/L	Not Detected		0.4	1.0	7/28/2016	HM
Odor Threshold at 60 C	SM2150B	TON	1		1	3	7/27/2016	MP
o-Phosphate-P, Dissolved	EPA300.0	mg/L	Not Detected		0.4		7/28/2016	HM
Perchlorate	EPA314	µg/L	Not Detected	E	2.0		8/8/2016	BSK
pH (Laboratory)	SM4500-H+B	pH (H)	7.6		0.1		7/27/2016	BS
Potassium	EPA200.7	mg/L	1.5		0.5		8/1/2016	MW
QC Anion Sum x 100	Calculation	%	103%				8/1/2016	MP
QC Anion-Cation Balance	Calculation	%	4				8/2/2016	MW
QC Cation Sum x 100	Calculation	%	112%				8/2/2016	MW
QC Ratio TDS/SEC	Calculation		0.62				8/2/2016	MP
Selenium, Total	EPA200.8	µg/L	Not Detected		2	50	7/28/2016	SM
Silica as SiO2, Total	EPA200.7	mg/L	46		0.5		8/1/2016	MW
Silver, Total	EPA200.8	µg/L	Not Detected		10	100	7/28/2016	SM
Sodium	EPA200.7	mg/L	37		0.5		8/1/2016	MW
Specific Conductance (E.C)	SM2510B	µmhos/cm	464		1	900	7/29/2016	LJ
Sulfate	EPA300.0	mg/L	5		4.0	250	7/28/2016	HM
Synthetic Organic Compounds - Mont		µg/L	Not Detected	E			8/11/2016	BSK
TCP Low Level	SRL524M-TCP	ug/L	Not Detected	E			8/4/2016	BSK
Thallium, Total	EPA200.8	µg/L	Not Detected		1.0	2	7/28/2016	SM
Total Coliform (Quantitray)	SM9223B	MPN/100mL	<1		1		7/27/2016	MW
Total Diss. Solids	SM2540C	mg/L	286		10	500	7/28/2016	MP
Turbidity	EPA180.1	NTU	Not Detected		0.05	5.0	7/28/2016	BS
Volatile Org. Compounds (524)	EPA524	µg/L	Not Detected	E			8/1/2016	BSK
Zinc	EPA200.7	µg/L	Not Detected		10		8/1/2016	MW

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

mg/L: Milligrams per liter ug/L: Micrograms per liter PQL: Practical Quantitation Limit MCL: Maximum Contamination Level

H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See Report attachments. T= Temperature Exceedance

APPENDIX 5

Geology Opinion

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Prepared by Paul F. Pedone, EWB-Portland Professionals member 7/15/2016

I have focused only on the wells that are listed in the "in compliance" folder. I will comment on others as they are identified by their respective well logs.

Recommendations for Hudson Landing area wells and potential for community water supply

The following wells were reported as being in compliance by Monterey County (data provided in EWB Google Drive folder—"In Compliance"):

HL WS#1 (CA-DWR #31415)—Owner Frank J. Brown, 146 Hudson Landing Rd.: This well log has no test or yield data listed; was completed in 1977; is screened from 120-160 feet; but is only 168 feet deep. **Recommendation:** Without additional information on yield and drawdown under pumping, this well is not a good candidate for a community well.

HL WS#8 (CA-DWR #149661)—Owner not listed. This well has good information on yield and pumping test and is currently providing water to 13 domestic users. It meets the county compliance criteria for nitrates, but new information indicates it has a level of chromium 6 that is above standards. A better image of the well log is provided by the file **WL-171-131014.jpg**.

Recommendation: This well has potential if it can meet the yield requirements for the public supply expansion. The current users will also need to find a method to diminish the Cr-6 level to meet all health requirements before it is considered for an expanded service district.

HL WS#13 (CA-DWR #331471)—Owner Larry Jennings, 1 Ironwood Drive, Soquel, CA; well located at 250 Hudson Landing Rd. This well has excellent information in the completion report. Yield is listed as 30 gpm, but the pump test was only for four hours. Well was completed in 1990.

Recommendation: This well has potential based on the information in the well log. Depending upon the water demand for the proposed project area, this well may be a primary candidate, if the owner is willing to consider having it upgraded for a community water supply.

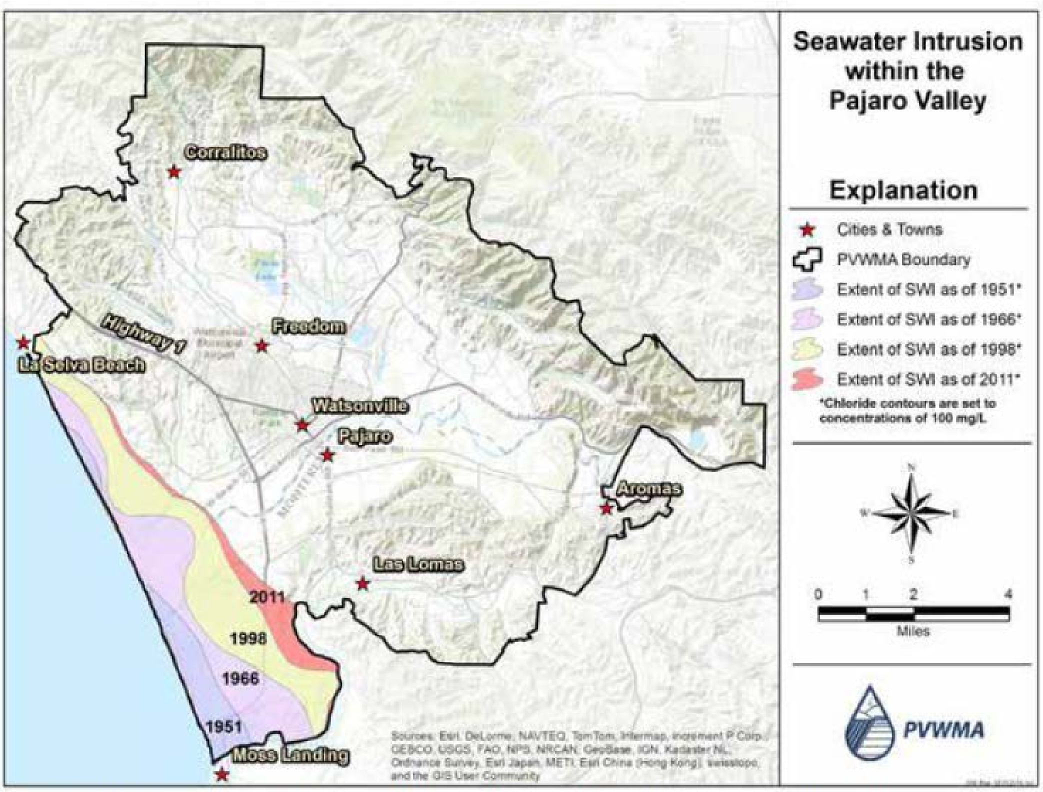
HL WS#12 (CA-DWR #074582)—Owner: Ammon Builders; well located at 195 Hudson Landing Road. Well was completed in 1978 and is 195 feet deep. Estimated yield at that time was 100 gpm. Data are limited in the well report.

Recommendation: Do not consider this as a primary candidate for a community well, primarily based on its moderate depth and lack of a thick confining clay layer.

Seawater intrusion: The problem of seawater intrusion has been identified in this region and information can be obtained about this issue with the following link: http://waterfoundation.net/wp-content/uploads/PDF/1407267913-CentralCoastGroundwaterReport-Aug2014(00258176xA1C15).pdf

The image below is extracted from that report since it is relevant to the project area. Note that the 2011 extent of seawater intrusion is shown as being very close to the southwest project boundary.

Another useful document is the USGS fact sheet for this issue in this part of California (http://pubs.usgs.gov/fs/fs-044-03/).



Source: Pajaro Valley Water Management Agency (PVWMA). Basin Management Plan Update – Final. Prepared by Carollo Engineers. February 2014.

12/2-28

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do Not Fill In
№ 149661
State Well No.
Other Well No.

(1) OWNER:
Name
Address
WATSONVILLE

(2) LOCATION OF WELL:
County MONTEREY Owner's number, if any APN# 117-131-14
Township, Range, and Section WATSONVILLE HUDSON LANDING Rd
Distance from cities, roads, railroads, etc.

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:
STEEL: KAI WELL OTHER: PVC - SCREEN If gravel packed
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	194	6	160	12¼	50	194

Size of shoe or well ring: Size of gravel:
Describe joint COMENTED & SCREWED (BELL END)

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
154	164	4	50	.040 X 3½
174	184	4	50	.040 X 3½

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 50 ft.
Were any strata sealed against pollution? Yes ☐ No ☒ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing

(9) WATER LEVELS:
Depth at which water was first found, if known ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing 50 ft.

(10) WELL TESTS:
Was pump test made? Yes ☒ No ☐ If yes, by whom? CLIFFORD PUMP
Yield: 171 gal./min. with 124 ft. drawdown after 9 hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☐
Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG:
Total depth 256 ft. Depth of completed well 194 ft.
Formation: *Describe by color, character, size of material, and structure*

Formation	ft. to ft.
BROWN CLAY	0 — 10
BLUE CLAY	10 - 64
GRAVEL	64 - 76
FINE SAND	76 - 88
GRAVEL	88 - 112
FINE SAND	112 - 208
CLAY	208 - 256

Work started 5/13 1976, Completed 5/19 1976

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME CLIFFORD PUMP & WELL CO
(Person, firm, or corporation) (Typed or printed)
Address PO BOX 1018 215 SAN JUAN Rd
WATSONVILLE CA 95076
[SIGNED] [signature] VP
(Well Driller)
License No. 264081 Dated 5/30, 1976

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68)

HL Well #8 driller's log

APPENDIX 6

2006 HLR Feasibility Study

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Kennedy/Jenks Consultants

2191 E. Bayshore Blvd. #200
Palo Alto, CA 94303
650-852-2800
650-856-8527 (Fax)

ENGINEER'S REPORT FOR HUDSON LANDING ASSESSMENT DISTRICT

25 January 2006

Prepared for

Pajaro/Sunny Mesa Community Services District
136 San Juan Road
Watsonville, CA 95076

K/J Project No. 0488026.00

Table of Contents

Section 1: Introduction and Certifications

AGENCY:	Pajaro/Sunny Mesa Community Services District
PROJECT:	Proposed Hudson Landing Assessment District
To:	Board of Directors

ENGINEER'S "REPORT" PURSUANT TO THE PROVISIONS OF SECTION 10204 OF THE STREETS AND HIGHWAYS CODE

Pursuant to the provisions of Article XIID of the State Constitution and the "Municipal Improvement Act of 1913" being Division 12 of said Code, and the Resolution of Intention adopted by the Board of Director's of the PAJARO/SUNNY MESA COMMUNITY SERVICES DISTRICT, State of California, in connection with the proceedings for Assessment District No. ––(hereinafter referred to as the "Assessment District), I. Thomas E. Yeager, P.E., a registered Professional Engineer and authorized representative of Kennedy/Jenks Consultants, the duly appointed Engineer of Work, herewith submits the "Report" for the Assessment District, consisting of this Introduction and Certifications and the sections listed below.

Section 2

This section contains preliminary plans and specifications that describe the general nature, location and extent of the proposed improvements. Said plans and specifications are on file in the Office of the General Manager.

Section 3

This section contains an estimate of the cost of the proposed improvements, including capitalized interest, if any, incidental costs and expenses in connection therewith as set forth herein and attached hereto.

Section 4

This section consists of a proposed assessment of the total amount of the costs and expenses of the proposed improvements upon several subdivisions of land within the Assessment District, in proportion to the estimated benefits to be received by such subdivisions from said improvements, which is set forth upon assessment roll filed herewith and made part hereof.

Section 5

This section contains the proposed maximum annual administrative assessment to be levied upon each subdivision or parcel of land within the Assessment District to pay costs incurred by the PAJARO/SUNNY MESA COMMUNITY SERVICES DISTRICT, and not otherwise reimbursed, resulting from the administration and collection of assessments or from the administration and registration of any associated bonds and reserve or other related funds.

Section 6

This section contains a map showing the boundaries of the Assessment District, and a diagram showing the Assessment District, the boundaries of the subdivisions of land within said Assessment District, as the same existed at the time of passage of the Resolution of Intention is filed herewith and made part hereof, and part of the assessment.

Section 7

This section consists of the following:

- Description of facilities

This report is submitted on the ____day of _______________, 2006.

KENNEDY/JENKS CONSULTANTS

____

THOMAS E. YEAGER, P.E.
ENGINEER OF WORK

Preliminary approval by the BOARD OF DIRECTORS of the PAJARO/SUNNY MESA COMMUNITY SERVICES DISTRICT, MONTEREY COUNTY, CALIFORNIA on the _____ day of ______________________, 2006

____

DISTRICT SECRETARY
PAJARO/SUNNY MESA COMMUNITY SERVICES DISTRICT

Section 2: Preliminary Plans and Specifications

The preliminary plans and specifications to construct the water system improvements for the area described as Hudson Landing Assessment District which describe the general nature, location and extent of the improvements for this Assessment District are referenced herein and incorporated as if attached and a part of this Report.

The preliminary plans for the improvements as approved are on file in the office of the General Manager.

The final plans will be prepared in accordance with District Standards and shall meet the appropriate requirements of the State of California , Department of Health Services.

Section 3: Cost Estimates

See Table 1 on the following page.

TABLE 1
DETAILED COST ESTIMATE

HUDSON LANDING DISTRIBUTION SYSTEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
Install 8" PVC waterline	4,500	lf	$ 60.00	$270,000
Install 6" PVC	5,600	lf	$ 50.00	$280,000
Install 1" service line & meter box	58	ea	$ 2,500.00	$145,000
Connection Fees	58	ea	$ 4,119.00	$238,902
Install PRV including vault	2	ea	$ 15,000.00	$30,000
Tie-ins to existing waterline	1	ea	$ 5,000.00	$5,000
Install new fire hydrant	10	ea	$ 4,000.00	$40,000
6"-8" gate valve	10	ea	$ 1,500.00	$15,000
Erect new 100k-gal bolted steel tank	0	ea	$ 120,000.00	$0
Level controls - 100k tank	0	ls	$ 1,000.00	$0
SUBTOTAL				$1,023,902
CONTINGENCIES				
Plus 20% contingency				$204,780
Plus 5% inflation factor				$51,195
ENGINEERING				
Pre-design Services			$30,000	
Plans & Specifications			$150,000	
Bid Assistance			$10,000	
Project Management			$10,000	
Construction Management			$74,675	
TOTAL ENGINEERING COSTS				$274,675
FORMATION COSTS				
District Formation Expenses			$10,000	
Trustee Fees			$3,000	
Printing			$8,000	
Financial Advisor Fee			$20,000	
Bond Counsel			$39,954	
Bond Counsel/Disclosure Counsel Expenses			$6,768	
Disclosure Counsel			$23,757	
Contingency			$10,000	
TOTAL FORMATION COSTS				$121,479
BOND ISSUANCE COSTS				
Bond Reserve (10%)			$167,603	
Original Issue Discount (1.5%)			$25,140	
Bond Discount (2.5%)			$41,901	
TOTAL BOND ISSUANCE COSTS				$234,644
TOTAL COST				$1,910,676

Section 4: Assessment Role and Method of Assessment Spread

WHEREAS, ____________________, 2006 the Board of Directors of the PAJARO/SUNNY MESA COMMUNITY SERVICES DISTRICT, State of California, did, pursuant to the provisions of the 1913 Act, the "Municipal Improvement Act of 1913,' being Division 12 of the Streets and Highways Code, of the State of California, adopt its Resolution of Intention No. _____, for the installation, construction and acquisition of certain public improvements, together with appurtenances and appurtenant work in connection therewith, in a special assessment district know and designated as

Hudson Landing Assessment District

(hereinafter referred to as the "Assessment District"); and

WHEREAS, said Resolution of Intention, as required by law, did direct the Engineer of Work to make and file a "Report" consisting of the following required by Section 10204 of the Act:

1. Plans
2. Specifications
3. Cost Estimates
4. Assessment Diagram showing the Assessment District and the subdivisions of land therein
5. A proposed assessment of the costs and expenses of the works of improvement levied upon the parcels within the boundaries of the Assessment District
6. The proposed maximum annual assessment to be levied upon each subdivision or parcel of land within the Assessment District to pay the costs incurred by the City and not otherwise reimbursed resulting from the administration and collection of assessments or from the administration and registration of any associated bonds and reserve or other related funds.

For particulars, reference is made to the Resolution of Intention as previously adopted.

NOW, THEREFORE, I Thomas E. Yeager, P.E., the authorized representative of Kennedy/Jenks Consultants, pursuant to Article XIIID of the California Constitution and the "Municipal Improvement Act of 1913", do hereby submit the following:

1. Pursuant to the provisions of the law and the Resolution of Intention, I have assessed the costs and expenses of the works of improvements to be performed in the Assessment District upon parcels of land in the Assessment District specially benefited thereby in direct proportion and relation to the estimated special benefits received by each of said parcels. For particulars as to the identification of said parcels, reference is made to Assessment Diagram, a copy of which is attached hereto.

2. As required by law, a Diagram is hereto attached, showing the Assessment District as well as boundaries of the respective parcels and subdivisions of land within said District

as the same existed at the time of passage of said Resolution of Intention, each of which subdivisions of land or parcels or lots respectively have been given a separate number upon said diagram and in said Assessment Role.

3. The subdivisions and parcels of land, the numbers therein as shown on the respective Assessment Diagram as attached hereto, correspond with the numbers as appearing on the Assessment Roll as contained herein.

4. NOTICE IS HEREBY GIVEN that bonds will be issued in accordance with Division 10 of Streets and Highways Code of the State of California (the "Improvement Bond Act of 1915"), to represent all unpaid assessments, which bonds shall be issued not to exceed the maximum term as authorized by law, thirty-nine (39) years, FROM THE 2nd DAY OF SEPTEMBER NEXT SUCCEEDING TWELVE (12) MONTHS FROM THEIR DATE. Said bonds shall bear interest at a rate not to exceed the current maximum rate of 12% per annum.

5. By virtue of the authority contained in said "Municipal Improvement Act of 1913", and by further direction and order of the legislative body, I hereby recommend the following Assessment to cover the cost the costs and expenses for the acquisition of improvements for the Assessment District based on the costs and expenses as set forth below.

DESCRIPTION	AS PRELIMINARILY APPROVED	AS CONFIRMED
Estimated Cost of Construction	$1,554,553	
Estimated Formation Costs	$121,479	
Estimated Bond Costs	$234,644	
Estimated Total to Assessment	$1,910,676	

6. The METHOD of Spread of Assessment is as set forth in Exhibit "A" which is attached hereto, reference and so incorporated.

DATED: ____________________, 2006 KENNEDY/JENKS CONSULTANTS

____

THOMAS E. YEAGER, P.E.
RCE No. 48014
ASSESSMENT ENGINEER

4.1 ASSESSMENT ROLE

See Table 2 on the following pages

TABLE 2:
HUDSON LANDING
PRELIMINARY ASSESSMENT ROLE

K/J Parcel # (Sheet - #)	APN	Owner Address	Zoning	# DU	# PCA	Dwelling Unit Assessment Meter/Connection Asessment	Dwelling Unit Assessment Project Cost Assessment	Total Dwelling Unit Assessment	Area (acres)	Area Assessment	Total Assessment	Estimated Annual Assessment 6%–25 years
16	117-141-006	Fernandes, Jose O and Maria L	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	8.29	$25,252	$48,658	$ 3,806.54
16		136 Hudson Landing Rd.										
16		Watsonville, CA 95076-5409										
17	117-131-007	Cruz, Aurthur V and Maria Elena	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	2.50	$7,615	$31,022	$ 2,426.83
17		100 Hudson Landing Rd.										
17		Watsonville, CA 95076-5409										
18	117-142-001	Oriofre, Marielo	LDR-2	2	2	$ 13,338.00	$33,475	$46,813	1.21	$3,686	$50,499	$ 3,950.53
18		145 Hudson Landing Rd.										
18		Watsonville, CA 95076-5408										
19	117-142-002	County of Monterey	LDR-2	0	1	$ -	$16,738	$16,738	0.31	$944	$17,682	$ 1,383.26
19		Salinas, CA 93901										
20	117-171-010	Maurer, Paul F	LDR-2	0	1	$ -	$16,738	$16,738	0.23	$701	$17,438	$ 1,364.19
20		P.O. Box 3211										
20		Huntington Beach, CA 92605-3211										
21	117-171-018	Korach, Nancy L	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	0.50	$1,523	$24,930	$ 1,950.25
21		167 Hudson Landing Rd.										
21		Watsonville, CA 95076-5408										
22	117-141-007	Zamara Manuel	LDR-2	2	2	$ 13,338.00	$33,475	$46,813	0.54	$1,645	$48,458	$ 3,790.88
22		152 Hudson Landing Rd.										
22		Watsonville, CA 95076-5409										
23	117-141-008	Gonzales, Gualberto and Maria	LDR-2	2	2	$ 13,338.00	$33,475	$46,813	2.23	$6,793	$53,606	$ 4,193.59
23		170 Hudson Landing Rd.										
23		Watsonville, CA 95076-5409										
24	117-141-027	Herdandez, Ofelia	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	0.25	$762	$24,168	$ 1,890.67
24		20 Spring Road										$ -
24		Watsonville, CA 95076										
25	117-141-026	Rousseau, Dennis R and Maggie Arnold	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	3.00	$9,138	$32,545	$ 2,545.97
25		P.O. Box 54										
25		Moss Landing, CA 95039-0054										
26	117-141-004	Heinrich, Jeffrey W	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	3.91	$11,910	$35,317	$ 2,762.82
26		50 Spring Rd.										
26		Watsonville, CA 95076-5417										
27	117-141-003	Cavesuela, Agapito M and Olga V	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	0.91	$2,768	$26,175	$ 2,047.68
27		64 Spring Rd.										
27		Watsonville, CA 95076-5417										
28	117-141-002	Perez, Filiberto	LDR-2	2	2	$ 13,338.00	$33,475	$46,813	1.28	$3,899	$50,712	$ 3,967.21
28		68 Spring Rd.										
28		Watsonville, CA 95076-5417										
31	117-141-022	Moran, Julie	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	1.00	$3,046	$26,453	$ 2,069.39
31		89 Spring Rd.										
31		Watsonville, CA 95076-5416										
32	117-141-021	Butterworth, David L and Robin	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	1.78	$5,422	$28,829	$ 2,255.26
32		71 Spring Rd										
32		Watsonville, CA 95076-5416										
33	117-141-020	Healey, Timothy J.	LDR-2	1	1	$ 6,669.00	$16,738	$23,407	11.50	$35,029	$58,436	$ 4,571.45
33		4132 De Mille Dr.										
33		San Jose, cA 95117-3101										
34	117-141-019	Sanchez, Ascencion G and Evangalina B	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	3.44	$10,477	$33,884	$ 2,650.72
34		61 Spring Rd.										
34		Watsonville, CA 95076-5416										
35	117-141-018	Eaton, Arthur and Tracy	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	1.15	$3,503	$26,910	$ 2,105.14
35		59 Spring Road										
35		Watsonville, CA 95076										
36	117-141-016	Uquillas, Alex 7 Michelle	Res 1C	1	1	$ 6,669.00	$16,738	$23,407	3.52	$10,722	$34,129	$ 2,669.89
36		8001 San Miguel Canyon Rd #155										
36		Salinas, CA 93907										
37	117-141-017	Rodriguez, Frank G.	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	1.07	$3,259	$26,666	$ 2,086.07
37		412 Cliff St.										
37		Santa Cruz, CA 95060										
38	117-141-024	Tapia Francisco and Maria R. Vidrio	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.40	$1,211	$24,618	$ 1,925.87
38		23 Spring Rd.										

TABLE 2:
HUDSON LANDING
PRELIMINARY ASSESSMENT ROLE

K/J Parcel # (Sheet - #)	APN	Owner / Address	Zoning	# DU	# PCA	Dwelling Unit Assessment: Meter/Connection Asessment	Dwelling Unit Assessment: Project Cost Assessment	Total Dwelling Unit Assessment	Area (acres)	Area Assessment	Total Assessment	Estimated Annual Assessment 6%--25 years
38		Watsonville, CA 95076-5416										
39	117-141-025	Clark, Melvn Eugene and Judie Mae	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.42	$1,286	$24,692	$ 1,931.69
39		21 Spring Rd.										
39		Watsonville, CA 95076-5416										
40	117-141-014	Sepulveda, Victor and Irma	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	3.43	$10,448	$33,855	$ 2,648.44
40		57 Spring Rd.										
40		Watsonville, CA 95076-5416										
41	117-141-012	Cortez, Felipe and Felicitas O	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.28	$868	$24,274	$ 1,898.97
41		19 Spring Rd.										
41		Watsonville, CA 95076-5416										
42	117-141-011	Leavitt, Eric A and Dawn M	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.28	$853	$24,260	$ 1,897.82
42		13 Spring Rd.										
42		Watsonville, CA 95076-5416										
43	117-141-010	Parker, Richard E and Carol A	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.27	$837	$24,244	$ 1,896.61
43		11 Spring Rd.										
43		Watsonville, CA 95076-5416										
44	117-141-009	Matlock, Edwin H and Mary B	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.22	$672	$24,078	$ 1,883.66
44		1961 Main St. PMB 168										
44		Watsonville, CA 95076-3027										
45	117-141-013	Vargas, Ruben & Maria S, Juana, and Leticia	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	4.73	$14,408	$37,814	$ 2,958.22
45		180 Hudson Landing Rd.										
45		Watsonville, CA 95076-5409										
46	117-171-016	Estrada, Francisco and Elia	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	3.77	$11,484	$34,890	$ 2,729.46
46		171 Hudson Landing Rd.										
46		Watsonville, CA 95076-5408										
47	117-171-009	Deestrada, Angelita	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.45	$1,358	$24,765	$ 1,937.36
47		189 Hudson Landing Rd.										
47		Watsonville, CA 95076-5408										
48	117-171-008	Gonzales, Mario R.	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.30	$914	$24,320	$ 1,902.59
48		191 Hudson Landing Road										
48		Watsonville, CA 95076										
49	117-171-007	Cluster, James Franklin	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.28	$850	$24,257	$ 1,897.63
49		193 Hudson Landing Rd.										
49		Watsonville, CA 95076-5408										
50	117-171-006	Carlson, Bruce P and Susan W	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.30	$909	$24,316	$ 1,902.22
50		195 Hudson Landing Rd.										
50		Watsonville, CA 95076-5408										
51	117-171-005	Espiritu, Isabel Robancho	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	1.50	$4,567	$27,974	$ 2,188.41
51		209 Hudson Landing Rd.										
51		Watsonville, CA 95076-5410										
52	117-171-013	Lopez, Revocable Living Trust	Rural 3E	3	3	$ 20,007.00	$50,213	$70,220	5.18	$15,785	$86,004	$ 6,728.13
52		211 Hudson Landing Rd.										
52		Watsonville, CA 95076-5410										
53	117-171-003	Maldonaldo, Aurelio and Claudia	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.81	$2,467	$25,874	$ 2,024.12
53		219 Hudson Landing Rd.										
53		Watsonville, CA 95076-5410										
54	117-171-002	Nunez, Mario Antonio	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.58	$1,767	$25,173	$ 1,969.31
54		221 Hudson Landing Rd.										
54		Watsonville, CA 95076-5410										
55	117-171-001	Rodriguez, Alex & Michelle	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.81	$2,467	$25,874	$ 2,024.12
55		225 Hudson Landing Rd										
55		Watsonville, CA 95076-5410										
56	117-151-005	Gomez, Herbert T and Martha V	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	2.90	$8,833	$32,240	$ 2,522.15
56		200 Hudson Landing Rd.										
56		Watsonville, CA 95076-5410										
57	117-151-001	Baisa, Joe and Andrea R	Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	2.00	$6,092	$29,499	$ 2,307.68
57		240 Carnation Dr.										
57		Freedom, CA 95019-3130										
58	117-151-003	BJ - CR Inc.	Rural 4C	1	1	$ 6,669.00	$16,738	$23,407	14.00	$42,644	$66,051	$ 5,167.18
58		830 Chateau Dr.										
58		Hillsborough, CA 94010-6507										

TABLE 2:
HUDSON LANDING
PRELIMINARY ASSESSMENT ROLE

K/J Parcel # (Sheet - #)	APN	Owner Address		Zoning	# DU	# PCA	Dwelling Unit Assessment: Meter/Connection Asessment	Dwelling Unit Assessment: Project Cost Assessment	Total Dwelling Unit Assessment	Area (acres)	Area Assessment	Total Assessment	Estimated Annual Assessment 6%–25 years
59	117-151-007	Ramerez, Maria J.		Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	4.04	$12,306	$35,713	$ 2,793.80
59		240 Wells Rd.											
59		Watsonville, CA 95076-5448											
60	117-151-009	Jennings, Larry TRS		Res 8A--Road Right-of-way	0	0	$ -	$0	$0	0.00	$0	$0	$ -
60		1 Ironwood Dr.											
60		Soquel, CA 95073-3030											
61	117-151-008	Rodriguez, Ismael and Teresa		Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	2.55	$7,767	$31,174	$ 2,438.74
61		253 Hudson Landing Rd.											
61		Watsonville, CA 95076-5410											
62	117-161-006	Lopez, Enrique and Senobia		Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	2.03	$6,195	$29,601	$ 2,315.71
62		124 San Juan Rd.											
62		Watsonville, CA 95076-5237											
63	117-161-007	Salgado, Joseph A.		Res 1C	1	1	$ 6,669.00	$16,738	$23,407	0.50	$1,523	$24,930	$ 1,950.25
63		245 Hudson Landing Rd.											
63		Watsonville, CA 95076-5410											
64	117-161-008	Salgado, John P Sr. and Barbara J		Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	1.55	$4,708	$28,114	$ 2,199.39
64		245 Hudson Landing Rd.											
64		Watsonville, CA 95076-5410											
65	117-161-004	Lopez, Enrique and Senobia		Rural 3E	2	2	$ 13,338.00	$33,475	$46,813	2.00	$6,092	$52,905	$ 4,138.78
65		124 San Juan Rd.											
65		Watsonville, CA 95076-5237											
66	117-161-012	Martinez, Jamie and Francisco		Res 1C	1	1	$ 6,669.00	$16,738	$23,407	2.00	$6,092	$29,499	$ 2,307.68
66		261 Hudson Landing Rd.											
66		Watsonville, CA 95076-5410											
67	117-161-013	Lopez, Hilda		Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	1.36	$4,143	$27,549	$ 2,155.18
67		263 Hudnson Landing Road											
67		Watsonville, CA 95077-0746											
68	117-161-009	Martinez, Richard Lawrence & Patricia C.		Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	1.50	$4,569	$27,976	$ 2,188.54
68		277 Hudson Landing Rd.											
68		Watsonville, CA 95076-5410											
69	117-161-011	Martinez, Joseph A and Beatriz		Rural 3E	1	1	$ 6,669.00	$16,738	$23,407	0.50	$1,523	$24,930	$ 1,950.25
69		279 Hudson Landing Rd.											
69		Watsonville, CA 95076-5410											
71	117-161-010	Martinez, Richard Lawrence		8C--Well Lot	0	0	$ -	$0	$0	0.00	$0	$52,905	$ 4,138.78
71		277 Hudson Landing Rd.											
71		Watsonville, CA 95076-5410											
70	117-161-001	Martinez, Manuel M and Terry C		Rural 3E	2	2	$ 13,338.00	$33,475	$46,813	2.00	$6,092	0	
70		319 Hudson Landing Rd.											
70		Watsonville, CA 95076-5433											
72	117-151-004	BJ - CR Inc.		Rural 4C	0	1	$ -	$16,738	$16,738	53.53	$163,054	$179,792	$ 14,065.12
72		830 Chateau Dr.											
72		Hillsborough, CA 94010-6507											
		TOTAL			58	61				165.09			
TOTAL COST			$1,910,676										
CONNECTION &METER FEES		$ 6,669.00	$386,802				$ 386,802.00	$ 1,020,995.52			$ 502,878.39	$ 1,910,675.91	
TOTAL COST LESS CONNECTION FEES			$1,523,874										
DWELLING UNIT ASSESSMENT			$1,020,996	67%									
AREA ASSESSMENT			$502,878	33%									

4.2 METHOD AND FORMULA OF ASSESSMENT SPREAD

Since the improvements are to be funded by the levying of assessments, the "Municipal Improvements Act of 1913" and Article XIID of the State Constitution require that assessments must be based on the estimated special benefit that the properties receive from the works of improvement. In addition, Article XIIID, Section 4, of the State Constitution requires that a parcel's assessment may not exceed the reasonable cost of the proportional benefit conferred on that parcel. Section 4 provides that only special benefits are assessable and the local agency levying the assessment must separate the general benefits from the special benefits. It also requires that publicly owned property that benefit form the improvements be assessed.

Neither the Act nor the State Constitution specifies the method or formula that should be sued to apportion the costs to properties in any special assessment district proceedings. The responsibility for recommending an apportionment of the costs to properties which specially benefit from the improvements rests with the Assessment Engineer, who is appointed for the purpose of making an analysis of the facts and determining the correct apportionment of the assessment obligation. In order to apportion the assessments to each parcel in direct proportion with the special and direct benefit which it will receive from the improvements, an analysis has been completed and is sued as the basis for apportioning costs to each property within the Assessment District as explained below.

Based upon a review of the development conditions an analysis of the special and direct benefit to be received by each parcel from the construction of the works or improvements, the Assessment Engineer recommends the apportionment of costs as outlined below. The final authority and action rest with the Board of Directors after hearing all testimony and evidence presented at a public hearing and tabulating the assessment ballots previously mailed to all record owners of property within the Assessment district. Upon the conclusion of the public hearing, the Board of Directors must make a final determination whether or not the assessment spread has been made in direct proportion to estimated special benefits received by each parcel within the Assessment District. Ballot tabulation will be finalized at that time and, if a majority of ballots, weighted by the assessment amount, are in support of the Assessment District, then the Board of Directors may form the Assessment District and levy the special assessment against the parcels therein.

The following sections define the special and general benefits and set forth the methodology used to apportion the costs of improvements to each parcel, and confirm that the Assessments are reasonable and justified.

4.2.1 General and Special Benefits

It has been determined that all water system improvements are a special benefit to the Assessment District, and that no general benefits are attributable to the existing Pajaro/Sunny mesa Community Services District.

4.2.1.1 General Benefits

There are no general benefits and all improvement costs are apportioned to the properties within the Assessment District.

4.2.1.2 Apportionment of Special Benefits

Individual properties receive special benefits from the new water distribution system. These benefits are associated with:

- Improved domestic potable water service
- Improved exterior irrigation water supply
- Improved fire protection
- Improved ability to subdivide developable land.

Therefore, the costs are apportioned to each parcel based on

- Number of existing dwelling units on each parcel,
- Acreage of each parcel

Sixty-seven (67%) percent of the total project cost, less the actual meter cost and the appropriate connection fee, will be charged in proportion to the number of units to be served on a property. Thirty-three (33%) of the total project cost, less the actual meter cost and the appropriate connection fee, will be charged in proportion to the acreage of each parcel.

The cost of water meters and connection fees will be charged to individual properties in conformance with the existing ordinances of the Pajaro/ Sunny Mesa Community Services District.

Project costs shall include all:

- Construction costs
- District meter and connection fees
- Contingencies
- Engineering fees
- District formation costs
- Bond issuance costs

4.3 True Value of Parcels

See Table 3 on the following pages.

TABLE 3:
HUDSON LANDING
TRUE VALUE OF PARCELS

DATE: 01-23-06					
K/J Parcel # (Sheet - #)	APN	Owner Address	Total Assessment	Land Value	True Value
16	117-141-006	Fernandes, Jose O and Maria L	$48,937	$89,255	$178,510
16		136 Hudson Landing Rd.			
16		Watsonville, CA 95076-5409			
17	117-131-007	Cruz, Aurthur V and Maria Elena	$31,301	$31,842	$63,684
17		100 Hudson Landing Rd.			
17		Watsonville, CA 95076-5409			
18	117-142-001	Oriofre, Marielo	$51,057	$254,667	$509,334
18		145 Hudson Landing Rd.			
18		Watsonville, CA 95076-5408			
19	117-142-002	County of Monterey	$17,961		$0
19		Salinas, CA 93901			
20	117-171-010	Maurer, Paul F	$17,717	$15,307	$30,614
20		P.O. Box 3211			
20		Huntington Beach, CA 92605-3211			
21	117-171-018	Korach, Nancy L	$25,209	$42,856	$85,712
21		167 Hudson Landing Rd.			
21		Watsonville, CA 95076-5408			
22	117-141-007	Zamara Manuel	$49,016	$108,101	$216,202
22		152 Hudson Landing Rd.			
22		Watsonville, CA 95076-5409			
23	117-141-008	Gonzales, Gualberto and Maria	$54,164	$14,906	$29,812
23		170 Hudson Landing Rd.			
23		Watsonville, CA 95076-5409			
24	117-141-027	Herdandez, Ofelia	$24,447		$0
24		20 Spring Road			
24		Watsonville, CA 95076			
25	117-141-026	Rousseau, Dennis R and Maggie Arnold	$32,824	$129,149	$258,298
25		P.O. Box 54			
25		Moss Landing, CA 95039-0054			
26	117-141-004	Heinrich, Jeffrey W	$35,596	$63,691	$127,382
26		50 Spring Rd.			
26		Watsonville, CA 95076-5417			
27	117-141-003	Cavesuela, Agapito M and Olga V	$26,454	$11,936	$23,872
27		64 Spring Rd.			
27		Watsonville, CA 95076-5417			
28	117-141-002	Perez, Filiberto	$34,254	$56,768	$113,536
28		68 Spring Rd.			
28		Watsonville, CA 95076-5417			
31	117-141-022	Moran, Julie	$26,732	$89,648	$179,296
31		89 Spring Rd.			
31		Watsonville, CA 95076-5416			
32	117-141-021	Butterworth, David L and Robin	$29,108	$128,523	$257,046
32		71 Spring Rd			
32		Watsonville, CA 95076-5416			
33	117-141-020	Healey, Timothy J.	$58,715	$332,652	$665,304
33		4132 De Mille Dr.			
33		San Jose, cA 95117-3101			
34	117-141-019	Sanchez, Ascencion G and Evangalina B	$34,163	$215,405	$430,810
34		61 Spring Rd.			
34		Watsonville, CA 95076-5416			
35	117-141-018	Eaton, Arthur and Tracy	$27,189	$65,991	$131,982
35		59 Spring Road			
35		Watsonville, CA 95076			
36	117-141-016	Uquillas, Alex 7 Michelle	$34,408	$213,920	$427,840
36		8001 San Miguel Canyon Rd #155			

TABLE 3:
HUDSON LANDING
TRUE VALUE OF PARCELS

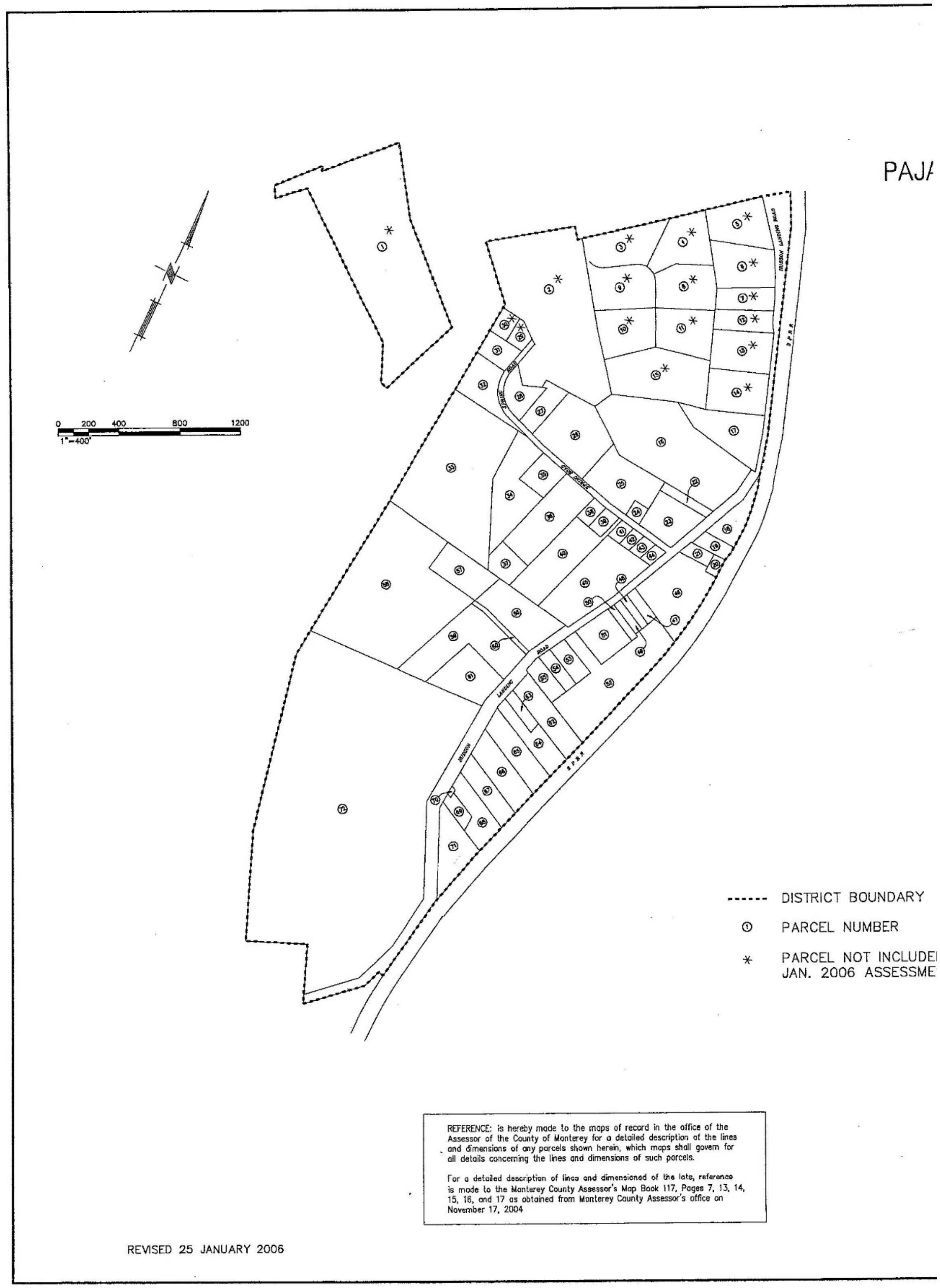
K/J Parcel # (Sheet - #)	APN	Owner Address	Total Assessment	Land Value	True Value
36		Salinas, CA 93907			
37	117-141-017	Rodriguez, Frank G.	$26,945	$7,956	$15,912
37		412 Cliff St.			
37		Santa Cruz, CA 95060			
38	117-141-024	Tapia Francisco and Maria R. Vidrio	$24,897	$38,276	$76,552
38		23 Spring Rd.			
38		Watsonville, CA 95076-5416			
39	117-141-025	Clark, Melvn Eugene and Judie Mae	$24,971	$8,873	$17,746
39		21 Spring Rd.			
39		Watsonville, CA 95076-5416			
40	117-141-014	Sepulveda, Victor and Irma	$34,133	$129,149	$258,298
40		57 Spring Rd.			
40		Watsonville, CA 95076-5416			
41	117-141-012	Cortez, Felipe and Felicitas O	$24,553	$7,956	$15,912
41		19 Spring Rd.			
41		Watsonville, CA 95076-5416			
42	117-141-011	Leavitt, Eric A and Dawn M	$24,538	$97,366	$194,732
42		13 Spring Rd.			
42		Watsonville, CA 95076-5416			
43	117-141-010	Parker, Richard E and Carol A	$24,523	$11,816	$23,632
43		11 Spring Rd.			
43		Watsonville, CA 95076-5416			
44	117-141-009	Matlock, Edwin H and Mary B	$24,357	$7,956	$15,912
44		1961 Main St. PMB 168			
44		Watsonville, CA 95076-3027			
45	117-141-013	Vargas, Ruben & Maria S, Juana, and Leticia	$38,093	$140,959	$281,918
45		180 Hudson Landing Rd.			
45		Watsonville, CA 95076-5409			
46	117-171-016	Estrada, Francisco and Elia	$35,169	$211,964	$423,928
46		171 Hudson Landing Rd.			
46		Watsonville, CA 95076-5408			
47	117-171-009	Deestrada, Angelita	$25,044	$67,309	$134,618
47		189 Hudson Landing Rd.			
47		Watsonville, CA 95076-5408			
48	117-171-008	Gonzales, Mario R.	$24,599	$135,075	$270,150
48		191 Hudson Landing Road			
48		Watsonville, CA 95076			
49	117-171-007	Cluster, James Franklin	$24,536	$11,142	$22,284
49		193 Hudson Landing Rd.			
49		Watsonville, CA 95076-5408			
50	117-171-006	Carlson, Bruce P and Susan W	$24,595	$84,111	$168,222
50		195 Hudson Landing Rd.			
50		Watsonville, CA 95076-5408			
51	117-171-005	Espiritu, Isabel Robancho	$28,253	$12,916	$25,832
51		209 Hudson Landing Rd.			
51		Watsonville, CA 95076-5410			
52	117-171-013	Lopez, Revocable Living Trust	$86,841		$0
52		211 Hudson Landing Rd.			
52		Watsonville, CA 95076-5410			
53	117-171-003	Maldonaldo, Aurelio and Claudia	$26,153	$116,580	$233,160
53		219 Hudson Landing Rd.			
53		Watsonville, CA 95076-5410			
54	117-171-002	Nunez, Mario Antonio	$25,452	$10,678	$21,356
54		221 Hudson Landing Rd.			
54		Watsonville, CA 95076-5410			
55	117-171-001	Rodriguez, Alex & Michelle	$26,153	$131,512	$263,024
55		225 Hudson Landing Rd			
55		Watsonville, CA 95076-5410			

TABLE 3:
HUDSON LANDING
TRUE VALUE OF PARCELS

K/J Parcel # (Sheet - #)	APN	Owner Address	Total Assessment	Land Value	True Value
56	117-151-005	Gomez, Herbert T and Martha V	$32,519	$80,773	$161,546
56		200 Hudson Landing Rd.			
56		Watsonville, CA 95076-5410			
57	117-151-001	Baisa, Joe and Andrea R	$29,778	$13,835	$27,670
57		240 Carnation Dr.			
57		Freedom, CA 95019-3130			
58	117-151-003	BJ - CR Inc.	$86,330	$54,813	$109,626
58		830 Chateau Dr.			
58		Hillsborough, CA 94010-6507			
59	117-151-007	Ramerez, Maria J.	$35,992	$164,616	$329,232
59		240 Wells Rd.			
59		Watsonville, CA 95076-5448			
60	117-151-009	Jennings, Larry TRS	$0	$0	$0
60		1 Ironwood Dr.			
60		Soquel, CA 95073-3030			
61	117-151-008	Rodriguez, Ismael and Teresa	$31,453	$129,950	$259,900
61		253 Hudson Landing Rd.			
61		Watsonville, CA 95076-5410			
62	117-161-006	Lopez, Enrique and Senobia	$29,880	$45,933	$91,866
62		124 San Juan Rd.			
62		Watsonville, CA 95076-5237			
63	117-161-007	Salgado, Joseph A.	$25,209	$7,591	$15,182
63		245 Hudson Landing Rd.			
63		Watsonville, CA 95076-5410			
64	117-161-008	Salgado, John P Sr. and Barbara J	$28,393	$11,046	$22,092
64		245 Hudson Landing Rd.			
64		Watsonville, CA 95076-5410			
65	117-161-004	Lopez, Enrique and Senobia	$53,463	$94,508	$189,016
65		124 San Juan Rd.			
65		Watsonville, CA 95076-5237			
66	117-161-012	Martinez, Jamie and Francisco	$29,778	$72,402	$144,804
66		281 Hudson Landing Rd.			
66		Watsonville, CA 95076-5410			
67	117-161-013	Lopez, Hilda	$27,828	$89,049	$178,098
67		263 Hudhson Landing Road			
67		Watsonville, CA 95077-0746			
68	117-161-009	Martinez, Richard Lawrence & Patricia C.	$28,255	$10,830	$21,660
68		277 Hudson Landing Rd.			
68		Watsonville, CA 95076-5410			
69	117-161-011	Martinez, Joseph A and Beatriz	$25,209	$7,591	$15,182
69		279 Hudson Landing Rd.			
69		Watsonville, CA 95076-5410			
71	117-161-010	Martinez, Richard Lawrence	$53,463	$11,906	$23,812
71		277 Hudson Landing Rd.			
71		Watsonville, CA 95076-5410			
70	117-161-001	Martinez, Manuel M and Terry C	0	$0	$0
70		319 Hudson Landing Rd.			
70		Watsonville, CA 95076-5433			
72	117-151-004	BJ - CR Inc.	$180,071	$113,080	$226,160
72		830 Chateau Dr.			
72		Hillsborough, CA 94010-6507			
		TOTAL	$1,910,676	$4,144,034	$8,008,268
		NOTE: The total assessed value of improvements within the Hudson Landing Assessment District is $1,910,676			

Section 5: Annual Administrative Assessment

The Pajaro/Sunny Mesa CSD may assess a fee of up to 2% of the total annual assessment to cover annual administrative cost. It is up to the Board's discretion whether to levy this administrative fee.


PAJ/
0 200 400 800 1200
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DISTRICT BOUNDARY
PARCEL NUMBER
PARCEL NOT INCLUDEI
JAN. 2006 ASSESSME
REFERENCE: is hereby made to the maps of record in the office of the Assessor of the County of Monterey for a detailed description of the lines and dimensions of any parcels shown herein, which maps shall govern for all details concerning the lines and dimensions of such parcels.
For a detailed description of lines and dimensioned of the lots, reference is made to the Monterey County Assessor's Map Book 117, Pages 7, 13, 14, 15, 16, and 17 as obtained from Monterey County Assessor's office on November 17, 2004
REVISED 25 JANUARY 2006

Section 7: Description of Facilities

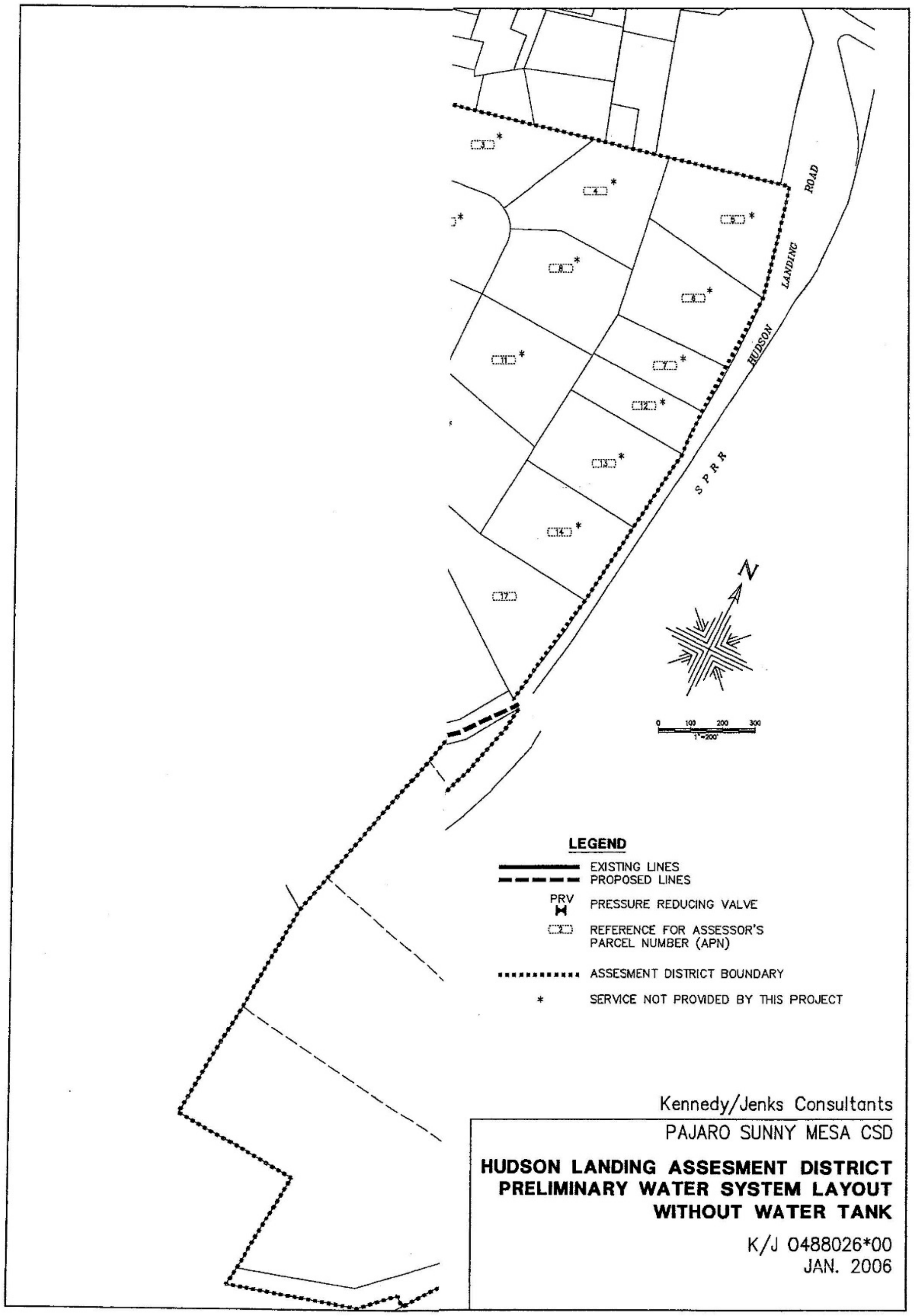
Section 10100 of the Act provides for the legislative body of any special purpose district to finance certain capital facilities and services within or along any public right-of-way or easement. The following is a list of proposed improvements as allowed under the Act to be constructed, acquired, installed, maintained, repaired or improved under provisions of the Act. For the general location of the improvements to be constructed references is hereby made to the plans and Specifications described in Section 2 of this report.

For areas contained in the proposed Assessment District boundary the proposed improvements are:

1. Domestic waterline, valves, pressure reducing valves, fire hydrants, and associated appurtenances; and including any easements required for construction
2. Water meters, meter boxes, and services lines within the public right-of-way
3. Connection fee as required by the Pajaro/Sunny Mesa for new services

The final plans will be prepared in accordance with district standards, and in accordance with the appropriate requirements of the State of California, Department of Health Services.

See following page for a preliminary layout of the water system improvements.


ROAD
LANDING
HUDSON
S P R R
N
0 100 200 300
1"=200'
LEGEND
EXISTING LINES
PROPOSED LINES
PRV
PRESSURE REDUCING VALVE
REFERENCE FOR ASSESSOR'S PARCEL NUMBER (APN)
ASSESMENT DISTRICT BOUNDARY
SERVICE NOT PROVIDED BY THIS PROJECT
Kennedy/Jenks Consultants
PAJARO SUNNY MESA CSD
HUDSON LANDING ASSESMENT DISTRICT
PRELIMINARY WATER SYSTEM LAYOUT
WITHOUT WATER TANK
K/J 0488026*00
JAN. 2006

APPENDIX 7

Conceptual Water Distribution System Layouts

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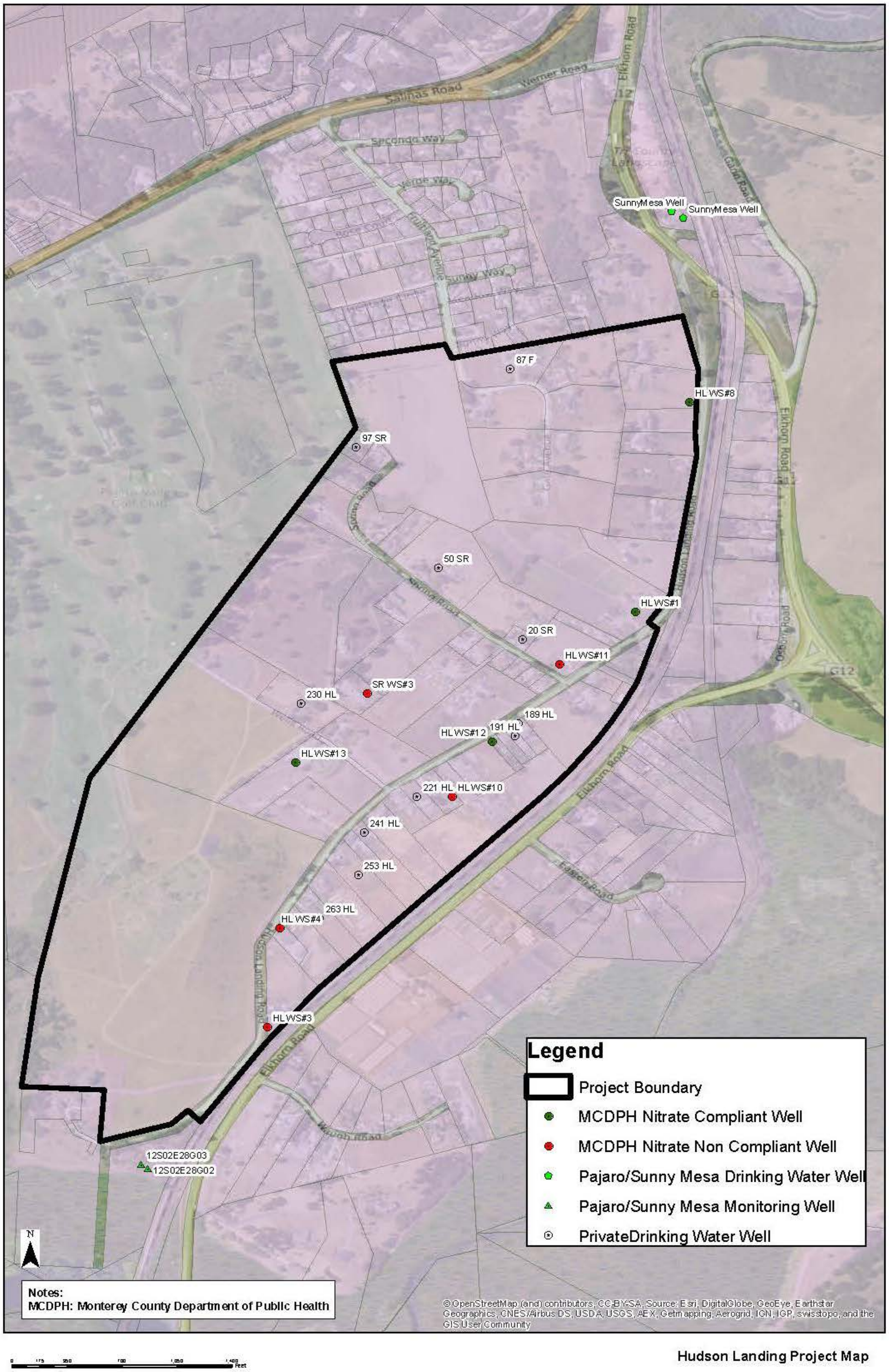
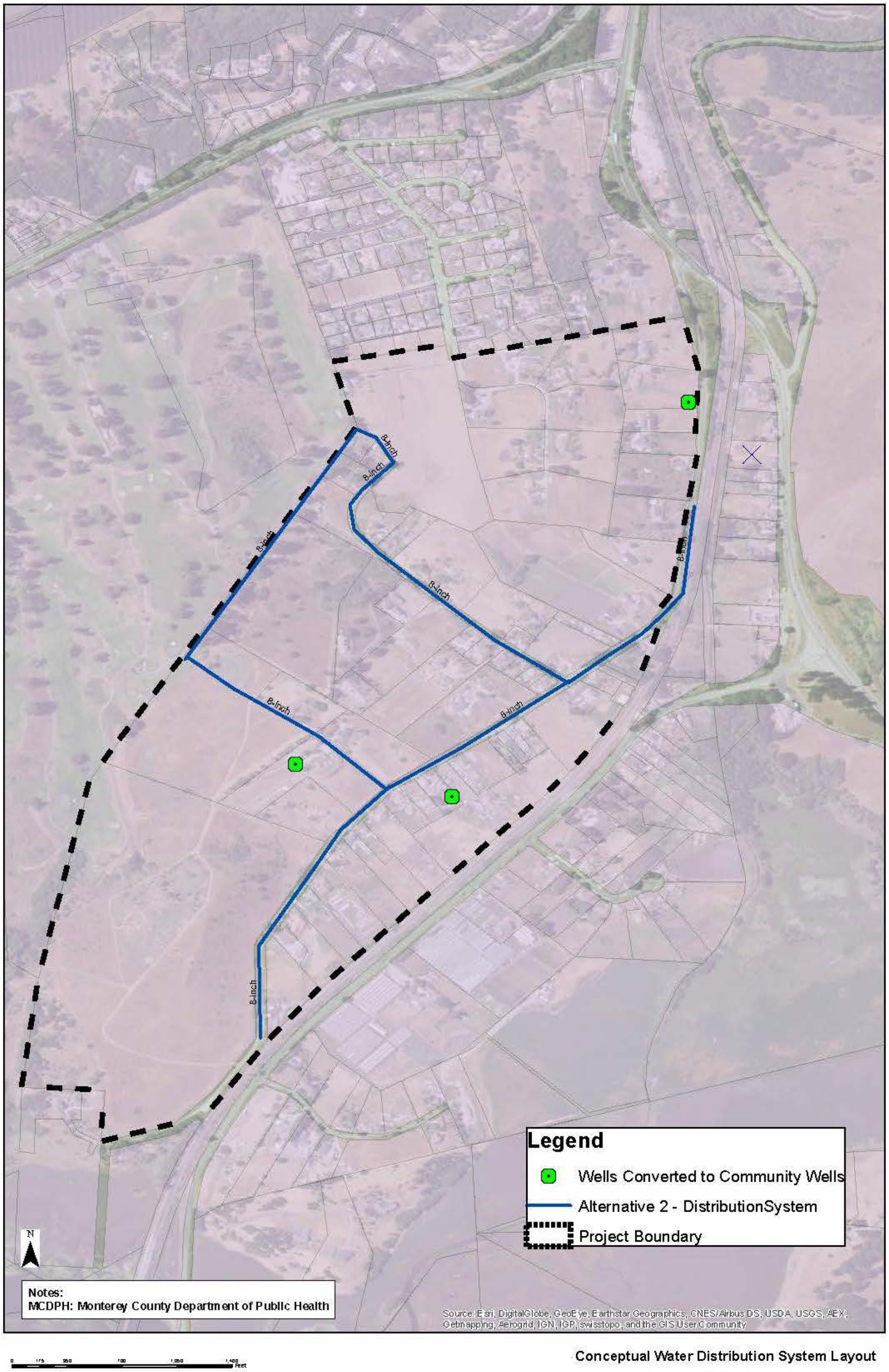
Alternative 1: Wellhead Treatment for All Wells

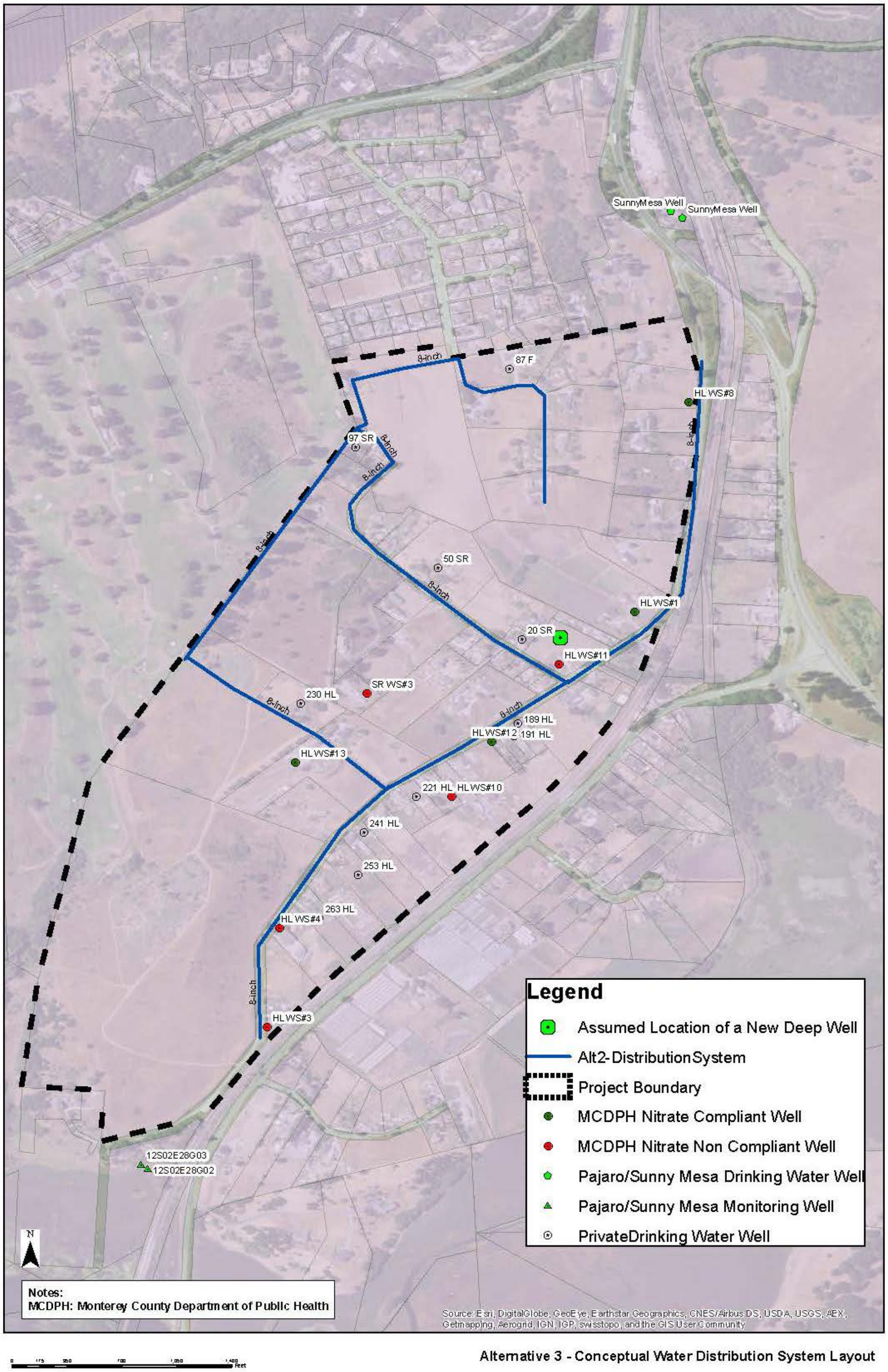


Alternative 2: Wellhead treatment for select wells



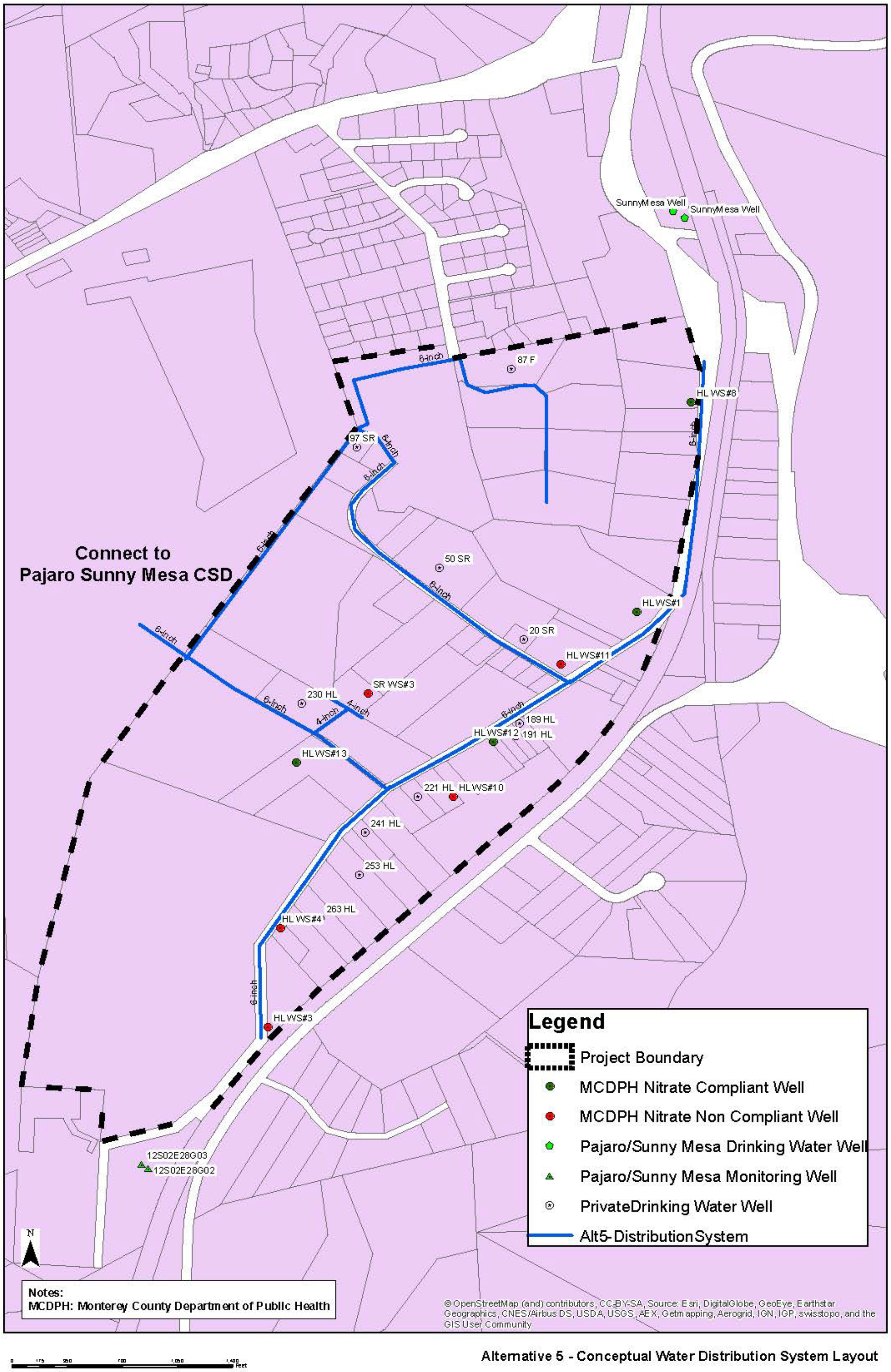
2

Alternative 3: Installation of new deep wells



Alternative 3 - Conceptual Water Distribution System Layout

Alternative 5: Interconnect with the municipal water system



Alternative 5 - Conceptual Water Distribution System Layout

APPENDIX 8

Cost Estimates

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Alternative 2
Wellhead Treatment for All Wells

The costs for this alternative are related primarily to the individual well testing and the treatment package for each location. There will be some engineering design costs related to the analysis of the test results and determination of the treatment method. Residents would have ongoing maintenance and monitoring costs for their systems. No water distribution system is required.

Project Costs:

Alternative 1 - Wellhead Treatment for all wells					
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	**Notes**
Construction Cost Estimate					
Treatment at Well	EA	50	$ 10,000	$ 500,000	Asssumed 50 total wells (permitted and private) within Project Boundary
1-inch piping from well to houses	LF	5000	$ 30	$ 150,000	
1-inch piping from well to septic tank	LF	5000	$ 30	$ 150,000	
Construction Subtotal				**$ 800,000**	
Estimate Indirect Costs					
Well Testing	EA	50	$ 2,500	$ 125,000	
Design Engineering		5%		$ 40,000	
Legal and Permits		2%		$ 16,000	
Subtotal Indirect Costs				**$ 181,000**	
Contingency		30%		$ 294,300.00	
Total Estimate Project Cost				**$ 1,275,300**	
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	
Operation and Maintenance Cost Estimate					
Annual Maintenance Cost	EA	50	$ 1,500	$ 75,000	
Energy Cost - Well Pumping	kWh	25,000	$ 0.130	$ 3,250	500 kWh at each well x 50 wells
Regulatory Cost fo Well Testing	EA	50	$ 1,000	$ 50,000	
Contingency		30%		$ 38,475	
Total Estimate Annual O&M Cost				**$ 166,725**	

Alternative 2
Wellhead Treatment for Select Wells

1. Project Costs - The distribution system would be for domestic use only without fire hydrants; therefore a 6" PVC system would be satisfactory. It is assumed that 3 wells would be identified for treatment packages. One recommended well is the existing well serving the 7 properties at the end of Fruitland Road, but this well would not be connected to the Hudson Landing Road network thus saving considerable water line installation costs. The following are the estimated project costs and annual O&M cost:

Alternative 2 - Wellhead treatment for selected 3 wells					
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	**Notes**
Construction Cost Estimate					
Hexavalent Chromium Well Head Treatment	LS	2	$ 105,000	$ 210,000	Quote from Evoqua; 25 gpm facility each; Two Sites
Nitrate Well Head Treatment	LS	1	$ 384,000	$ 384,000	Quote from Evoqua; 25 gpm facility each; One Site
New submersible pumps	LS	3	$ 5,000	$ 15,000	35 gpm each pump
Site grading, foundation and yard piping	LS	1	$ 100,000	$ 100,000	
Install 6" Water Line within Hudson Landing Project Boundary	LS	9,650	$ 90	$ 868,500	Assuming the new distrubtution system can be tied to the distribution system for well WS #8.
Install new 6-inch gate valves	LS	16	$ 1,700	$ 27,200	
Install new 1-inch service connection tie-in	LS	80	$ 2,800	$ 224,000	
Install PRV with vault	LS	2	$ 10,000	$ 20,000	
Storage Tank (50,000 gallon)	LS	1	$ 130,000	$ 130,000	Storage to equalize peak. $100,000 (escalated to $130,000) - RS Means 2007
Construction Subtotal				**$ 1,978,700**	
Estimate Indirect Costs					
Geotechnical Engineering	LS	1	$ 75,000	$ 75,000	
Surveying	LS	1	$ 25,000	$ 25,000	
Design Engineering		10%		$ 197,870	
Construction Services and Startup		7%		$ 138,509	
Legal and Permits		2%		$ 39,574	
Subtotal Indirect Costs				**$ 475,953**	
Contingency		30%		$ 736,395.90	
Total Estimate Project Cost				**$ 3,191,049**	
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	
Annual Operation and Maintenance Cost Estimate					
Annual Maintenance Cost	LS	1	$ 30,000	$ 30,000	
Labor Cost for Treatment and Distribution System	hr	1248	$ 100	$ 124,800	24hrs/week from a certified operator
Energy Cost - Well Pumping	kWh	30000	$ 0.130	$ 3,900	3 pumps - Each 35 gpm @ 200' TDH pumping 24x7
Resin Replacement - Hexavalent Chrominum	LS	1	$ 7,230	$ 7,230	Quote from Evoqua for 25 gpm facility
Resin Replacement - Nitrate	LS	1	$ 163,000	$ 163,000	Quote from Evoqua for 25 gpm facility
Regulatory Cost for Well Treatment Facility	LS	1	$ 5,000	$ 5,000	
Contingency		30%		$ 100,179	
Total Estimate Annual O&M Cost				**$ 434,109**	

2. Loan Costs – Since it is doubtful that this alternative would be eligible for a USDA loan/grant, it is assumed that the residents would be responsible for paying off the loan. Since it would be an unsecured loan, it can be assumed that it would be some form of conventional loan for 20 years. There could be some cost-share funding from a state program, but for this analysis, it is assumed that there would be none. The cost for the loan repayment is as follows:

- The rates for unsecured conventional loans could range between 5% - 7.5%. A 5% rate is used in these calculations.
- Monthly payments approximately $3,191,049 @ 5% = $21,060/month or $263/month/household

3. Ongoing Maintenance and Operations - An administrative authority would have to be established to maintain and monitor the system. Residents would be charged a monthly fee for the administration and operation of their system. A monthly O&M payment for approximately $434,109 = $36,176/month or $452/month/household.

Alternative 3

Installation of New Deep Wells

1. Project Costs - The distribution system would be for domestic use only without fire hydrants; therefore a 6" PVC system would be satisfactory. It is assumed that 1 deep well locations would be identified for treatment packages. All 80 properties would be served by this system. No fire service would be included so 6" PVC water mains would be satisfactory. The following are the project costs:

Alternative 3 - Installation of a new deep well					
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	**Notes**
Construction Cost Estimate					
Drill, install and test one (1) new deep well - 30	LS	1	$ 24,000	$ 24,000	$60.5/LF (escalated to 80/LF) - RS Means 2007
Submersible Pump	EA	1	$ 5,000	$ 5,000	$3,875/ea (escalated to $5000/LF) - RS Means 2007
Hexavalent Chromium Well Head Treatment	LS	1	$ 105,000	$ 105,000	Quote from EvoquaTreat 36 gpm avg day demand;
Site grading, foundation and yard piping	LS	1	$ 75,000	$ 75,000	
Install 6" Water Line within Hudson Landing Project Boundary	LF	13,110	$ 90	$ 1,179,900	
Install new 6-inch gate valves	EA	16	$ 1,700	$ 27,200	
Install new 1-inch service connection tie-in	EA	80	$ 2,800	$ 224,000	
Install PRV with vault	EA	2	$ 10,000	$ 20,000	
Storage Tank (50,000 gallon)	EA	1	$ 130,000	$ 130,000	Storage to equalize peak. $100,000 (escalated to 2=$130,000) - RS Means 2007
Construction Subtotal				**$ 1,790,100**	
Estimate Indirect Costs					
Geotechnical Engineering	LS	1	$ 75,000	$ 75,000	
Surveying	LS	1	$ 25,000	$ 25,000	
Design Engineering		10%		$ 179,010	
Construction Services and Startup		7%		$ 125,307	
Legal and Permits		2%		$ 35,802	
Subtotal Indirect Costs				**$ 440,119**	
Contingency		30%		$ 669,065.70	
Total Estimate Project Cost				**$ 2,899,285**	
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	
Operation and Maintenance Cost Estimate					
Annual Maintenance Cost	LS	1	$ 20,000	$ 20,000	
Labor Cost for Treatment and Distribution System	hr	830	$ 100	$ 83,000	16hrs/week from a certified operator
Energy Cost - Well Pumping	kWh	20,000	$ 0.130	$ 2,600	35 gpm @ 250' TDH pumping 24x7
Resin Replacement	LS	1	$ 10,000	$ 10,000	Quote from Evoqua for 36 gpm facility
Regulatory Cost for Well Treatment Facility	LS	1	$ 5,000	$ 5,000	
Contingency		30%		$ 36,180	
Total Estimate Annual O&M Cost				**$ 156,780**	

2. Loan Costs – It is unlikely that this alternative would be eligible for a USDA loan/grant. The residents would be responsible for paying off the loan. Since it would be an unsecured loan, it can be assumed that it would be some form of conventional loan for 20 years. There could be some funding from a state program, but for this analysis, it is assumed that there would be none. The cost for the loan repayment is as follows:

- The rates for unsecured conventional loans could range between 5% - 7.5%. A 5% rate is used in these calculations.
- Monthly payments $2,899,285 @ 5% = $19,134/mo. or $239/mo./household

3. Ongoing Maintenance and Operations Costs - An administrative authority would have to be established to maintain and monitor the system. Residents would be charged a monthly fee for the administration and operation of their system. It is estimated that this monthly fee would be $163.

Alternative 4

Blending of Water from Select Wells

The distribution system would be for domestic use only without fire hydrants; therefore a 6” PVC system would be satisfactory. It is assumed that 2 deep well locations would be identified for treatment packages. All 80 properties would be served by this system. No fire service would be included so 6” PVC water mains would be satisfactory. It is assumed that 4 wells with the highest quality water in compliance would be selected.

No estimate will be conducted at this time due to the high degree of uncertainty in the water quality of the existing wells, the new well (s), and the blending requirements. In addition, the cost and benefits is marginal at best when considering the other alternatives.

Alternative 5

Interconnect With the Municipal Water System

1. Project Costs – This alternative is very similar to the 2006 engineering study conducted for the Pajaro/Sunny Mesa Community Service District (CSD). All 80 properties would be served by this system. The following are the project costs:

Alternative 5 - Interconnect with Pajaro/Sunny Mesa Municipal Water System					
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	**Notes**
Construction Cost Estimate					
Install 8" Water Line from Pajaro Sunny Mesa to Hudson Landin	LF	3,200	$ 100	$ 320,000	
Install 8" Water Line within Hudson Landing Project Boundary	LF	13,110	$ 100	$ 1,311,000	
Install new fire hydrants	EA	13	$ 8,000	$ 104,000	Typically, spaced one every 400 ft
Install new 8-inch gate valves	EA	16	$ 1,700	$ 27,200	
Install new 1-inch service connection tie-in	EA	80	$ 2,800	$ 224,000	One per household
Connection fees	EA	80	$ 5,000	$ 400,000	
Install PRV with vault	EA	2	$ 20,000	$ 40,000	
Water System Tie-Ins	EA	2	$ 10,000	$ 20,000	
Construction Subtotal				**$ 2,446,200**	
Estimate Indirect Costs					
Geotechnical Engineering	LS	1	$ 60,000	$ 60,000	
Surveying	LS	1	$ 25,000	$ 25,000	
Design Engineering		10%		$ 244,620	
Construction Services and Startup		7%		$ 171,234	
Legal and Permits		2%		$ 48,924	
District Formation Cost	LS	1	$ 150,000	$ 150,000	
Subtotal Indirect Costs				**$ 699,778**	
Contingency		30%		$ 943,793	
Total Estimate Project Cost				**$ 4,089,771**	
Item	**Units**	**Quantity**	**Unit Cost**	**Total Cost YR 2016 Dollars ($)**	
Operation and Maintenance Cost Estimate					
Annual Water Fee					
Typical usage rate per household	household	80	$ 1,950	$ 156,019	$24.82 connection fee and $5.10/ccf usage @ 27 ccf/household - 2016 Rates
Total Estimate Annual Cost				**$ 156,019**	

2. Loan Costs – It is probable that this alternative would be eligible for a cost share USDA loan/grant with the assumption that the residents would be responsible for paying off the loan portion. The USDA requires extensive guarantees that the loan will be paid back in 30 years. Interest rates are generally lower in the 3% range. There could be some funding from a State program and the Monterey County could cover some of the start costs, but for this analysis, it is assumed that there would be none. The following cost breakdowns assume a 50% USDA cost-share and for comparison purposes, the alternative cost without the grant.

1) With 50% USDA grant -

A 3% rate is used in these calculations:

Monthly payments$4,089,771 @ 3% = $17243/month or $216/month/household

2) Loan without the USDA grant -

A 3% rate is used in these calculations:

Monthly payments$2,044,886 @ 3% = $12650/mo. or $718/month/household

3. **Ongoing Maintenance and Operations Costs –** All operations and maintenance would be managed by the Pajaro/Sunny Mesa Community Service District as well as all administrative functions. Using current water rates for the District plus the service fees, the average customer would pay $163/month (based on average consumption & the meter charge of $24.82 connection fee and $5.10/ccf usage @ 27 ccf/household - 2016 Rates).

11.1.2. Final Preliminary Engineering Report - Sunny Mesa and Vega Road Hexavalent Chromium Projects

MNS Engineers, December 21, 2016

MNS ENGINEERS INC

Pajaro/Sunny Mesa Community Services District

Final Preliminary Engineering Report - Sunny Mesa and Vega Road Hexavalent Chromium Projects

December 21, 2016

PREPARED FOR:

Don Rosa, District Manager

PREPARED BY:

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Pajaro/Sunny Mesa Community Services District

Final Preliminary Engineering Repot – Sunny Mesa and Vega Road Hexavalent Chromium Projects

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Executive Summary

ES.1. Project Overview

The Pajaro/Sunny Mesa Community Services District (District) provides water services to approximately 1,500 connections in the unincorporated communities of Pajaro and Sunny Mesa in northern Monterey County through multiple independent water systems including the Pajaro Water System (PWS), Sunny Mesa Water System (SMWS), and Vega Road Water System (VRWS).

The two wells which supply water to the Sunny Mesa Water System and one well which supplies the Vega Road Water System have recently shown concentrations of hexavalent chromium (chrome-6) above the maximum contaminant level (MCL). The District has submitted a compliance schedule to the State Water Resources Control Board (SWRCB) demonstrating a feasible route for achieving compliance for the Sunny Mesa Water System by the end of 2019, if funding can be obtained to implement improvements, and no other significant obstacles arise.

The goal of this project is to plan for infrastructure improvements to bring water supplies for both the Sunny Mesa Water System and the Vega Road Water System into compliance with the chrome-6 MCL.

ES.2. Existing System Overview

The PWS provides water to approximately 6,500 people in the community of Pajaro and surrounding area located on the south bank of the Pajaro River, south of the City of Watsonville. The SMWS provides water to 880 people in the unincorporated community of Royal Oaks, bounded by Highway 1 to the west, Salinas Road to the north, Elkhorn Road to the east, and Elkhorn Slough to the south. The VRWS provides water to approximately 477 residents in the unincorporated areas of the Lewis Road and Vega Road valleys to the southeast of Pajaro.

ES.3. Sunny Mesa Hexavalent Chromium Project

Three project alternatives were developed and evaluated for mitigating chrome-6 contamination in the Sunny Mesa Water System wells:

Alternative 1 – Connect the Pajaro Water System to the SMWS via a new transmission pipeline from the existing terminus of the PWS along Salinas Road to the SMWS well site on Elkhorn Road. At the well site, a new pump station would boost the pressure of water from the PWS to match SMWS pressure, and a blending facility would blend water from the PWS with water produced from the SMWS Well No. 2. The resultant blended water would have concentrations of chrome-6 below the MCL.

Alternative 2 – Install a treatment system at the SMWS well site to directly mitigate chrome-6 in the pumped groundwater. The resultant treated water would have concentrations of chrome-6 below the MCL.

Alternative 3 – Combine the booster pump station and intertie pipeline discussed in Alternative 1 and the treatment system discussed in Alternative 2.

ES.4. Vega Road Hexavalent Chromium Project

The Vega Road Hexavalent Chromium Project proposes to connect the PWS to the VRWS through a new transmission pipeline. A new booster pump station is required to boost the pressure of water from the PWS to match VRWS pressure in the Vista Verde pressure zone. The system would allow the VRWS to operate entirely on water from the PWS, with no water production from the VRWS wells, or a combination of water produced in the Vista Verde Well and water from the PWS.

ES.5. Hexavalent Chromium Treatment Alternatives

Six wellhead treatment technology alternatives were screened for use at the Sunny Mesa Well Site. The recommended treatment technology for this project is a Strong Base Anion Ion Exchange Resin (SBA) with onsite regeneration due to its lower capital and long-term operating costs.

ES.6. Permitting Requirements

A variety of permits are required for the construction of the Sunny Mesa Hexavalent Chromium Project, depending on the selected alternative, and Vega Road Hexavalent Chromium Project. This includes compliance with the California Environmental Quality Act (CEQA), as well as encroachment permits from the County of Monterey, a well permit for destruction and construction of wells, and a floodplain encroachment permit.

ES.7. Estimate of Probable Construction Cost and Project Recommendations

Cost estimates for each project alternative were developed, incorporating construction, engineering design, legal, environmental permitting, construction management, and District administration costs. Estimates of the total costs associated with the project, including these additional expenses, are included in Table ES-1.

Table ES-1: Total Estimated Project Costs

Project Alternative	Estimated Cost of Construction	District Engineer/ Administration	Engineering	Environmental	Construction Management	Total Estimated Project Cost
Sunny Mesa Hexavalent Chromium Project						
Alternative 1 – Blending with PWS	$2,300,000	$120,000	$250,000	$50,000	$280,000	$2,880,000
Alternative 2 – Wellhead Treatment	$2,380,000	$120,000	$260,000	$80,000	$280,000	$3,010,000
Alternative 3 – Wellhead Treatment and Connect to PWS	$3,050,000	$150,000	$330,000	$50,000	$360,000	$3,810,000
Vega Road Hexavalent Chromium Project						
Connect to PWS	$1,840,000	$90,000	$200,000	$20,000	$220,000	$2,280,000

To compare total project construction and operational costs of the Sunny Mesa Hexavalent Chromium Project alternatives, a 20-year comparison timeline was utilized. Total project construction and operational costs are summarized in Table ES-2.

Table ES-2: Sunny Mesa Hexavalent Chrome Project Lifecycle Costs

Project Alternative	Total Estimated Project Cost	20-year Operation Costs	20-Year Total Project Costs
Alternative 1 – Blending with PWS	$2,880,000	$520,000	$3,400,000
Alternative 2 – Wellhead Treatment	$3,010,000	$910,000	$3,920,000
Alternative 3 – Wellhead Treatment and Connect to PWS	$3,810,000	$910,000	$4,720,000

Alternative 1 provides the lowest total lifecycle costs and provides the most value to the District while minimizing system complexity and risk associated with implementing treatment and increasing well production rates. As a result, this is the recommended alternative.

Operating costs for the Vega Road Hexavalent Chrome Project were estimated; electrical costs for pumping water from the PWS to the VRWS are approximately equal to pumping water from the Vista Verde Well. As a result, the change in operating costs compared to current operation is negligible.

Section 1. Project Overview

This Section provides an overview of the District, and primary drivers and goals for this project.

1.1. District Background

The District was formed in and has been in operation since 1986. The District was created by the Monterey County Local Agency Formation Commission (LAFCO) with the consolidation of the Pajaro Community Services District, the Sunny Mesa Water District, and Monterey County Service Area No. 73. The District is a public agency governed by a five member Board of Directors who serve without compensation. The District provides water services to approximately 1,500 customers in the unincorporated communities of Pajaro and Sunny Mesa in northern Monterey County.

The District provides potable water service, parks, streetlights, and sanitary sewer service to thousands of residents of northern Monterey County from the Pajaro River in the north to Moss Landing in the west and to the Highway 101 corridor in the east and south. It is the only public agency providing public potable water services in the Pajaro, Elkhorn, and Prunedale areas. In total, the District operates 14 independent potable water systems, including the Pajaro Water System, Sunny Mesa Water System, and Vega Road Water System.

The District's water systems are regulated by the California Division of Drinking Water Regulations and the Monterey County Environmental Health Department.

1.2. Project Background

On July 1, 2014, the State of California lowered the MCL for chrome-6 from 50 to 10 micrograms per liter (µg/l). On January 7, 2016, the District received notification from the SWRCB indicating concentrations of chrome-6 in the SMWS exceed the new MCL. A recent sample from the VRWS also exceeded the chrome-6 MCL.

The District does not have the means to immediately comply with the new chrome-6 requirements. Senate Bill 385, which established the new chrome-6 MCL, provides a "grace period" for compliance. The District has submitted a compliance schedule to the SWRCB, laying out a route to compliance for the Sunny Mesa Water System by the end of 2019. Being able to comply with the new chrome-6 MCL will be dependent on obtaining funding for required improvements, as well as other factors.

Compliance with the chrome-6 MCL for the Vega Road Water System has not yet been mandated by the State, but the District desires to avoid future violations of the MCL. This Preliminary Engineering Report (PER) will be used as a decision-making tool for the implementation of recommended projects and grant funding applications for the compliance with SWRCB chrome-6 requirements for both water systems. The analysis and recommendations for the Sunny Mesa and Vega Road Hexavalent Chromium Projects will be conducted concurrently and will be considered as two elements of a single project, but could be designed, permitted and constructed separately, if dictated by funding availability. These are discussed in more detail in Sections 3 and 4.

1.3. Project Goals

The primary goal of this PER is to develop and analyze strategies to reduce the concentration of chrome-6 in the water delivered to the customers of the Sunny Mesa and Vega Road Water Systems below the MCL of 10 µg/l. Projects for mitigating the chrome-6 issues for the Sunny Mesa and Vega Road Water Systems could simultaneously consolidate the Pajaro, Sunny Mesa, and Vega Road Water Systems into a single integrated system and provide significant water supply redundancy and reliability throughout the three systems' service areas. If the three systems are not consolidated, each independent system should be maintained with at least two sources of supply to ensure long-term system reliability.

This PER includes the following key elements:

1. A spreadsheet-based hydraulic analysis to determine minimum requirements for transferring water between the three water systems.

2. Recommended pipeline alignments and other required system improvements, including blending facilities, pumping facilities, communications and controls, and other identified improvements to meet project goals.

3. Analysis and recommendation of specific chrome-6 wellhead treatment technology suitable for the application, based on anticipated flow rates and water chemistry.

4. Preliminary layouts for wellhead treatment systems, blending facilities, pumping facilities, and other improvements.

5. A description of environmental permitting requirements and costs associated with obtaining environmental approvals anticipated for the recommended project(s).

6. A description of other permitting requirements for the recommended project(s).

7. An engineer's estimate of probable construction cost for each project alternative.

8. Development of a recommended project and key project considerations to be further developed during detailed design.

Completing the design and implementation of this project in a timely manner is essential to meet the compliance schedule submitted by the District to the SWRCB. With the completion of this PER by the end of 2016, the District will have three years to develop detailed designs of the recommended project(s), obtain funding, and complete construction to bring the water systems into compliance by the end of 2019.

Section 2. Existing Water Systems Overview

The District's service area is divided into independent water systems:

1. Pajaro Water System (PWS), System No. 2710020
2. Sunny Mesa Water System (SMWS), System No. 2700773, and
3. Vega Road Water System (VRWS), System No. 2700787).

This section provides details on these three water systems.

2.1. Pajaro Water System

The PWS provides water to approximately 6,500 people in the community of Pajaro and surrounding area located on the south bank of the Pajaro River south of the City of Watsonville. The PWS has approximately 22 inactive connections and approximately 461 active connections, 347 of which are residential and 114 are commercial. The PWS serves single- and multi-family residential, agricultural, institutional, irrigation, fire, and commercial customers.

The PWS service area is shown on Figure 2-1.

2.1.1. Water Facilities

The PWS primary well and tank site is located on several adjoining parcels of land to the southeast of the community of Pajaro along Railroad Avenue near the intersection with Allison Road. The site has an existing surface elevation of approximately 30 feet above sea level (asl).

The PWS currently consists of one primary groundwater well with a capacity of 1,600 gallons per minute (GPM), one standby well located at the District office at 136 San Juan Road, one above-ground 600,000-gallon welded steel storage tank, and a booster pump system utilizing two hydropneumatic tanks. A project to construct an additional 600,000-gallon bolted steel storage tank adjacent to the existing storage tank is anticipated to begin by the end of 2016 to increase storage and provide redundancy in the PWS.

PWS Well No. 1, the standby well, was drilled in 1986 with a depth of 600 feet. It has a 14-inch steel casing to 600 feet and a sanitary seal to a depth of 415 feet. It is equipped with a water-lubricated turbine pump with a capacity of 800 GPM and a 50-horsepower (hp) motor. PWS Well No. 1 discharges directly into the distribution system. For this well to be activated, a chlorination system would be required, as well as treatment for manganese. PWS Well No. 2 was drilled in 1986 and is the primary supply for the system. The well is 1,200 feet deep with a 14-inch steel casing to a depth of 600 feet and an annular seal to a depth of 420 feet. It is equipped with a water-lubricated turbine pump capable of producing 1,600 GPM with a 50-hp motor. Well No. 2 is controlled by a float switch in the existing storage tank.

The groundwater is disinfected with a 12.5 percent sodium hypochlorite solution diluted with two gallons of water per one gallon of chlorine. Sodium hypochlorite is injected between the well pump and the existing water storage tank. Seven bacteriological samples are taken monthly from the distribution system and booster pump and one sample is taken quarterly from the well.

The PWS operates one pressure zone ranging between 60 and 80 pounds per square inch (psi), maintained by two hydropneumatic tanks and two booster pumps. Booster Pump No. 1 is a two-stage vertical turbine pump and has a capacity of 1,500 GPM at a discharge head of 118 feet. Booster Pump No. 2 is a three-stage vertical turbine pump and has a capacity of 2,500 GPM at a discharge head of 118 feet.

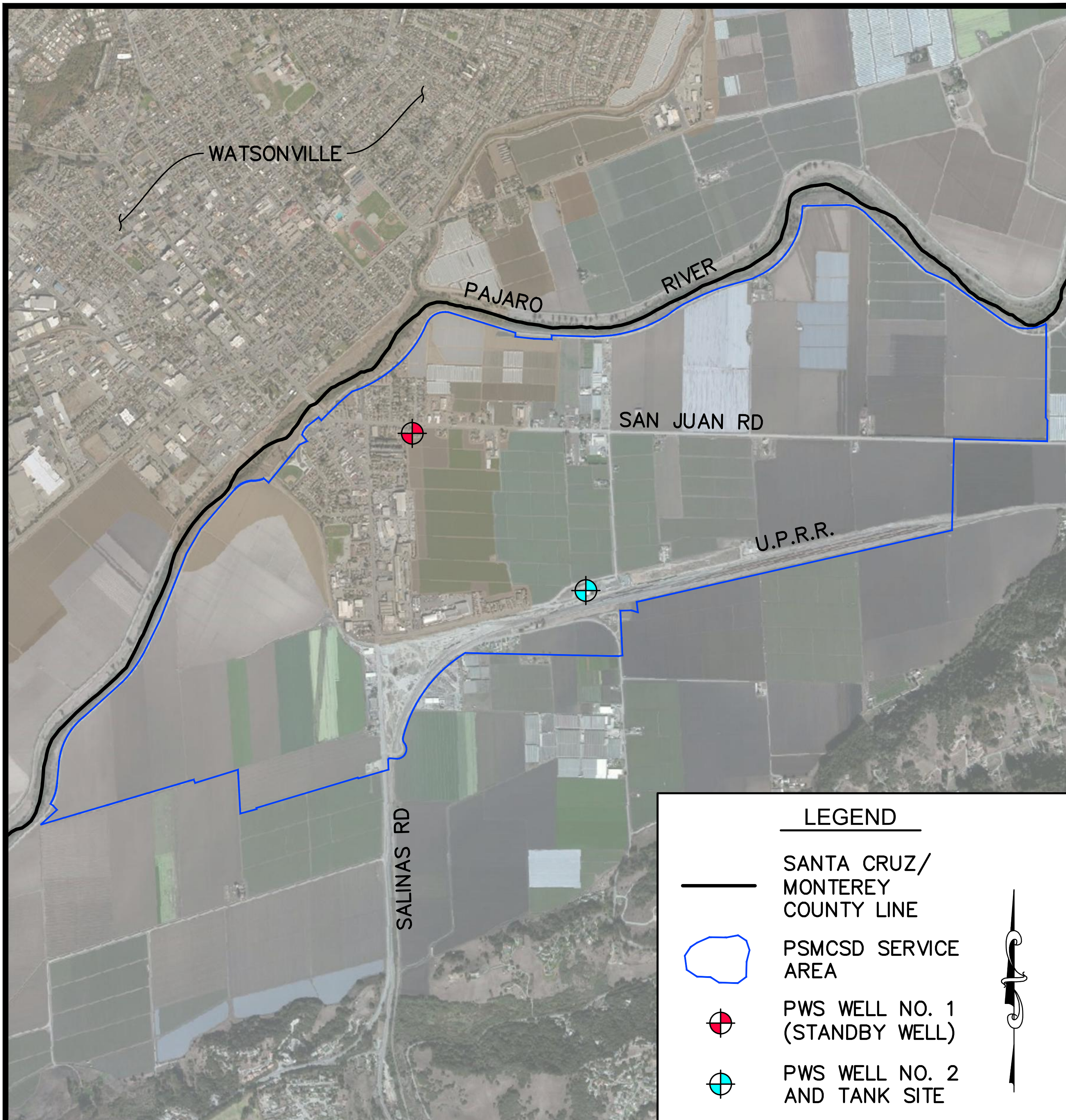

FIGURE 2-1: PWS SERVICE AREA

SUNNY MESA / VEGA MUTUAL HEXAVALENT CHROMIUM PROJECTS
PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

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2,000' 0' 2,000'
1" = 2,000'

The water distribution system is primarily composed of polyvinyl chloride (PVC) pipes with diameters ranging from four to ten inches. Most service laterals are copper, and the rest are polyethylene. All connections are metered. The PWS also includes 66 backflow prevention devices, tested annually, and one air gap. There are 96 valves throughout the system ranging from six to ten inches and are exercised annually. The system dead-ends in nine locations, which are flushed biannually or more frequently in response to water quality complaints.

In addition to the well and tank site located on Railroad Avenue, and the District office site, the District also owns a parcel of land between the end of Lewis Court and the bend in Lewis Road, as shown in Figure 2-2; an assessor's parcel map of the site is included as Appendix A. The parcel has an area of 23,522 square feet, or 0.54 acres. Section 4 describes potential improvements to be constructed at this parcel for the Vega Road Hexavalent Chromium Project. The PWS may also be intertied to the Sunny Mesa Hexavalent Chromium Project, discussed in Section 3.

2.1.2. Water Quality

The PWS is sampled in seven locations throughout the distribution system and once at the booster pump station per month. The well discharge is sampled quarterly. PWS water meets all MCLs and regulatory action levels.

2.1.3. Existing Demand

Recent data regarding pumped and delivered water quantities was provided by the District. Approximate minimum, average, and maximum daily flows for the PWS are as follows, based on pumped water quantities, in gallons per day (GPD):

- Minimum Daily Demand: 200,000 GPD (rounded)
- Average Daily Demand: 255,000 GPD (rounded)
- Maximum Daily Demand: 542,000 GPD (rounded)

For the purposes of this study, only existing demands are being considered. If demands increase in the future, extending operating periods or increasing system capacity may be required.

FIGURE 2-2: VMWS BOOSTER PUMP STATION SITE

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80' 0' 80'

1" = 80'

2.2. Sunny Mesa Water System

The SMWS provides water to 880 people in the unincorporated community of Royal Oaks, bounded by Highway 1 to the west, Salinas Road to the north, Elkhorn Road to the east, and Elkhorn Slough to the south. The SMWS has 19 inactive connections and 261 active connections, including 254 residential customers and seven commercial customers. The SMWS service area is shown on Figure 2-3.

2.2.1. Water Facilities

The SMWS consists of two wells, a 200,000-gallon storage tank, and a water distribution system with a hydropneumatic tank. The wells are located on a District-owned parcel, also known as the SMWS well site, near the intersection of Elkhorn Road and Hudson Landing Road (APN 117-121-003); an assessor's parcel map of the SMWS well site parcel is included as Appendix B. The parcel has an area of 32,472 square feet, or 0.75 acres. The two wells pump directly into the distribution system, which feeds the storage tank. The SMWS well site is served electricity via an existing 125-ampere, 3-phase 480-Volt service. The static depth to groundwater at the SMWS well site is 48 feet.

Drilled in 1968, SMWS Well No. 1 is 453 feet deep with a 12-inch steel casing to a depth of 396 feet and a sanitary seal to a depth of 80 feet. It is equipped with a water lubricated turbine pump and a 60-hp motor to produce 375 GPM. Well No.1 is used to supplement higher demands in the summer season. The District installed a sand removal system in Well No.1 after observing problems with sand in the discharge water.

Well No. 2 was drilled in 1989 to a depth of 525 feet with a 10-inch steel casing to a depth of 470 feet and a sanitary seal to a depth of 260 feet. It is equipped with a submersible pump and 25-hp motor to produce 167 GPM. Well No. 2 is typically utilized during the winter season when demand is lower. Both wells are controlled by a float switch in the storage tank. The operating pressure at the well site is approximately 125 psi.

Sodium hypochlorite is injected into the distribution system immediately downstream of the Well No. 2 discharge.

The above-ground welded steel storage tank was installed in 1985 and has a 200,000-gallon capacity. It is located at the top of Stone Ridge Estates at the end of Silver Stone Street. The tank is located at the highest point in the distribution system, approximately 190 feet above the pump elevation.

A booster pump station including a 7,500-gallon hydropneumatic tank and two 15-hp booster pumps provides additional head to the distribution system. The booster pump station operates within a pressure range of 28 to 32 psi. A 50-hp fire pump will activate upon a drop in pressure in the tank fill line. Additionally, a small pump and hydropneumatic tank system located at the SMWS tank site provides water to three homes on Silver Stone Street, which are at an elevation above which can be served by the booster pump station.

The booster pump station maintains the pressure in the main pressure zone between 28 and 125 psi. The distribution lines are mainly PVC ranging from six to twelve inches in diameter; a small length of asbestos cement (AC) pipe is included in the system. Service laterals are mostly copper and are all metered. The SMWS contains ten backflow prevention devices; nine are tested annually; however, the backflow assembly on Salinas Road cannot be tested. The system has 33 valves ranging from six to twelve inches and are exercised annually. Four dead-ends with blow-offs are flushed at least annually. One bacteriological sample is taken from the system monthly.

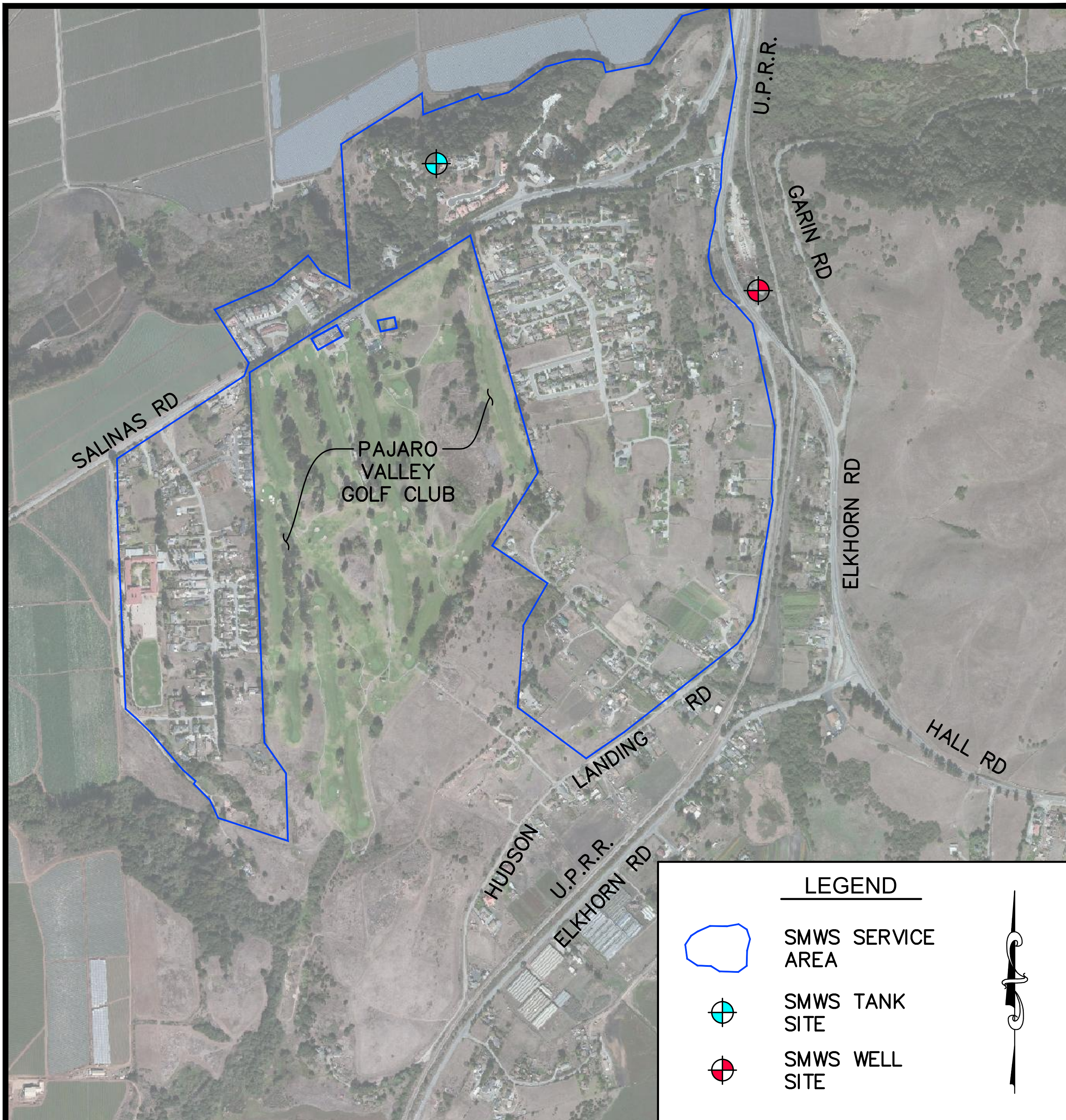

FIGURE 2-3: SMWS SERVICE AREA

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1,000' 0' 1,000'

1" = 1,000'

2.2.2. Water Quality

The SMWS water is sampled once per month. Water quality data is known for samples taken between March 2014 and March 2016 from Wells No. 1 and No. 2. Data from these samples show chrome-6 concentrations ranged from 7.1 to 17.0 µg/l and averaged 12.6 µg/l. SMWS water meets all other MCLs and regulatory action levels.

2.2.3. Existing Demand

Recent data regarding pumped and delivered water quantities was provided by the District. Approximate average and maximum daily flows for the SMWS are as follows, based on pumped water quantities, in GPD:

- Average Daily Demand: 84,000 GPD (rounded)
- Maximum Daily Demand: 287,000 GPD (rounded)

For the purposes of this study, only existing demands are being considered. If demands increase in the future, extending operating periods or increasing system capacity may be required.

2.3. Vega Road Water System

The District formed the Vega Road Assessment District to develop the Vega Road Water System (VRWS). A $4,500,000 water project was completed in November 2010 to serve the unincorporated areas of the Lewis Road and Vega Road valleys to the southeast of Pajaro. The District operates the Vista Verde Well as the primary supply well for the VRWS after concentrations of chrome-6 exceeded the MCL in the Oakleaf Well discharge. The Vega Road Hexavalent Chromium Project is discussed in Section 4.

The VRWS service area is shown on Figure 2-4.The VRWS provides water to approximately 477 residents in the unincorporated areas of the Lewis Road and Vega Road valleys to the southeast of Pajaro. The system has 19 inactive connections and 120 residential connections.

2.3.1. Water Facilities

The VRWS consists of four pressure zones and includes two wells, seven pumps, 13 hydropneumatic tanks, and four storage tanks, distributed throughout the service area.

The Vista Verde Well was drilled in 1990 to a depth of 420 feet; it has a 10-inch steel casing to the bottom of the well and a sanitary seal extending to a depth of 300 feet. The Vista Verde Well is equipped with a submersible pump and 30-hp, 480-Volt, three-phase motor installed in December 2012. It has a capacity of 175 GPM and is controlled by a pressure transducer on the Vista Verde tank, a 65,000-gallon bolted steel tank located at the top of Del Piero Estates at an approximate elevation of 312 feet asl. The tank sits approximately 233 feet above the pump elevation. The Vista Verde system is one of four pressure zones in the VRWS.

The Oakleaf Well was drilled in 1999 and is equipped with a submersible pump and 25-hp, 240-Voltmotor to produce 220 GPM. The well is controlled by a float valve in the 90,000-gallon Oakleaf tank. The Vista Verde system has the ability to supply the Oakleaf tank at 55 psi. The Oakleaf system includes two booster pumps and a 6,000-gallon hydropneumatic tank to supply several homes, as well as the Kari Lane Tank and the Marlin Way and Andreas pressure zones.

The Kari Lane Tank is a 30,000-gallon bolted steel tank at approximately 330 feet elevation. The inlet pressure from the Oakleaf pressure zone is 24 psi. The Kari Lane Tank, booster pump, and hydropneumatic tank provide localized water service.

The Oakleaf system also feeds a twin booster pump system serving the Marlin Way and Andreas pressure zones. The twin booster pump system, located at 185 feet elevation, serves the Marlin Way customers at 216 feet elevation and the Andreas tank at 473 feet elevation. The 90,000-gallon Andreas Tank, booster pump, and hydropneumatic tank provide localized water service, or water is directed from Andreas Tank through a pressure reducing valve (PRV) back through the VRWS to the Kari Lane and Oakleaf Tanks.

The distribution system includes PVC pipe ranging from six to ten inches in diameter. Two bacteriological samples are collected monthly from the system. Disinfection facilities to add sodium hypochlorite are located at each of the well sites.

2.3.2. Water Quality

The VRWS is sampled in two locations per month. Sample data for the Oakleaf Well from May 2014 to March 2016 was provided by the District. During this time period, the concentration of chrome-6 exceeded the MCL once with a concentration of 12 µg/l in March 2015. Concentrations during other samples ranged from below detection levels to 9.0 µg/l. VRWS water meets all other MCLs and regulatory action levels.

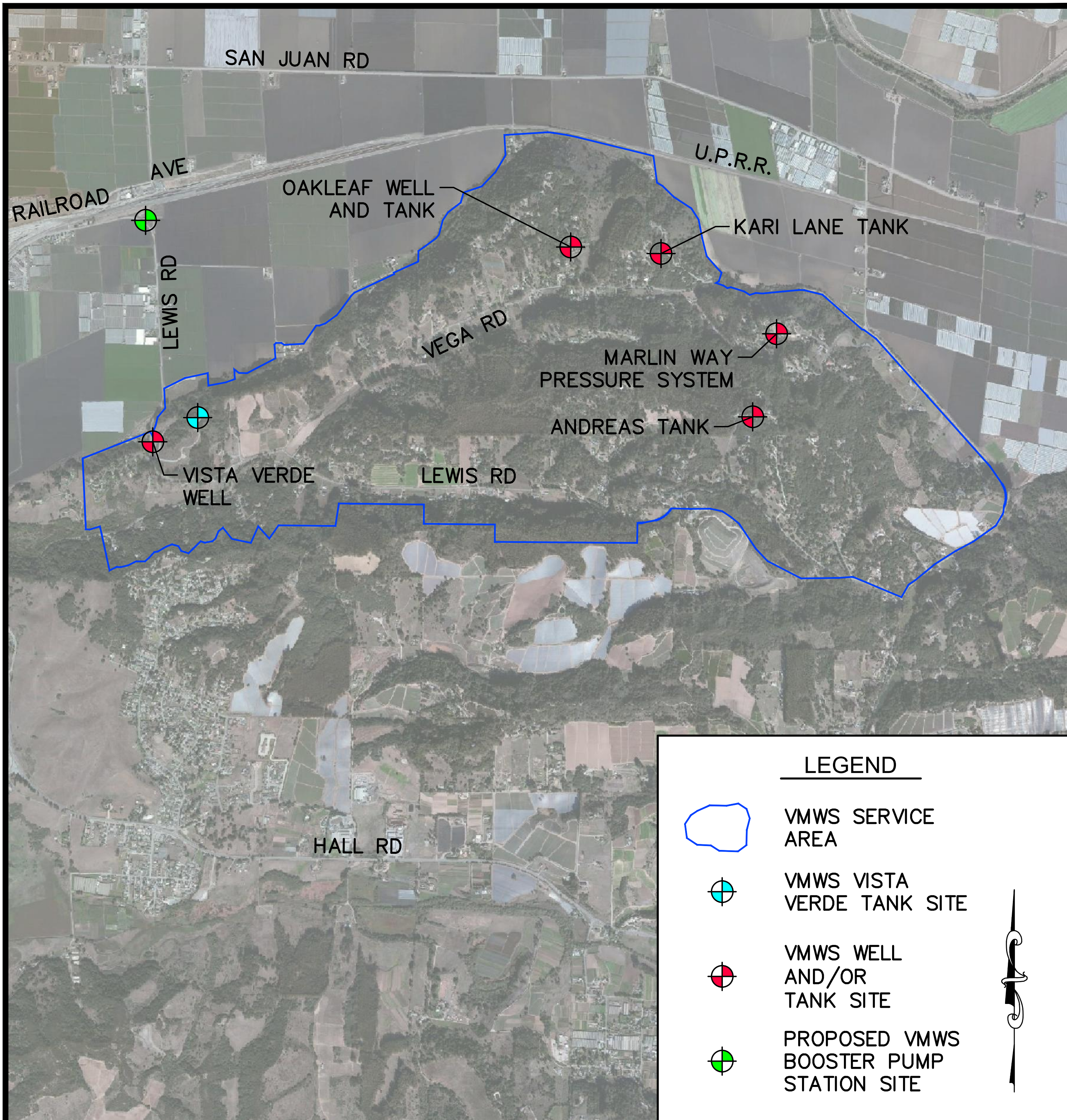

FIGURE 2-4: VMWS SERVICE AREA

SUNNY MESA / VEGA MUTUAL HEXAVALENT CHROMIUM PROJECTS

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2,500' 0' 2,500'

1" = 2,500'

2.3.3. Existing Demand

Approximate minimum, average, and maximum daily flows for the previous five years for the SMWS are as follows:

- Average Daily Demand: 50,000 GPD (rounded)
- Maximum Daily Demand: 130,000 GPD (rounded)

For the purposes of this study, only existing demands are being considered. If demands increase in the future, extending operating periods or increasing system capacity may be required.

2.4. Combined Systems

Combined, the PWS, SMWS, and VRWS serve approximately 7,860 people throughout the region. The systems include roughly 720 residential and 120 commercial customers, as well as agricultural, institutional, irrigation, fire, and inactive services. Table 2-1 summarizes the demand and supply characteristics of the three systems individually and combined.

Table 2-1 – Summary of the Combined Water Systems

Pajaro, Sunny Mesa, and Vega Road Water System Demands

Water System	Average Daily Demand (GPD)	Average Daily Demand (GPM)	Maximum Daily Demand (GPD)	Maximum Daily Demand (GPM)	Well Production Capacity (GPM)
Pajaro Water System	255,000	177	542,000	376	1,600
Sunny Mesa Water System	84,000	58	287,000	199	167
Vega Road Water System	50,000	35	130,000	90	175
Total	**389,000**	**270**	**959,000**	**666**	**1,942**

Note: This assumes the PWS standby well, the SMWS Well No. 1, and the Oakleaf well are not in service.

2.5. System Hydraulics

The various components of the three water systems being analyzed as part of this project are sited in multiple locations, at various elevations, and operate at various pressures. A summary of the elevations and static (non-operating) pressures of relevant system components are provided in Table 2-2.

Table 2-2 - Pajaro, Sunny Mesa, and Vega Water Systems Static Pressures and Hydraulic Grade Lines

Existing/ Proposed	Location	Elevation (ft)	Low Pressure (psi)	High Pressure (psi)	Low HGL (ft)	High HGL (ft)
Existing	Vista Verde Tank Free Surface	327	0	0	327	327
Proposed	PWS-VRWS Booster Pumps Suction	31	60	80	171	217
Proposed	PWS-VRWS Booster Pumps Discharge	31	128	128	327	327
Existing	Pajaro Hydropneumatic Tank Discharge	32	60	80	171	217
Existing	Pajaro Tank Free Surface	48	0	0	48	48
Existing	SMWS Well Site	23	125	125	312	312
Existing	SMWS Hydropneumatic Tank	215	28	32	280	289
Proposed	PWS-SMWS Booster Pumps Suction	23	64	84	171	217
Proposed	PWS-SMWS Booster Pumps Discharge	23	125	125	312	312

Section 3. Sunny Mesa Hexavalent Chromium Project

This Section analyzes three alternative strategies to mitigate the chrome-6 contamination in the SMWS.

3.1. Alternative 1 – Blending with PWS Water

The proposed improvements included in this alternative are shown schematically on Figure 3-1. Alternative 1 proposes to connect the PWS to the SMWS through a pipeline from the existing terminus of the PWS along Salinas Road to the SMWS well site on Elkhorn Road (Figure 3-2). At the well site, a new pump station would boost the pressure of water from the PWS to match SMWS pressure, and a blending facility would blend water from the PWS with water produced from the SMWS Well No. 2 (Figure 3-3). The resultant blended water would have concentrations of chrome-6 below the MCL. The system would also allow the SMWS to operate entirely on water from the PWS, with no water production from the SMWS wells.

Additional required modifications include:

- A pressure reducing valve which would allow the SMWS to transfer water to the PWS.
- Destruction of SMWS Well No. 1, due to sand production issues, iron contamination, and anticipated well lifespan.
- Site improvements to integrate the blending system into the water system.
- Controls and electrical improvements for the well site.
- Modifications at the Pajaro Tank Site

These improvements are described in detail in the following sections.

3.1.1. Operational Scenarios

If Alternative 1 is implemented, three operational scenarios have been identified:

Operational Scenario 1: In this scenario, water would be transferred from the PWS and blended with water produced from SMWS No. 2, before being discharged into the distribution system. Blended water from these two sources would meet the system demands of the SMWS. This is assumed to be the normal operating scenario.

Operational Scenario 2: In this scenario, sufficient water would be transferred from the PWS to meet the total system demand of the SMWS. This scenario would be utilized if the SMWS Well No. 2 is taken out of service.

Operational Scenario 3: In this scenario, water would be transferred from the SMWS to the PWS. Due to the chrome-6 contamination in water produced from SMWS Well No. 2, only water pre-treated by blending could be transferred from the SMWS to the PWS, which limits the quantity of water which could transferred to the PWS without additional treatment.

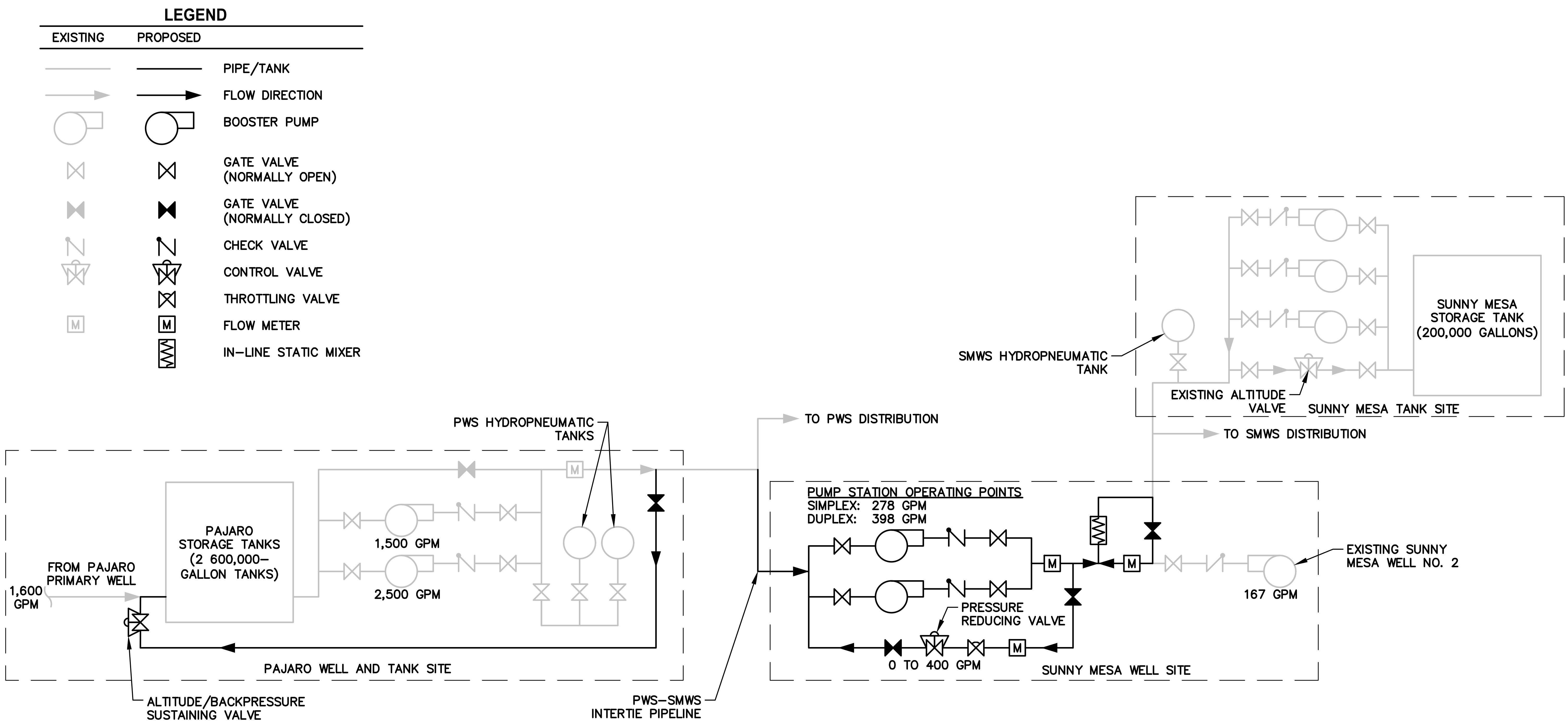

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FIGURE 3-1: SMWS ALTERNATIVE 1 IMPROVEMENT SCHEMATIC

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NO SCALE

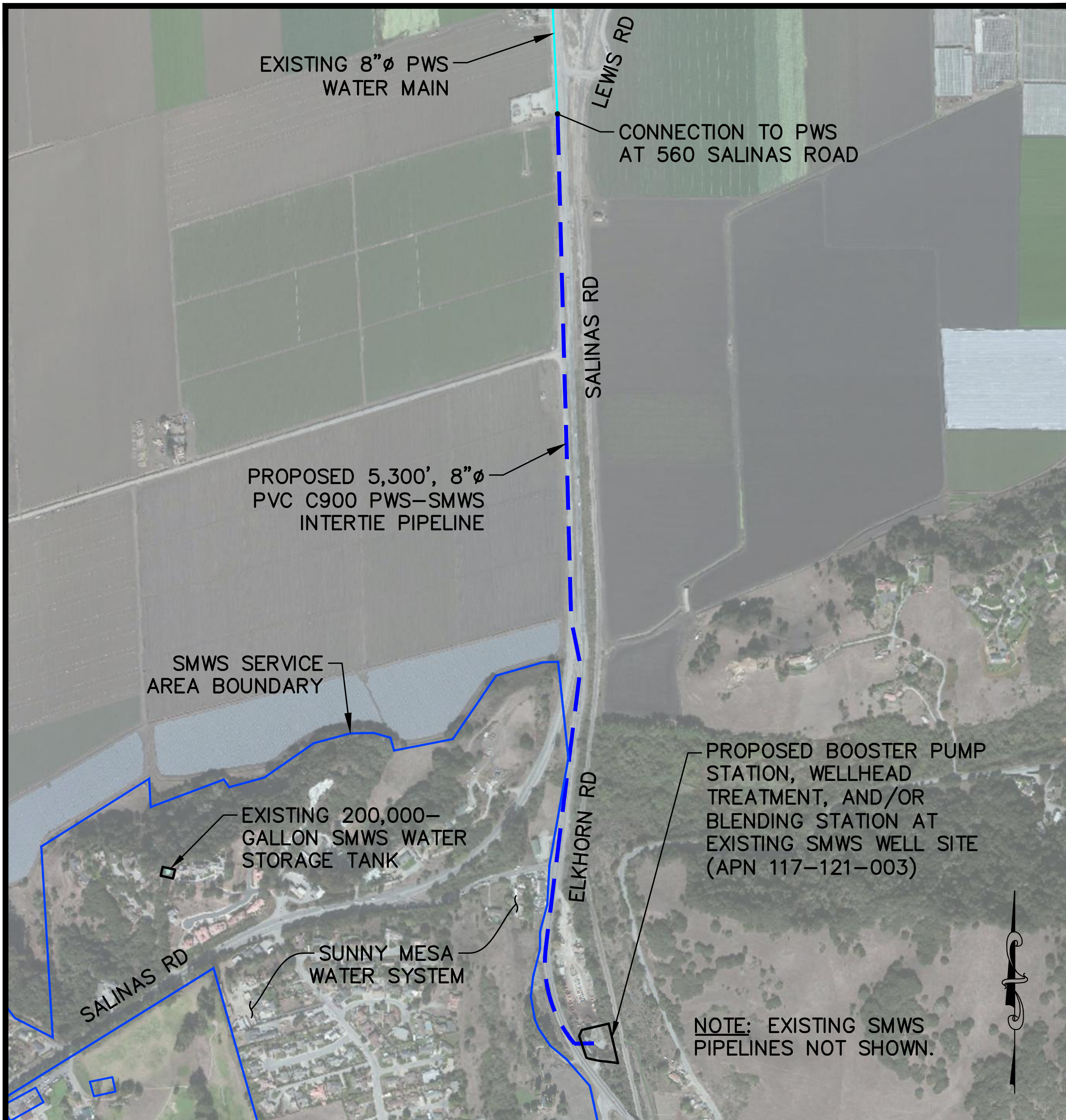

FIGURE 3-2: SMWS ALTERNATIVE 1 IMPROVEMENT PLAN

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750' 0' 750'

1" = 750'

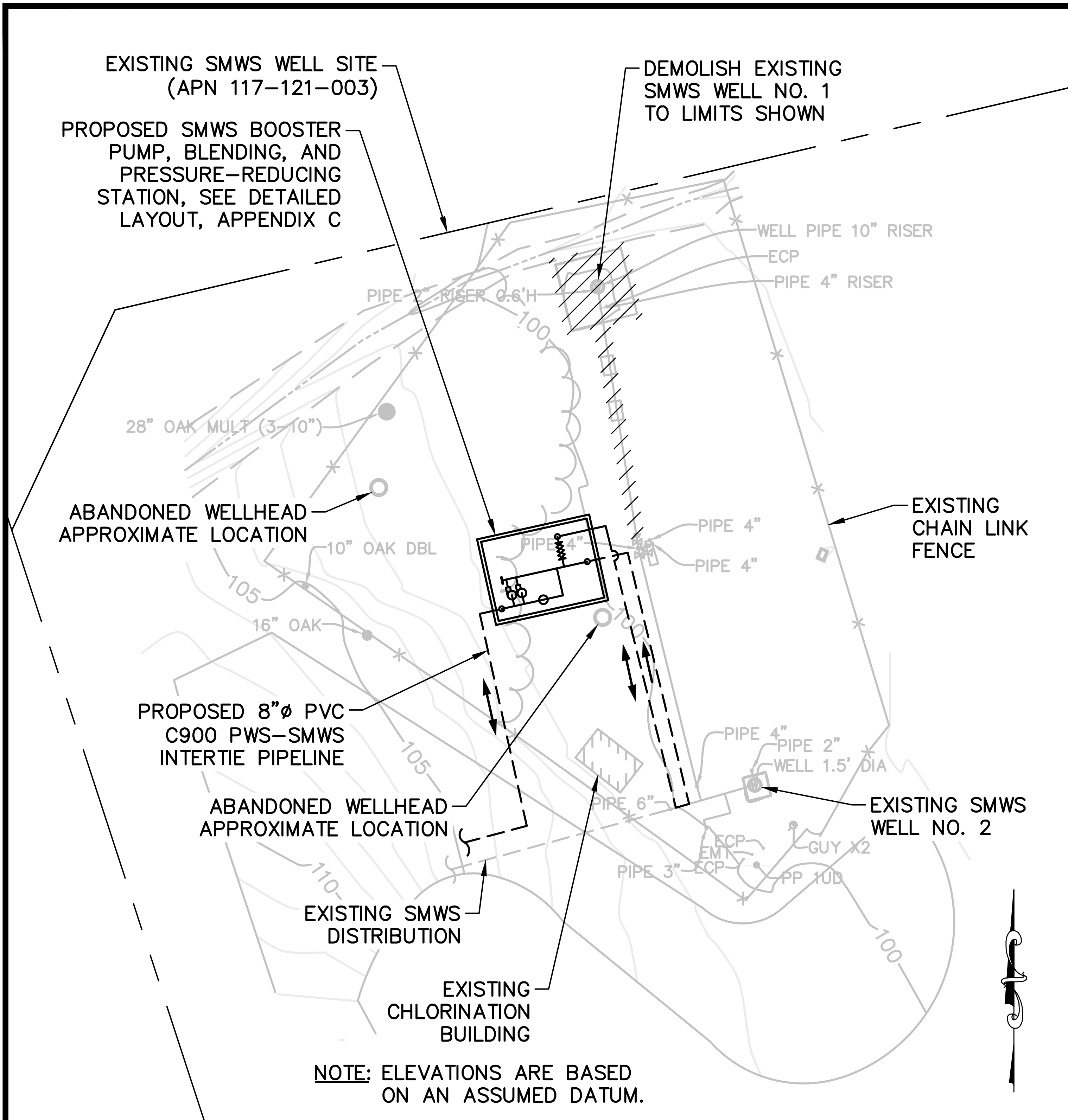

FIGURE 3-3: SMWS ALTERNATIVE 1 WELL SITE PLAN

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20' 0' 20'

1" = 20'

3.1.2. Pipeline Alignment and Material

The pipeline to connect the PWS to the SMWS would connect to the terminus of the PWS, located at an existing hydrant and blow-off assembly at the southern end of the parcel at 560 Salinas Road, south of the intersection with Lewis Road. The water main in Salinas Road at this location is 8-inch diameter pipe. An 8-inch PVC C900 water line would be constructed from this location to the south along Salinas Road and Elkhorn Road to the SMWS well site, as shown on Figure 3-2. The length of the intertie pipeline is approximately 5,300 feet.

3.1.3. Blending Requirements

Blending is a common method to reduce the concentration of a contaminant in a water supply before distribution. The historic maximum concentration of chrome-6 in the SMWS Well No. 2 is 17 µg/l. The concentration of chrome-6 in the PWS is below detectable limits, with the detection limit being 1 µg/l.

To achieve a blended product water with a chrome-6 concentration reliably below the MCL of 10 µg/l, a maximum concentration goal of 7 µg/l has been established. This provides for some buffer if the chrome-6 concentration in either supply source exceeds the historic average slightly, or if future regulatory requirements further decrease the regulatory limit.

The concentration of the contaminant in the discharge water can be calculated with the following mass balance equation:

$$Q_1C_1 + Q_2C_2 = Q_BC_B$$

Where: Q = water flow rate (GPM, cfs)
C = concentration of contaminant (µg/l)
1 = water supply source No. 1
2 = water supply source No. 2
B = blended discharge water

Using this equation, and assuming concentrations of chrome-6 in the SMWS and PWS water supplies of 17 µg/l and 1 µg/l respectively, and a production rate of 167 GPM from SMWS Well No. 2, a required dilution flow rate from PWS of 278 GPM was calculated.

An evaluation was also conducted to determine the required dilution rate to achieve a more conservative blended discharge concentration of 5 µg/l, which yielded a required flow rate from the PWS of 501 GPM. Hydraulic modeling indicates insufficient capacity exists in the PWS distribution system to provide this flow rate without significantly impacting distribution system pressures for existing customers. Additional information on hydraulic modeling is included in Section 3.4. If concentrations of chrome-6 significantly increased in the future, or the regulatory limit was decreased, the District could reduce the discharge flow rate from SMWS Well No. 2 by throttling or pump replacements to meet the MCL without relying solely on the PWS.

3.1.4. Required System Flow Rates

A goal to transfer/produce the maximum daily demand (MDD) for the SMWS in a six-hour period was initially established. The SMWS MDD is 287,000 GPD. To transfer/produce this quantity of water in a six-hour period, a combined transfer/production rate of 797 GPM is required. The SMWS Well No. 2 currently produces 167 GPM. To achieve the six-hour MDD transfer/production goal, 630 GPM would need to be transferred from the PWS if blended with water produced from SMWS Well No. 2, or 797 GPM, if serving the SMWS entirely from the PWS. Hydraulic modeling indicates insufficient capacity exists in the PWS distribution system to provide this flow rate without significantly impacting distribution system pressures for existing customers. Additional information on hydraulic modeling is included in Section 3.4.

As a result, the transfer/production goal was reduced to a goal of transferring/producing the SMWS MDD in a 12-hour period. To transfer this quantity of water in a 12-hour period, a combined transfer/production rate of 398 GPM is required. If blended with water produced from SMWS Well No. 2, 231 GPM would be transferred from the PWS, or 398 GPM, if serving the SMWS entirely from the PWS to meet this goal.

Comparing the results of this analysis and the blending requirements discussed in Section 3.1.3, the recommended flow rate from the PWS when blending with water produced from the SMWS Well No. 2 is 278 GPM. When serving the SMWS solely from the PWS, a flow rate of 398 GPM is required.

3.1.5. Sunny Mesa Booster Pump Station

The booster pump station to transfer water from the PWS system to the SMWS would consist of two parallel pumps, each sized to handle the flow rates for blending discussed in Section 3.1.4. Each pump would be equipped with a variable frequency drive (VFD) to allow the District to regulate the booster pump station flow rate depending on operational requirements. Both pumps would be equipped with 25–hp motors. If both pumps operate simultaneously, they can serve the entire SMWS demand without blending. The pump station would be housed in a small manufactured building equipped with lighting, courtesy outlets, and electrical equipment and controls. A preliminary layout for this pump station is included in Appendix C. Siting of the booster pump station is shown on Figure 3-3.

A spreadsheet based hydraulic analysis was developed to determine booster pump station requirements. The Sunny Mesa Booster Pump Station operating points are shown in Table 3-1, including total dynamic head (TDH).

Table 3-1: Sunny Mesa Booster Pump Station Operating Points

Sunny Mesa Booster Pump Station									
Operation Mode	**Flow Rate (GPM)**	**Low Static Suction HGL (FT)**	**High Static Suction HGL (FT)**	**Dynamic Suction Losses (FT)**	**Assumed Additional Losses (FT)**	**Discharge Static HGL (FT)**	**Discharge Losses (FT)**	**Pump TDH @ Low Static Suction (FT)**	**Pump TDH @ High Static Suction (FT)**
Simplex	278	171	217	14.7	23	312	10.5	189	143
Duplex	398	171	217	28.5	23	312	10.5	203	157

3.1.6. Blending Station

The blending station would be constructed integral to the booster pump station at the existing SMWS well site, and would include three magnetic flow meters, an in-line mixer, and a programmable logic controller (PLC). The PLC would regulate the flow rate of blending water from the PWS by signaling to the pump station to regulate the flow rate of the booster pump station. This would allow the District to adjust blending ratios based on changing contaminant concentrations.

Alternatively, blending flow rates could be achieved with throttling valves; however throttling valves are not recommended due to increased energy consumption.

3.1.7. Pressure Reducing Valve

A pressure reducing valve, integrated into the Sunny Mesa Booster Pump Station, would allow the transfer of water from the SMWS to the PWS. The pressure reducing station would decrease system pressure from 125 psi, to approximately 84 psi, to match the maximum system pressure of the PWS.

The pressure reducing valve between the SMWS and PWS should be equipped with manual shut-off valves. For water to be transferred from the SMWS to the PWS, District staff would need to manually operate the valves. This prevents a main break in the PWS from draining the storage tank in the SMWS. As this pressure reducing valve would be utilized infrequently, only a single pressure reducing valve is recommended, without a redundant valve.

Additionally, the pressure reducing valve would be equipped with an electric actuated butterfly valve and flow meter for throttling the flow of water between the two systems. A PLC would control the closure of the butterfly valve to achieve a transfer flow rate specified by the District; the flow meter would include a digital output to provide a feedback loop and modulate the flow rate through the PRV.

The maximum flow rate from the SMWS to the PWS has been calculated to be approximately 400 GPM. This flow rate limits the pressure drop from the pressure reducing valve to the PWS storage tank to less than 20 psi, allowing water to be delivered into the PWS storage tank, and preventing the PWS booster pumps from activating while water is being transferred, except potentially under a peak demand scenario, in which the PWS booster pump station may cycle on/off to serve system demands.

3.1.8. Modifications to the Pajaro Tank Site

To transfer water from the SMWS to the PWS storage tanks, modifications at the tank site will be required. A connection would be necessary from the distribution system to a new tee on the tank inlet on the proposed 600,000-gallon bolted steel tank. A combination altitude and back pressure valve, such as a Cla-Val 210-09, would be provided on the inlet tee to allow water into the PWS storage tanks and maintain system pressure without over-filling the PWS tanks. A normally-closed gate valve would be provided, which would only allow flow from the distribution system into the PWS storage tank when opened. This connection is shown schematically on Figure 3-1.

3.1.9. Benefits of Interconnection with PWS

The most significant benefit of connecting the PWS and the SMWS is an effective means of mitigating chrome-6 contamination in the SMWS. Additionally, connecting the SMWS with the PWS would increase overall system reliability for both water systems, and a consolidated water distribution system will allow portions of the system to be taken offline for maintenance and repairs.

3.2. Alternative 2 – Wellhead Treatment System

Alternative 2 includes installation of a treatment system at the SMWS well site to directly mitigate chrome-6 in the pumped groundwater. An analysis of alternative chrome-6 treatment technologies are described in Section 5. The resultant treated water would have concentrations of chrome-6 below the MCL.

Additional required modifications include:

- Replacement of the existing SMWS Well No. 2 pump and motor to increase capacity and discharge pressure of the well, as this well cannot meet current MDD.
- Destruction of SMWS Well No. 1 due to sand production issues.
- Construction of a new well, proposed SMWS Well No. 3, to provide a redundant source of supply.
- Site improvements to integrate the treatment system into the water system.
- Controls and electrical improvements for the well site.

The proposed improvements included in this alternative are shown schematically on Figure 3-4 and spatially on Figure 3-5. Additionally, these improvements are described in detail in the following sections.

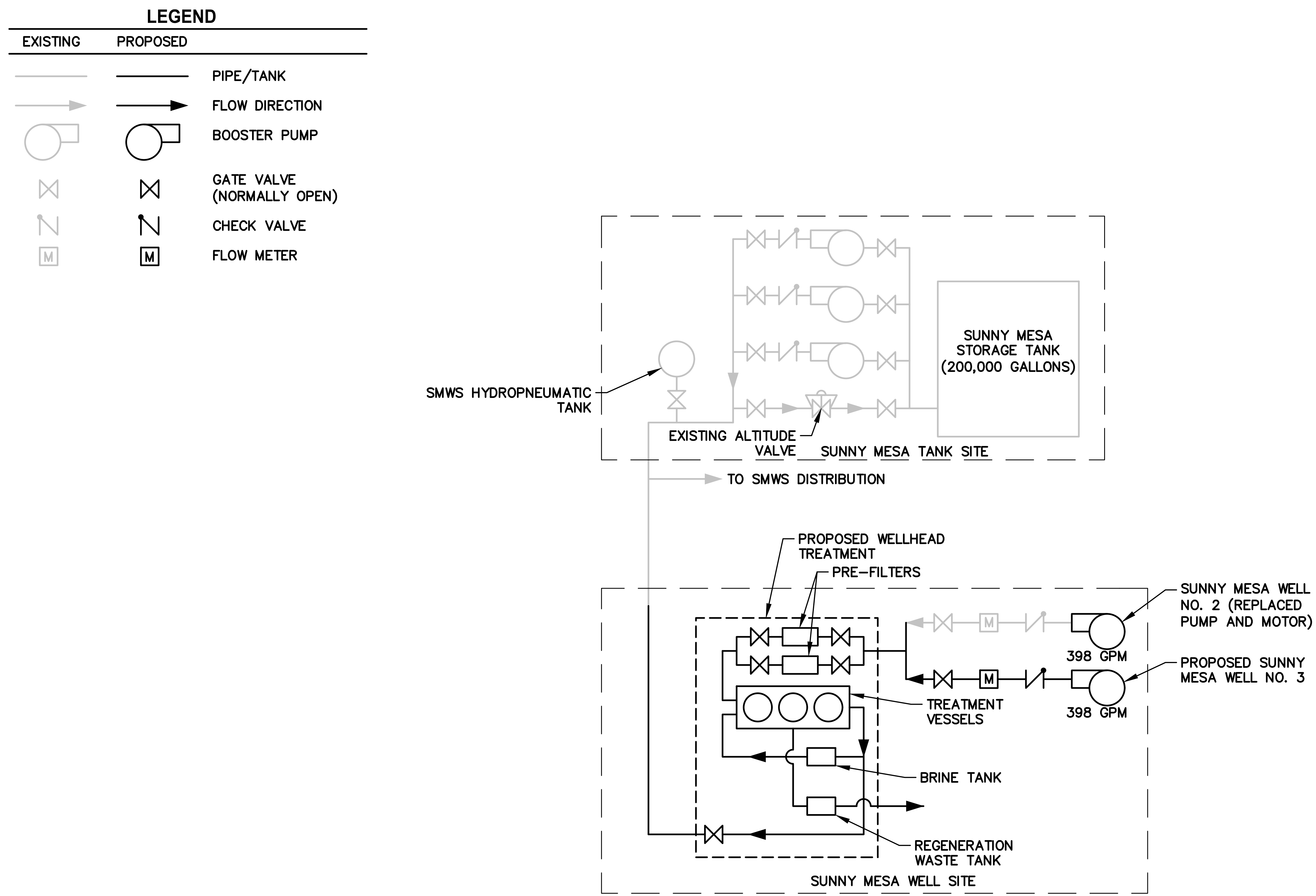

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FIGURE 3-4: ALTERNATIVE 2 SYSTEM SCHEMATIC

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NO SCALE

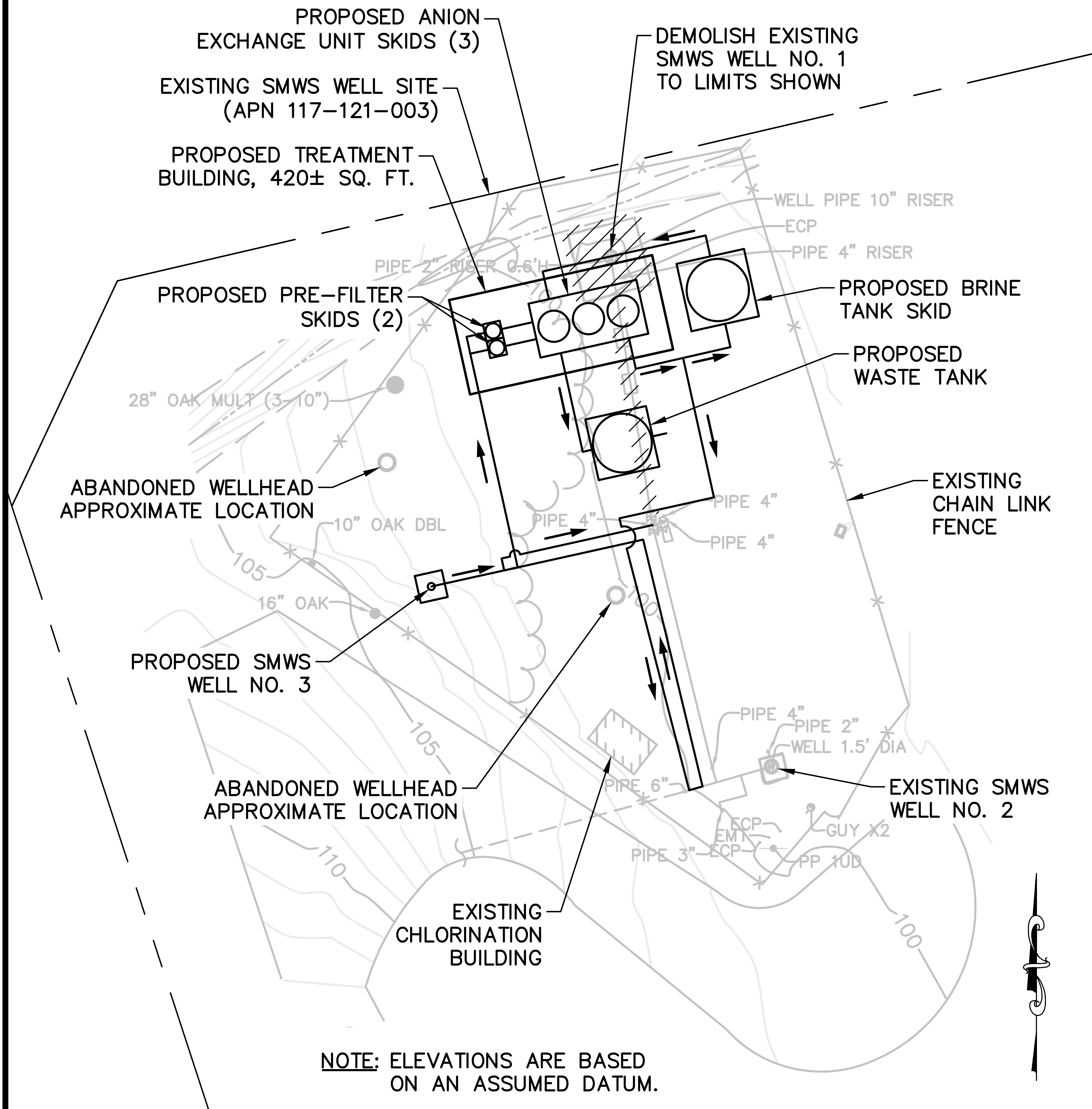

FIGURE 3-5: SMWS ALTERNATIVE 2 WELL SITE PLAN

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3.2.1. Operational Scenarios

If Alternative 2 is implemented, two operational scenarios have been identified:

Operational Scenario 1: In this scenario, water would be withdrawn from SMWS Well No. 2, treated in the treatment system, and discharged into the distribution system and storage tank.

Operational Scenario 2: This scenario is identical to Scenario 1, except the new SMWS Well No. 3 would be used to withdraw water.

The two wells are anticipated to alternate operation each tank fill/draw cycle, which is assumed to be the normal operating scenario.

3.2.2. Flow Rates

The SMWS MDD is 287,000 GPD. To provide an even basis of comparison between Alternative 1 and Alternative 2, a goal of providing the maximum daily demand in a 12-hour period was established. With this goal, both SMWS Well No. 2 and the proposed SMWS Well No. 3 would each need to be able to supply 398 GPM. For the purposes of this analysis, it is assumed SMWS Well No. 2 would be able to provide this flow rate if it were retrofitted with a larger motor and pump.

3.2.3. Treatment System

A treatment system designed to treat 398 GPM is required to lower the concentration of chrome-6 at the SMWS well site. It is assumed the proposed SMWS Well No. 3 would have similar water chemistry to water produced and from SMWS No. 2, and only one treatment process would be required to treat the water from both wells.

A detailed discussion and recommendations regarding alternative treatment technologies is included in Section 5. Based on the evaluation conducted in Section 5, a strong base anion exchange system with onsite regeneration is the recommended treatment technology.

3.2.4. Well Pump Replacement and New Well

The current pump and motor installed in SMWS Well No. 2 cannot meet the MDD for the SMWS. As a result, the pump and motor will need to be replaced. Additionally, the proposed treatment system increases pressure losses through the system. A required discharge pressure of 175 psi at a flow rate of 398 GPM for the replacement pump has been estimated. The proposed SMWS Well No. 3 would also need to meet this operating condition.

Proposed SMWS Well No. 3 would need to be located at least 50 feet from any property boundary, and at least 50 feet from SMWS Well No. 2. These siting restrictions limit the areas at the SMWS well site where this new well could be constructed. The proposed well location shown on Figure 3-5 is the only location within the existing fence line where this well could be constructed.

3.2.5. Operational Requirements

The recommended treatment system is anticipated to require a certified Grade III Water Treatment Operator. Currently the District only has Grade II operators. In order to operate this system, the District would need to hire a Grade III operator, or a current staff member would need to obtain this certification. Qualifying to take the Grade III Water Treatment Operator exam requires at least one year's experience operating a Grade II water treatment plant, which none of the District's staff currently has. It is anticipated the District would be required to hire out partial operation of the treatment system for one year while this experience requirement is met. One year of contract operation is anticipated to cost approximately $30,000.

3.2.6. Site Improvements

In addition to the process improvements identified, site improvements are anticipated to include several concrete slabs for the various equipment skids and waste tank included in the treatment system, yard piping to connect treatment equipment, and construction of gravel surfacing within the fenced-in well site to provide a drivable surface for chemical deliveries and waste brine hauling trucks.

3.2.7. Waste Disposal

It is assumed waste brine from the treatment process will need to be hauled offsite. For each regeneration cycle, approximately 1,600 gallons of brine waste would be produced, on an approximately four-month interval. Alternatively, this brine could be metered into a nearby sanitary sewer draining to the City of Watsonville under an industrial discharge permit. This discharge would need to be negotiated with the City of Watsonville, if feasible.

3.2.8. Benefits of Treatment at the SMWS Well Site

The most significant benefit of providing treatment at the SMWS well site is treatment provides an effective means of mitigating chrome-6 contamination in the SMWS. Additionally, this alternative would provide two reliable sources of water for the SMWS, each sized to meet MDD of the system. The SMWS Well No. 3 could be constructed and placed into operation while retrofit work on SMWS Well No. 2 is performed.

3.3. Alternative 3 – Wellhead Treatment with Connection to PWS

This alternative combines the booster pump station and intertie pipeline discussed in Alternative 1 and the treatment system identified in Alternative 2. This would result in a system which would meet the reliability requirement of having two sources of supply as well as meeting water quality requirements.

Required modifications include:

- Replacement of the existing SMWS Well No. 2 pump and motor to increase capacity and discharge pressure of the well, as this well cannot meet current MDD.
- Destruction of SMWS Well No. 1, due to sand production issues.
- Site improvements to integrate the treatment system into the water system.
- Controls and electrical improvements for the well site.
- A pressure reducing valve which would allow the SMWS to transfer water to the PWS.
- Modifications at the Pajaro Tank Site

The proposed improvements included in this alternative are shown schematically on Figure 3-6 and spatially on Figure 3-7. The intertie pipeline alignment would be as shown on Figure 3-2. Additionally, these improvements are described in detail in the following sections.

3.3.1. Operational Scenarios

If Alternative 3 is implemented, two operational scenarios have been identified as follows:

Operational Scenario 1: In this scenario, water would be withdrawn from SMWS Well No. 2, treated in the treatment system, and discharged into the distribution system and storage tank. This is assumed to be the normal operating scenario.

Operational Scenario 2: In this scenario, the entire system demand would be served from the PWS.

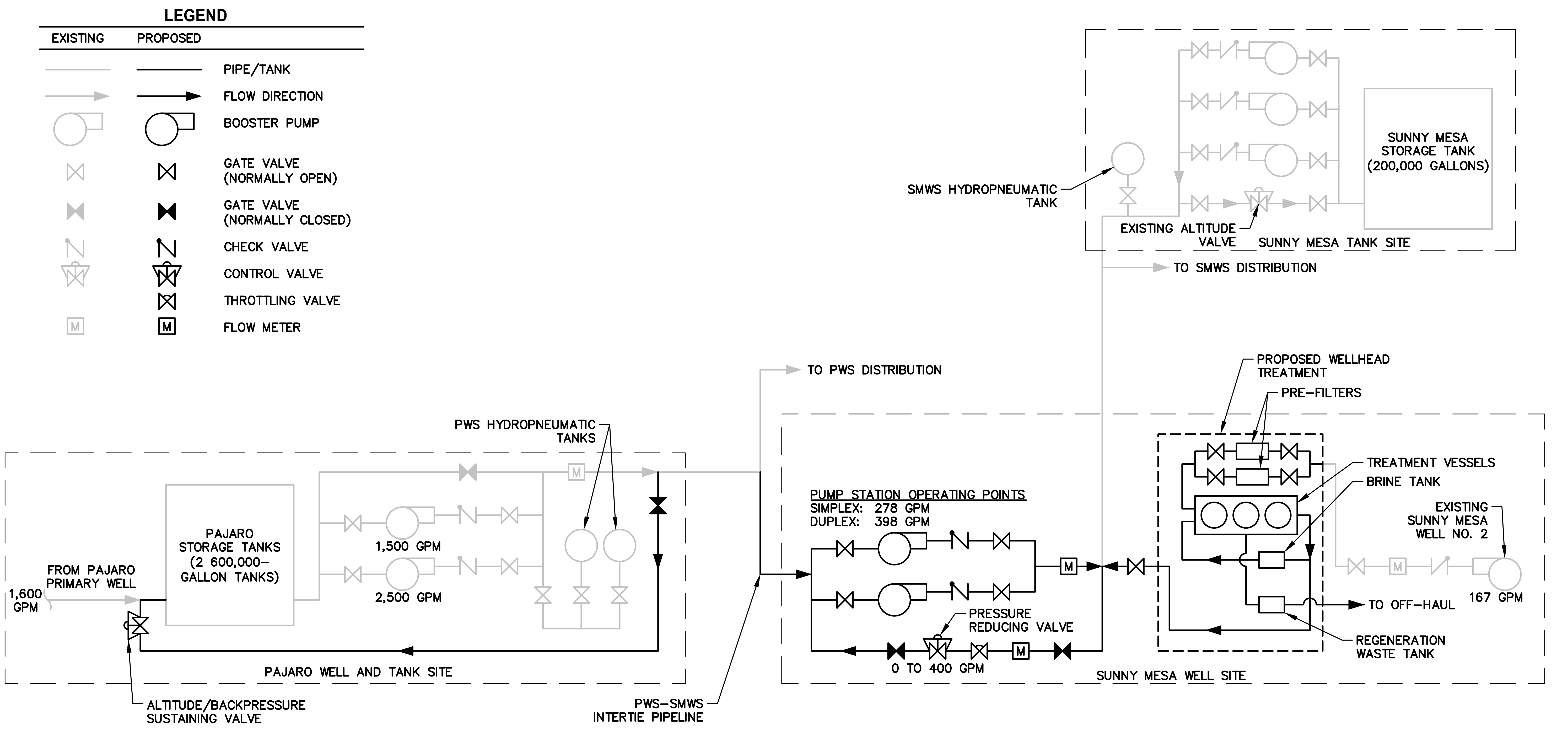

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FIGURE 3-6: SMWS ALTERNATIVE 3 IMPROVEMENT SCHEMATIC

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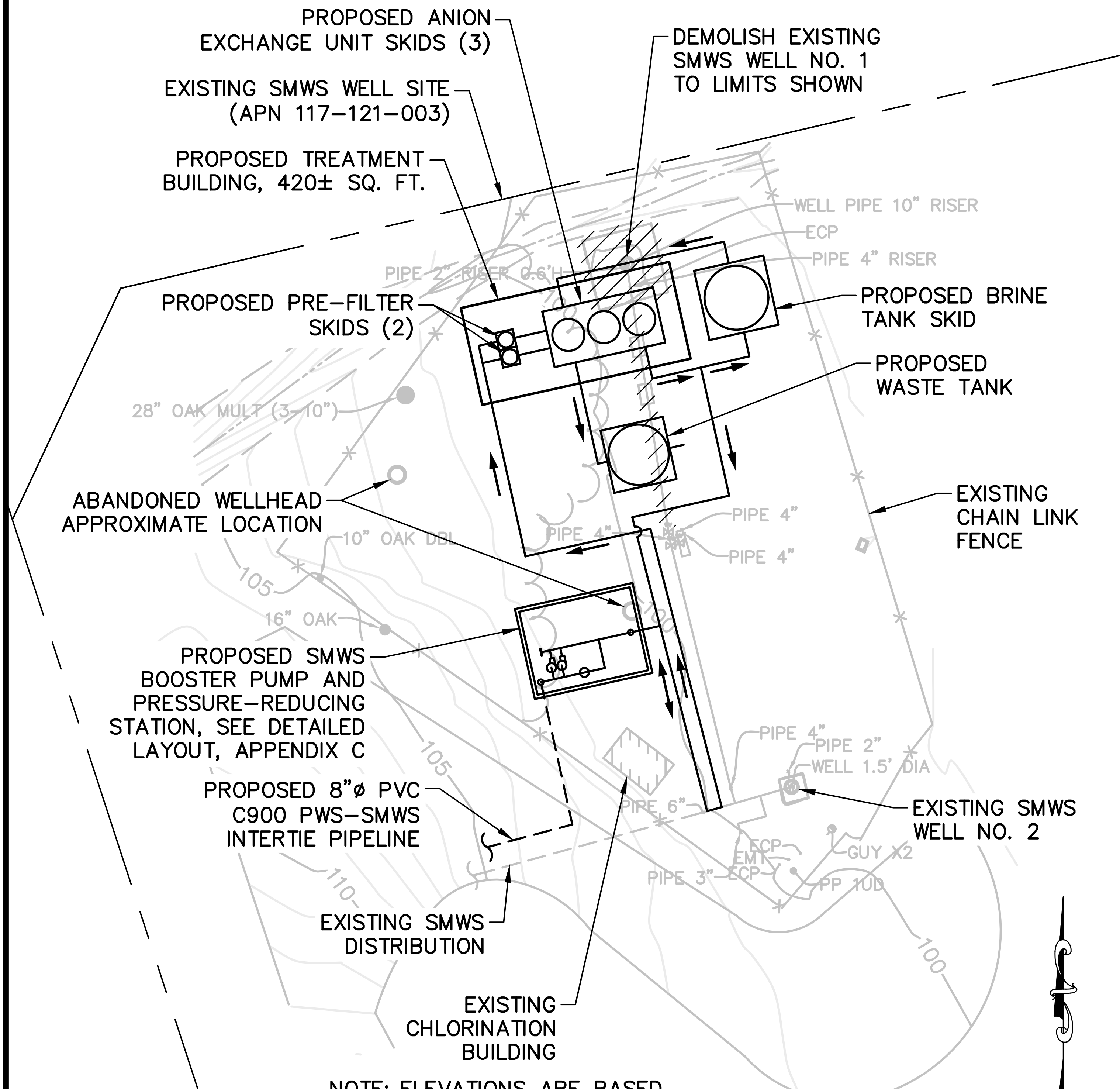
NO SCALE



NOTE: ELEVATIONS ARE BASED ON AN ASSUMED DATUM.

FIGURE 3-7: SMWS ALTERNATIVE 3 WELL SITE PLAN

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1" = 20'

3.3.2. Pipeline Alignment and Material

The pipeline alignment and material for the intertie between the PWS and the SMWS well site would be as discussed in Section 3.1.2.

3.3.3. Flow Rates

The SMWS MDD is 287,000 GPD. To provide an even basis of comparison between Alternative 1, 2 and 3, a goal of providing the maximum daily demand in a 12-hour period has been established. With this goal, SMWS Well No. 2 would need to be able to supply 398 GPM. For the purposes of this analysis, it is assumed SMWS Well No. 2 would be able to provide this flow rate if it were retrofitted with a larger motor and pump.

The booster pump station would be sized similarly to the Sunny Mesa Booster Pump Station discussed in Section 3.1.5, except when operating in simplex mode, each pump would need to provide at least the MDD. Both pumps operating would yield a discharge of 398 GPM into the SMWS, meeting the MDD in a 12-hour period.

3.3.4. Treatment System

The treatment system would be identical to the treatment system discussed in Section 3.2.3. Treatment system operational requirements would be as discussed in Section 3.2.5.

3.3.5. Pressure Reducing Valve

The pressure reducing valve would be as described in Section 3.1.7.

3.3.6. Modifications to the Pajaro Tank Site

Modifications to the Pajaro Tank Site would be as described in Section 3.1.8.

3.3.7. Benefits of Interconnection with PWS and Treatment

The most significant benefit of this alternative is its ability to provide two independent supplies, each complying with the chrome-6 MCL. Additionally, this alternative increases the available local supply to meet MDD, allowing the SMWS Well No. 2 to meet the SMWS MDD without supplemental supplies from the PWS.

Connecting the SMWS with the PWS would increase overall system reliability for both water systems. In addition, a consolidated water distribution system will allow portions of the system to be taken offline for maintenance and repairs, and the increased supply availability from the SMWS Well No. 2 would allow more water to be transferred to the PWS in an emergency situation compared to Alternative 1.

The intertie pipeline between the PWS and the SMWS could be constructed and placed into operation while retrofit work on SMWS Well No. 2 is performed.

3.4. Hydraulic Model

A spreadsheet based hydraulic model was developed to determine booster pump station discharge pressure requirements and anticipated flow rates between the water systems. The hydraulic model is included in Appendix D. Development of the hydraulic model included the following assumptions:

- Hazen-Williams friction factor of 130 for all pipes.
- All flow between system locations travels along a straight path, system loops and multiple flow paths were not included.
- Flow and pressure considerations were not fully examined within each of the water systems discussed in this report.

Given these assumptions, a modeling software based hydraulic model should be developed as part of the detailed design process. The hydraulic model should incorporate system demands in each of the systems to obtain a clearer picture of system losses.

Section 4. Vega Road Hexavalent Chrome Project

The VRWS supplies water to residential and commercial customers in the Lewis Road and Vega Road valleys and surrounding hills. One water quality sample from the range of available data from the Oakleaf Well dated March 26, 2015 indicated concentrations of chrome-6 above the MCL. Data from four other sampling events was provided by the District, demonstrating a range of chrome-6 concentrations ranging from below the detection level to 9.0 µg/l. To mitigate the chrome-6 issue in this system, a connection from the PWS to the VRWS for supply purposes is proposed and analyzed in this Section.

The PWS connection would provide an alternate source of supply for the VRWS, allowing the Oakleaf Well to be placed on standby/emergency operation.

4.1. Vega Road Hexavalent Chrome Project Summary

A pipeline connection from the PWS to the VRWS would be constructed from the existing terminus of the PWS on Lewis Road to the intersection of Lewis Road and a private driveway located at approximately 249 Lewis Road. A new booster pump station is required to boost the pressure of water from the PWS to match the VRWS pressure in the Vista Verde pressure zone. The system would allow the VRWS to operate entirely on water from the PWS, with no water production from the VRWS wells, or a combination of water produced in the Vista Verde Well and water from the PWS.

Additional required modifications include:

- A pressure reducing valve, including controls, which would allow the VRWS to transfer water to the PWS
- Site improvements at the booster pump station site to develop the site into a fully functional municipal site
- New electrical service to the booster pump station site

It is assumed modifications at the Pajaro Tank Site described in Section 3.1.8 would be completed as part of the Sunny Mesa Hexavalent Chromium Project.

The proposed improvements included in this alternative are shown schematically on Figure 4-1 and spatially on Figures 4-2, 4-3, and 4-4, as well as being described in detail in the following sections.

4.2. Pipeline Alignment and Material

The PWS distribution piping discharges from the Pajaro Tank site along Railroad Avenue, crosses under the Union Pacific Railroad to Lewis Road, and extends to the east to a fire hydrant located near 40 Lewis Road (APN 117-262-008). The water main in Lewis Road at this location is eight inches in diameter. An 8-inch PVC C900 water pipeline would be constructed from this location approximately 1,100 feet to the east along Lewis Road to a District-owned parcel between Lewis Road and Lewis Court (APN 117-262-021).

A new booster pump station with an integral pressure reducing valve would be constructed on this parcel. Details on these improvements are included in Sections 4.3 and 4.4. From the new booster pump station, an 8-inch PVC C900 pipeline line would be constructed approximately 3,100 feet to the south along Lewis Road to the nearest connection point with the VRWS, located at the base of the incline along Lewis Road at the intersection of Vista Verde Drive, a private driveway located at approximately 249 Lewis Road.

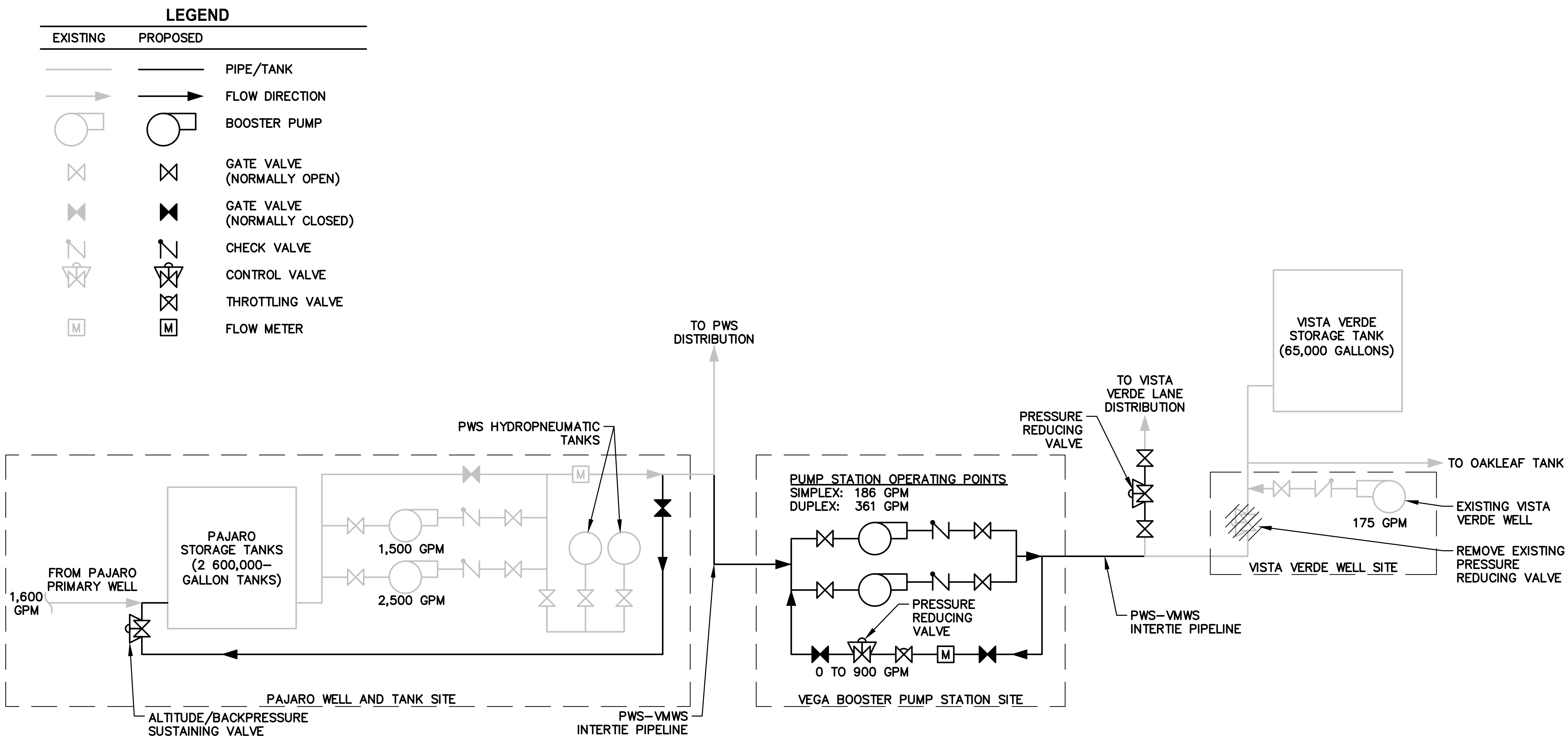

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FIGURE 4-1: VMWS IMPROVEMENT SCHEMATIC

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NO SCALE

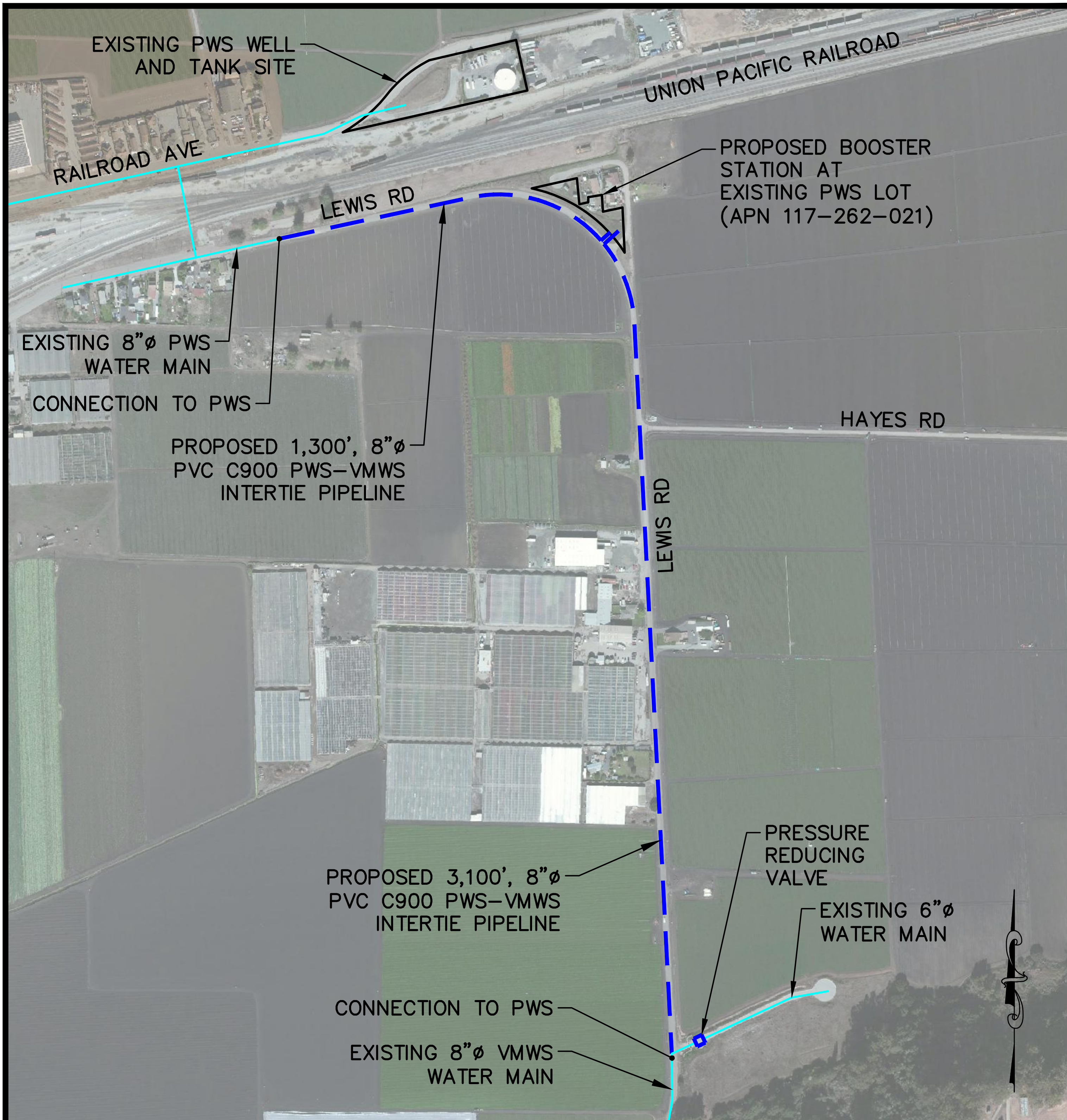

FIGURE 4-2: VMWS IMPROVEMENT PLAN

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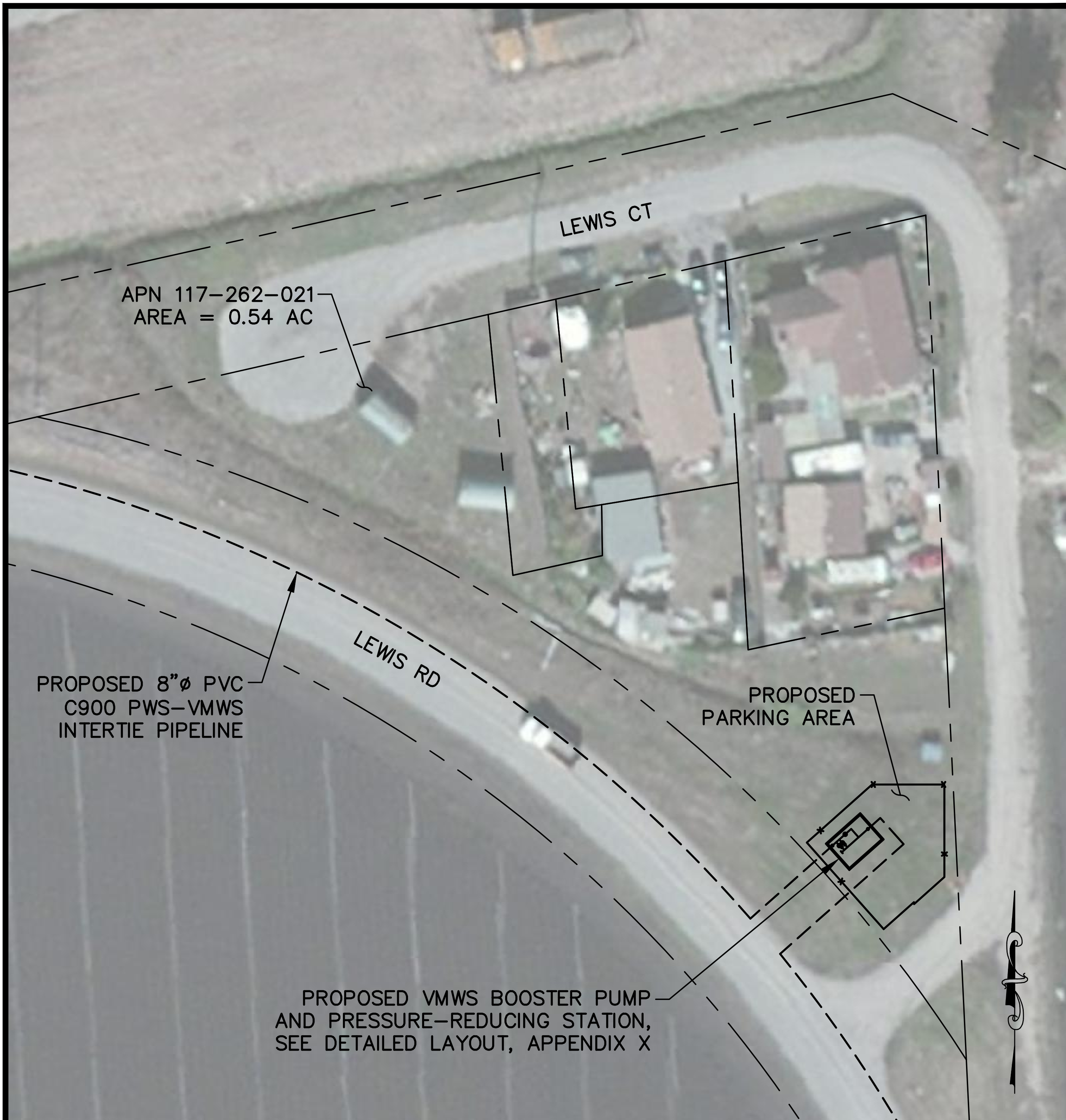

FIGURE 4-3: VMWS BOOSTER PUMP STATION SITE PLAN

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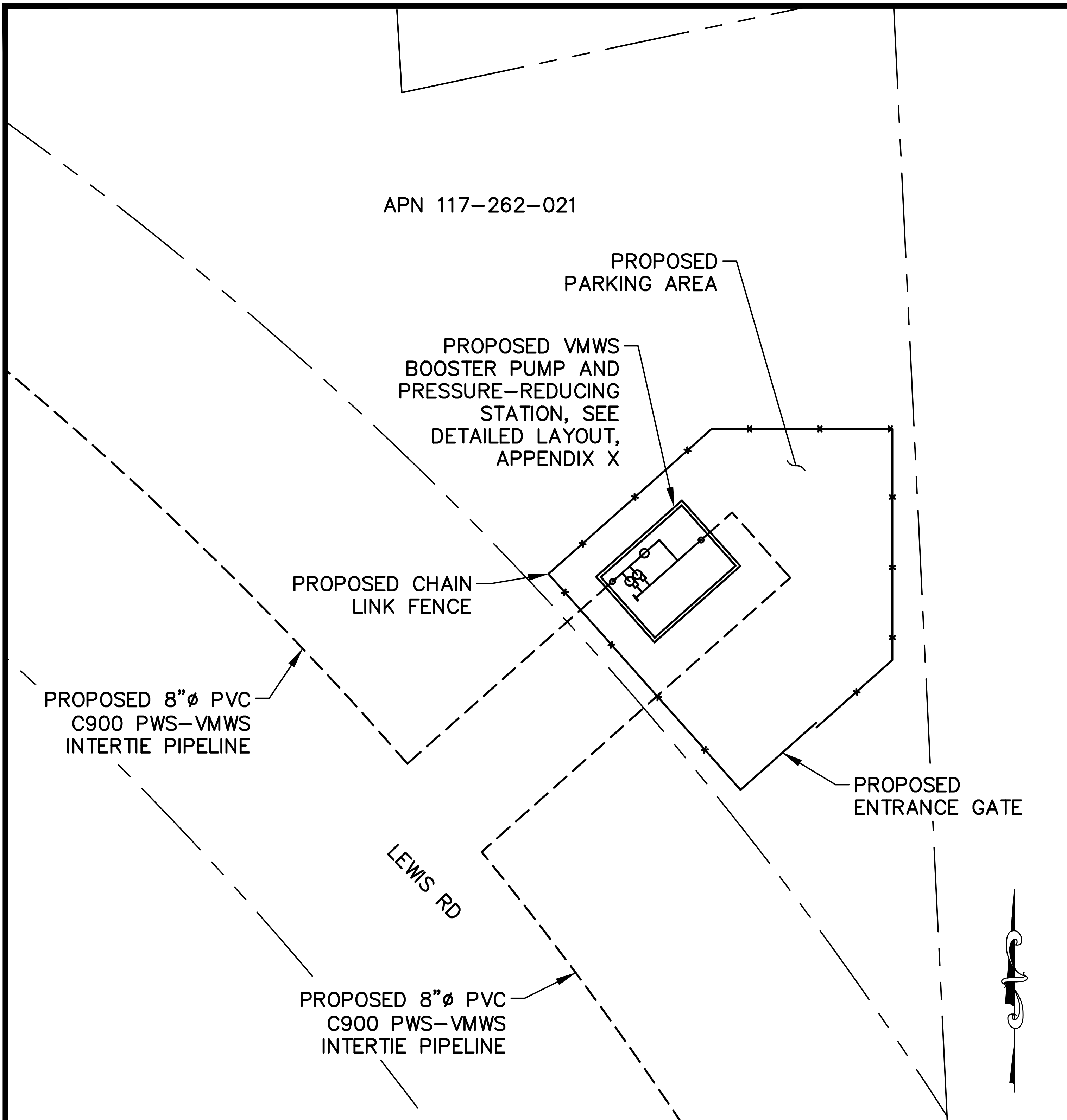

FIGURE 4-4: VMWS BOOSTER PUMP STATION SITE PLAN

SUNNY MESA / VEGA MUTUAL HEXAVALENT CHROMIUM PROJECTS
PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

MNS ENGINEERS INC
ENGINEERING | SURVEYING
CONSTRUCTION MANAGEMENT

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PSMCS.150080

20' 0' 20'

1" = 20'

4.3. Required System Flow Rates

A goal to transfer/produce the MDD into each water system in a six-hour period was established. The VRWS MDD is 130,000 GPD. To transfer this quantity of water in a six-hour period, a transfer rate of 361 GPM is required.

If the Oakleaf Well is placed on standby/emergency only operation mode, system demand would need to be supplied entirely by the PWS and the Vista Verde Well. The Vista Verde Well produces 175 GPM. This indicates a required discharge flow rate from the proposed booster pump station of 186 GPM.

If the entire system demand is provided by the PWS, the booster pump station would need to supply 361 GPM.

4.4. Booster Pump Station

The booster pump station to transfer water from the PWS to the VRWS consists of two parallel pumps, each sized for 186 GPM as discussed in Section 4.3. Each pump would be equipped with a 15-hp motor and a soft starter to reduce current draw during start-up. If both pumps operate simultaneously, they can serve the entire VRWS demand without the Vista Verde Well in operation. The pump station would be housed in a fiberglass prefabricated structure equipped with lighting, courtesy outlets, controls and other electrical equipment. The booster pump station operating points are summarized in Table 4-1. A preliminary pump station design layout is included in Appendix C.

The floor elevation of the pump station would need to be elevated above the base flood elevation to avoid damage to the facility in the event of a 100-year flood.

Table 4-1: Vega Road Booster Pump Station Operating Points

Vega Booster Pump Station

Operation Mode	Flow Rate (GPM)	Low Static Suction HGL (FT)	High Static Suction HGL (FT)	Dynamic Suction Losses (FT)	Discharge Static HGL (FT)	Discharge Losses (FT)	Pump TDH @ Low Static Suction (FT)	Pump TDH @ High Static Suction (FT)
Simplex	186	171	217	1.61	327	15.88	174	128
Duplex	361	171	217	5.5	327	24.11	186	140

4.5. Pressure Reducing Valve

The maximum flow rate from the VRWS to the PWS was calculated to be approximately 900 GPM. A pressure reducing valve, located integral to the proposed booster pump station, would allow the transfer of water from the VRWS to the PWS. The pressure reducing valve would decrease system pressure from 128 psi to approximately 80 psi to match the maximum system pressure of the PWS.

It is recommended the pressure reducing valve between the VRWS and PWS be equipped with manual shut-off valves. For water to be transferred from the SMWS to the PWS, District staff would need to manually operate the valves. This prevents a main break in the PWS from draining the Vista Verde tank in the VRWS. As this pressure reducing valve would be utilized infrequently, only a single pressure reducing valve is recommended, without a redundant valve.

Additionally, the pressure reducing valve would be equipped with an electric-actuated butterfly valve and flow meter for throttling the flow of water between the two systems. A PLC would control the closure of the diaphragm valve to achieve a transfer flow rate specified by the District; the flow meter would include a digital output to provide a feedback loop and modulate the flow rate through the PRV.

4.6. Additional Site Improvements

In addition to the booster pump station and pressure reducing valve at the District-owned parcel between Lewis Road and Lewis Court, other improvements would be required to develop this currently unimproved site:

- An electrical service to provide electrical power to the booster pump station, site lighting, and other appurtenances
- An access driveway and parking area, composed of a gravel surface
- A security fence and access gate
- Site lighting
- Site drainage improvements
- Communication equipment to signal pump operation from the Vista Verde Tank

4.7. Operation and Controls

The Vista Verde Well would remain the primary source of water for the VRWS. Transfer of water from the PWS to the VRWS would occur when the Vista Verde Well could not meet system demands, typically when the Vista Verde Well is out of service for maintenance. Operation of the Vega Booster Pump Station would be controlled by a level sensor in the Vista Verde Tank. If water levels drop below the "pump on" level for the Vista Verde Well, the Vega Booster Pump Station would activate.

Water would be transferred from the VRWS to the PWS only in emergency situations. District staff would open isolation valves, and set a flow rate on the PLC, and water would be allowed to move from one system to the other.

To ensure the Vega Booster Pump Station would operate when needed, the pump station should be periodically operated. It is assumed the pump station would operate two days per quarter.

4.8. Hydraulic Model

A discussion on the hydraulic model and associated recommendations is included in Section 3.4. In developing a detailed hydraulic model, a detailed analysis of the VRWS should be conducted to ensure water transferred from the PWS can effectively be transferred throughout the VRWS to meet MDD. A copy of the hydraulic model developed for this project is included in Appendix D.

Section 5. Hexavalent Chromium Treatment Alternatives

This Section evaluates alternative treatment technologies for reducing chrome-6 in the Sunny Mesa Well No. 2 to below the MCL.

5.1. Water Quality

As discussed in Section 2.2.2, sampling has shown chrome-6 concentrations have ranged from 7.1 to 17 µg/l and averaged 12.6 µg/l. SMWS water meets all other MCLs and regulatory action levels. For the purposes of a treatment evaluation, other notable water constituents include low levels of sulfates, alkalinity of 154 milligrams per liter (mg/l), and a pH of 7.5.

5.2. Treatment Alternatives

Six alternative wellhead treatment technology alternatives were screened for use at the Sunny Mesa well site:

- Reduction, Coagulation, Filtration
- Reverse Osmosis
- Ion Exchange Membranes
- Weak Base Anion Ion Exchange Resin
- Strong Base Anion Ion Exchange Resin with onsite regeneration
- Strong Base Anion Ion Exchange Resin with offsite regeneration

A discussion on each of these technologies is provided in the following sections.

5.2.1. Reduction, Coagulation, Filtration (RCF)

In the RCF process, chrome-6 is reduced to chrome-3 by the addition of ferric chloride or ferrous sulfate. Excess iron is oxidized by either aeration or a very small addition of chlorine. The chrome-3 and iron are then precipitated and coagulated with the aid of a polymer. The coagulated particulates are then filtered out by a multimedia filter or microfiltration membrane. The resultant treated water requires a booster pump station to reach system pressure.

This type of system is characterized by an extended series of unit treatment processes and complex operation. The resultant solid waste stream is not anticipated to be classified as hazardous waste and could be hauled to a landfill. These systems are only cost effective for large systems, and as a result are not further evaluated for this application.

5.2.2. Reverse Osmosis (RO)

RO uses a semi-permeable membrane to remove minerals and dissolved solids including chrome-6 from water. In order to protect the membranes from fouling, pre-treatment may be required. If implemented for this application, only a fraction of the flow stream would be treated, utilizing untreated water to blend with RO permeate. This blending stream would reduce the treatment requirement, and also provide sufficient minerals to avoid taste and corrosivity issues associated with the RO permeate. This treatment process would result in a waste stream of approximately 25 percent of the treated water stream, which would need to be discharged to a sanitary sewer or potentially used for irrigation.

This technology is often used when a variety of contaminants are present, which can be removed simultaneously. Due to the high capital cost, high long-term operating costs, and single contaminant targeted for removal, RO was not evaluated further for this application.

5.2.3. Ion Exchange Membranes (IEM)

Ion-exchange membranes are composed of a polymeric material attached to charged ion groups. The membranes selectively exclude cations or anions from passing through the membrane due to Donnan equilibrium and Donnan exclusion and not due to physically blocking or electrostatically excluding specific charged species. This technology is widely used in industrial applications and in concentrated waste situations, such as RO brine. It can be used for recovery of certain ions from wastewater.

Similar to RO, IEM is not recommended for use in this application because of the large pressure drop across the membrane, which translates to higher energy costs, the low concentration of chrome-6 to be removed, and there is no need to remove any of the other constituents. Additionally, this technology has not been widely used in the United States.

5.2.4. Weak Base Anion Ion Exchange Resin (WBA)

The WBA process utilizes an ion exchange resin media to remove chrome-6 from water. As water passes through a resin bed, chrome-6 is adsorbed by the resin. Prior to the ion exchange process, a pre-filter is required to remove suspended matter to protect the resin, and the pH of the water must be reduced to 6.0. Following resin treatment, the pH of the water is raised to non-corrosive levels. Typically, either carbon dioxide, or a combination of hydrochloric acid and sodium hydroxide, is used for adjusting pH levels. If carbon dioxide is used, aeration is used to remove the carbon dioxide from the water and raise the pH after resin treatment. In this application, it is assumed hydrochloric acid and sodium hydroxide would be used, which do not necessitate aeration, allowing the treatment system to operate at system pressure, (i.e., no additional pumping would be required to transfer water into the distribution system and storage). Treated water can then be chlorinated and transferred to the distribution system.

If implemented for this application, only a fraction of the flow stream would be treated, utilizing untreated water to blend with the treated water. The resultant blended water would have a maximum chrome-6 concentration of 6 µg/l, assuming source water quality of 17 µg/l.

The WBA utilizes a disposable ion exchange resin, which needs to be periodically replaced; regeneration of this media is not economically feasible. The spent resin will likely need to be disposed of as non-Resource Conservation and Recovery Act (RCRA) hazardous waste, and replaced with virgin resin. If radioactive compounds such as thorium or uranium are present in the source water, the resin can become radioactive, increasing the cost of disposal and requiring additional certifications for handling of wastes, including designating an operator as a Radiation Safety Officer and obtaining a Radiation License.

Initial screening indicates this technology may be a reasonable option; additional investigation is warranted, and is discussed in Section 5.3. A treatment system for this application would include:

- Two pre-filters enclosed in a building with the ion exchange units
- Two 8-foot diameter contact vessels, ASME stamped, rated for 150 psi, each containing 300 cubic feet of anion exchange resin, enclosed in a building
- Hydrochloric acid and sodium hydroxide chemical pumps
- Chemical storage tanks
- Miscellaneous piping, valves, and accessories

5.2.5. Strong Base Anion Ion Exchange Resin (SBA) With Onsite Regeneration

Similar to the WBA process, the SBA process utilizes an ion exchange resin media to remove chrome-6 from water. Prior to the ion exchange process, a pre-filter is also required to remove suspended matter to protect the resin. Treated water can then be chlorinated and transferred to the distribution system.

A salt-brine feed system located onsite is used to regenerate the resin when it is exhausted. After regeneration, the salt brine and resin rinse water is discharged to a waste brine tank. While there are some locations where the waste brine could be discharged to the sewer under an industrial discharge permit, the high salt content, in addition to the chrome-6 and other metals accumulated in the waste brine, will greatly limit the availability of this option to most water agencies. One alternative is to haul the waste brine to a dedicated facility for disposal. Alternatively, resin could be regenerated offsite, as discussed in Section 5.2.6. For the purposes of this evaluation, it is assumed the waste will need to be hauled offsite.

A treatment system for this application would include:

- Two primary pre-filters, enclosed in a building with the ion exchange units
- Three 5.5-foot diameter contact vessels, ASME stamped, rated for 150 psi, each containing 45 cubic feet of anion exchange resin, enclosed in a building
- 5,000-gallon waste brine storage tank
- Salt silo and brine tank
- Miscellaneous piping, valves, and accessories

Initial screening indicates this technology may be a reasonable option; additional investigation is warranted, and is discussed in Section 5.3.

5.2.6. Strong Base Anion Ion Exchange Resin (SBA) With Offsite Regeneration

Utilizing the same treatment technology as discussed in Section 5.2.5, this alternative would contract out the resin handling and regeneration. This process simplifies system operation. A treatment system for this application would include:

- Two pre-filters, enclosed in a building with the ion exchange units
- Eight 4-foot diameter contact vessels, ASME stamped, rated for 150 psi, each containing 60 cubic feet of anion exchange resin, enclosed in a building
- Miscellaneous piping, valves, and accessories

Initial screening indicates this technology may be a reasonable option; additional investigation is warranted, and is discussed in Section 5.3.

5.3. Alternative Treatment Technology Evaluation

As discussed in Section 5.2, three of the six treatment alternatives described have been identified which would be effective in treating chrome-6 from Sunny Mesa Well No. 2. These alternatives are compared in this section. Detailed alternative system information was provided by Evoqua Water Technologies. Due to the high level of complexity of the treatment systems, schematics showing all piping, valves, vessels, etc. have not been included.

To provide a balanced comparison between Alternative 1, blending with water from PWS, an equal level of service has been assumed; this includes supplying 398 GPM to the Sunny Mesa System, and providing water with a chrome-6 concentration of less than 7 µg/l. A 20-year planning horizon has been utilized as the basis for comparing operating costs. All costs are in 2016 dollars.

A comparison of the capital and long-term operating costs of each treatment system is summarized in Table 5-1. The capital cost for each system only includes the purchase price of equipment.

Table 5-1: 20-Year Total Costs for Treatment Alternatives

Treatment Alternative	Treatment System Capital Cost	Resin Replacement Interval	Resin Replacement Cost	Estimated Annual Operation and Maintenance Costs	20-Year Cost
1 - Weak Base Anion Exchange	$700,000	3 Years	$170,000	$57,000/Year – Resin + Disposal $10,000/ Year - Chemicals	$2,040,000
2 - Strong Base Anion Exchange (Onsite Regeneration)	$210,000	3 Month Regeneration Cycle 5 Year Replacement Cycle	$18,000	$8,800/Year – Resin + Salt $9,600/Year – Waste Off hauling	$578,600
3 - Strong Base Anion Exchange (Offsite Regeneration)	$350,000	6 Months	$ 15,000	$30,000 – Resin	$950,000

A comparison of the advantages and disadvantages of each treatment system is summarized in Table 5-2.

Table 5-2: Treatment Technology Color Alternative Review Table (CART)

Treatment Alternative	Treatment Features			Good → Poor		
	Construction Cost	Operating Costs	Operation Difficulty	Process Complexity	Waste Streams	System Footprint
1 - Weak Base Anion Exchange	$$$	$$$	Regular Maintenance on Chemical Feeds and Chemical Deliveries	Medium	Anion Exchange Resin - Hazardous Waste	Treatment Vessels, Chemical Pumps and Chemical Storage
2 - Strong Base Anion Exchange (Onsite Regeneration)	$	$	More Complex Process to Operate and Maintain	High	Brine Waste	Pre-Filters, Treatment Vessels, Brine Waste, Salt Storage/Brine Tank
3 - Strong Base Anion Exchange (Offsite Regeneration)	$$	$$	Coordination for Resin Replacements	Low	None - Resin Regenerated Offsite	Pre-Filters and Treatment Vessels

Based on this evaluation, a strong base anion exchange system with onsite regeneration is recommended due to the low construction and operation costs, compared to the other alternatives.

Section 6. Permitting Requirements

A variety of environmental and other permits are anticipated to be required for the proposed project(s). A memorandum is provided in Appendix D which includes a description of environmental permitting requirements and costs associated with obtaining environmental approvals for the recommended project(s), as well as environmental permitting compliance.

6.1. Environmental Permits and Compliance

As discussed in the memorandum in Appendix D, the Vega Road Water System Hexavalent Chromium and Sunny Mesa Hexavalent Chromium Projects will need to comply with CEQA. An Initial Study and Mitigated Negative Declaration (IS-MND) is the anticipated route for CEQA compliance for the Sunny Mesa Hexavalent Chromium Project. If permitted as a separate project, the Vega Road Water System Hexavalent Chromium Project may be eligible for a Categorical Exemption. Additional permits associated with well construction/deconstruction from the Monterey County Health Department, and permitting for construction within the coastal zone will be required for environmental compliance.

A summary of the fees associated with environmental permitting and compliance is provided in Table 6-1.

Table 6-1: Environmental Permitting and Compliance Costs

Action	Estimated Costs
Sunny Mesa Hexavalent Chromium Project	
Alternative 1	
Well Deconstruction	$1,317
Coastal Zone Permitting	$9,020
CEQA Review (IS-MND)	$20,000 – $22,000
Biological Resources Assessment and Construction Monitoring	$20,000 – $22,000
Total	**$50,337 – $54,337**
Alternative 2	
Well Construction and Deconstruction	$17,643 - $27,443
Coastal Zone Permitting	$9,020
CEQA Review (IS-MND)	$17,000 – $20,000
Biological Resources Assessment and Construction Monitoring	$20,000
Total	**$63,663– $76,463**
Alternative 3	
Well Deconstruction	$1,317
Coastal Zone Permitting	$9,020
CEQA Review (IS-MND)	$20,000 – $22,000
Biological Resources Assessment and Construction Monitoring	$20,000 – $22,000
Total	**$47,337– $50,337**
Vega Road Hexavalent Chromium Project	
Well Construction and Deconstruction	NA
Coastal Zone Permitting	NA
CEQA Review (Categorical Exemption)	$1,500 – $3,000
Biological Survey and Letter Report	$12,000 – $13,000
Total	**$13,500 – $16,000**

6.2. Other Project Permits

In order to construct the Vega Road Water System Hexavalent Chromium Project and the Sunny Mesa Hexavalent Chromium Project, several permits are required in addition to complying with CEQA. The permits vary slightly depending on the selected alternative for the Sunny Mesa Hexavalent Chromium Project.

County of Monterey Encroachment Permit: For the Vega Road Water System Hexavalent Chromium Project and Sunny Mesa Hexavalent Chromium Project Alternative 1 and 3, an encroachment permit is required from the County of Monterey for pipeline construction within the public right-of-way.

State Water Resources Control Board Permit Amendment: Any change in the source of supply or significant modification/addition of water treatment to a water system requires an amendment to the District's Water Supply Permits. Consolidation of the water systems such that they are administered as a single water system may be required.

Flood Plain Encroachment Permit and County of Monterey Building Permit: For construction of the Vega Road Water System Hexavalent Chromium Project, the VRWS booster pump station would be constructed within the 100-year flood plain elevation, as the ground elevation at the pump station site is below the 100-year flood plain elevation. In addition, a fraction of the SMWS well site is within the 100-year flood plain. As a result, a floodplain encroachment permit and/or a variance from the Monterey County Water Resources Agency is required. In addition, submitting a building permit application for the project is required to facilitate County review of the floodplain encroachment permit and/or variance application.

The projects are anticipated to be exempt from grading permits, and added impermeable surfaces are anticipated to be below the area threshold requiring County review of post-construction stormwater improvements.

Section 7. Recommended Project and Preliminary Estimate of Probable Costs

This section presents the anticipated cost of construction and operation of the various project alternatives, and makes recommendations regarding project implementation.

7.1. Cost Assumptions

Cost estimates were developed for each project alternative. The unit costs utilized in the detailed cost estimates are based on information obtained from a variety of resources, including cost estimate resource guidebooks, budgetary quotes from vendors for pump stations, treatment systems, and other mechanical equipment, engineer's experience, and publically available information. In addition, the following mark-ups were applied to the project costs:

- Mobilization, including Division 1 costs, bonds and insurance: 10%
- Taxes on materials: 7.625%
- Contractor Markup for subcontractors: 12%
- Contractor Markup for overhead and profit: 12%
- Project Contingency: 30%
- Escalation of project costs attributed to inflation: 2%

Pumping costs are assumed to only be incurred as a result of electricity usage. The District currently pays $0.44536 and $0.19396 per kilowatt of electricity for peak and off-peak usage, respectively. For this analysis, it is assumed all electricity usage is during peak periods.

7.2. Opinion of Probable Costs of Construction

Construction cost estimates for each project alternative are summarized in Table 7-1. Detailed cost estimates are included in Appendix E.

Table 7-1: Estimated Probable Cost of Construction Summary

Project Alternative	Estimated Cost of Construction
Sunny Mesa Hexavalent Chromium Project	
Alternative 1 – Blending with PWS	$2,300,000
Alternative 2 – Wellhead Treatment	$2,380,000
Alternative 3 – Wellhead Treatment and Connect to PWS	$3,050,000
Vega Road Hexavalent Chromium Project	
Connect to PWS	$1,840,000

7.3. Additional Estimated Project Costs

In addition to the construction costs of the proposed improvements, costs will be incurred by the projects associated with engineering design, legal, environmental permitting, construction management, and District administration. It is assumed the projects will be grant funded, and as a result, additional costs associated with grant administration will be incurred. Estimates of the total costs associated with the project, including these additional expenses, for each alternative have been developed and are included in Table 7-2. Engineering costs are assumed to be 11 percent of construction costs. Costs for environmental permitting and compliance are as discussed in Section 6.1, and have been rounded to the nearest $10,000 using the high end of cost ranges. District Administration is assumed to be 5% of total costs, which includes District staff time, District engineering services, legal expenses, and grant administration. Construction management costs are assumed to be 12 percent of construction costs.

Table 7-2: Total Estimated Project Costs

Project Alternative	Estimated Cost of Construction	District Engineer/ Administration	Engineering	Environmental	Construction Management	Total Estimated Project Cost
Sunny Mesa Hexavalent Chromium Project						
Alternative 1 – Blending with PWS	$2,300,000	$120,000	$250,000	$50,000	$280,000	$2,880,000
Alternative 2 – Wellhead Treatment	$2,380,000	$120,000	$260,000	$80,000	$280,000	$3,010,000
Alternative 3 – Wellhead Treatment and Connect to PWS	$3,050,000	$150,000	$330,000	$50,000	$360,000	$3,810,000
Vega Road Hexavalent Chromium Project						
Connect to PWS	$1,840,000	$90,000	$200,000	$20,000	$220,000	$2,280,000

7.4. Operation and Maintenance Costs

Operational and maintenance costs are anticipated to be incurred by the project associated with pumping and treatment. These costs are summarized in this section.

7.4.1. Sunny Mesa Hexavalent Chromium Project

Operating costs for the Sunny Mesa Hexavalent Chromium Project would be incurred for pumping costs to supply water from the PWS, operation of the Sunny Mesa Booster Pump Station, and ongoing costs associated with treatment, depending on the selected alternative. Depending on the alternative, different operating costs would be incurred as summarized in Table 7-3 under normal operating conditions.

Table 7-3: Sunny Mesa Hexavalent Chrome Project Sources of Operational Costs

	Sources of Operational Costs				
	PWS Well No. 2 Operation	PWS Booster Pump Station Operation	Sunny Mesa Booster Pump Station Operation	Sunny Mesa Well Operation	Anion Exchange Treatment System Operation
Alternative 1 – Blending with PWS	X	X	X	X	
Alternative 2 – Wellhead Treatment				X	X
Alternative 3 – Wellhead Treatment and Connect to PWS				X	X

Note: Alternative 3 is assumed to default operation to on-site treatment; as a result, limited operational costs from the PWS are anticipated.

Operating costs for each alternative are summarized in Table 7-4. Treatment costs are as discussed in Section 5.3. Operating costs are rounded to the nearest $1,000.

Table 7-4: Sunny Mesa Hexavalent Chromium Project Operational Costs

Project Alternative	Annual Pumping Costs	Annual Treatment Costs	First Year Contract Treatment Operation Cost	20-Year Operation Costs
Alternative 1 – Blending with PWS	$26,000	$0	$0	$520,000
Alternative 2 – Wellhead Treatment	$26,000	$18,000	$30,000	$910,000
Alternative 3 – Wellhead Treatment and Connect to PWS	$26,000	$18,000	$30,000	$910,000

To compare total project construction and operational costs, a 20-year comparison timeline was utilized. Total project construction and operational costs are summarized in Table 7-5.

Table 7-5: Sunny Mesa Hexavalent Chromium Project Lifecycle Costs

Project Alternative	Total Estimated Project Cost	20-year Operation Costs	20-Year Total Project Costs
Alternative 1 – Blending with PWS	$2,880,000	$520,000	$3,400,000
Alternative 2 – Wellhead Treatment	$3,010,000	$910,000	$3,920,000
Alternative 3 – Wellhead Treatment and Connect to PWS	$3,810,000	$910,000	$4,720,000

7.4.2. Vega Road Hexavalent Chrome Project

Operating costs for the Vega Road Hexavalent Chromium Project would be incurred by pumping costs from operation of the Vega Booster Pump Station and additional water provided by the PWS. An estimate of the pumping costs associated with the Vega Road Hexavalent Chrome Project was developed, and includes PWS groundwater pumping, PWS booster pumping and pumping costs associated with the Vega Booster Pump Station. These costs are estimated to be approximately $40 per day. These costs were compared to the anticipated reduction in pumping costs associated with non-operation of the Vista Verde well, and were slightly lower. As a result, the Vega Road Hexavalent Chromium Project is anticipated to have a negligible impact on operating costs, regardless of the usage of the Vega Booster Pump Station.

7.5. Recommended Project

In order to comply with the MCL for chrome-6 for the Sunny Mesa and Vega Road Water Systems, mitigation projects are recommended.

For the Sunny Mesa Hexavalent Chromium Project, a CART was developed to compare the three alternatives, and is presented as Table 7-6.

Table 7-6: Sunny Mesa Hexavalent Chromium Project Alternative Color Alternative Review Table (CART)

Alternative	Treatment Features			Good		Poor
	Construction Cost	Operating Costs	System Intertie	Contract Operation and Treatment Certification Required	Waste Streams Generated	Assumed Increased Well Production Feasible
Alternative 1 – Blending with PWS	$$	$$	Yes	No	No	No
Alternative 2 – Wellhead Treatment	$$	$$$	No	Yes	Yes	Yes
Alternative 3 – Wellhead Treatment and Connect to PWS	$$$	$$$	Yes	Yes	Yes	Yes

Based on the CART presented in Table 7-6, Alternative 1 – Blending with PWS provides the most value to the District while minimizing system complexity and risk associated with implementing treatment and increasing well production rates. As a result, this is the recommended alternative.

A combined system schematic, showing proposed improvements for the PWS, SMWS, and the VRWS is included as Figure 7-1.

7.6. Next Steps

In order to meet the deadlines set forth in the compliance schedule submitted by the District to the SWRCB, the District should actively work to move this project forward. Key next steps towards project completion include obtaining grant funding, loan, or other funding source to fund the total construction project costs, including design, engineering and administration, construction management, and any other identified project costs. At this time, the District is unable to implement these projects with available funds. Outside funding is required to complete these projects.

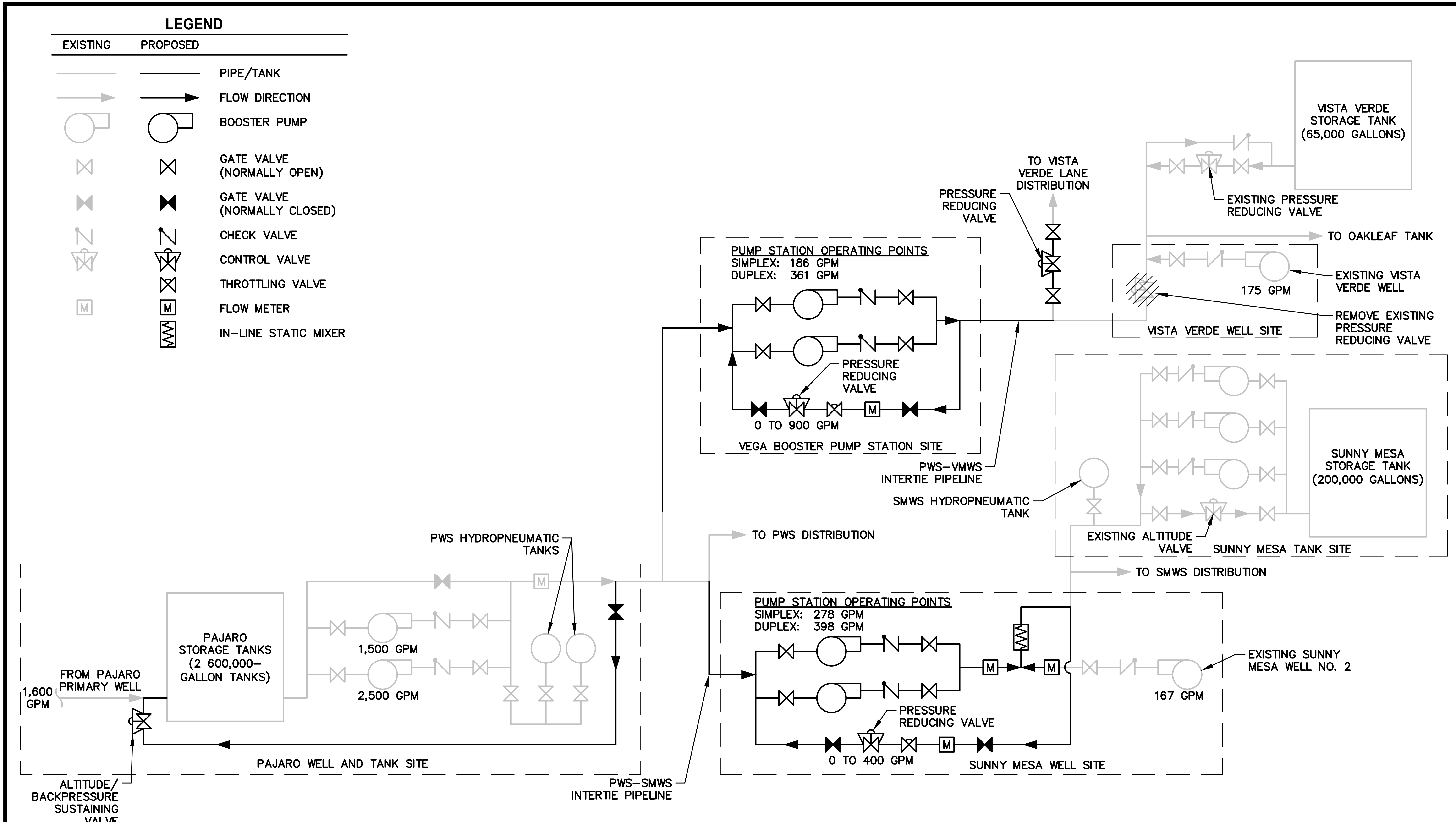

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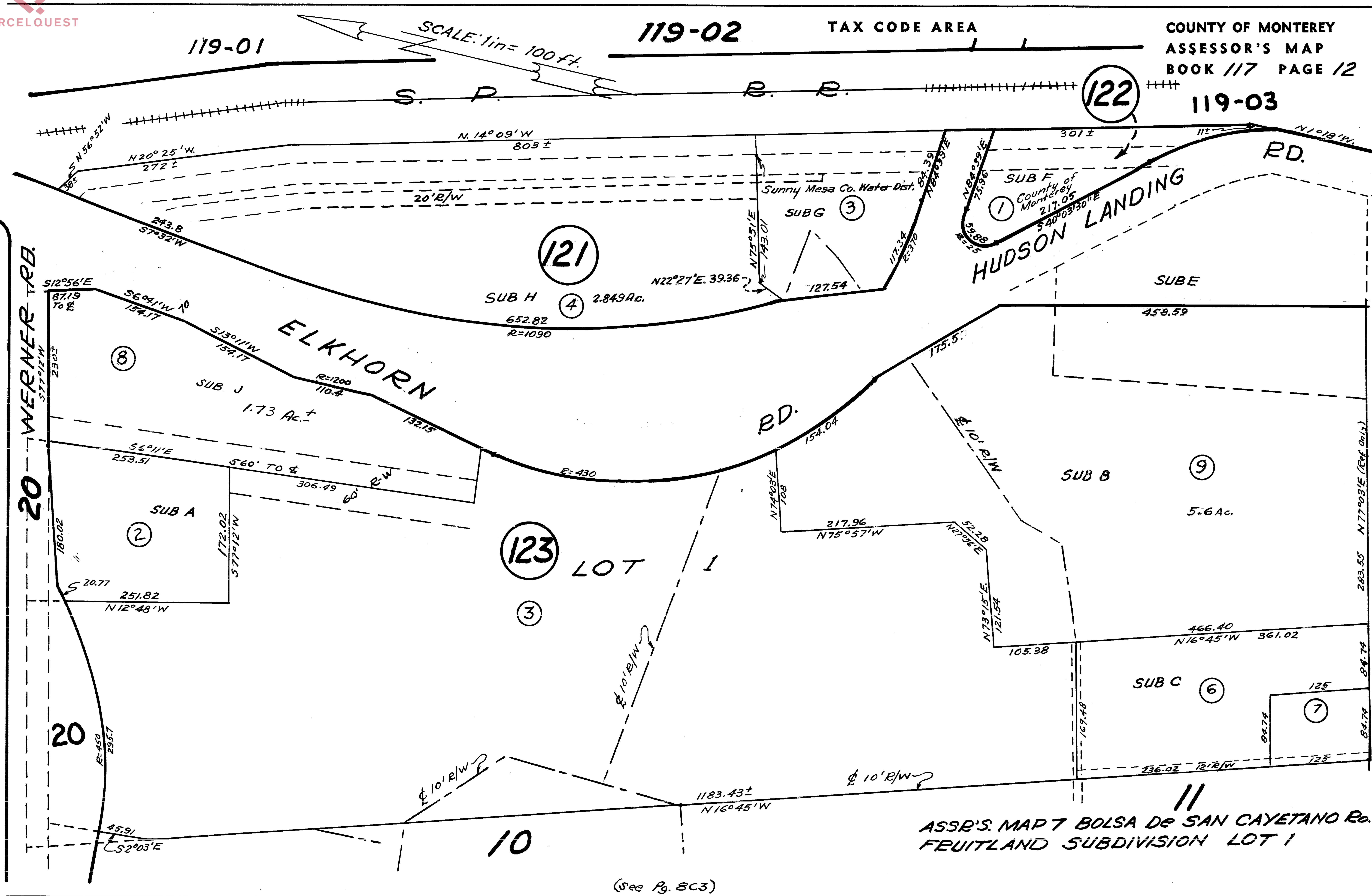
FIGURE 7-1: COMBINED PWS, SMWS, AND VMWS SYSTEM SCHEMATIC

SUNNY MESA / VEGA MUTUAL HEXAVALENT CHROMIUM PROJECTS
PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

PSMCS.150080

NO SCALE

Appendix A. Parcel Map for APN 117-122-021


COUNTY OF MONTEREY
ASSESSOR'S MAP
BOOK 117 PAGE 12
TAX CODE AREA
119-01
119-02
119-03
SCALE: 1 in = 100 ft.
S. P. R. R.
122
121
123
ELKHORN RD.
HUDSON LANDING RD.
WERNER RD.
SUB H
2.849 Ac.
SUB G
Sunny Mesa Co. Water Dist.
SUB F
County of Monterey
SUB E
SUB J
1.73 Ac.±
SUB A
SUB B
5.6 Ac.
SUB C
LOT 1
20' R/W
60' R-W
℄ 10' R/W
20
13
11
10
ASSR'S. MAP 7 BOLSA De SAN CAYETANO Ro.
FRUITLAND SUBDIVISION LOT 1
(See Pg. 8C3)
LIETZ #103 300 3-58

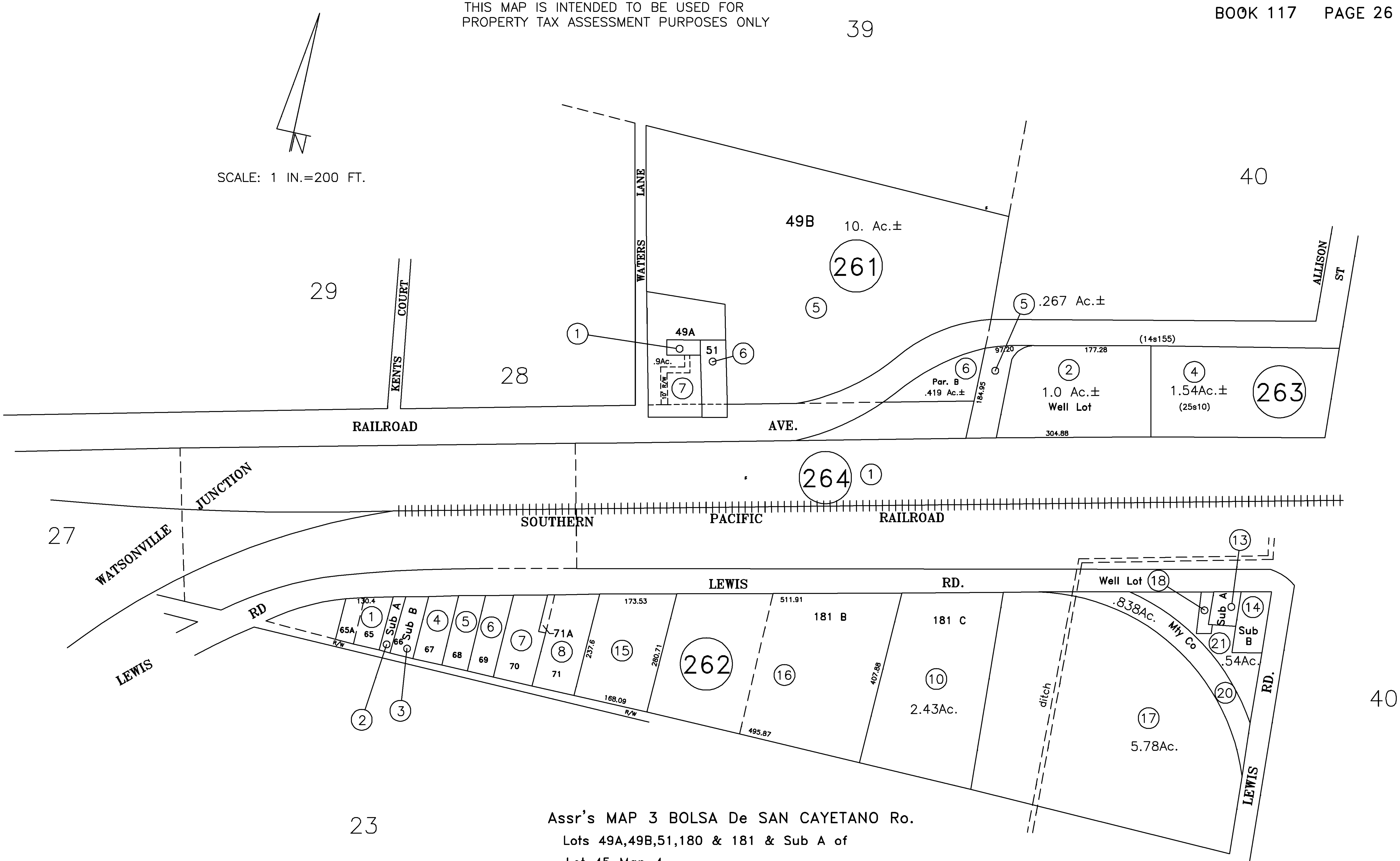
Appendix B. Parcel Map for APN 117-261-003

TAX CODE AREA–

39

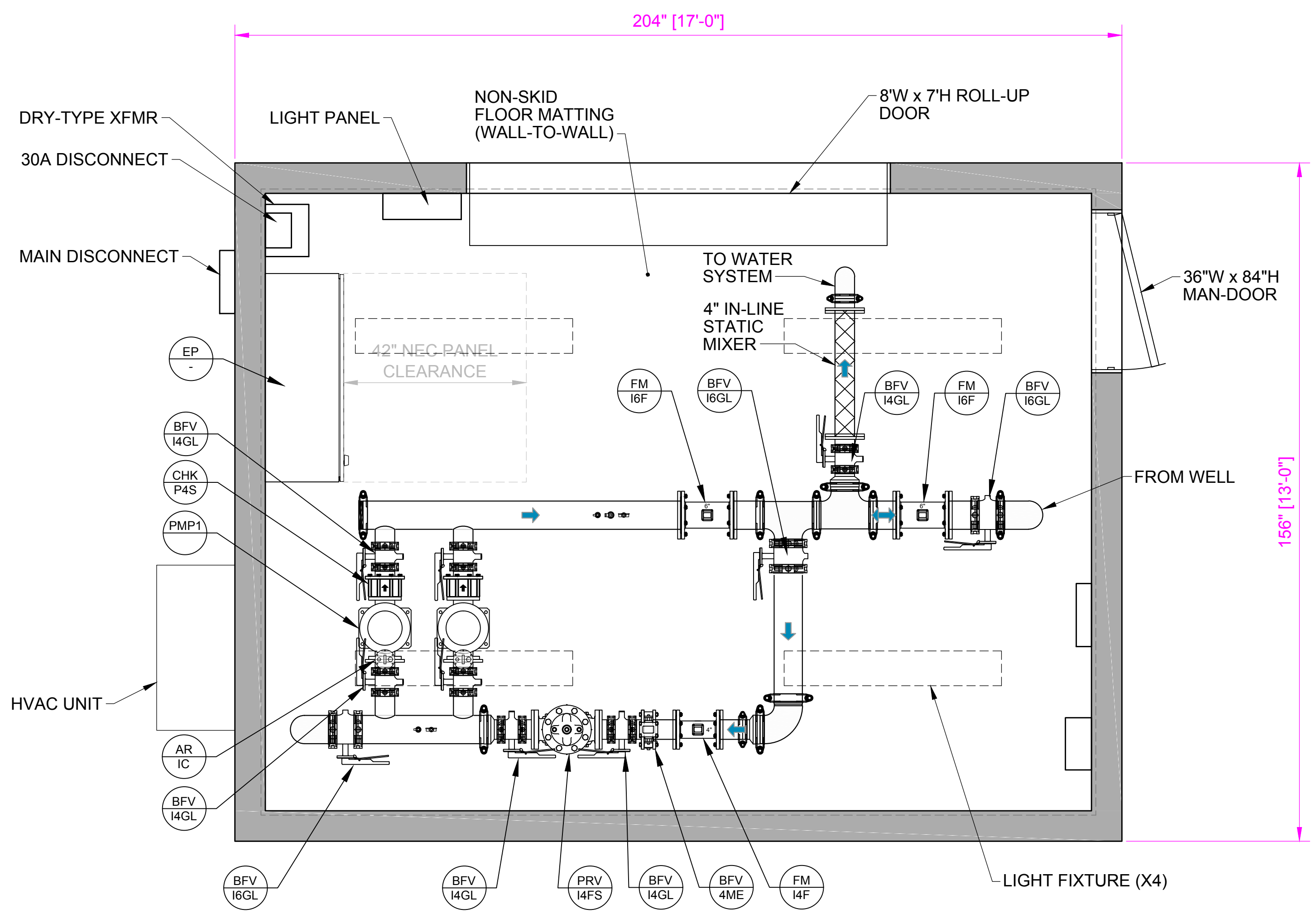
COUNTY OF MONTEREY
ASSESSOR'S MAP
BOOK 117 PAGE 26

THIS MAP IS INTENDED TO BE USED FOR
PROPERTY TAX ASSESSMENT PURPOSES ONLY



Assr's MAP 3 BOLSA De SAN CAYETANO Ro.
Lots 49A,49B,51,180 & 181 & Sub A of
Lot 45 Map 4

Appendix C. Pump Station Preliminary Layouts



Plan View

DESIGN SPECIFICATIONS

Design Flow Rate:	0	GPM @ 0	PSI			
Duty Pump Details:	0	HP/Pump	0	GPM	@ 0	TDH
Jockey Pump Details:	0	HP/Pump	0	GPM	@ 0	TDH
Incoming Power:	0	Volt / 0	Phase			
Model #	X					

BILL OF MATERIALS

ITEM	DESCRIPTION	SIZE	Count
AR IC	AIR RELIEF VALVE	3/4"	2
BFV 4ME	BUTTERFLY VALVE, MODULATING ELECTRIC	4"	1
BFV I4GL	BUTTERFLY VALVE, LO, GV	4"	7
BFV I6GL	BUTTERFLY VALVE, LO, GV	6"	3
CHK P4S	CHECK VALVE, SILENT	4"	2
EP	ELECTRICAL PANEL	(SIZE)	1
FM I4F	FLOW METER	4"	1
FM I6F	FLOW METER	6"	2
HP SW	HIGH PRESSURE SWITCH	1/4"	1
PG	PRESSURE GAUGE	2 1/2"	2
PMP1	PUMP, CENTRIFUGAL	HP	2
PR ST	PRESSURE SENSOR	1/4"	2
PRV I4FS	PRESSURE RELIEF VALVE, STRAIGHT	4"	1
SKD	SKID		1

PIPING: 304 SS

PPS
PRECISION PUMPING SYSTEMS
6515 BUSINESS WAY
BOISE, IDAHO 83716
208-323-5300

CUSTOMER	
PROJECT	Sunny Mesa
DRAWING #	2VMS-NJ-NF-FM(3)-6
SCALE	NTS
DATE	10/24/2016
SHEET	1 OF 1
STATUS	*Draft*

1:40

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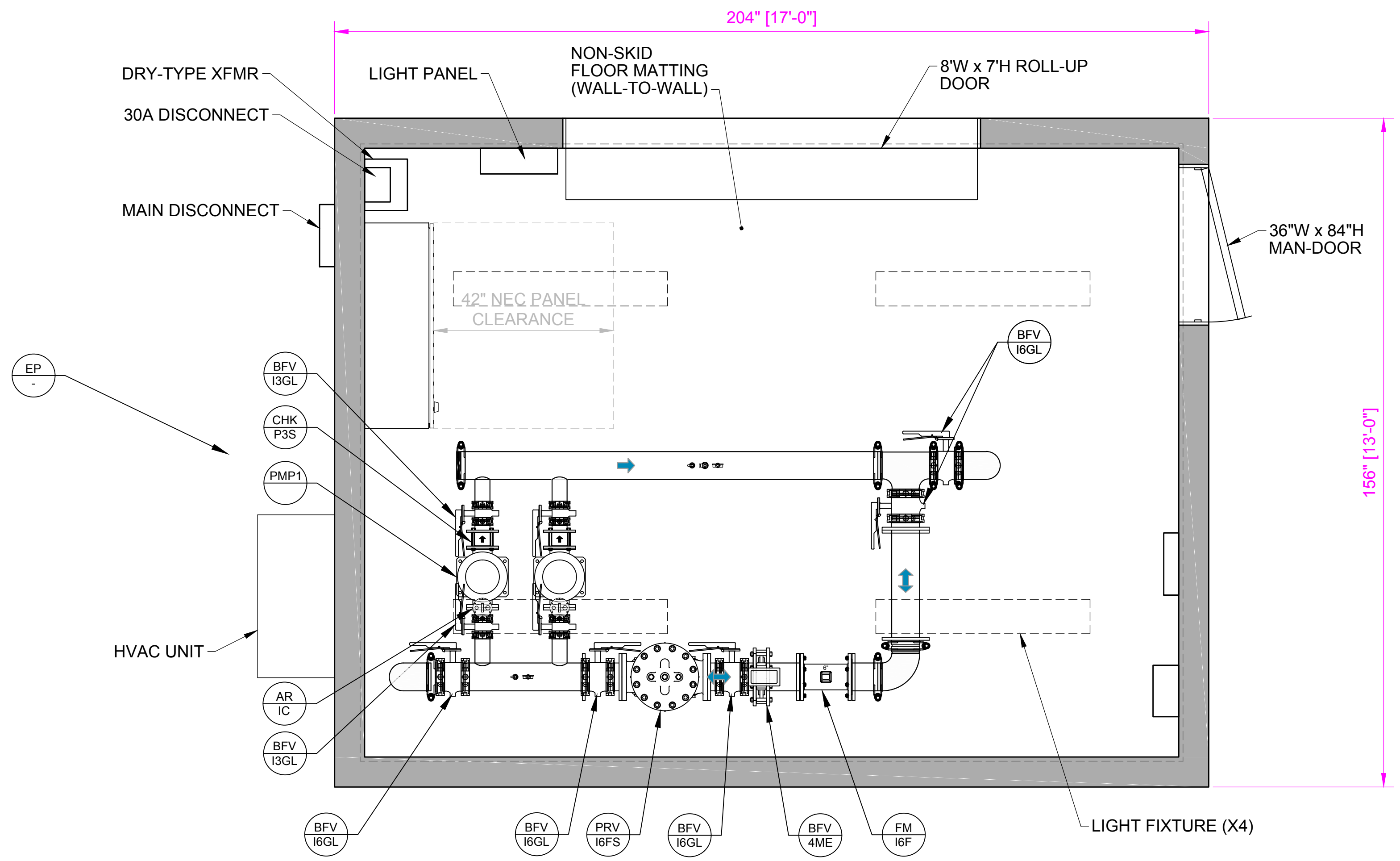

Plan View

DESIGN SPECIFICATIONS

Design Flow Rate:	0 GPM @ 0 PSI
Duty Pump Details:	0 HP/Pump | 0 GPM @ 0 TDH
Jockey Pump Details:	0 HP/Pump | 0 GPM @ 0 TDH
Incoming Power:	0 Volt / 0 Phase
Model #	X

BILL OF MATERIALS

ITEM	DESCRIPTION	SIZE	Count
AR IC	AIR RELIEF VALVE	3/4"	2
BFV 4ME	BUTTERFLY VALVE, MODULATING ELECTRIC	8"	1
BFV I3GL	BUTTERFLY VALVE, LO, GV	3"	4
BFV I6GL	BUTTERFLY VALVE, LO, GV	6"	5
CHK P3S	CHECK VALVE, SILENT	3"	2
EP	ELECTRICAL PANEL	(SIZE)	1
FM I6F	FLOW METER	6"	1
HP SW	HIGH PRESSURE SWITCH	1/4"	1
PG	PRESSURE GAUGE	2 1/2"	2
PMP1	PUMP, CENTRIFUGAL	HP	2
PR ST	PRESSURE SENSOR	1/4"	2
PRV I6FS	PRESSURE REDUCING VALVE, STRAIGHT	6"	1
SKD	SKID		1

PIPING: 304 SS

PPS PRECISION PUMPING SYSTEMS 6515 BUSINESS WAY BOISE, IDAHO 83716 208-323-5300	CUSTOMER	DRAWING # 2VMS-NJ-NF-FM-6	
	PROJECT Vega BPS	SCALE NTS	DATE 10/19/2016
		SHEET 1 OF 1	STATUS *Draft*

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Appendix D. Hydraulic Model

Calculation By: SPP **Checked By:** NEP

Alignment: 1 - PWS Hydropneumatic Tank to SMWS Well site in Simplex 278 GPM

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:	Inputs	Outputs

FLOWRATE	**278 GPM**
TOTAL HEADLOSS	**14.69 FT**
TOTAL HEADLOSS	**6.36 PSI**

Darcy-Weisbach Headloss: $$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	278	
	Pipe Internal Diameter (in) =	**12**	
	Velocity (fps) =	0.79	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**250**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter	1	9	6.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow	1	30.0	30.00
Through Tee Flow	3	5.2	15.60
Swing Check Valve		120	0.00
Gate Valve	1	2.9	2.90
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	55
		Total Equiv Length (ft) =	305
		Headloss (ft) =	0.07

Water Distribution System Data			
	Design Pump Rate (gpm) =	278	
	Pipe Internal Diameter (in) =	**10**	
	Velocity (fps) =	1.14	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**3,100**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	2	9	15.00
90 Bend	1	12.0	10.00
90 Bend LR		6.8	0.00
45 Bend	10	8.1	67.50
22.5 Bend		8	0.00
11.25 Bend		8	0.00
Branch Tee Flow	1	25	20.83
Through Tee Flow	10	4.6	38.33
Swing Check Valve		98	0.00
Gate Valve	6	2.8	14.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	166
		Total Equiv Length (ft) =	3,266
		Headloss (ft) =	1.90

Water Distribution System Data			
	Design Pump Rate (gpm) =	278	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	1.77	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**7,300**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	2	9	12.00
90 Bend	1	9.8	6.53
90 Bend LR		5.7	0.00
45 Bend	6	6.3	25.20
22.5 Bend		6	0.00
11.25 Bend		6	0.00
Branch Tee Flow	1	20	13.33
Through Tee Flow	5	3.9	13.00
Swing Check Valve		74	0.00
Gate Valve	6	2.7	10.80
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	81
		Total Equiv Length (ft) =	7,381
		Headloss (ft) =	12.72

Water Distribution System Data			
	Design Pump Rate (gpm) =	278	
	Pipe Internal Diameter (in) =	**6**	
	Velocity (fps) =	3.15	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**0**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend		7.2	0.00
90 Bend LR		4.7	0.00
45 Bend		4.5	0.00
22.5 Bend		4	0.00
11.25 Bend		4	0.00
Branch Tee Flow		15	0.00
Through Tee Flow		3.1	0.00
Swing Check Valve		52	0.00
Gate Valve		2.6	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Calculation By: SPP **Checked By:** NEP

Alignment: 1 - PWS Hydropneumatic Tank to SMWS Well site in Duplex 398 GPM

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:	Inputs	Outputs

FLOWRATE	398 GPM
TOTAL HEADLOSS	28.53 FT
TOTAL HEADLOSS	12.35 PSI

Darcy-Weisbach Headloss: $$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	12	
	Velocity (fps) =	1.13	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	250	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter	1	9	6.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow	1	30.0	30.00
Through Tee Flow	3	5.2	15.60
Swing Check Valve		120	0.00
Gate Valve	1	2.9	2.90
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	55
		Total Equiv Length (ft) =	305
		Headloss (ft) =	0.14

Water Distribution System Data			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	**10**	
	Velocity (fps) =	1.63	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**3,100**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	2	9	15.00
90 Bend	1	12.0	10.00
90 Bend LR		6.8	0.00
45 Bend	10	8.1	67.50
22.5 Bend		8	0.00
11.25 Bend		8	0.00
Branch Tee Flow	1	25	20.83
Through Tee Flow	10	4.6	38.33
Swing Check Valve		98	0.00
Gate Valve	6	2.8	14.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	166
		Total Equiv Length (ft) =	3,266
		Headloss (ft) =	3.69

Water Distribution System Data			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	2.54	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**7,300**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	2	9	12.00
90 Bend	1	9.8	6.53
90 Bend LR		5.7	0.00
45 Bend	6	6.3	25.20
22.5 Bend		6	0.00
11.25 Bend		6	0.00
Branch Tee Flow	1	20	13.33
Through Tee Flow	5	3.9	13.00
Swing Check Valve		74	0.00
Gate Valve	6	2.7	10.80
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	81
		Total Equiv Length (ft) =	7,381
		Headloss (ft) =	24.70

Water Distribution System Data			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	**6**	
	Velocity (fps) =	4.52	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**0**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend		7.2	0.00
90 Bend LR		4.7	0.00
45 Bend		4.5	0.00
22.5 Bend		4	0.00
11.25 Bend		4	0.00
Branch Tee Flow		15	0.00
Through Tee Flow		3.1	0.00
Swing Check Valve		52	0.00
Gate Valve		2.6	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Calculation By: SPP **Checked By:** NEP

Alignment: 2 - SMWS Well Site to SMWS Storage Tank

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:

Inputs	Outputs

FLOWRATE	**398 GPM**
TOTAL HEADLOSS	**10.50 FT**
TOTAL HEADLOSS	**4.55 PSI**

Darcy-Weisbach Headloss:

$$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	**12**	
	Velocity (fps) =	1.13	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =		Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter		9	0.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow		30.0	0.00
Through Tee Flow		5.2	0.00
Swing Check Valve		120	0.00
Gate Valve		2.9	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Water Distribution System Data			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	**10**	
	Velocity (fps) =	1.63	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**1,100**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	2	12.0	20.00
90 Bend LR		6.8	0.00
45 Bend	4	8.1	27.00
22.5 Bend	4	8	26.67
11.25 Bend		8	0.00
Branch Tee Flow		25	0.00
Through Tee Flow	1	4.6	3.83
Swing Check Valve		98	0.00
Gate Valve	3	2.8	7.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	85
		Total Equiv Length (ft) =	1,185
		Headloss (ft) =	1.34

Water Distribution System Data			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	2.54	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**2,400**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter	1	9	6.00
90 Bend		9.8	0.00
90 Bend LR		5.7	0.00
45 Bend	8	6.3	33.60
22.5 Bend		6	0.00
11.25 Bend		6	0.00
Branch Tee Flow	1	20	13.33
Through Tee Flow		3.9	0.00
Swing Check Valve	1	74	49.33
Gate Valve		2.7	0.00
Static Mixer	1	30	20.00
		Equivalent Fitting Length (ft) =	122
		Total Equiv Length (ft) =	2,522
		Headloss (ft) =	8.44

Tank Inlet Piping			
	Design Pump Rate (gpm) =	398	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	2.54	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**100**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	2	9.8	13.07
90 Bend LR		5.7	0.00
45 Bend	2	6.3	8.40
22.5 Bend	1	6	4.00
11.25 Bend		6	0.00
Branch Tee Flow	3	20	40.00
Through Tee Flow		3.9	0.00
Swing Check Valve	1	74	49.33
Gate Valve	1	2.7	1.80
Pipe Exit	1	1	0.67
		Equivalent Fitting Length (ft) =	117
		Total Equiv Length (ft) =	217
		Headloss (ft) =	0.73

MNS ENGINEERS INC

Sunny Mesa Hexavalent Chrome Project
Hydraulics Analysis

PSMCS.150080

Calculation By: SPP **Checked By:** NEP

Alignment: 3 - SMWS Tank to SMWS Well site to PWS Tank Inlet

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:

Inputs	Outputs

FLOWRATE	**362 GPM**
TOTAL HEADLOSS	**33.66 FT**
TOTAL HEADLOSS	**14.57 PSI**

Darcy-Weisbach Headloss: $$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	362	
	Pipe Internal Diameter (in) =	**12**	
	Velocity (fps) =	1.03	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**250**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter	1	9	9.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow	1	30.0	30.00
Through Tee Flow	3	5.2	15.60
Swing Check Valve		120	0.00
Gate Valve	1	2.9	2.90
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	58
		Total Equiv Length (ft) =	308
		Headloss (ft) =	0.12

Water Distribution System Data			
	Design Pump Rate (gpm) =	362	
	Pipe Internal Diameter (in) =	**10**	
	Velocity (fps) =	1.48	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**4,200**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	2	9	15.00
90 Bend	3	12.0	30.00
90 Bend LR		6.8	0.00
45 Bend	14	8.1	94.50
22.5 Bend	4	8	26.67
11.25 Bend		8	0.00
Branch Tee Flow	1	25	20.83
Through Tee Flow	11	4.6	42.17
Swing Check Valve		98	0.00
Gate Valve	9	2.8	21.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	250
		Total Equiv Length (ft) =	4,450
		Headloss (ft) =	4.22

Water Distribution System Data			
	Design Pump Rate (gpm) =	362	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	2.31	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**9,700**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	3	9	18.00
90 Bend	3	9.8	19.60
90 Bend LR	0	5.7	0.00
45 Bend	16	6.3	67.20
22.5 Bend	1	6	4.00
11.25 Bend		6	0.00
Branch Tee Flow	5	20	66.67
Through Tee Flow	5	3.9	13.00
Swing Check Valve	2	74	98.67
Gate Valve	12	2.7	21.60
Pipe Exit	2	1	1.33
		Equivalent Fitting Length (ft) =	310
		Total Equiv Length (ft) =	10,010
		Headloss (ft) =	28.11
		8" PRV Pressure Drop (ft) =	0.61
		8" PRV Pressure Drop (psi) =	0.26

Water Distribution System Data			
	Design Pump Rate (gpm) =	362	
	Pipe Internal Diameter (in) =	**6**	
	Velocity (fps) =	4.11	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**0**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	0	9	0.00
90 Bend		7.2	0.00
90 Bend LR		4.7	0.00
45 Bend	0	4.5	0.00
22.5 Bend		4	0.00
11.25 Bend		4	0.00
Branch Tee Flow		15	0.00
Through Tee Flow	0	3.1	0.00
Swing Check Valve		52	0.00
Gate Valve		2.6	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00
		6" PRV Pressure Drop (ft) =	1.51
		6" PRV Pressure Drop (psi) =	0.66
			6" PRV not included in

Calculation By: SPP **Checked By:** NEP

Alignment: 4 - PWS Hydropneumatic Tank to VMWS Booster Pump Station

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:	**Inputs**	**Outputs**

FLOWRATE	**186 GPM**
TOTAL HEADLOSS	**1.61 FT**
TOTAL HEADLOSS	**0.70 PSI**

Darcy-Weisbach Headloss:

$$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**12**	
	Velocity (fps) =	0.53	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**250**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter	1	9	9.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow	1	30.0	30.00
Through Tee Flow	3	5.2	15.60
Swing Check Valve		120	0.00
Gate Valve	1	2.9	2.90
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	58
		Total Equiv Length (ft) =	308
		Headloss (ft) =	0.03

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**10**	
	Velocity (fps) =	0.76	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**900**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	1	12.0	10.00
90 Bend LR		6.8	0.00
45 Bend	10	8.1	67.50
22.5 Bend		8	0.00
11.25 Bend		8	0.00
Branch Tee Flow	1	25	20.83
Through Tee Flow	2	4.6	7.67
Swing Check Valve		98	0.00
Gate Valve	2	2.8	4.67
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	111
		Total Equiv Length (ft) =	1,011
		Headloss (ft) =	0.28

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	1.19	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**1,550**	Add Additional Tab
Item	Number of Fittings	3	Equivalent Length
Reducer		9	0.00
90 Bend	1	9.8	6.53
90 Bend LR		5.7	0.00
45 Bend		6.3	0.00
22.5 Bend		6	0.00
11.25 Bend		6	0.00
Branch Tee Flow	2	20	26.67
Through Tee Flow		3.9	0.00
Swing Check Valve		74	0.00
Gate Valve	2	2.7	3.60
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	37
		Total Equiv Length (ft) =	1,587
		Headloss (ft) =	1.30

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**6**	
	Velocity (fps) =	2.11	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =		Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend		7.2	0.00
90 Bend LR		4.7	0.00
45 Bend		4.5	0.00
22.5 Bend		4	0.00
11.25 Bend		4	0.00
Branch Tee Flow		15	0.00
Through Tee Flow		3.1	0.00
Swing Check Valve		52	0.00
Gate Valve		2.6	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Calculation By: SPP **Checked By:** NEP

Alignment: 5A - VMWS Booster Pump Station to Vista Verde Well site

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:	**Inputs**	**Outputs**

FLOWRATE	**186 GPM**
TOTAL HEADLOSS	**3.41 FT**
TOTAL HEADLOSS	**1.48 PSI**

Darcy-Weisbach Headloss: $$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**12**	
	Velocity (fps) =	0.53	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =		Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter		9	0.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow		30.0	0.00
Through Tee Flow		5.2	0.00
Swing Check Valve		120	0.00
Gate Valve		2.9	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	1.19	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =	**4,050**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	3	9.8	19.60
90 Bend LR		5.7	0.00
45 Bend	4	6.3	16.80
22.5 Bend	4	6	16.00
11.25 Bend		6	0.00
Branch Tee Flow		20	0.00
Through Tee Flow	4	3.9	10.40
Swing Check Valve	1	74	49.33
Gate Valve	2	2.7	3.60
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	116
		Total Equiv Length (ft) =	4,166
		Headloss (ft) =	3.41

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**6**	
	Velocity (fps) =	2.11	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =		Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend		7.2	0.00
90 Bend LR		4.7	0.00
45 Bend		4.5	0.00
22.5 Bend		4	0.00
11.25 Bend		4	0.00
Branch Tee Flow		15	0.00
Through Tee Flow		3.1	0.00
Swing Check Valve		52	0.00
Gate Valve		2.6	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Water Distribution System Data			
	Design Pump Rate (gpm) =	186	
	Pipe Internal Diameter (in) =	**4**	
	Velocity (fps) =	4.75	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =		Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend		4.8	0.00
90 Bend LR		3.4	0.00
45 Bend		2.9	0.00
22.5 Bend		2.5	0.00
11.25 Bend		2.5	0.00
Branch Tee Flow		10	0.00
Through Tee Flow		2.2	0.00
Swing Check Valve		31	0.00
Gate Valve		2.4	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Calculation By: SPP **Checked By:** NEP

Alignment: 5B - Vista Verde Well site to Vista Verde Tank

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:	Inputs	Outputs

FLOWRATE	361 GPM
TOTAL HEADLOSS	12.47 FT
TOTAL HEADLOSS	5.40 PSI

Darcy-Weisbach Headloss:

$$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	361	
	Pipe Internal Diameter (in) =	**12**	
	Velocity (fps) =	1.02	
	Meets Maximum Velocity Requirement?	OK	
	Line Length (ft) =		Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter		9	0.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow		30.0	0.00
Through Tee Flow		5.2	0.00
Swing Check Valve		120	0.00
Gate Valve		2.9	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	0
		Total Equiv Length (ft) =	0
		Headloss (ft) =	0.00

Water Distribution System Data			
	Design Pump Rate (gpm) =	361	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	2.30	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**1,900**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	3	9.8	19.60
90 Bend LR		5.7	0.00
45 Bend	6	6.3	25.20
22.5 Bend	6	6	24.00
11.25 Bend		6	0.00
Branch Tee Flow	2	20	26.67
Through Tee Flow	2	3.9	5.20
Swing Check Valve	1	74	49.33
Gate Valve	3	2.7	5.40
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	155
		Total Equiv Length (ft) =	2,055
		Headloss (ft) =	5.74

Water Distribution System Data			
	Design Pump Rate (gpm) =	361	
	Pipe Internal Diameter (in) =	**6**	
	Velocity (fps) =	4.10	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**20**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	2	9	9.00
90 Bend		7.2	0.00
90 Bend LR		4.7	0.00
45 Bend		4.5	0.00
22.5 Bend		4	0.00
11.25 Bend		4	0.00
Branch Tee Flow	2	15	15.00
Through Tee Flow		3.1	0.00
Swing Check Valve	1	52	26.00
Gate Valve		2.6	0.00
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	50
		Total Equiv Length (ft) =	70
		Headloss (ft) =	0.79

Water Distribution System Data			
	Design Pump Rate (gpm) =	361	
	Pipe Internal Diameter (in) =	**4**	
	Velocity (fps) =	9.22	
	Meets Maximum Velocity Requirement?	**Check Maximum Flowrate**	
	Line Length (ft) =	**55**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	1	4.8	1.60
90 Bend LR		3.4	0.00
45 Bend	4	2.9	3.87
22.5 Bend		2.5	0.00
11.25 Bend		2.5	0.00
Branch Tee Flow		10	0.00
Through Tee Flow	1	2.2	0.73
Swing Check Valve	1	31	10.33
Gate Valve	1	2.4	0.80
Pipe Exit	1	1	0.33
		Equivalent Fitting Length (ft) =	18
		Total Equiv Length (ft) =	73
		Headloss (ft) =	5.94

Calculation By: SPP **Checked By:** NEP

Alignment: 6A - Vista Verde Tank to VMWS PRV Discharge at Booster Pump Station

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:	Inputs	Outputs

FLOWRATE	955 GPM
TOTAL HEADLOSS	110.08 FT
TOTAL HEADLOSS	47.64 PSI

Darcy-Weisbach Headloss:

$$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	955	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	6.10	
	Meets Maximum Velocity Requirement?	**Check Maximum Flowrate**	
	Line Length (ft) =	**5,950**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	4	9.8	26.13
90 Bend LR		5.7	0.00
45 Bend	10	6.3	42.00
22.5 Bend	10	6	40.00
11.25 Bend		6	0.00
Branch Tee Flow	2	20	26.67
Through Tee Flow	4	3.9	10.40
Swing Check Valve		74	0.00
Gate Valve	5	2.7	9.00
Diaphragm Valve	1	30	20.00
		Equivalent Fitting Length (ft) =	174
		Total Equiv Length (ft) =	6,124
		Headloss (ft) =	103.48
		8" PRV Pressure Drop (ft) =	4.22
		8" PRV Pressure Drop (psi) =	1.83

Water Distribution System Data			
Design Pump Rate (gpm) =		955	
Pipe Internal Diameter (in) =		**6**	
Velocity (fps) =		10.84	
Meets Maximum Velocity Requirement?		**Check Maximum Flowrate**	
Line Length (ft) =		**20**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer	2	9	9.00
90 Bend		7.2	0.00
90 Bend LR		4.7	0.00
45 Bend		4.5	0.00
22.5 Bend		4	0.00
11.25 Bend		4	0.00
Branch Tee Flow		15	0.00
Through Tee Flow	2	3.1	3.10
Swing Check Valve		52	0.00
Gate Valve	2	2.6	2.60
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	15
		Total Equiv Length (ft) =	35
		Headloss (ft) =	2.38
		6" PRV Pressure Drop (ft) =	10.54
		6" PRV Pressure Drop (psi) =	4.56
			No 6" PRV in this Section

Calculation By: SPP **Checked By:** NEP

Alignment: 6B - VMWS PRV Discharge to PWS Tank

Objective: Determine equivalent lengths of distribution piping and appurtenances, then determine the headloss through the distribution piping.

Instructions: Input flow in GPM, pipe diameter in inches, pipe length, and number of fittings/appurtenances.

Legend:	**Inputs**	**Outputs**

FLOWRATE	**1,050 GPM**
TOTAL HEADLOSS	**46.22 FT**
TOTAL HEADLOSS	**20.00 PSI**

Darcy-Weisbach Headloss: $$H_f(ft) = \frac{3.022 v_{fps}^{1.85} L_{ft}}{C^{1.85} D^{1.17}}$$

Water Distribution System Data			
	Design Pump Rate (gpm) =	1050	
	Pipe Internal Diameter (in) =	**12**	
	Velocity (fps) =	2.98	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**250**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Meter	1	9	9.00
90 Bend		15.0	0.00
90 Bend LR		7.8	0.00
45 Bend		9.7	0.00
22.5 Bend		9	0.00
11.25 Bend		9	0.00
Branch Tee Flow	1	30.0	30.00
Through Tee Flow	3	5.2	15.60
Swing Check Valve		120	0.00
Gate Valve	1	2.9	2.90
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	58
		Total Equiv Length (ft) =	308
		Headloss (ft) =	0.86

Water Distribution System Data			
	Design Pump Rate (gpm) =	1050	
	Pipe Internal Diameter (in) =	**10**	
	Velocity (fps) =	4.29	
	Meets Maximum Velocity Requirement?	**OK**	
	Line Length (ft) =	**900**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	1	12.0	10.00
90 Bend LR		6.8	0.00
45 Bend	10	8.1	67.50
22.5 Bend		8	0.00
11.25 Bend		8	0.00
Branch Tee Flow	1	25	20.83
Through Tee Flow	2	4.6	7.67
Swing Check Valve		98	0.00
Gate Valve	2	2.8	4.67
Pipe Exit		1	0.00
		Equivalent Fitting Length (ft) =	111
		Total Equiv Length (ft) =	1,011
		Headloss (ft) =	6.87

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Water Distribution System Data			
	Design Pump Rate (gpm) =	1050	
	Pipe Internal Diameter (in) =	**8**	
	Velocity (fps) =	6.70	
	Meets Maximum Velocity Requirement?	**Check Maximum Flowrate**	
	Line Length (ft) =	**1,600**	Add Additional Tab
Item	Number of Fittings	L/D Ratio	Equivalent Length
Reducer		9	0.00
90 Bend	2	9.8	13.07
90 Bend LR		5.7	0.00
45 Bend		6.3	0.00
22.5 Bend		6	0.00
11.25 Bend		6	0.00
Branch Tee Flow	3	20	40.00
Through Tee Flow		3.9	0.00
Swing Check Valve		74	0.00
Gate Valve	3	2.7	5.40
Diaphragm Valve		30	0.00
		Equivalent Fitting Length (ft) =	58
		Total Equiv Length (ft) =	1,658
		Headloss (ft) =	33.40
		8" Altitude Valve Pressure Drop (ft) =	5.10
		8" Altitude Valve Pressure Drop (psi) =	2.21

Appendix E. Rincon Consultants, Inc. Environmental Permitting and Compliance Memorandum

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Date: 10/28/16
To: Nick Panofsky, PE
Organization: MNS Engineering, Inc.
From: Skyler Murphy, MESM, Rincon Consultants
Email: smurphy@rinconconsultants.com
cc: Karen Holmes and Stephen Svete, Rincon Consultants
Re: Pajaro Sunny Mesa CSD – Sunny Mesa/Vega Mutual Hexavalent Chrome Project

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The purpose of this memorandum is to discuss the general process and costs associated with the environmental review and permitting of three design alternatives for the Sunny Mesa Hexavalent Chrome Project and the Vega Mutual Hexavalent Chrome Project. The discussion includes potential costs associated with CEQA review, biological resource analysis and reporting, and the procurement of California Department of Fish and Wildlife (CDFW) permits. The discussion does not include potential costs associated with mitigation or construction such as riparian zone impact mitigation, biological monitoring, pre-construction biological surveys or Storm Water Pollution Prevention Plan (SWPPP) requirements, if applicable. Such detail can be provided at a later date when detailed siting information, construction scheduling, and other factors become known.

The Sunny Mesa Hexavalent Chrome Project consists of three project alternatives:

Alternative 1 would involve a blending scheme by connecting water from the Pajaro Water System via the construction of a pipeline from the Sunny Mesa Water System (SMWS) Well No. 1 site to the Pajaro Water System along Salinas Road. This would also include construction of a new pump station and blending facility at the SMWS Well No. 1 site. .

Alternative 2 would involve the installation of a treatment system at the SMWS Well No. 1 site and would not involve the construction of any new linkage pipeline. The treatment system would be a strong base anion exchange system with an onsite resign regeneration system. Additionally, Alternative 2 would involve the construction of a new groundwater well (SMWS Well No 3) and the destruction of SMWS Well No. 1. The new SMWS Well No 3 would provide a redundant source of supply.

Alternative 3 would involve the combination of the inter-tie pipeline described above in Alternative 1 and the treatment system under Alternative 2, and effectively would be a combination of the two systems

In addition to the three alternatives described above, this memorandum includes a discussion of the Vega Mutual Hexavalent Chrome Project. The Vega Hexavalent Chrome Project would involve the construction of an inter-tie pipeline connecting the Pajaro Water System with the Vega Mutual Water System (VMWS) along Lewis Road. In addition, there would be construction a new booster pump and pressure reducing station on an undeveloped Pajaro Sunny Mesa CSD owned site between Lewis Road and Lewis Court.

The following discussion outlines a cost comparison for the groundwater well permitting, coastal construction permitting, CEQA environmental review, and biological assessment and permitting for each of the above mentioned project alternatives.

Well Permitting

The proposed Sunny Mesa Hexavalent Chrome project Alternative 2 would involve well construction and deconstruction work that would require permitting from Monterey County as well as the Central Coast Regional Water Quality Control Board (CCRWQCB).

Alternative 1 Blending Inter-Tie. Alternative 1 would involve the deconstruction of SMWS Well No. 1 due to sand production issues. Deconstruction of a well in Monterey County would require the payment of well deconstruction fees to the Monterey County Water Resources Agency (WRA). The total permitting costs to the WRA for well deconstruction would be $1,317 (Amy Woodrow 2016).

Alternative 2 On-site Treatment System. In addition to the deconstruction of SMWS Well No. 1, Alternative 2 would involve the construction of a new SMWS Well No. 3, which would provide a redundant source of supply. It is anticipated that the Pajaro Sunny Mesa CSD would balance pumping between the SMWS Well No. 2 and 3 and that each well would produce approximately 50 AF/year. Therefore, the project applicant would be required to pay a fee of $1,317 for well destruction, as well as a fee of $2,726 for construction of a new well to the Monterey County WRA (Amy Woodrow 2016).

Construction of a new well additionally requires discharge of water from the new well during testing. The discharge of water would require payment of fees to the CCRWQCB, and would be covered under either the General Permit for Discharges with Low Threat to Water Quality (NPDES Permit CA9933001) or the General Permit for Discharges of Highly Treated Groundwater to Surface Waters (NPDES Permit CAG993002). Prior to discharge of groundwater water from the well would be required to be tested for criteria pollutants to determine if there is a need for treatment of well water prior to discharge. Water that is not found to not require treatment would be covered under the General Permit for Discharges with Low Threat to Water Quality. Due to the proximity of the riparian channel to the well construction site, it is assumed that water discharged from the well would enter the channel to the east of the site. Therefore, payment of a $2,200 fee would be required. If water would not enter the riparian channel, the discharge would be considered a discharge to land and there would be no discharge fee (Sheila Soderberg 2016).

In the case that well water is determined to contain criteria pollutants and require treatment prior to discharge, the project would be covered under the General Permit for Discharges of Highly Treated Groundwater to Surface Waters. The discharge of highly treated groundwater would require the payment of a $12,000 fee to the CCRWQCB. This does not account for the costs associated with necessary treatment (Sheila Soderberg 2016).

Finally, because Alternative 2 would construct a new groundwater well within the Coastal Zone, it would require a Coastal Development Permit. Per the Monterey County Planning Department, the anticipated cost for a Coastal Development Permit for a new groundwater well serving more than 15 connections would be $11,400.

Alternative 3 Inter-tie and On-site Treatment Systems. Alternative 3 would involve well construction and deconstruction similar to Alternative 2. Therefore, costs would be similar to those described under Alternative 2 above.

Vega Mutual Hexavalent Chrome Project. There is no well construction or deconstruction proposed under the Vega Mutual Hexavalent Chrome Project. Therefore, there would be no costs associated with well permitting.

Table 1
Estimated Well Permitting Costs

Action	Estimated Costs
Sunny Mesa Hexavalent Chrome Project	
Alternative 1	
Well Deconstruction Permit (WRA)	$1,317
Alternative 2	
Well Deconstruction Fee (WRA)	$1,317
Well Construction Fee (WRA)	$2,726
CCRWQCB Discharge Permit Costs	$2,200 - $12,000
Coastal Development Permit	$11,400
Total Costs	**$17,643 - $27,443**
Alternative 3	
Well Deconstruction Fee (WRA)	$1,317
Well Construction Fee (WRA)	$2,726
CCRWQCB Discharge Permit Costs	$2,200 - $12,000
Coastal Development Permit	$11,400
Total Costs	**$17,643 - $27,443**
Vega Mutual Hexavalent Chrome Project	
Well Construction	NA

Coastal Zone Construction Permits

The SMWS well site is located within the Coastal Zone of Monterey County. The majority of the pipeline under the Sunny Mesa Hexavalent Chrome project is located outside of the Coastal Zone and the entire Vega Mutual Hexavalent Chrome Project is located outside of the Coastal Zone. Proposed development within the SMWS Well Site in the Coastal Zone would require a Coastal Development Permit in addition to the Coastal development Permit required for the construction of a new well. This analysis assumes that construction under the proposed project alternatives would require a General Coastal Development Permit. The anticipated cost of a General Coastal Development Permit would be approximately $9,020 (Monterey County 2016). As shown in Table 3, all project alternatives under the Sunny Mesa Hexavalent Chrome Project would require a General Coastal Development Permit for work within the SMWS Well Site. However, the Vega Mutual Hexavalent Chrome Project would not require Coastal Zone permitting.

Table 3
Estimated CEQA Costs

Action	Estimated Costs
Sunny Mesa Hexavalent Chrome Project	
Alternative 1 Coastal Zone Permitting	$9,020
Alternative 2 Coastal Zone Permitting	$9,020
Alternative 3 Coastal Zone Permitting	$9,020
Vega Mutual Hexavalent Chrome Project	
Coastal Zone Permitting	NA

CEQA Review Requirements

The proposed Sunny Mesa Hexavalent Chrome project would involve surficial disturbance of land areas, which could result in significant environmental effects. As a discretionary action needing approval from a public agency, it would be subject to environmental review under the California Environmental Quality Act (CEQA). Assuming that potential impacts to environmental resources under each project alternative would be mitigable, the likely required analysis would be an Initial Study – Mitigated Negative Declaration (IS-MND).

Alternative 1 Blending Inter-Tie. Key areas of potential concern under Alternative 1 include biological resources and water, both supply and quality. Proposed construction on the SMWS well site would require review of potential impacts to biological resources and the creation of potential mitigation to address any identified impacts, due to the proximity of the project site to a riparian corridor along the eastern site boundary. Additionally, construction on the SMWS well site, as well as excavation of the proposed pipeline would require review for potential impacts to water quality.

Alternative 2 On-site Treatment System. Key areas of potential concern under Alternative 2 include biological resources, water quality, groundwater resources, and hazards/hazardous materials. Similar to Alternative 1, proposed construction on the SMWS well site would require analysis of potential impacts to biological resources and water quality. However, the scope of this study would be limited to the SMWS well site and would not require analysis of the pipeline footprint. The proposed increase in capacity of SMWS Well No. 2 and the construction of proposed new Well No 3 as a redundant source of supply under Alternative 2 could potentially result in draw down of groundwater resources and would require analysis in an IS-MND. Additionally, disposal of waste generated from the proposed treatment system under Alternatives 2 would require analysis to assess potential impacts to water quality, as well as the transportation of hazardous material.

Alternative 3 Inter-tie and On-site Treatment Systems. Alternative 3 represents a combination of Alternatives 1 and 2. Therefore, potential key areas of concern would include biological resources, water quality, groundwater resources, and hazards/hazardous materials. The required analysis would be similar to the above Alternative 1 and 2.

The increased study area under Alternatives 1 and 3 would require a slightly larger area of study within an IS-MND. Therefore it is anticipated that Alternatives 1 and 3 would have slightly higher costs of CEQA review in comparison to Alternative 2. Anticipated costs for CEQA review is shown in Table 2.

Vega Mutual Hexavalent Chrome Project. This project would also involve environmental disturbance under a discretionary action and be subject to review under CEQA. However, construction of the Vega Mutual Hexavalent Chrome Project would be entirely within a previously disturbed area. Therefore, it is assumed that no significant impacts would be identified. As such the level of CEQA review anticipated would be a Categorical Exemption. The anticipated cost of completion of a categorical exemption for the Vega Mutual Hexavalent Chrome Project would be between $1,500 and $3,000.

Table 2
Estimated CEQA Costs

Action	Estimated Costs
Sunny Mesa Hexavalent Chrome Project	
Alternative 1 CEQA Review	$20,000 – $22,000
Alternative 2 CEQA Review	$17,000 – $20,000
Alternative 3 CEQA Review	$20,000 – $22,000
Vega Mutual Hexavalent Chrome Project	
CEQA Review	$1,500 – $3,000

Biological Resources & Permitting

Overall Findings Common to All Alternatives

Based on a review of the project description provided, Figures 3-1 through 3-6, and desktop review, it appears the Sunny Mesa Water System (SMWS) well site property contains a potentially jurisdictional feature: a tributary to the Elkhorn Slough and the associated riparian corridor. This feature likely falls under the jurisdiction of the U.S. Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW). Based on our review of the above-mentioned figures and our communication, we understand all activities associated with Alternatives 1-3 will be limited to the existing fenced area of the property. Based on desktop review, the jurisdictional feature is just outside the fence. Therefore, for the purposes of this memo, we have assumed all three alternatives will avoid impacts to the riparian and streambed portion of the feature and will therefore not require permits from the USACE, RWQCB or CDFW. Similarly, during our desktop review, we have identified a potentially jurisdictional feature on the District-owned parcel between Lewis Road and Lewis Court (APN 117-262-021) associated with the Vega Mutual Hexavalent Chrome Project. However, based on a review of Figure 4-3, the Vega Mutual Hexavalent Chrome Project appears to avoid disturbance to this feature and we assume no permits from USACE, RWQCB or CDFW would be required for this project. If these features cannot be avoided, the following scope of work and estimated costs would likely increase. During our desktop review, we also noted multiple documented occurrences of California red-legged frog (*Rana draytonii*) within the project vicinity. This species is listed as threatened under the federal Endangered Species Act. The riparian corridor discussed above provides potentially suitable dispersal habitat for California red-legged frogs; however, for the purposes of this memo we have assumed potential effects to this species (and all other species and critical habitat listed under the federal or state Endangered Species Act) can be avoided and no consultation with U.S. Fish and Wildlife will be required.

Based on the reviewed materials discussed above, the project has the potential to impact biological resources, such as nesting birds protected by the California Fish and Game Code and the Migratory Bird Treaty Act. Other potential impacts include to water quality. A Biological Resources Assessment would be required for all project alternatives to evaluate biological resources and potential impacts related to each alternative. The Biological Resources Assessment would also support the CEQA document and would be required for the Streambed Alteration Agreement from CDFW. As shown in Table 1, the anticipated cost for a Biological Resources Assessment is estimated to be $5,000 -$7,000. The Biological Resources Assessment should include:

- *Literature/database review*
- *Reconnaissance-level Field Survey*
- *Biological inventory:*

- *Physical site characteristics (topography, soil, drainages)*
- *Habitat classifications and mapping*
- *Plant and wildlife species observed on-site*
- *Identification and analysis of special status species observed or expected*
- *Nesting bird habitat assessment*
- *Wildlife movement analysis*
- *General protected tree assessment*
- *Jurisdictional areas evaluation*
- *Impact assessment*
- *Recommendations to avoid and/or minimize impacts to protected biological resources*
- *Identification of mitigation measures to minimize and mitigate impacts to regulated biological resources that cannot be avoided.*

Alternative 1 Blending Inter-Tie. The majority of potential biological impacts for Alternative 1 are associated with the SMWS site. Sensitive biological resources are not anticipated within the pipeline footprint along Salinas Road. Potential impacts to biological resources include nesting birds and impacts to water quality. Pre-constriction biological surveys and biological monitoring during initial disturbance would be required to ensure impacts to sensitive biological resources are avoided. For the purpose of this memo, we have assumed initial disturbance within the SMWS site would not exceed two (2) weeks and survey results for active nests or federal or state endangered or threatened species, such as California red-legged frogs, would be negative.

Alternative 2 On-site Treatment System. Similarly, the majority of potential biological impacts for Alternative 2 are associated with the SMWS site. Potential impacts to biological resources include nesting birds and impacts to water quality. We understand well development and testing water would be discharged to the channel by sheet flow, or irrigation sprinklers. To avoid impacts to jurisdictional features, we recommend utilizing the irrigation sprinkler option. If sheet flow methods are used, we assume sufficient Best Management Practices (BMPs) will be implemented to avoid impacts to jurisdictional resources and adjacent sensitive habitat. Pre-constriction biological surveys and biological monitoring during initial disturbance would be required to ensure impacts to sensitive biological resources are avoided. For the purpose of this memo, we have assumed initial disturbance within the SMWS site would not exceed two (2) weeks and survey results for active nests or federal or state endangered or threatened species, such as California red-legged frogs, would be negative.

Alternative 3 Inter-tie and On-site Treatment Systems. Alternative 3 represents a combination of Alternatives 1 and 2. Potential impacts to biological resources include nesting birds and impacts to water quality. We understand well development and testing water would be discharged to the channel by sheet flow, or irrigation sprinklers. To avoid impacts to jurisdictional features, we recommend utilizing the irrigation sprinkler option. If sheet flow methods are used, we assume sufficient BMPs will be implemented to avoid impacts to jurisdictional resources and adjacent sensitive habitat. Pre-constriction biological surveys and biological monitoring during initial disturbance would be required to ensure impacts to sensitive biological resources are avoided. For the purpose of this memo, we have assumed initial disturbance within the SMWS site would not exceed two (2) weeks and survey results for active nests or federal or state endangered or threatened species, such as California red-legged frogs, would be negative. The increased study area associated with combining Alternatives 1 and 2 would result in increased costs due to increased survey time, additional graphics, and increased analysis.

Vega Mutual Hexavalent Chrome Project. We understand this project footprint would be focused on construction of a pipeline from 40 Lewis Road to approximately 249 Lewis Road and a new booster pump station on a currently undeveloped District-owned parcel between Lewis Road and Lewis Court

(APN 117-262-021). Based on desktop review, we do not anticipate potentially significant impacts to biological or jurisdictional resources. In addition, no regulatory permits or impacts to listed species are anticipated. Pre-constriction biological surveys and biological monitoring during initial disturbance would be required to ensure impacts to sensitive biological resources are avoided. For the purpose of this memo, we have assumed initial disturbance within the SMWS site would not exceed one (1) week and survey results for active nests or federal or state endangered or threatened species, such as California red-legged frogs, would be negative. A reconnaissance-level biological survey and a letter report would be required to document this. The letter report is anticipated to cost between $3,500 and $4,500 and should include:

- *Literature/database review*
- *Reconnaissance-level Field Survey*
- *Biological inventory*

Table 3
Estimated Biological Resources, and Permitting Costs

Action	Estimated Costs
Sunny Mesa Hexavalent Chrome Project	
Biological Resources Assessment	$5,000 – $7,000
Biological Construction Monitoring	$15,000
Total Cost	**$20,000 – $22,000**
Vega Mutual Hexavalent Chrome Project	
Biological Survey and Letter Report	$3,500 – $4,500
Biological Construction Monitoring	$8,500
Total Cost	**$12,000 – $13,000**

Conclusion

The anticipated overall costs for the Sunny Mesa Hexavalent Chrome Project alternatives and the Vega Hexavalent Chrome Project are shown in Table 4.

Table 4
Estimated Biological Resources, and Permitting Costs

Action	Estimated Costs
Sunny Mesa Hexavalent Chrome Project	
Alternative 1	
Well Deconstruction	$1,317
Coastal Zone Permitting	$9,020
CEQA Review (IS-MND)	$20,000 – $22,000
Biological Resources Assessment and Construction Monitoring	$20,000 – $22,000
Total Cost	**$50,337 – $54,337**
Alternative 2	
Well Construction and Deconstruction	$17,643 - $27,443
Coastal Zone Permitting	$9,020
CEQA Review (IS-MND)	$17,000 – $20,000
Biological Resources Assessment and Construction Monitoring	$20,000
Total Cost	**$63,663– $76,463**
Alternative 3	
Well Construction and Deconstruction	$17,643 - $27,443
Coastal Zone Permitting	$9,020
CEQA Review (IS-MND)	$20,000 – $22,000
Biological Resources Assessment and Construction Monitoring	$20,000 – $22,000
Total Cost	**$66,663– $80,463**
Vega Mutual Hexavalent Chrome Project	
Well Construction and Deconstruction	NA
Coastal Zone Permitting	NA
CEQA Review (Categorical Exemption)	$1,500 – $3,000
Biological Survey and Letter Report	$12,000 – $13,000
Total Cost	**$13,500 – $16,000**

Notes: Costs do not include potential construction costs, such as biological monitoring and pre-construction biological surveys.

It is anticipated that all project alternatives would require the completion of an IS-MND. Due to the larger area of study under Alternative 1 and 3 to include the intertie pipeline, the anticipated costs for CEQA review for Alternatives 1 and 3 are anticipated to be slightly higher than the costs for Alternative 2. However, costs for biological assessment and permitting under all three project alternatives are anticipated to be the same.

Due to the project scope and location of the Vega Hexavalent Chrome Project, the anticipated costs for CEQA review and biological assessment and permitting are anticipated to be less than the Sunny Mesa Hexavalent Chrome Project alternatives. It is anticipated that the CEQA review of this project would be satisfied by the completion of a Categorical Exemption. Further, no potentially significant impacts to biological or jurisdictional resources and no regulatory permits or impacts to listed species are anticipated.

References

Monterey County. July 2016. Monterey County Land Use Fees. Available: https://www.co.monterey.ca.us/home/showdocument?id=12844

Persons Contacted

Amy Woodrow, Monterey County Water Resources Agency. Email. October 27, 2016

Sheila Soderberg, Central Coast Regional Water Quality Control Board. Phone. October 24, 2016.

Appendix F. Engineer's Estimates of Probable Costs of Construction

OPINION OF PROBABLE CONSTRUCTION COST

eMNS ENGINEERS INC

Project: Sunny Mesa Hexavalent Chrome Project Alternative 1 - Connection to Pajaro Water System

Prepared By: SPP
Date Prepared: 12/21/2016
MNS Proj. No. PSMCS.150080

Building, Area: Sunny Mesa Well Site

Estimate Type:
- [ ] Conceptual
- [x] Preliminary (w/o plans)`
- [ ] Design Development @
- [ ] Construction
- [ ] Change Order

______ % complete

Current at ENR ______
Escalated to ENR ______
Months to Midpoint of Construction ______

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Existing Well No. 1 Destruction	1	LS					$50,000	$50,000	$50,000
2	8" PVC C900 Water Main	5320	LF	$60.00	$319,200.00	$100.00	$532,000.00			$851,200
3	Sunny Mesa Well Site Clearing and Grading	1	LS			$2,500.00	$2,500.00			$2,500
4	Well Site Piping	1	LS	$25,000.00	$25,000.00	$25,000.00	$25,000.00			$50,000
5	Fire Hydrant and Appurtenances	4	EA	$1,500.00	$6,000.00	$1,500.00	$6,000.00			$12,000
6	8" Pressure Reducing Valve	1	EA	$9,000.00	$9,000.00	$750.00	$750.00			$9,750
7	Booster Pump Station	1	LS	$260,000.00	$260,000.00	$50,000.00	$50,000.00			$310,000
8	Booster Pump Station Slab	1	LS	$1,500.00	$1,500.00	$2,500.00	$2,500.00			$4,000
9	8" PVC C900 Pajaro Tank Fill Line	120	LF	$60.00	$7,200.00	$100.00	$12,000.00			$19,200
10	8" Flanged Altitude/Backpressure Sustaining Valve	1	EA	$12,000.00	$12,000.00	$750.00	$750.00			$12,750
11	Hot Tap into Existing 10" PWS Distribution Line	1	LS	$750.00	$750.00	$1,000.00	$1,000.00			$1,750
12	Connection to Existing PWS Tank Fill Line	1	LS	$750.00	$750.00	$1,000.00	$1,000.00			$1,750
13	Traffic Control	1	LS	$10,000.00	$10,000.00	$10,000.00	$10,000.00			$20,000
14	Hydraulics Modeling	1	LS			$30,000.00	$30,000.00			$30,000
	Subtotals				$651,400.00		$673,500.00		$50,000.00	$1,374,900
	Mobilization and Division 1 Costs	@	10.00%		$65,140.00		$67,350.00		$5,000.00	$137,490
	Subtotals				$716,540.00		$740,850.00		$55,000.00	$1,512,390
	Taxes - Materials Costs	@	7.63%		$54,636.18					$54,636
	Subtotals				$771,176.18		$740,850.00		$55,000.00	$1,567,026
	Contractor Markup for Sub	@	12.00%						$6,600.00	$6,600
	Subtotals				$771,176.18		$740,850.00		$61,600.00	$1,573,626
	Contractor OH&P	@	10.00%		$77,117.62		$74,085.00		$6,160.00	$157,363
	Subtotals				$848,293.79		$814,935.00		$67,760.00	$1,730,989
	Estimate Contingency	@	30.00%							$519,297
	Subtotals									$2,250,285
	Escalate to Midpoint of Construct	@	2.00%							$45,006
	Estimated Bid Cost									$2,295,291
	Total Estimate									$2,295,300
	Total Estimate									**$2,300,000**

OPINION OF PROBABLE CONSTRUCTION COST

Project: Sunny Mesa Hexavalent Chrome Project Alternative 2 - Wellhead Treatment System

Prepared By: SPP

Date Prepared: 12/21/2016

Building, Area: Sunny Mesa Well Site

MNS Proj. No. PSMCS.150080

Estimate Type:

☐ Conceptual
☑ Preliminary (w/o plans) `
☐ Design Development @
☐ Construction
☐ Change Order
_____ % complete

Current at ENR _____
Escalated to ENR _____
Months to Midpoint of Construction _____

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Sunny Mesa Well Site Clearing and Grading	1	LS			$5,000	$5,000			$5,000
2	Well Site Piping	1	LS	$40,000	$40,000	$40,000	$40,000			$80,000
3	Existing Well No. 1 Destruction	1	LS					$50,000	$50,000	$50,000
4	Existing Well No. 2 Pump Replacement	1	LS	$80,000	$80,000	$50,000	$50,000			$130,000
5	Well No. 2 Electrical Upgrades	1	LS	$75,000	$75,000	$75,000	$75,000			$150,000
6	Construct Well No. 3	1	LS					$250,000	$250,000	$250,000
7	Well No. 3 Pump & Motor	1	LS	$80,000	$80,000	$50,000	$50,000			$130,000
8	New Well No. 3 Electrical Equipment, Piping, Valves, and Accessori	1	LS	$75,000	$75,000	$75,000	$75,000			$150,000
9	Treatment System Building	1	LS	$50,000	$50,000	$25,000	$25,000			$75,000
10	SBA Wellhead Treatment System	1	LS	$210,000	$210,000	$75,000	$75,000			$285,000
11	Upgrade Electric Service - 250 Amp Service	1	LS					$50,000	$50,000	$50,000
12	Hydraulic Modeling	1	LS			$30,000	$30,000			$30,000
13	Subtotals				$610,000		$425,000		$350,000	$1,385,000
14	Mobilization and Division 1 Costs	@	10.00%		$61,000		$42,500		$35,000	$138,500
	Subtotals				$671,000		$467,500		$385,000	$1,523,500
	Taxes - Materials Costs	@	7.63%		$51,164					$51,164
	Subtotals				$722,164		$467,500		$385,000	$1,574,664
	Contractor Markup for Sub	@	12.00%						$46,200	$46,200
	Subtotals				$722,164		$467,500		$431,200	$1,620,864
	Contractor OH&P	@	10.00%		$72,216		$46,750		$43,120	$162,086
	Subtotals				$794,380		$514,250		$474,320	$1,782,950
	Estimate Contingency	@	30.00%							$534,885
	Subtotals									$2,317,835
	Escalate to Midpoint of Construct	@	2.00%							$46,357
	Estimated Bid Cost									$2,364,192
	Total Estimate									$2,364,200
	Total Estimate									**$2,360,000**

OPINION OF PROBABLE CONSTRUCTION COST

Project: Sunny Mesa Hexavalent Chrome Project Alternative 3 - Wellhead Treatment System and Connection to PWS

Building, Area: Sunny Mesa Well Site

Prepared By: SPP
Date Prepared: 12/21/2016
MNS Proj. No. PSMCS.150080

Estimate Type:
- [ ] Conceptual
- [x] Preliminary (w/o plans) `
- [ ] Design Development @
- [ ] Construction
- [ ] Change Order

______ % complete

Current at ENR ______
Escalated to ENR ______
Months to Midpoint of Construction ______

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Existing Well No. 1 Destruction	1	LS					$50,000	$50,000	$50,000
2	8" PVC C900 Water Main	5320	LF	$60.00	$319,200.00	$100.00	$532,000.00			$851,200
3	Sunny Mesa Well Site Clearing and Grading	1	LS			$5,000.00	$5,000.00			$5,000
4	Well Site Piping	1	LS	$40,000	$40,000	$40,000	$40,000			$80,000
5	Fire Hydrant and Appurtenances	4	EA	$10,000.00	$40,000.00	$5,000.00	$20,000.00			$60,000
6	8" Pressure Reducing Valve	1	EA	$9,000.00	$9,000.00	$750.00	$750.00			$9,750
7	Booster Pump Station	1	LS	$260,000.00	$260,000.00	$50,000.00	$50,000.00			$310,000
8	8" PVC C900 Pajaro Tank Fill Line	120	LF	$60.00	$7,200.00	$100.00	$12,000.00			$19,200
9	8" Flanged Altitude/Backpressure Sustaining Valve	1	EA	$12,000.00	$12,000.00	$750.00	$750.00			$12,750
10	Hot Tap into Existing 10" PWS Distribution Line	1	LS	$750.00	$750.00	$1,000.00	$1,000.00			$1,750
11	Connection to Existing PWS Tank Fill Line	1	LS	$750.00	$750.00	$1,000.00	$1,000.00			$1,750
12	Treatment System Building	1	LS	$50,000	$50,000	$25,000	$25,000			$75,000
13	400 GPM Wellhead Treatment System	1	LS	$210,000.00	$210,000.00	$75,000.00	$75,000.00			$285,000
14	Traffic Control	1	LS	$10,000.00	$10,000.00	$10,000.00	$10,000.00			$20,000
15	Hydraulic Modeling	1	LS			$30,000.00	$30,000.00			$30,000
	Subtotals				$958,900.00		$802,500.00		$50,000.00	$1,811,400
	Mobilization and Division 1 Costs	@	10.00%		$95,890.00		$80,250.00		$5,000.00	$181,140
	Subtotals				$1,054,790.00		$882,750.00		$55,000.00	$1,992,540
	Taxes - Materials Costs	@	7.63%		$80,427.74					$80,428
	Subtotals				$1,135,217.74		$882,750.00		$55,000.00	$2,072,968
	Contractor Markup for Sub	@	12.00%						$6,600.00	$6,600
	Subtotals				$1,135,217.74		$882,750.00		$61,600.00	$2,079,568
	Contractor OH&P	@	10.00%		$113,521.77		$88,275.00		$6,160.00	$207,957
	Subtotals				$1,248,739.51		$971,025.00		$67,760.00	$2,287,525
	Estimate Contingency	@	30.00%							$686,257
	Subtotals									$2,973,782
	Escalate to Midpoint of Construct	@	2.00%							$59,476
	Estimated Bid Cost									$3,033,258
	Total Estimate									$3,033,260
	Total Estimate									**$3,030,000**

OPINION OF PROBABLE CONSTRUCTION COST

MNS ENGINEERS INC

Project: Vega Mutual Hexavalent Chrome Project - Connection to Pajaro Water System

Prepared By: SPP
Date Prepared: 12/21/2016
MNS Proj. No. PSMCS.150080

Building, Area: Lift Station and Connection Point

Estimate Type:
- [ ] Conceptual
- [x] Preliminary (w/o plans)`
- [ ] Design Development @
- [ ] Construction
- [ ] Change Order

______ % complete

Current at ENR ______
Escalated to ENR ______
Months to Midpoint of Construction ______

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	8" PVC C900 Water Main	4200	LF	$60.00	$252,000.00	$100.00	$420,000.00			$672,000
2	Fire Hydrant and Appurtenances	2	EA	$10,000.00	$20,000.00	$5,000.00	$10,000.00			$30,000
3	Vega Mutual Booster Pump Station Site Clearing and Grading	1	LS			$5,000.00	$5,000.00			$5,000
4	Booster Pump Station Piping	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00			$40,000
5	Pressure Reducing Valve	1	EA	$9,000.00	$9,000.00	$750.00	$750.00			$9,750
6	Pressure Reducing Station @ Vista Verde Drive	1	LS	$25,000.00	$25,000.00	$7,500.00	$7,500.00			$32,500
7	Pressure Reducing Station Bypass	1	EA	$7,500.00	$7,500.00	$7,500.00	$7,500.00			$15,000
8	Booster Pump Station	1	EA	$205,000.00	$205,000.00	$50,000.00	$50,000.00			$255,000
9	8" PVC C900 Pajaro Tank Fill Line	120	LF	$60.00	$7,200.00	$100.00	$12,000.00			$19,200
10	Traffic Control	1	LS	$5,000.00	$5,000.00	$5,000.00	$5,000.00			$10,000
11	Hydraulic Modeling	1	LS			$20,000.00	$20,000.00			$20,000
	Subtotals				$550,700.00		$557,750.00			$1,108,450
	Mobilization and Division 1 Costs	@	10.00%		$55,070.00		$55,775.00			$110,845
	Subtotals				$605,770.00		$613,525.00			$1,219,295
	Taxes - Materials Costs	@	7.63%		$46,189.96					$46,190
	Subtotals				$651,959.96		$613,525.00			$1,265,485
	Contractor Markup for Sub	@	12.00%							
	Subtotals				$651,959.96		$613,525.00			$1,265,485
	Contractor OH&P	@	10.00%		$65,196.00		$61,352.50			$126,548
	Subtotals				$717,155.96		$674,877.50			$1,392,033
	Estimate Contingency	@	30.00%							$417,610
	Subtotals									$1,809,643
	Escalate to Midpoint of Construct	@	1.50%							$27,145
	Estimated Bid Cost									$1,836,788
	Total Estimate									$1,836,790
	Total Estimate									**$1,840,000**

11.1.3. Final Preliminary Engineering Report – Springfield Water System Improvements

MNS Engineers, February 14, 2020

MNS ENGINEERS INC

February 14, 2020

Pajaro Sunny Mesa Community Services District

Final Preliminary Engineering Report - Springfield Water System Improvements

PREPARED FOR:

Don Rosa, District Manager

PREPARED BY:

Nicholas Panofsky, PE

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Pajaro/Sunny Mesa Community Services District

Final Preliminary Engineering Repot:
Springfield Water System Improvements

General Manager

Don Rosa

District Engineer

Tom Yeager, PE

MNS Engineers Staff

Nicholas Panofsky, PE

Tyler Hunt, PE

Sean Packard, PE

Prepared by:

Nicholas Panofsky, PE C75006

Lead Engineer

MNS Engineers

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ACRONYMS

AACE	American Association of Cost Engineers
ACOE	United States Army Corps of Engineers
ACP	Asbestos cement pipe
ADD	Average daily demand
APN	Assessor's Parcel Number
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
bgs	Below ground surface
Caltrans	California Department of Transportation
CART	Color alternatives review table
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
County	Monterey County
DDW	California Department of Drinking Water
District	Pajaro/Sunny Mesa Community Services District
ENR	Engineering News-Record
ESHA	Environmentally Sensitive Habitat Area
GPD	Gallons per day
GPM	Gallons per minute
HDD	Horizontal directional drilling
HDPE	High density polyethylene
kW	Kilowatt(s)
LAFCO	Local Agency Formation Commission
m	Meter
MCL	Maximum contaminant level
MH	Mobile home
mg/l	Milligrams per liter
MDD	Maximum daily demand
MLWS	Moss Landing Water System
MS4	Municipal Separate Storm Sewer System
MSL	Mean sea level
OSHA	Occupational Safety and Health Administration
PHD	Peak hourly demand
ppm	Parts per million
PSI	Pounds per square inch
PSMCSD	Pajaro/Sunny Mesa Community Services District
PVC	Polyvinyl chloride
ROW	Right-of-way
RWQCB	Regional Water Quality Control Board
SFR	Single family residence
SMWC	Springfield Mutual Water Company
Springfield	Springfield Mutual Water Company
SUG	Seismic Use Group
SW-1	Springfield Well No. 1
SW-2	Proposed Springfield Well No. 2
SW-3	Proposed Springfield Well No. 3
SWRCB	California State Water Resources Control Board
SWS	Springfield Water System
TDH	Total dynamic head
TDS	Total dissolved solids
U.S.	United States
VFD	Variable frequency drive

Section 1. Executive Summary

1.1. District Background and Existing System

The Pajaro/Sunny Mesa Community Services District (PSMCSD or District) acquired the Springfield Mutual Water Company in 2005. The water system, now called the Springfield Water System (SWS), currently serves approximately 34 residences along Struve Road. The existing Springfield Water System is fed by a single shallow well, designated as Springfield Well No. 1 (SW-1). SW-1 has documented water quality problems for several contaminants, including nitrates exceeding up to five times the maximum contaminant level established by the State of California. Since the acquisition, the District has been working to improve the water quality delivered to residents.

1.2. Project Overview and Goals

The goal of the Springfield Water System Improvements project (Project) is to plan for, design, and implement upgrades to the SWS to provide a high-quality water source for long-term water supply reliability for the community.

The work to achieve this goal will be completed in multiple phases. The first phase is the Project ("Project") includes a new single source of supply to serve the entire system at completion of all phases, and distribution system infrastructure to serve existing SWS customers, approximately 10 residences on Springfield Road, and the MH Park.

Future phases, which are not included in the Project, are anticipated to include a second well to provide an additional source of supply and additional distribution system infrastructure to serve additional customers on Struve and Giberson Roads. When all phases are complete, the new potable water system is anticipated to serve approximately 34 residences on Struve Road currently served by the existing SWS, 24 additional residences on Springfield and Giberson Roads not currently served by the existing SWS, and the Moss Landing Mobile Home Park (MH Park) which includes 105 mobile home sites currently served by a private well.

1.3. System Demands

The average daily demand (ADD) and maximum daily demand (MDD) for the three communities to be served by the system are summarized in Table 1-1. Housing unit types include single family residences (SFR) and mobile homes (MH). While not all of these customers will be served the Project, demand for all future customers is considered for sizing of production, distribution, and storage facilities.

Table 1-1: Combined Water System Average Daily Demand

Community	Unit Type	Units	ADD (GPM)	MDD (GPM)
Springfield Water System	SFR	34	13	31
Moss Landing Mobile Home Park	MH	105	15	22
Springfield and Giberson Roads	SFR	24	9	22
Total			**37**	**87**

Peak hourly demand (PHD) is assumed to be 1.5 times the MDD, or 130 GPM.

1.4. Water Sources

The system will be supplied by at least one source of water, with a goal of two separate sources. Three potential sources are considered as part of this Preliminary Engineering Report (Report), including:

Alternative A: Drill a new well at the Moss Landing Middle School site (SW-2).

Alternative B: Connect to the existing Moss Landing water system.

Alternative C: Drill a new well at the existing well site (SW-3).

Alternative A is recommended as the primary water source for the SWS, since the test well has been completed and demonstrated the ability to provide sufficient water to the system. Alternative C is recommended as the secondary source of supply for the system as a result of input from the County of Monterey and State of California; in addition, the hydrogeologic evaluation conducted as part of this study indicates a new well at the existing well site would likely produce good quality water.

1.5. Project Description

The recommended Project will be Alternative A, which will develop an independent water supply system for the Springfield area, consisting of a new well, water storage tanks, booster pump station, and other improvements at the Moss Landing Middle School site; new distribution piping along Springfield Road, Struve Road, easements, and within the MH Park; and installation of new individual service laterals and meters.

Future Phases of work include a new well at the existing SW-1 site (Alternative C), additional distribution piping along Struve Road and Giberson Road, and installation of additional individual service laterals and meters.

1.6. Permitting

A variety of permits from various agencies are anticipated to be required for the Project. In addition to compliance with the California Environmental Quality Act (CEQA), anticipated permits for the Project construction include:

- Caltrans Encroachment Permit
- County of Monterey Encroachment Permit
- California Coastal Commission Coastal Development Permit
- Monterey Bay Air Resources District Permit to Construct and Permit to Operate
- U.S. Fish and Wildlife Service Section 7 or 10 Incidental Take Permit
- State Water Resources Control Board Permit Amendment

Permits Required for Future Phases include:

- County of Monterey Encroachment Permit
- California Coastal Commission Coastal Development Permit
- U.S. Army Corps of Engineers and RWQCB Section 401 and 404 permits
- U.S. Army Corps of Engineers and RWQCB Section 401 and 404 permits
- California Department of Fish and Wildlife Lake and Streambed Alteration Agreement
- U.S. Fish and Wildlife Service Section 7 or 10 Incidental Take Permit
- State Water Resources Control Board Permit Amendment

1.7. Project Costs

An estimate of total project costs has been developed. In addition to construction costs, various additional expenses anticipated to be incurred as part of the Project have been estimated based on an assumed percentage of construction costs, summarized in Table 1-2.

Table 1-2: Estimated Project Construction and Construction Management Costs

Project Element	Estimated Percentage of Construction Costs	Estimated Construction Cost	
		Project	Future Phases
Construction Costs	-	$6,980,000	$4,170,000
Construction Survey	1%	$69,800	$41,700
Utility Relocation	2%	$139,600	$83,400
Engineering Design	10%	$698,000	$417,000
Design Survey	1%	$69,800	$41,700
Geotechnical Engineering and Hydrogeology	2%	$139,600	$83,400
Construction Management and Inspection	12%	$837,600	$500,400
Environmental and Project Permitting	3%	$209,400	$125,100
Right-of-Way Engineering	1%	$69,800	$41,700
Right-of-Way Acquisition	3%	$209,400	$125,100
District Administration	5%	$349,000	$208,500
Total		**$9,772,000**	**$5,838,000**

1.8. Project Recommendations and Next Steps

The District has confirmed State funding will be acquired for all phases of the improvements, but the current available funding will not accommodate all proposed improvements. Therefore, it is recommended the Project be divided into multiple phases. It is anticipated that the Project will be covered by the State funding and will include the new well SW-2, storage tanks, booster pump station, and other associated improvements at the Moss Landing Middle School site, as well as new distribution piping, service laterals, and meters throughout the Springfield Road, Struve Road, and MH Park areas.

Future Phases will complete the SWS loop around McClusky Slough and the Springfield Road/Giberson Road/Struve Road area. Future Phases will not be covered by the initial State funding and will be constructed on a separate timeline. Only the Project will be included in the subsequent detailed design stage. All components of the Project will be designed and constructed to accommodate the water demand of the completed SWS, including Future Phases.

Dividing the Project into multiple phases will incur a greater final cost for the complete SWS whereas keeping the Project together as a single set of contract documents would be less expensive due to economy of scale. However, with funding available for the Project, it is recommended the District advance the Project forward as quickly as feasible to improve water quality in the Springfield area. If the Project moves forward in an efficient manner, it is anticipated construction could be complete by the end of 2021.

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Section 2. Project Overview

2.1. District Background

The Pajaro/Sunny Mesa Community Services District (PSMCSD or District) has been in operation since 1986. The District was created by the Monterey County Local Agency Formation Commission (LAFCO) with the consolidation of the Pajaro Community Services District, the Sunny Mesa Water District, and Monterey County Service Area No. 73. The District is a public agency governed by a five (5) member Board of Directors.

The District provides potable water service, fire protection, parks, streetlights, and sanitary sewer services to thousands of residents in northern Monterey County (County). The District provides these services from the Pajaro River in the north to Moss Landing in the west and to the Highway 101 corridor in the south. It is the only public agency which provides public potable water services in the Pajaro, Elkhorn, and Prunedale areas.

The PSMCSD water system is regulated by State Wate Resources Control Board Department of Drinking Water regulations and the Monterey County Environmental Health Department.

2.2. Existing Supply System

The District acquired the Springfield Mutual Water Company in 2005. Since the acquisition, the District has been working with the residents of Struve Road to improve the potable water system. The water system, now called the Springfield Water System (SWS), currently serves approximately 34 single family residential parcels along Struve Road.

The existing SWS is fed by a single shallow well, designated as Springfield Well No. 1 (SW-1), located in an active agricultural field to the north of Struve Road. A photo of the existing well site is provided in Figure 2-1. Existing SWS infrastructure, including SW-1, is shown on Figure 2-2.

Figure 2-1: Existing Springfield Well Site

SW-1 has documented water quality problems for a number of contaminants. Table 2-1 shows the maximum contaminant level (MCL) established by the State of California and typical levels of contaminants exceeding these levels recorded at SW-1, recorded between 2012 and 2019.

Table 2-1: Existing Springfield Well (SW-1) Water Quality Issues

Contaminant	MCL	Springfield Water System
Nitrate (NO_3)	45 mg/l	58-293 mg/l
Chloride	250 mg/l	639 mg/l
Total Dissolved Solids (TDS)	500 mg/l	2,170 - 2,900 mg/l
Specific Conductance	900 µS/m	4,146 µS/m
Sulfate	250 mg/l	349 mg/l
1,2,3-Trichloropropane	0.005 µg/l	0.025 - 0.039 µg/l

It is believed the high levels of nitrates in SW-1 are a result of non-point source pollution from agricultural operations. High levels of total dissolved solids (TDS) and specific conductance are a result of seawater intrusion into the shallow aquifer SW-1 draws water from. Sulfate contamination is likely from naturally occurring sources.

The existing water supply system does not disinfect water prior to distribution. Due to the low-quality water produced by the existing system, the District currently provides bottled water to residences served by the SWS for potable uses. Residences in the SWS are allowed 170 5-gallon bottles of potable water per week. On average, the District provides 437 5-gallon bottles of potable water per month. The District also recently began providing bottled water to the residences in the Moss Landing Mobile Home Park (MH Park).

The building housing the existing SW-1 facilities is dilapidated and should be demolished to protect the health and safety of District operation staff and the public. New facilities at this site should include security improvements to exclude the public.

2.3. Existing Distribution System

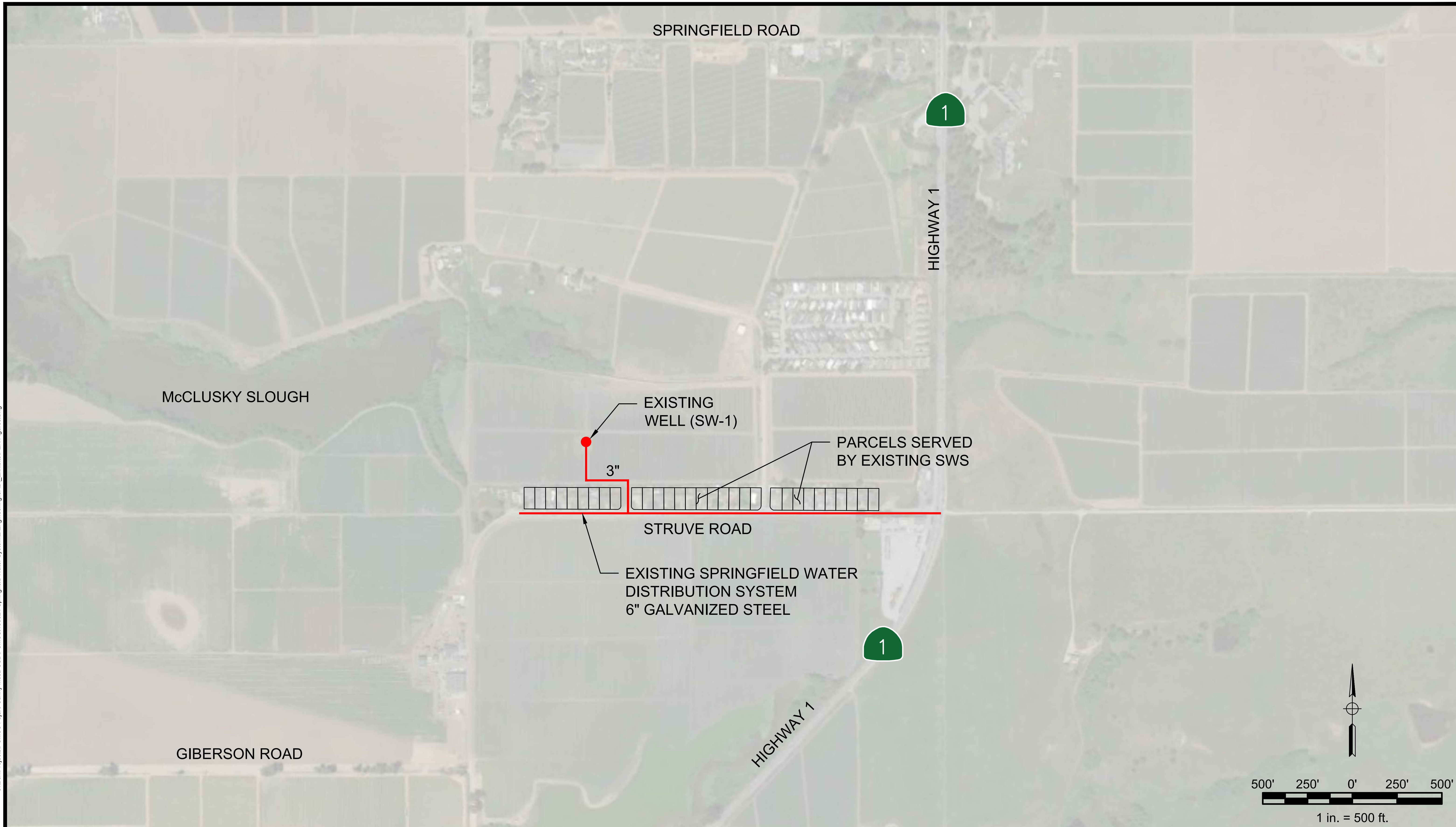
SW-1 discharges into the SWS which conveys water to the residences on Struve Road. There are currently 34 parcels being served by this system. The number of residences per parcel is unknown, but it is believed to be significantly higher than national average of approximately 3.14 persons in a family household (per the U.S. Census Bureau). The pipeline between SW-1 and the distribution main is believed to be constructed of 3-inch piping. The existing distribution main is 6-inch asbestos cement pipe (ACP). Existing service laterals are believed to be galvanized steel. Approximate locations of the existing distribution system piping are shown in Figure 2-2.

There are no individual water meters on the existing distribution system. The only water meter on the system is a total production meter at SW-1. Historic system demands are discussed in Section 2.5.

2.4. Project Goals

The goal of the Springfield Water System Improvements is to construct improvements to the SWS to deliver a reliable and potable water supply to the community. This Preliminary Engineering Report (Report) explores several alternative methods of supplying potable water to the area.

Initially, the project was intended to serve only the residences on Struve Road, currently served by the SWS, and potentially the MH Park. Since Project initiation, service to the MH Park has been confirmed, as well as additional residences along the proposed pipeline alignments.



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EXISTING SPRINGFIELD WATER SYSTEM

SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT

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FIGURE 2-2

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When all phases are complete, the expanded SWS is anticipated to serve approximately 34 residences on Struve Road, 24 residences on Springfield and Giberson Roads, and the MH Park which includes 105 mobile home sites. The proposed composite service area and distribution piping to serve these customers is shown on Figure 2-3. Service to all customers will be achieved over multiple phases as discussed in Section 11.

The system will be supplied by at least one source of water, with a goal of two separate sources. Three potential sources are considered as part of this Report, including:

Alternative A: Drill a new well at the Moss Landing Middle School site.

Alternative B: Install a new connection between the existing Moss Landing Water System and the SWS.

Alternative C: Drill a new well at the existing SW-1 well site.

New individual service laterals and meters will be installed for each customer.

2.5. System Demands

This section documents the demand requirements for the customers who will be served by the Project.

2.5.1. Existing Springfield Water System Residential Demands

Existing system demands were reviewed for the period from the start of 2011 through April 2018. Usage data is collected from a single water meter measuring total well production from SW-1. A summary of the monthly water use for the system is show in Table 2-2.

Table 2-2: Springfield Water System Historical Monthly Total Water Demand (Gallons)

	2011	2012	2013	2014	2015	2016	2017	2018
January	573,716	471,988	454,784	569,976	531,828	552,099	563,992	617,848
February	513,876	381,480	418,132	471,240	487,696	433,990	429,726	449,548
March	509,388	372,504	463,012	534,820	584,936	620,092	685,168	628,320
April	554,268	397,188	454,784	536,316	557,260	504,152	476,326	570,724
May	639,540	467,500	673,948	605,132	523,600	514,624	706,112	-
June	559,504	546,788	552,024	682,924	604,384	676,416	774,928	-
July	597,652	588,676	667,964	657,492	534,072	606,852	721,072	-
August	602,888	586,432	634,304	594,660	585,684	670,806	620,765	-
September	548,284	523,600	699,380	513,876	634,304	699,305	878,975	-
October	499,664	628,320	540,056	559,504	526,667	560,925	734,536	-
November	454,036	442,068	537,812	550,378	412,597	624,580	640,288	-
December	428,604	485,452	609,620	520,758	455,532	526,966	576,708	-
Average Daily Use	17,757	16,098	18,372	18,622	17,640	19,153	21,393	18,887

During the evaluation period, the SWS pumped an average of 18,491 gallons per day (GPD) from SW-1. For the 34 parcels served, this equates to 544 gallons per parcel per day. The highest monthly demand during this period occurred during September of 2017. During this month, the system provided an average of 29,299 GPD, or 862 gallons per parcel per day. To estimate the maximum daily demand (MDD) for the system, the maximum month demand was multiplied by a factor of 1.5 in accordance with the California Code of Regulations (CCR) Title 22 §64554.

The existing SWS provides non-potable water to the parcels served. The new system will provide a potable source of water, which is anticipated to increase water use, as water provided by the system will also be utilized for potable uses. Meters will be installed on the system as part of this Project, which will enable the District to bill customers based on actual water use rather than the flat monthly rate currently in effect. Billing customers using this strategy will place downward pressure on water use.

Since the impact of these considerations cannot be accurately established, future demands for existing customers are assumed to remain equal to existing demands. The average daily demands (ADD) and MDD for the SWS are summarized in Table 2-3. The ADD and MDD are described in units of GPD and gallons per minute (GPM).

Table 2-3: Springfield Water System Maximum Daily Demand Summary

Community	Parcels	Max Month ADD per Unit (GPD)	Max Month ADD (GPD)	MDD Peaking Factor	MDD (GPD)	MDD (GPM)
Existing Springfield Water System	34	862	29,299	1.5	43,949	31

2.5.2. Springfield Road and Giberson Road Demands

Twenty-four (24) potential water system customers have been identified on Springfield Road and Giberson Road which would potentially be served by the expanded SWS. For the purposes of estimating system demands, we have assumed each potential additional customer has an equal demand to the customers served by the existing system. The MDD for the Springfield Road and Giberson Road customers are summarized in Table 2-4. Service to all customers will be achieved over multiple phases as discussed in Section 11.

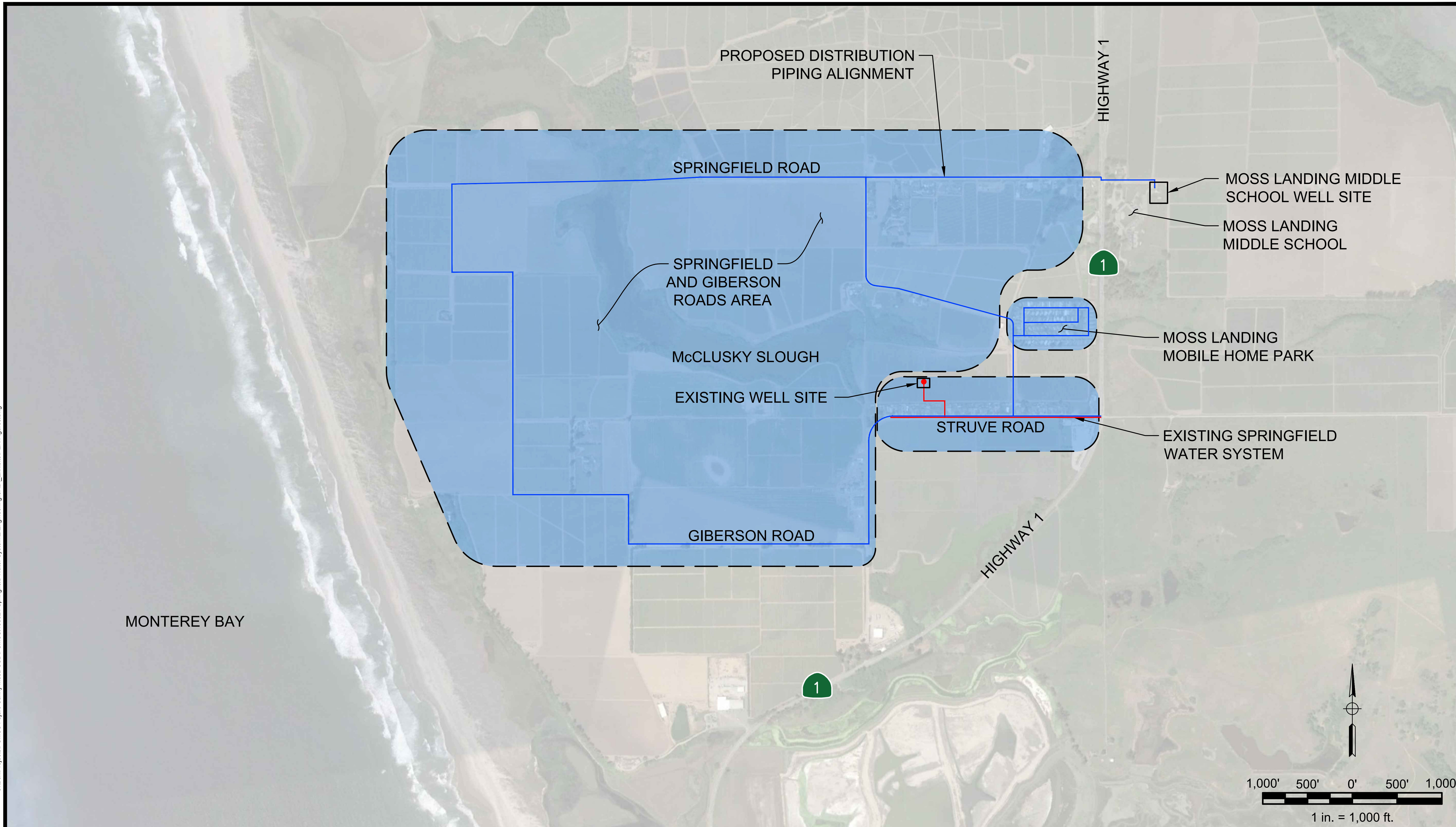
Table 2-4: Springfield Road and Giberson Road Customers Maximum Daily Demand Summary

Community	Parcels	Max Month ADD per Unit (GPD)	Max Month ADD (GPD)	MDD Peaking Factor	MDD (GPD)	MDD (GPM)
Springfield & Giberson Roads	24	862	20,682	1.5	31,023	22

2.5.3. Moss Landing Mobile Home Park

The MH Park has 105 individual units. The MH Park is currently provided bottled water by the District, but water usage data for the MH Park was not available for the preparation of this Report. As a basis for estimating demands, a search of publicly available documentation was conducted to identify typical mobile home water demands. A demand per mobile home unit was estimated based on a study of 2003 to 2006 average water use for four (4) mobile home parks in the Santa Clara Valley Water District. The ADD for each mobile home was calculated based on the 2003 to 2006 average yearly demand. Using the Santa Clara Valley Water District study, an ADD of 211 gallons per day per mobile home unit was estimated based on a connection weighted average of the four parks. The ADD of 211 gallons per day per mobile home unit was adopted to estimate demands for the MH Park

Average daily demands have been multiplied by 1.5 to estimate maximum monthly demands (MMD), and further multiplied by 1.5 to estimate MDD in accordance with CCR Title 22 §64554. The MDD for the MH Park customers are summarized in Table 2-5.



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PROPOSED COMPOSITE SERVICE AREA

SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT

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FIGURE 2-3

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Table 2-5: Moss Landing Mobile Home Park Maximum Daily Demand Summary

Community	Units	Average Daily Demand per Unit (GPD)	Average Daily Demand ADD (GPD)	MDD Peaking Factor	MDD (GPD)	MDD (GPM)
Moss Landing Mobile Home Park	105	211	22,155	2.25	49,849	35

2.5.4. Demand Summary

The ADD for the three communities proposed to be served by the SWS at buildout of all phases is summarized in Table 2-6. Housing unit types include single family residences (SFR) and mobile homes (MH).

Table 2-6: Expanded SWS Average Daily Demand

Community	Unit Type	Units	ADD per Unit (GPD)	ADD (GPD)	ADD (GPM)
Existing SWS	SFR	34	544	18,491	13
Moss Landing Mobile Home Park	MH	105	211	22,155	15
Springfield & Giberson Roads	SFR	24	544	13,052	9
Total				53,698	**37**

The MDD for the three communities proposed to be served by the system are summarized in Table 2-7.

Table 2-7: Expanded SWS Maximum Daily Demand

Community	MDD (GPM)
Existing SWS	31
Springfield & Giberson Roads	22
Moss Landing Mobile Home Park	35
Total	**87**

Peak hourly demand (PHD) is assumed to be 1.5 times the MDD, or 130 GPM.

2.5.5. Fire Flow

In accordance with the 2016 California Fire Code Appendix B, a minimum fire flow rate of 1,000 GPM for a period of one hour is required for one- and two-family residential dwellings, not equipped with automatic sprinkler systems, with a building area of up to 3,600 square feet. The District has confirmed 1,000 GPM is an acceptable fire flow rate but has requested a two-hour supply be provided. Section 4 describes the design requirements to meet these fire protection criteria.

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Section 3. Water Source Alternatives

3.1. Water Source Requirements

The County of Monterey Health Department has indicated a preference for the SWS to include a minimum of two sources of supply. The water source alternatives discussed in Section 3.2 were evaluated for use as primary and secondary sources of supply.

3.2. Water Source Alternatives

Three water supply alternatives were analyzed as part of this Report to provide a primary water supply for the SWS. This section provides an overview of the alternatives considered.

3.2.1. Alternative A – New Well at the Moss Landing Middle School Site

Alternative 1 would supply water to the SWS by constructing a new well and other improvements at a site on the property of the now-defunct Moss Landing Middle School. An easement on this site was acquired by the District in 2005. The easement on the school parcel (Assessor's Parcel Number (APN) 413-014-001), is 105 feet wide by 130 feet long and has an area of 0.31 acres surrounded by a four-foot-high chain link fence. The school parcel has a total area of 20.50 acres. An existing AT&T utility installation is located on the northeast corner of the parcel. According to data obtained from Google Earth, the site has an elevation of approximately 142 feet above mean sea level (MSL).

A test hole was drilled at the site in July 2008 to a depth of 630 feet below ground surface (bgs). Testing results and a geophysical electric log indicated good quality water is available at the site. These findings resulted in the decision to drill a test well at the site. The test well at the site was drilled from November 6 to 8, 2017. Subsequent casing, well development, and testing has shown this well is a suitable source of potable water for the SWS and has been completed as a production well. This well has been designated as the Springfield Well No. 2 (SW-2).

Additional information on the hydrogeology of the area, water quality information within the new well, and the recommendations for use of the well at the Moss Landing Middle School site is discussed in Section 5. A production rate of 100 GPM for this well is recommended.

3.2.2. Alternative B – Consolidate with Moss Landing Water System

Alternative 2 would serve the SWS with water provided from the existing Moss Landing Water System (MLWS). Three options for establishing this connection were evaluated. Each option would require construction of a transmission pipeline from the MLWS to a new water storage tank in the Springfield area. The transmission pipeline would connect to the MLWS at 2370 Highway 1 in front of the Whisper Charters and Monterey Bay Kayaks businesses.

Connecting to the existing MLWS will create additional demands on an already developed water system, which will reduce regional water supply reliability. In addition, this will expose the Springfield area to the risk of losing water supplies due to a water main break or other issue with the MLWS.

3.2.2.1. Moss Landing Water System Background

The existing MLWS is owned and operated by the District and serves the community of Moss Landing, located to the south of the Springfield area. The system consists of a single pressure zone supplied by two wells located east of Moss Landing on Dolan Road. The system also includes three water storage tanks and a booster pump station located adjacent to the Moss Landing Marine Laboratories located at 8272 Moss Landing Road.

Well pump operation is controlled based on the water level in the water storage tanks, each of which has a capacity of 59,000 gallons. The wells pump directly into the distribution system and provide system pressure for the distribution system when operating. Only one well may operate at a time. A backpressure sustaining valve regulates flow into the storage tanks; when the system pressure is above the set level, the valve opens to allow water to flow into the tanks until full; when the system pressure drops, the valve closes and stops flow to the tanks. The booster pump station draws water from the storage tanks and discharges into the distribution system.

Booster pump station operation is controlled based on system pressure. When one of the wells activates, system pressure increases, and the booster pump station shuts down. When a well pump turns off, pressure in the system drops, and the booster pump station activates. When operating, the booster pump station regulates output to maintain system pressure by regulating pump speeds using variable frequency drives (VFDs). Three small hydropneumatic tanks at the booster pump station site allow the booster pump station to shut down entirely during low flow periods.

Minimum static operating pressure in the MLWS varies between 38 and 68 pounds per square inch (PSI), depending on the location and elevation in the system. According to District records, the designated connection point with the SWS transmission pipeline has a minimum static system pressure of 62 PSI and is at an elevation of18 feet above MSL.

3.2.2.2. Moss Landing Water System Supply Capacity

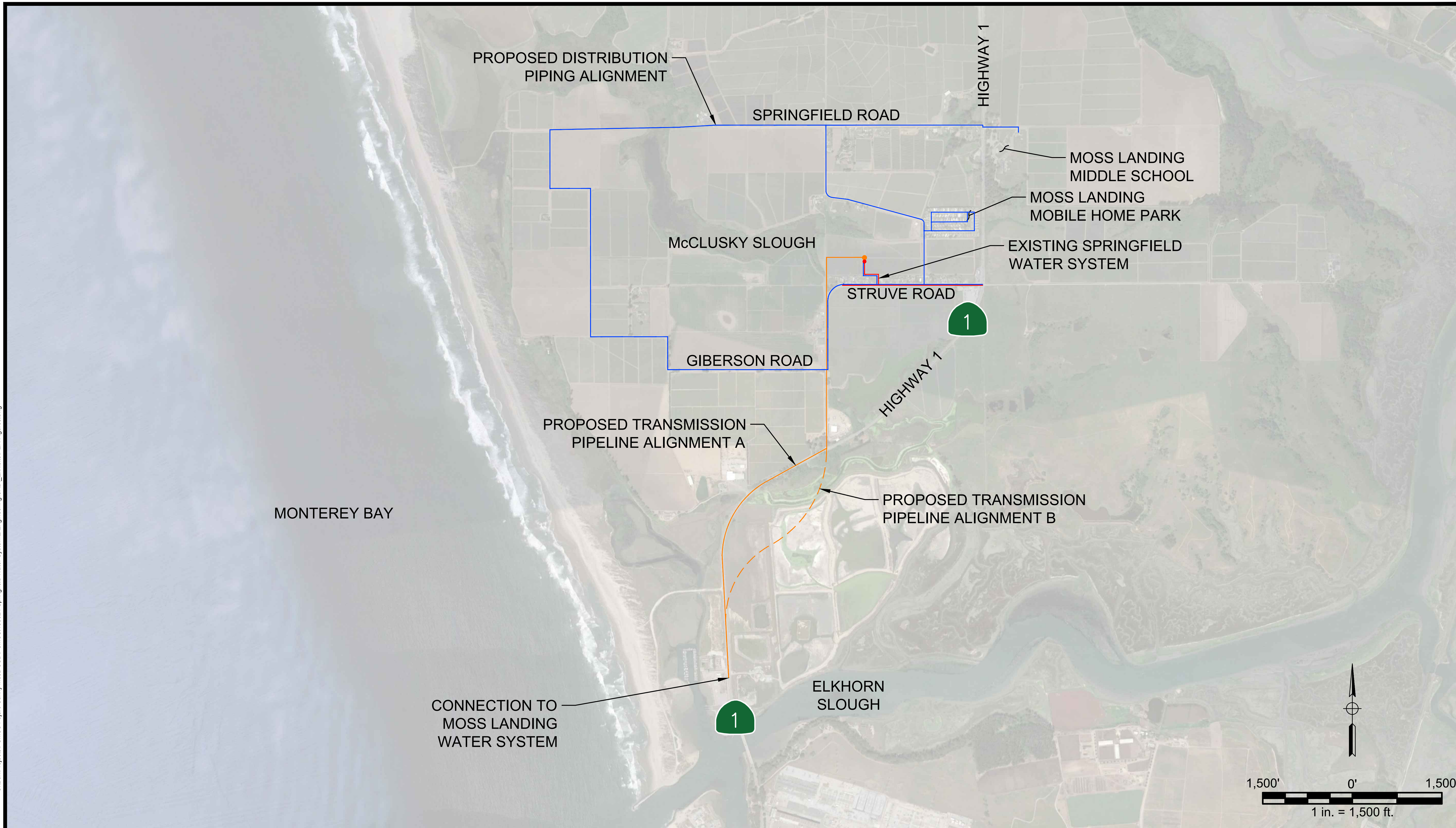
The primary MLWS well has a capacity of 450 GPM. The MLWS MDD is documented as 155,610 GPD, which equates to 108 GPM. This indicates excess capacity exists in the primary well, which could be used to serve the SWS. A hydrogeologic analysis on the potential impact of increased pumping at the MLWS wells has not been completed and is unknown.

Hydraulic modeling indicates there is insufficient capacity in the MLWS to directly serve the SWS fire flow demand. Meeting the fire flow demand requires water storage be provided in the SWS.

3.2.2.3. Moss Landing Connection Option 1

This option includes the construction of a new water storage tank for the SWS at either the existing SW-1 site or another nearby site at a similar elevation. A dedicated transmission pipeline would be extended from the MLWS to the new tank. The alignment of the transmission pipeline is assumed to be within Highway 1, which is a California Department of Transportation (Caltrans) right-of-way (ROW) from the point of connection to the MLWS to Struve Road, then within Struve Road and private property to the site of the new water storage tank. A combination altitude and backpressure sustaining valve would regulate flow into the storage tank. A new booster pump station would be provided adjacent to the new tank, which would pump water into the SWS distribution system. An emergency connection would be provided from the discharge side of the booster pump station to the MLWS side of the combination altitude and backpressure sustaining valve to allow the SWS to transfer water back into the MLWS. A back-up generator at the booster pump station would be required to provide back-up power in the event of a power outage.

This alternative is shown schematically on Figure 3-1. A conceptual level construction cost opinion has been developed and is included in Appendix A. Construction costs opinions for this alternative were developed in October 2016. The estimates were escalated for 2019 costs by utilizing the Engineering News-Record (ENR) Construction Cost Index.



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MOSS LANDING CONNECTION OPTION 1

SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT

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FIGURE 3-1

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3.2.2.4. Moss Landing Connection Option 2

This option includes the construction of a new water storage tank for the SWS at the Moss Landing Middle School site. There is currently insufficient system pressure in the Moss Landing Water System to reliably convey water to this new tank. A small booster pump station would be provided to transfer water through a dedicated transmission line to the new tank at the school site. A back-up generator at the booster pump station site would be required to provide back-up power in the event of a power outage. A pump station and back-up generator are also required to discharge water into the distribution system. The alignment of the transmission main is assumed to be in Highway 1 from the point of connection to the MLWS to the south side of Struve Road, then within Struve Road back to the intersection of Highway 1 in the east, continue within Highway 1 to Springfield Road, and follow Springfield Road to the Moss Landing Middle School site. This alignment was selected to minimize the length of piping installed within Caltrans ROW, installation costs, and challenges associated with future maintenance. A location for the booster pump station has not been established but would require acquisition of a site, or additional piping at the existing well site.

Bypass lines around both booster pump stations would also be provided to allow water stored in the tank at the Moss Landing Middle School site to serve the MLWS at a slightly reduced pressure in the event of an emergency.

This alternative is shown schematically on Figure 3-2. A conceptual level construction cost opinion has been developed and is included in Appendix A. Construction costs opinions for this alternative were developed in October 2016. The estimates were escalated for 2019 costs by utilizing the Engineering News-Record (ENR) Construction Cost Index.

3.2.2.5. Moss Landing Connection Option 3

This option is the same as Moss Landing Connection Option 2, except the booster pump station would be eliminated by increasing system pressure of the Moss Landing Water System by 10 to 15 PSI. This would provide sufficient pressure to reliably convey water to a tank at the Moss Landing Middle School site. A combination altitude and backpressure sustaining valve would regulate flow into the storage tank. A bypass line around the combination altitude and backpressure sustaining valve would also be provided to allow water stored in the tank at the Moss Landing Middle School site to serve the MLWS in the event of an emergency.

Modifications to the MLWS to increase system pressure would include reprogramming the booster pump station to modify pump set points and modifying settings on the backpressure sustaining valves which allow water to flow to the MLWS storage tanks. Increasing the pressure is anticipated to reduce the output of the primary MLWS well from 450 GPM to 430 GPM.

This alternative is shown schematically on Figure 3-3. A conceptual level construction cost opinion has been developed and is included in Appendix A. Construction costs opinions for this alternative were developed in October 2016. The estimates were escalated for 2019 costs by utilizing the Engineering News-Record (ENR) Construction Cost Index.

3.2.2.6. Moss Landing Connection Alternative B, Option Selection 1, 2, or 3

As a basis for comparing the Moss Landing Connection Options, a Color Alternatives Review Table (CART) was developed to provide a visual assessment of the alternatives, provided as Table 3-1.

Table 3-1: Moss Landing Connection Options CART

Option			Good →		Poor
	Estimated Construction Cost	Booster Pump Stations and Back-up Generators Required	Relative Energy Costs	Ability to Back Serve Moss Landing	Additional Challenges
Option 1: Tank Located at Existing Well Site	$6,500,000	Two	$$$	Yes	Permanent Access Easement Required
Option 2: Tank Located at Moss Landing Middle School Site with Booster	$6,900,000	Two	$$	Yes - At Reduced Pressure	Land Acquisition or Additional Piping and Permanent Access Easement Required
Option 3: Tank Located at Moss Landing Middle School Site with Increased Pressure	$5,500,000	One	$	Yes	-

Based on the criteria presented in Table 3-1, Option 3 is the preferred alternative for a connection with the MLWS.

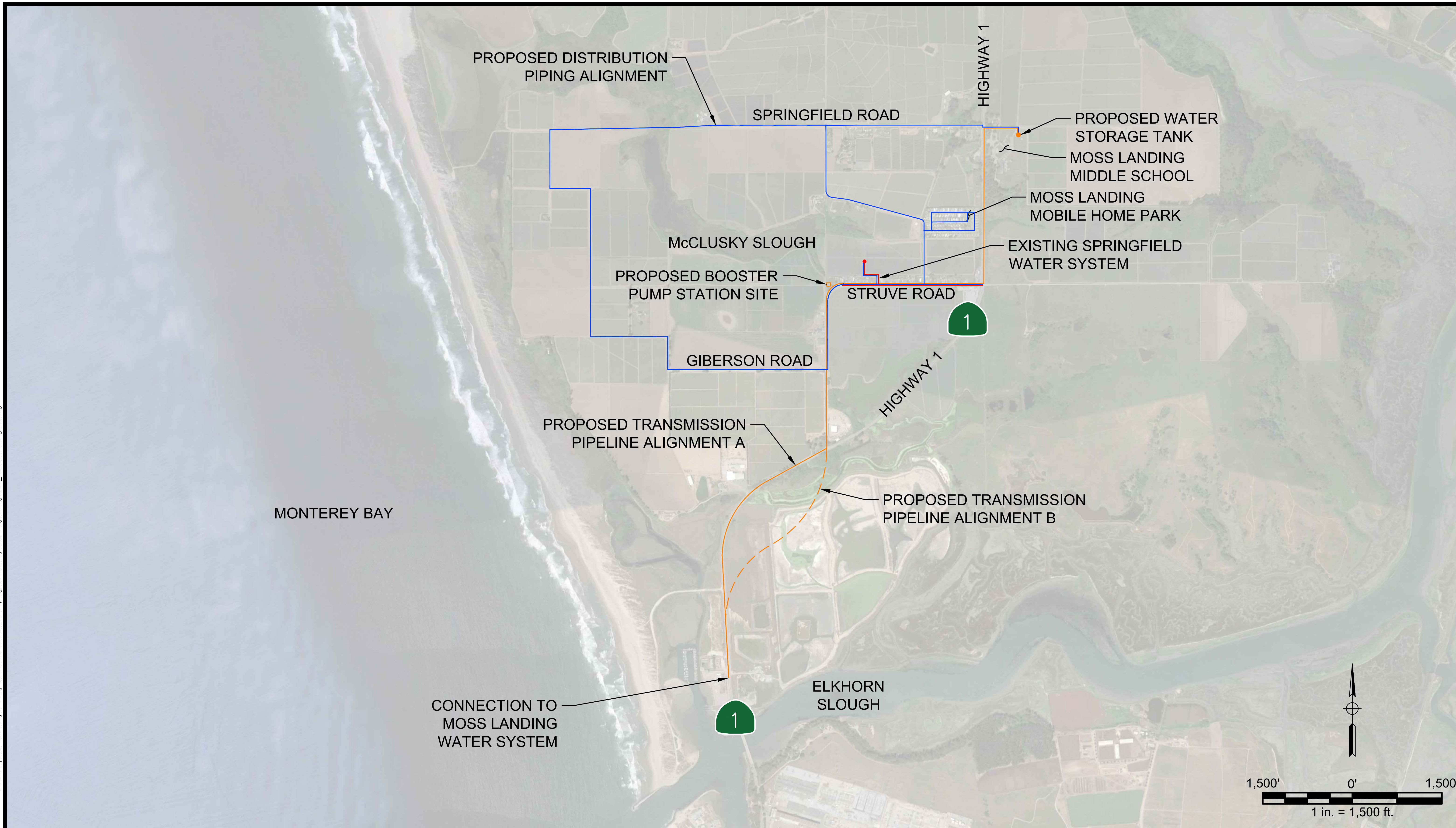
3.2.2.7. Pipeline Alignments and Installation Methods

Two pipeline alignments have been considered to connect the MLWS and SWS. Alignment A includes a transmission pipeline approximately 7,100 feet in length to be constructed primarily within the public ROW on Struve Road and Caltrans ROW along Highway 1. Alignment B would include a transmission pipeline approximately 6,900 feet in length which would be constructed primarily within the public ROW of Struve Road and within the Moss Landing State Wildlife Area. For either alternative, it is assumed the transmission pipeline would have a nominal diameter of eight inches to match the existing pipe diameter at the MLWS connection point. These alternative alignments are shown in Figures 3-1 through 3-3.

A technical memorandum assessing the feasibility of trenchless pipeline installation to connect to the MLWS was prepared by Aldea Services LLC, dated November 15, 2015. This technical memorandum is included as Appendix B of this report.

Based on the preliminary HDD feasibility evaluation for installing a pipeline from the SWS to the MLWS, using the HDD method is considered a viable construction alternative for installation of the water transmission pipeline. The proposed HDD bore alignments (assuming high density polyethylene (HDPE) pipe) are long (3,000 to 4,500 feet) to extremely long (greater than 4,500 feet). Shorter lengths can be performed in a single bore, while longer lengths are considered extremely long for a single bore and may need to be split into two separate bores or a single bore using the HDD intersect method.

While connecting the SWS to the MLWS using HDD piping installation methods is a viable alternative, utilizing the MLWS to supply the SWS is not recommended, as discussed in Section 3.3.



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MOSS LANDING CONNECTION OPTION 2

SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT

PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

FIGURE 3-2

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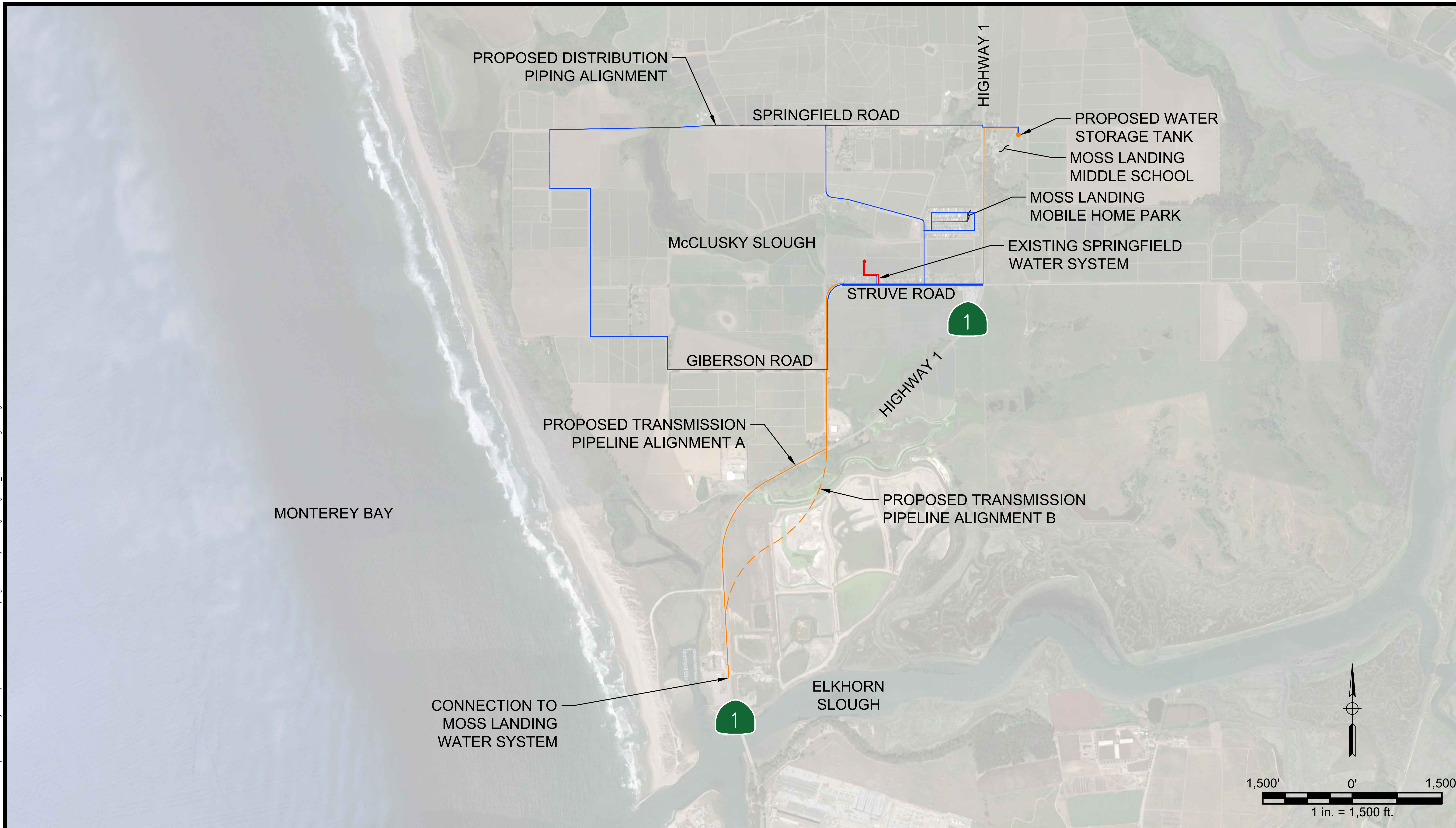

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MOSS LANDING CONNECTION OPTION 3
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PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

FIGURE 3-3

FEBRUARY 2020

3.2.3. Alternative C – New Well at Existing Well Site

Alternative 3 would supply water to the SWS utilizing a new well at the existing Springfield well site. Based on the hydrogeologic evaluation conducted as part of this Report, and discussed in more detail in Section 5, it is likely a deeper well at this site would provide a high-quality water source for the SWS. For the purposes of this Report, a new well at the existing well site has been designated as the future Springfield Well No. 3 (SW-3). This well will be designed with a target production rate of 100 GPM.

3.3. Recommended Water Supply Sources

Alternative A is recommended as the primary water source for the SWS since the well has been completed and has a demonstrated ability to provide water to the system. Alternative C is recommended as the secondary source of supply for the system as a result of input from the County of Monterey and State of California; in addition, the hydrogeologic evaluation conducted as part of this study indicates a new well at the existing well site would produce water of good quality.

Connecting to the MLWS is not recommended due to the high construction cost associated with the interconnection, the resultant decrease in local water supply reliability, and anticipated environmental and encroachment permitting challenges.

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Section 4. Project Requirements

This section addresses the technical requirements for the proposed water system.

4.1. General Project Requirements

It is the intent of this Project to develop a reliable, independent water supply system for the Springfield area. To achieve this goal, infrastructure elements required as part of this Project include:

- Water Supply
- Water Treatment
- Water Storage
- Booster Pump Station
- Back-up Generator
- Water Transmission Mains and Upgrade of Service Laterals
- Municipal Site Development

Additional information on the requirements for each of these elements are included in the following sections. A figure showing the overall system is included as Figure 4-1. Various equipment cut sheets for proposed equipment is included in Appendix C.

4.2. Water Supply

Water for the SWS will be primarily provided from the recently constructed SW-2 located at the Moss Landing Middle School site, with future SW-3 located at the existing SW-1 site to provide a secondary source of supply. For the purposes of preliminary sizing of equipment, each well pump will be sized to provide 100 GPM of supply.

The SW-2 well pump has been sized based in an assumed static depth to ground water of 143 feet, with a drawdown of 12 feet (8.8 GPM per foot of drawdown) as recommended by the hydrogeologic report discussed in Section 5. The pump will discharge to onsite storage at an elevation of approximately 17 feet above grade.

The SW-3 well pump has been sized based in an assumed static depth to ground water of 20 feet, as documented in the well driller’s report for SW-1, with a drawdown equal to SW-2. The SW-3 site is at an elevation of approximately 20 feet above MSL. The pump will discharge to the distribution system, which will be at a pressure of 80.7 to 90.7 PSI at the existing well site, depending on the pressure in the hydropneumatic tank at the Moss Landing Middle School site, as discussed is Section 4.5. The well pump is sized for the midpoint of the operating range.

For equipment consistency, the District has requested both wells be equipped with Goulds submersible vertical turbine well pumps. A summary of the well pumps is provided in Table 4-1.

Table 4-1: Recommended Well Pumps

Well	Primary Operating Point	Recommended Pump	Horsepower
SW-2	100 GPM @172’ TDH	Goulds 95L07	7.5
SW-3	100 GPM @ 230’ TDH	Goulds 95L10	10

4.3. Water Treatment

Water tests completed during development and testing of SW-2 indicate water quality in the well is satisfactory, with all tested parameters below State and Federal regulatory limits. Since these quality tests were completed, regulatory requirements for additional contaminants have been enacted. Additional testing will need to be completed for these contaminants to verify acceptable water quality. Detailed information on water quality is discussed in Section 5.

Based on the water quality testing results, treatment to remove specific contaminants is not required, unless additional contaminants are identified. In the future, water quality may degrade as a result of contamination from seawater, the upper aquifer, or another source. The site layout, discussed in Section 4.9, includes sufficient area for potential future water treatment facilities.

It is recommended water produced by SW-2 be chlorinated prior to entering on-site storage tanks and subsequently to the distribution system. Similar to the District's other systems, 1-gallon containers of sodium hypochlorite will be diluted on-site in a storage vessel to a concentration of 12.5%. To achieve a target chlorine residual of 1 part per million (ppm), 0.054 gallons of 12.5% sodium hypochlorite solution will need to be added each hour the system is operating. During ADD conditions, SW-2 is anticipated to operate for 10 hours per day, and 21 hours per day during MDD conditions; during these conditions, 0.54 and 1.134 gallons of 12.5% sodium hypochlorite solution will need to be added per day, respectively. A 20-gallon dual containment sodium hypochlorite storage tank is recommended to store sodium hypochlorite at the site.

An on-line continuous chlorine residual analyzer will be provided to verify chlorine residuals are being maintained. If the chlorine residual drops below a concentration of 0.5 ppm, an alarm will sound. A Hach CL17 chlorine analyzer is recommended.

The District may also desire to have an on-line turbidimeter included in the system design to provide data on water clarity. A turbidimeter can transmit an alarm if turbidity rises above a designated set point. A Hach TU5300 turbidimeter with an SC200 controller is recommended.

Both the chlorine analyzer and turbidimeter will discharge to waste.

The proposed SW-3 well has not yet been constructed. As a result, water quality parameters are unknown, but are anticipated to be substantially similar to the water quality observed at SW-2. As a result, considerations for water treatment are identical to those for SW-2.

4.4. Water Storage

Various criteria are considered for water storage, including storage volume, water quality, and storage tank appurtenances. These criteria are detailed in the following sections.

4.4.1. Water Storage Volume

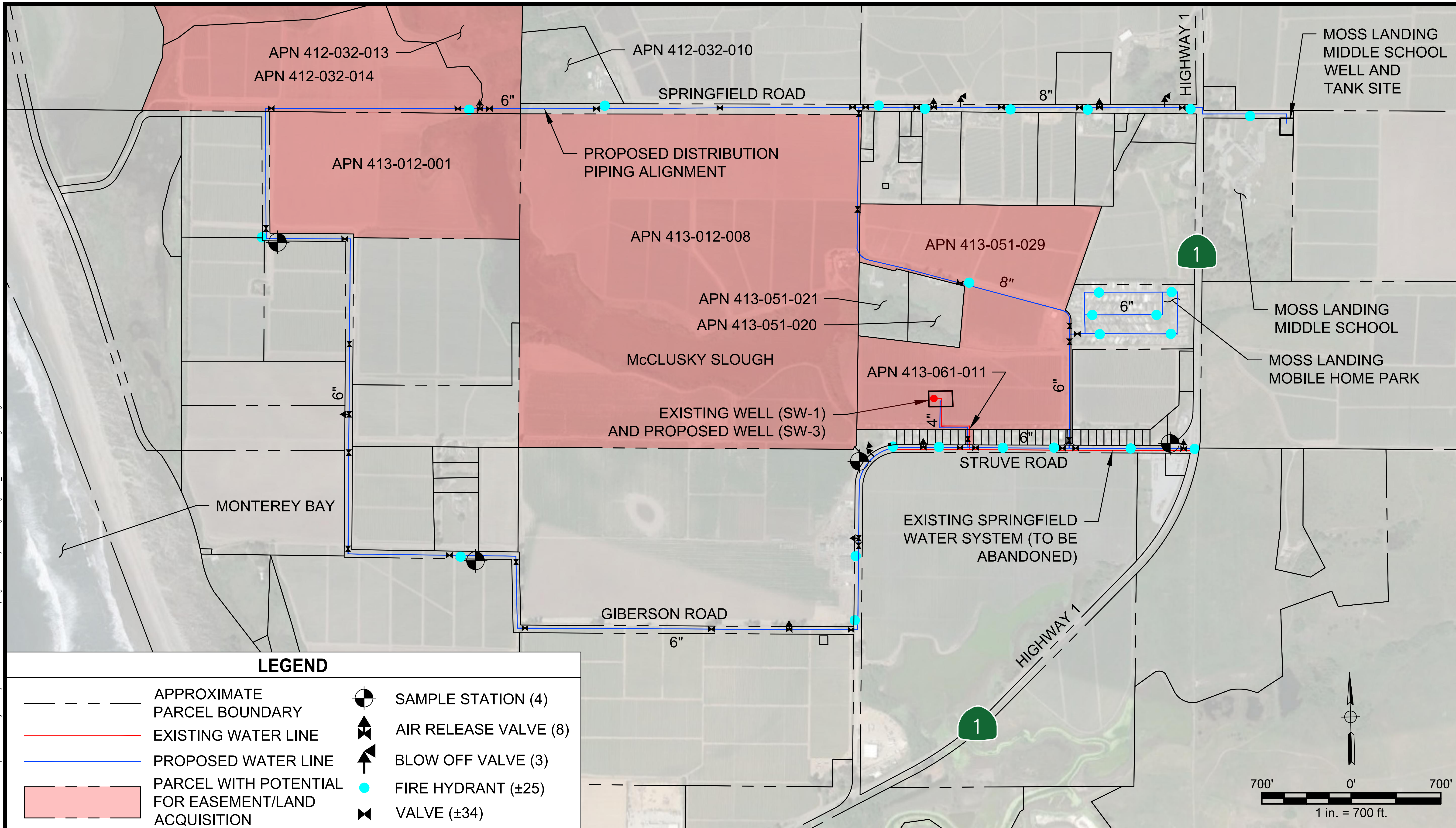
Determining the volume of water storage is a balance between multiple factors. Industry standards and fire protection requirements dictate the minimum water storage volume required for a potable water system.

The minimum storage required is determined by the following equation:

$$SSR = NFF + MDC - PC$$

Where:

SSR	=Storage Supply Required (gallons)
NFF	= Needed Fire Flow (120,000 gallons)
MDC	= Maximum Daily Consumption (124,820 gallons)
PC	= Production Capacity (24,000 gallons = 200 GPM for 2 hours, two wells pumping at 100 GPM)



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PROPOSED WATER DISTRIBUTION SYSTEM

SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT

PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

FIGURE 4-1

FEBRUARY 2020

Based on this calculation, a minimum storage volume of 220,820 gallons is required.

As water resides in a storage tank, chlorine residuals decay. If chlorine residuals drop sufficiently, water quality issues can develop. It is the District's goal to maintain three days' average daily demand in storage for the SWS.

4.4.2. Stored Water Quality

Based on the anticipated ADD for the SWS of 53,698 gallons per day, the residence time in a tank with a capacity of 220,820 gallons would be approximately 4.1 days, which could increase significantly during periods of lower demand. This exceeds the District's target of three days of storage capacity.

The existing SWS is not chlorinated. Assuming chlorination will be required for the new system, the primary water quality concern for water in the SWS is to maintain the water stored in a well-mixed state and maintain a consistent chlorine residual.

To achieve these goals, it is recommended permanent active storage mixing be installed to mix the chlorinated water. A variety of active mixing systems are available, including air bubbler systems and pumped mixing systems. A pumped mixing system, such as the GridBee Potable Tank Mixer, manufactured by the Medora Corporation, is recommended for this application.

4.4.3. Water Storage Design

Dividing the recommended storage volume of 220,820 gallons between two equal volume storage tanks will provide additional operating redundancy and allow for future repair of the tanks without necessitating temporary storage. Each tank will have a volume of 110,410 gallons or greater.

The water storage tanks for this project will be epoxy coated bolted steel tanks as described by American Water Works Association (AWWA) D103-09. Each tank will have a diameter of approximately 34 feet, with a liquid depth of approximately 17 feet. Each tank will be provided with the following appurtenances:

- Interior ladder
- Exterior ladder with Occupational Safety and Health Administration (OSHA) compliant cage, designed to limit access to District staff only
- Roof hatch
- Roof handrails, extending eight feet on either side of the exterior ladder
- Center roof vent
- Shell manway at ground level
- Exterior overflow
- Combined inlet/outlet connection
- Overflow outlet connection to drain
- Flexible connections for tank inlets and outlets
- Isolation valves (required on all inlets and outlets within 100 feet of new tank)
- Sample taps (2)
- Level sensor
- Gauge board
- Fall protection tie-off points

Since the storage tanks are not required to provide disinfection contact time, and are equipped with permanent mixing systems, separate inlet and outlet connections are not required.

The tanks will be provided with a factory-applied fusion-bonded epoxy coating to maximize the longevity of the tanks. A cathodic protection system is not recommended for bolted steel tanks with this type of coating.

Due to seismic design requirements, freeboard, or airspace, above the maximum water surface level is required to reduce the risk of tank damage in the event of an earthquake. This results in a taller tank than it would be to only store the required volume of water. The tank's Seismic Use Group (SUG) is the key determinant driving the design of tank freeboard and overall height.

The SUG assigned to a specific structure is a classification based on its intended use and expected performance under a variety of loading conditions, including earthquakes. The SUG has a significant impact on several factors involved in the structural design of facilities. SUG classifications range between I and IV; for potable water storage tanks, however, AWWA standards only include calculations for I, II and III. SUG IV is intended for structures of national strategic military importance and is not considered. Descriptions of these classifications according to AWWA standards are:

> *Seismic Use Group III:* SUG III shall be used for tanks that provide direct service to facilities deemed essential for post-earthquake recovery and essential to the life, health, and safety of the public, including post-earthquake fire suppression.
>
> *Seismic Use Group II:* SUG II shall be used for tanks that provide direct service to facilities deemed important to the welfare of the public
>
> *Seismic Use Group I:* SUG I shall be used for tanks not assigned to SUG II or III.

A SUG III is recommended for the proposed new tanks, as they provide supplies for fire protection, and there is no other storage in the system.

4.5. Pump Station

A pump station will be required to transfer water from the water storage tanks into the distribution system and maintain system pressure. The pump station is recommended to be sized based on maintaining a minimum system pressure of 40 PSI at the water meter for each customer. The customer with the highest elevation is the residence at the intersection of Springfield Road and Highway 1, which is at an elevation of approximately 114 feet above MSL. The Moss Landing Middle School site has an elevation of approximately 143 feet above MSL. Based on these elevations, the pump station needs to provide a minimum of 63.3 feet of head, or 27.4 PSI. The customers at the lowest elevation are those located on Struve Road, with a minimum elevation of approximately 20 feet above MSL. The pressure to these customers will be a minimum of 80.7 PSI.

Struve Road customers could be served without a pump station; however, due to the additional customers at higher elevations, a pump station is required.

Four pumps are recommended for the booster pump station. Two duty pumps would be provided, each sized for anticipated peak hourly system demand; this provides full redundancy for normal operating conditions. In addition, two fire pumps, each sized for peak fire flow, will also be provided; this provides full redundancy for emergency operating conditions. Each pump will be supplied with a soft starter to minimize peak electrical demands and transient pressures in the system. VFDs are not anticipated to be necessary. Both sets of pumps will be designed to operate in an alternating lead-lag set-up to operational frequency. Regular testing of the fire pumps will be required to verify and maintain operational conditions.

The duty pumps are recommended to be designed to transfer 200 GPM into the system, sufficient to meet the anticipated PHD for the system with a safety factor of 1.4. The fire pumps are recommended to be sized for 1,150 GPM each to meet PHD conditions and fire demands. Submersible canned vertical turbine pumps have been included in the preliminary design. This pump selection was made to protect the pumps from corrosion due to the coastal exposure of the site. Pumps and associated horsepower and make/model numbers are provided in Table 4-2.

Table 4-2: Recommended Booster Pumps

Pump	Primary Operating Point	Recommended Pump	Horsepower
Duty Pump #1	200 GPM @ 80' TDH	Xylem VIS-WFTM 7CHC	7.5
Duty Pump #2	200 GPM @ 80' TDH	Xylem VIS-WFTM 7CHC	7.5
Fire Pump #1	1150 GPM @ 73' TDH	Xylem VIS-WFTM 13CMC	30
Fire Pump #2	1150 GPM @ 73' TDH	Xylem VIS-WFTM 13CMC	30

The booster pump station will incorporate a hydropneumatic tank to allow pumps to provide consistent pressure and supply to the distribution system while cycling pumps on and off. The hydropneumatic tank has been sized based on the following equation:

$$Vt = [(P1 + 14.7)] / [P1 - P2]\ 15 * Qp * MF / Nc$$

Where:

Vt	= Total hydropneumatic tank volume (gallons)
P1, P2	= Pressures selected for water system operation (psig, not absolute pressures). P1 corresponds to the pump-off pressure and P2 to the pump-on pressure (37.4, 27.4)
Nc	= Number of pump operating cycles per hour. This number is either the current Department of Health (DOH) recommendation of six cycles per hour or a larger value that can be justified and documented by pump or motor manufacturers' warranties (6 cycles per hour)
Qp	= Pump delivery capacity (GPM) at the midpoint of the selected pressure range. Determined based on pump curves. If this value is not used, the Qp occurring at P2 (pump-on) must be used (200 GPM).
D	= Tank diameter (72 inches)
MF	= A multiplying factor related to tank diameter for horizontal tanks to ensure a six-inch water seal at the bottom of the tank. (1.06)

Based on this calculation, a minimum hydropneumatic tank volume of 2,761.3 gallons is calculated. A 3,000-gallon tank is included in the preliminary design. The booster pumps will be located outdoors at the site.

4.6. Back-up Electrical Generator

A back-up electrical generator will be required at the site. The generator will be sufficiently sized to handle the maximum anticipated load at the site. This maximum load is anticipated when starting a fire pump during operation of SW-2 as well as other minor on-site loads.

The back-up electrical generator has preliminarily been sized with a minimum generation capacity of 50 kilowatts (kW). The District has expressed an interest in a Caterpillar brand diesel generator with an integral double wall fuel tank for consistency with other sites. A Caterpillar C4.4 generator has been used as a basis for the preliminary design.

4.7. Water Transmission and Distribution Mains and Appurtenances

Water transmission mains will be required to transfer water from the booster pump station at the Moss Landing Middle School site and SW-3 to the distribution system. Mains have been preliminarily sized to provide sufficient water supplies without exceeding allowable pressure drops through the system during peak flows. New water mains will be constructed of polyvinyl chloride (PVC) C-900 pipe, pressure class 165 (DR25), sufficient to handle maximum system pressures. For portions of the project installed by horizontal directional drilling (HDD), fusible PVC pipe will be used for material consistency.

The existing SWS will be expanded to serve the additional customers. The existing 3-inch pipeline between SW-1 and Struve Road has a history of breaks and repairs and has reached the end of its service life; a new 4-inch water main will be installed between the SW-3 site and the distribution system. Replacement of the existing ACP within Struve Road is also recommended to be included in the project, as the planned increase in system pressure may cause catastrophic pipe failure. Approximately 12,700 linear feet of new 4-, 6-, and 8-inch water mains will be constructed in the Springfield, Giberson, and Struve Roads areas as shown on Figure 4-1.

New water mains will be installed throughout the MH Park, with metered laterals installed for each individual mobile home; all MH Park residents will become customers of the District. New fire hydrants will also be installed within the MH Park.

New distribution system piping will include valves, fire hydrants, air release valves, blow-offs, sampling stations, and other appurtenances as appropriate. The District has requested a minimum of four water quality sampling points throughout the distribution system. Fire hydrants, shown on Figure 4-1, are located approximately every 500 linear feet in residential areas, at dead ends of the distribution system, and in other strategic locations throughout the system. Existing wharf style hydrants will be removed. Fire hydrants will not be provided in areas where there are no existing residences or structures. Main line valves will be provided at selected fire hydrants, at intersections in the distribution system, and approximately every 1,000 linear feet throughout the distribution system.

4.8. Water Service Laterals

Water service laterals will be installed from the new main to new water meters at the property line for each customer. For customers with an existing water service, the new meter will be connected to the existing service lateral at the property line on the private (downstream) side of the meter. For customers without an existing water service, the service lateral will end at the new water meter at the property line, but the property owner will be required to extend the service line from the meter to the location of use at the owner’s expense. New services will be installed in accordance with District standards; separate water meters will be provided for each individual service connection.

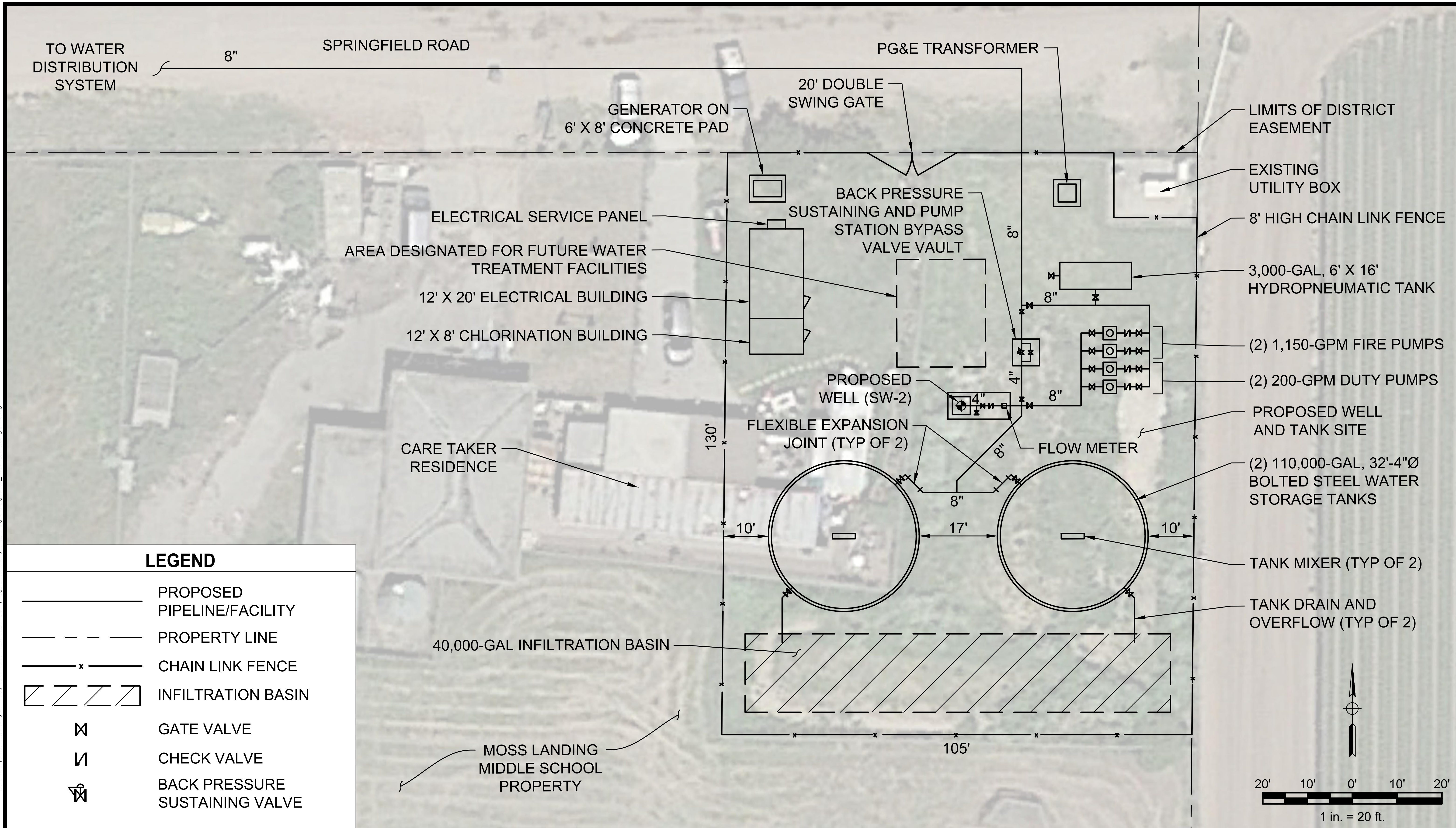
4.9. Moss Landing Middle School Site Development

The Moss Landing Middle School site will be developed as a fully functional municipal site. In addition to the permanent water supply infrastructure at the site, an area will be designated for a future treatment system to manage issues associated with potential future degradation of water quality. Other improvements at the site will include:

- Above-grade, below-grade, and interconnecting piping, valves, and accessories
- Chlorination facilities
- Electrical and lighting improvements
- Communications equipment
- A gravel surface suitable for driving vehicles and equipment
- A fiberglass reinforced plastic (FRP) building to house electrical equipment, chemical dosing equipment, chlorine analyzer, and turbidimeter (if provided)
- An eight-foot-high chain link fence with a locking gate to provide access to the site
- Communications equipment

A proposed layout of the Moss Landing Middle School site is included as Figure 4-2.

The existing roadway adjacent to the projected tank site, Springfield Road, is public ROW and has a paved surface.



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MOSS LANDING MIDDLE SCHOOL SITE PLAN
SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT
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FIGURE 4-2

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4.10. Existing Well Site Development

The existing SW-1 site will be redeveloped to provide a fully functioning municipal site. Improvements at the site will include:

- A new well, SW-3
- Above- and below-grade piping, valves, and accessories
- Chlorination facilities
- Electrical and lighting improvements
- A gravel surface suitable for driving vehicles and equipment
- FRP building to house electrical equipment, chemical dosing equipment, and chemicals
- An eight-foot-high chain link fence with a locking gate to provide access to the site
- Communications equipment
- Abandonment and demolition of the existing well
- Demolition of the existing building

In addition, a new access road will be required to provide all-weather access to the site from Struve Road. A conceptual design for the proposed roadway section includes of over-excavation to remove organic material and poor soils in the top 24 inches, fill as required, followed by a layer of geotextile fabric, and a 12-inch layer of graded and compacted base rock. A proposed layout of the existing SW-1 site and access road is included as Figure 4-3.

4.11. System Operation, Control, and Communication

A schematic drawing of the proposed SWS is provided as Figure 4-4. Additional information on operation of each of the components is provided in the following sections.

4.11.1. Well Pump Operation

Well pump operation will be controlled based on level in the water storage tanks. When the water level in the tanks drop below an adjustable set point, a well pump will activate. When the water storage tanks are full, the well pump will turn off.

SW-2 will act as the primary source of water for the system. SW-3 will only activate if manually activated by District staff if SW-2 is out of service or water levels in the water storage tanks drop below an adjustable set point.

SW-2 will discharge directly into the water storage tanks. SW-3 will discharge directly into the distribution system. Water produced by SW-3 in excess of system demand will be discharged to the water storage tanks; this discharge will be regulated by a backpressure sustaining valve.

4.11.2. Chlorination Operation

Sodium hypochlorite dosing pump operation will be controlled based on well pump operation. For each well, the dosing pump will operate whenever the well pump is operating, unless manually overridden by an operator. Dosing rates will be manually adjustable by operations staff based on observed well discharge rates and desired chlorine residual concentrations in the water storage tanks.

4.11.3. Booster Pump Station Operation

The booster pump station will maintain SWS water pressure at all times. Only one pump will operate at a time. Pumps will be controlled based on pressure in the hydropneumatic tank. When pressure in the hydropneumatic tank drops below a set point, the lead duty pump will activate. When pressure in the hydropneumatic tank reaches a high set point, the duty pump will turn off. If the pressure in the hydropneumatic tank drops below a low-low level set point, the duty pump will turn off, and a fire pump will activate. The fire pump will remain on until the high pressure set point is achieved, at which point it will turn off and return to normal duty operation.

Both pairs of duty and fire pumps will alternate lead/lag operation each pumping cycle. If a lead pump fails to activate, an alarm will sound, and the lag pump will activate. An on-site air compressor will automatically activate and add air to the hydropneumatic tank if a combination of tank level and pressure indicate additional air is required.

4.11.4. Back-up Generator Operation

The electrical system will be equipped with an automatic transfer switch. If a power outage is detected, the back-up generator will start automatically and provide power to the SWS. When electrical service resumes, the generator will turn off automatically and the SWS will return to grid-supplied power. The District will need to operate the back-up generator regularly as part of normal operation and maintenance procedures.

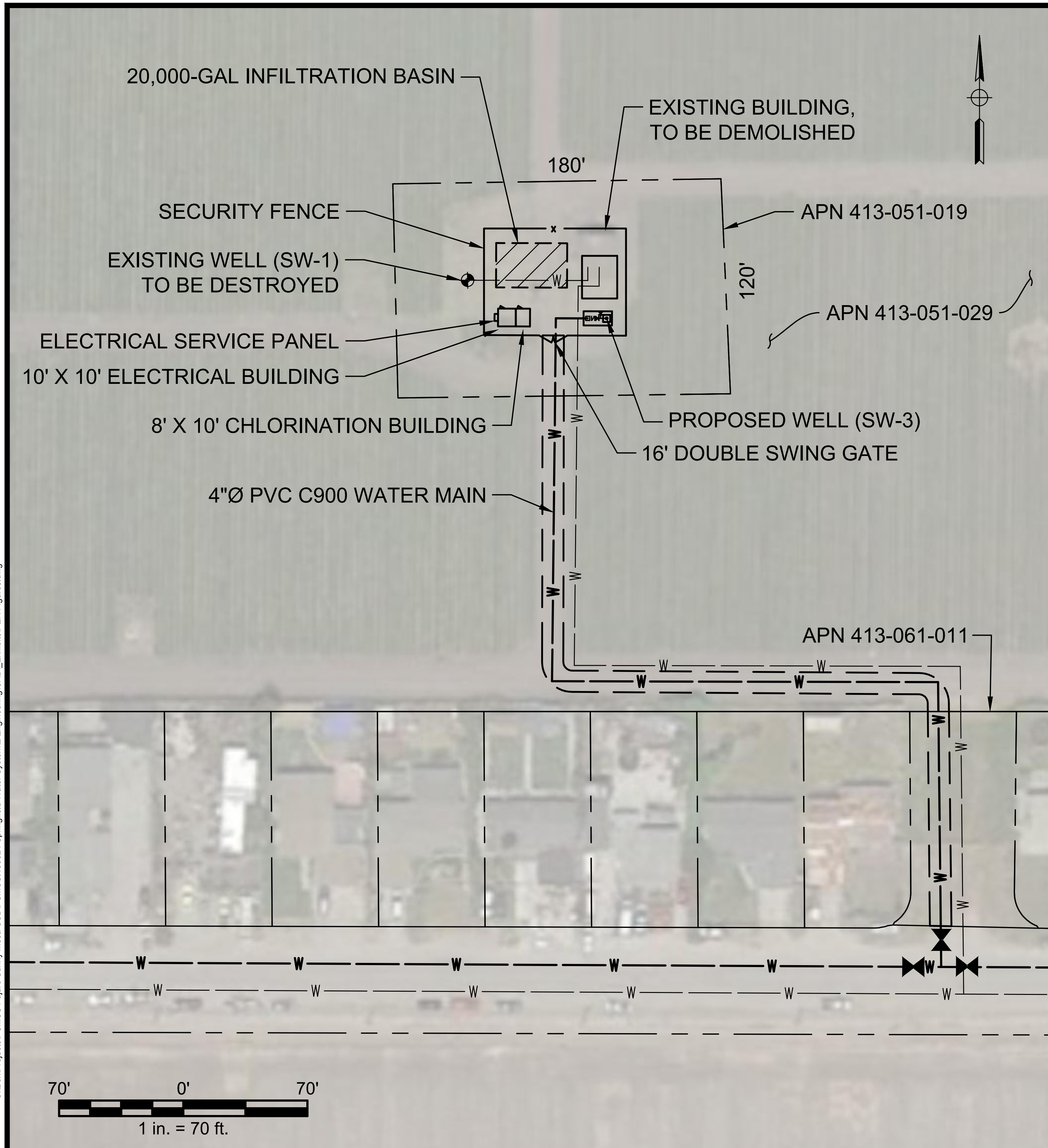
4.11.5. Alarms

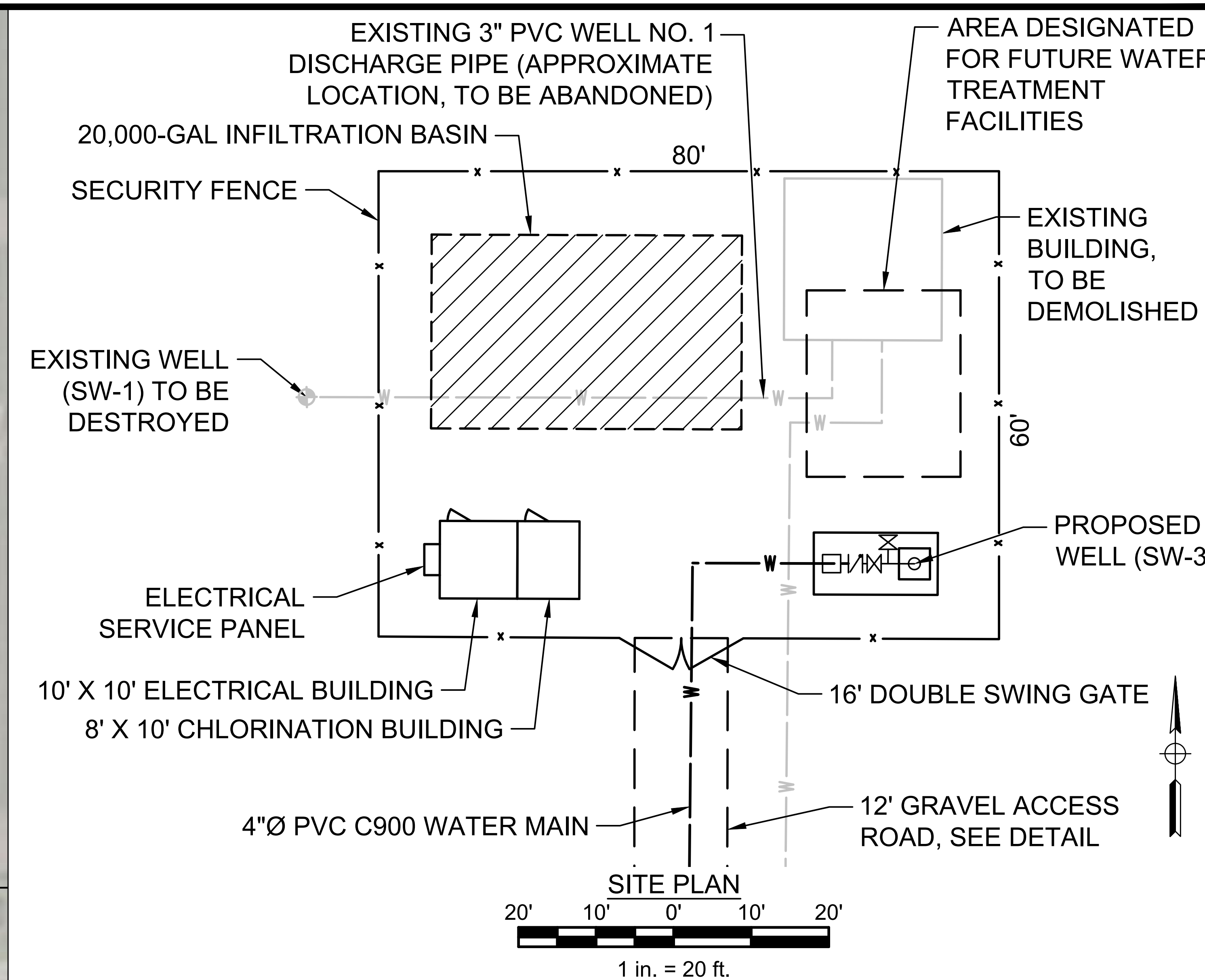
The SWS will incorporate various alarms to notify District staff of operation failures. An auto-dialer will contact operators when alarm conditions occur. A list of alarm conditions is provided as follows:

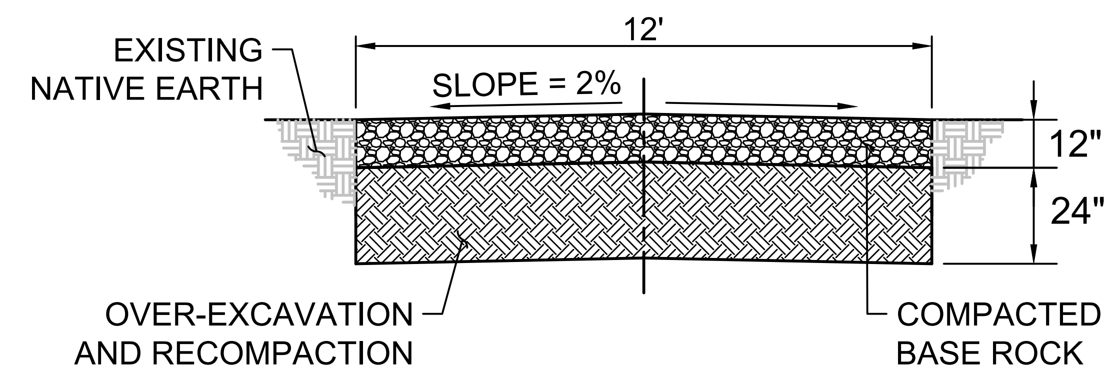
- Fire pump activated
- Tank high level
- Tank low level
- Duty pump No. 1 failure
- Duty pump No. 2 failure
- Fire pump No. 1 failure
- Fire pump No. 2 failure
- SW-2 pump failure
- SW-3 pump failure
- Hydropneumatic tank low pressure
- Hydropneumatic high pressure
- Sodium hypochlorite dosing pump failure (SW-2)
- Sodium hypochlorite dosing pump failure (SW-3)

4.11.6. Communication and Controls

Control of the SWS will primarily be from the Moss Landing Middle School site. Control systems will be located within the electrical building. A radio communications system will provide a signal between the two well sites. A radio survey will need to be conducted to verify a line-of-sight system will be functional.







ACCESS ROADWAY CROSS-SECTION DETAIL

4' 0' 4'

1 in. = 4 ft.

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0 1/2 1 2

THIS BAR IS 2 INCHES AT FULL SCALE. IF NOT 2 INCHES, THEN SCALE ACCORDINGLY.

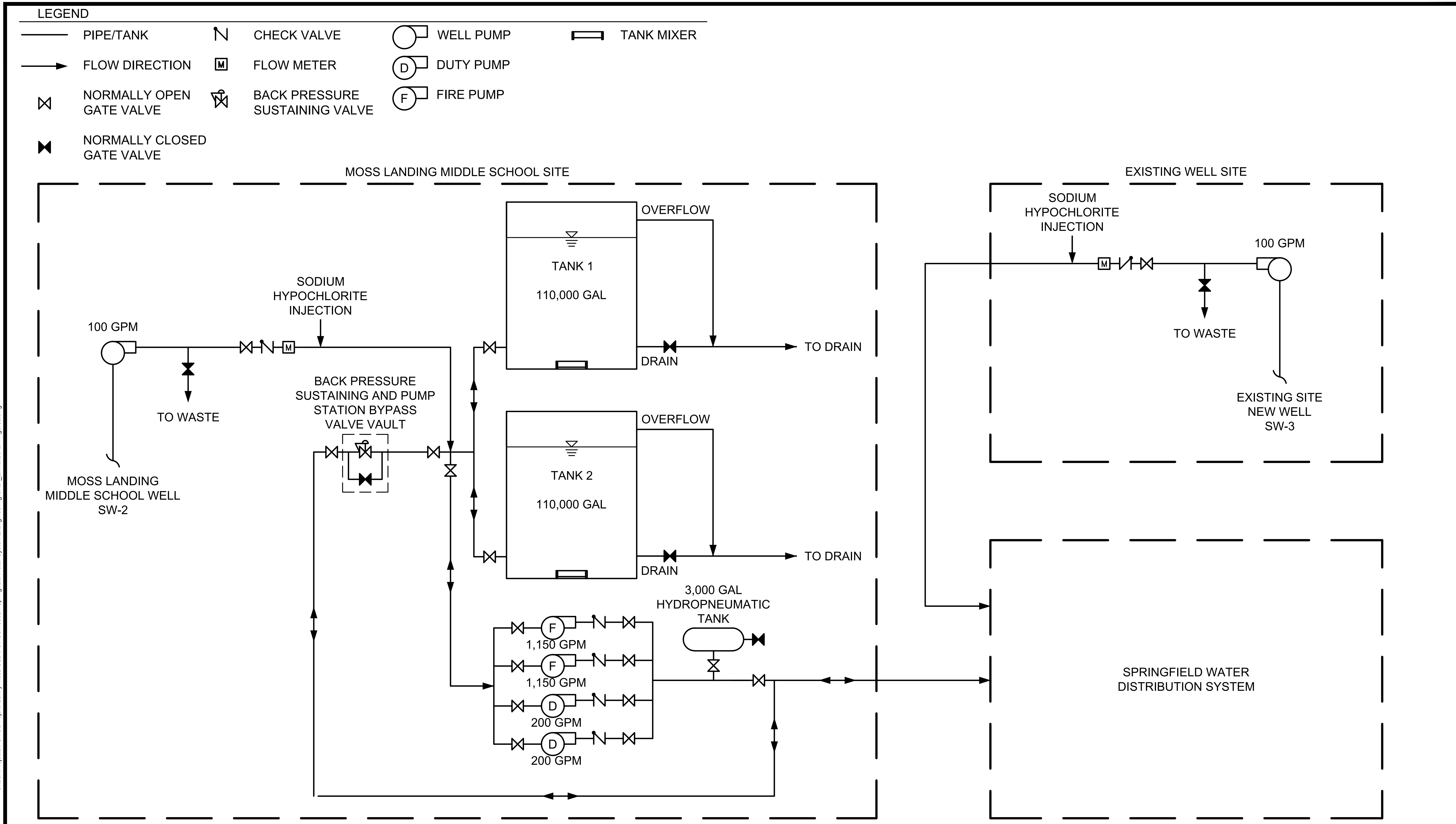
EXISTING WELL SITE PLAN

SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT

PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

FIGURE 4-3

FEBRUARY 2020



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SYSTEM FLOW SCHEMATIC

SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT

PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

FIGURE 4-4

FEBRUARY 2020

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Section 5. Hydrogeologic Findings

5.1. Hydrogeologic Report Summary

A hydrogeologic report titled *Drilling, Water Quality, and Yield Results, Springfield Well No. 2, Pajaro / Sunny Mesa Community Services District, Monterey California*, dated May 2018, was prepared for the project by Balance Hydrologics, Inc. This study is included as Appendix D of this report. A summary of the report findings are as follows.

The existing Springfield well SW-1 is located a little over one mile from the coast and from the Elkhorn Slough at an elevation of 19 feet above MSL. It draws groundwater from a depth of 122 to 172 feet bgs from a zone demonstrated to be intruded with seawater across the area. The SW-1 site is surrounded by agricultural fields in sandy soils within a gently sloping shallow swale draining to McClusky Slough, subject to flooding from agricultural drainage. Both seawater and agricultural drainage are likely sources of contamination to the existing well. Seawater intrusion across the Springfield subarea is fundamentally related to a chronic storage depletion from groundwater pumping drawing water levels below minimum levels required to stop seawater intrusion.

Two alternatives for a new potable water supply well were explored as part of the study. The first and preferred alternative well site is located at the Moss Landing Middle School site located approximately 3,500 feet northeast from the existing well. The second alternative is to install a new deeper well at the existing well site. The two project sites are located within the southern portion of the Springfield subarea of the Pajaro Valley Groundwater Basin. The primary aquifers within the basin are found in the Aromas Sands and overlying alluvial deposits.

The Moss Landing Middle School site is further from the ocean but closer to Elkhorn Slough than the existing well and sits at an elevation of 142 feet above MSL, rather than 19 feet above MSL. A test well hole was drilled at the Moss Landing Middle School site on July 28, 2008 to a depth of 630 feet bgs, and water-quality testing results and geophysical logging showed favorable conditions for a new source well at the site. The Moss Landing Middle School site appears to be a favorable location for a new water supply well based on the results of lithologic and geophysical logging, and water-quality sampling indicates fresh water quality. The site is not prone to flooding, and water storage at the site would be at a higher elevation, potentially providing head to the distribution system.

Based on the finding of the hydrogeologic report, SW- 2 was completed at the Moss Landing Middle School site, as discussed in Section 5.2. Following completion of SW-2, the hydrogeologic report was updated to incorporate the results of well construction, completion, development and water quality testing.

Minimal water quality information is available specifically at depth for the SW-1 site. However, based on information assembled in the hydrogeologic report, evaluating groundwater conditions by drilling and conducting e-log testing in a pilot hole and completing and testing a deeper well at the SW-1 site would be a reasonable approach to determining if SW-3 would be a suitable secondary source of supply.

5.2. Test Well Results

The SW-2 was completed to a depth of 600 feet with an 8-inch diameter PVC casing, 100 feet of screen casing from 490 to 590 feet bgs, and a 470-foot cement seal from the surface. Subsequent yield testing and water quality sampling confirmed SW-2 is suitable for use as a new municipal water supply source well. Preliminary area-of-influence calculations suggest the well may continue to be suitable for many decades, and possibly longer, if pumped at the proposed average day demand. The lifespan of the well is dependent on many factors, including location and pumping rates of other existing and future wells in the area, locations and movement of high salinity and/or contaminant plumes, and pumping intensity of SW-2. Minimizing well discharge rates and increasing pumping times will help to extend the well lifespan.

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Section 6. Pipeline Installation

This section discusses considerations for installing new water transmission and distribution mains.

6.1. Existing Utilities

Agencies which have below-grade utilities within the Project area were contacted to obtain utility atlas maps. Utilities with existing facilities in the area include:

- Castroville Community Services District (wastewater collection pipelines)
- Pajaro Valley Water Management Agency (recycled water pipelines)
- AT&T (communications infrastructure)
- PG&E (gas and electric)

Record or atlas information documenting the locations of existing utilities in the area have been collected. During the detailed design phase of the Project, in any location where new water transmission pipelines cross existing utilities, separation requirements and hydraulics will be considered and appropriate measures included in the design.

6.2. Separation Requirements

The separation requirements between wastewater facilities and potable water pipelines are provided by the Waterworks Standards (California Code of Regulations, Title 22, Division 4, Chapter 16, §64572). In general, these guidelines require ten feet of horizontal separation between parallel potable water pipelines and non-potable pipelines, including recycled water pipelines. In addition, vertical separation requirements are also designated when the conveyance facilities cross.

6.3. Pipeline Alignments

The initial project concept included a transmission pipeline from the Moss Landing Middle School site to Struve Road, with the alignment primarily traveling longitudinally within Highway 1. As the project developed and the scope of the SWS expanded to serve additional customers, an alternative alignment was identified to serve these additional customers.

Additionally, the revised project pipeline alignments are preferred to the original concept as the encroachment within Caltrans ROW is limited to a single crossing rather than a longitudinal encroachment. This is preferred by Caltrans and reduces safety risks to District staff.

The revised pipeline alignments will require ROW acquisition, as discussed in Section 8.

6.4. Pipeline Installation Methodology

Open trench pipeline installation and various trenchless pipeline installation methods were considered for construction of the Project.

6.4.1. Open Trench Pipeline Installation

Open trench installation is the traditional and most common method of water main pipeline construction. Open trench excavation consists of excavating down to the pipeline depth, installing the pipe, then backfilling the trench. This method is typically less expensive than trenchless installation if the pipe is constructed in an unpaved area.

Recommendations for open trench backfill materials will be developed during detailed design in conjunction with the Project geotechnical evaluation and standards for the jurisdictions owning the ROW where pipeline segments are to be installed.

Costs associated with open trench installation are dependent on the location where the pipeline is installed. Excavation in some areas is likely to encounter groundwater. Groundwater present in trench excavations will need to be dewatered, which will increase construction costs. Estimated depths to groundwater will be determined as part of the Project geotechnical evaluation.

6.4.2. Highway 1 Crossing

A new 8-inch pipeline will be required to cross Highway 1 at the intersection with Springfield Road. This pipeline installation will need to conform to Caltrans standards which require the pipeline to be installed within a steel casing pipe, anticipated to be 14 inches in diameter with a minimum wall thickness of 1/4 inch. The casing pipe will be installed using the bore and jack method.

6.4.3. McClusky Slough Crossing

Installation of the water main crossing McClusky Slough is anticipated to be completed by horizontal directional drilling (HDD). Fusible PVC pipe is proposed for the crossing in order to maintain material consistency throughout the system.

Section 7. Electrical Requirements

This section provides a summary of the electrical requirements for the project.

7.1. Electric Service

The existing SW-1 site is currently served by an existing 480-volt service. A new transformer will be provided to serve low voltage demands, which will include a chlorine dosing pump, turbidimeter, chlorine analyzer, and communications equipment.

The Moss Landing Middle School site will require a new 480-volt service. A new transformer will be provided to step down the 480-volt to serve low voltage demands, which will also include a chlorine dosing pump, turbidimeter, chlorine analyzer, air compressor, and communications equipment.

7.2. Demand Summary

A summary of the anticipated electric demands is provided in Table 7-1. Only demands of 0.5 horsepower and greater are documented.

Table 7-1: Electrical Demand Summary

Load	Voltage	Horsepower
SW-2 Well Pump	480	7.5
SW-3 Well Pump	480	10
Duty Pump #1	480	7.5
Duty Pump #2	480	7.5
Fire Pump #1	480	30
Fire Pump #2	480	30
Tank #1 Mixing System	120	0.5
Tank #2 Mixing System	120	0.5
Hydropneumatic Tank Air Compressor	120	1

7.3. Back-up Generator Sizing

An emergency back-up generator will be provided at the Moss Landing Middle School site. The back-up generator will need to be able to supply power to the SW-2 well pump, one fire pump, both tank mixing systems, and other miscellaneous minor demands at the site. If a fire pump is operating, a duty pump will not be operating.

Based on these demands, a back-up generator has been preliminarily sized; a 50-kW generator is anticipated to provide sufficient capacity. This recommendation will be refined during detailed design.

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Section 8. Right-of-Way Requirements

This section discusses the ROW requirements for the Project. The Project includes acquisition of temporary construction access easements, as well as acquisition of permanent easements and/or real property acquisition in several areas. Parcel maps of the areas are included in Appendix E.

8.1. Moss Landing Middle School Site

The District has obtained a permanent easement at the northeast corner of the Moss Landing Middle School property, APN 413-014-001. The easement has dimensions of 105 feet by 130 feet, as shown on Figure 4-2. This easement is suitable and sufficient for development of the site.

8.2. Existing Well Site

The existing SW-1 site is owned by the District. The parcel, APN 413-051-019, has an area of approximately 0.5 acres, with dimensions of 180 feet by 120 feet and is shown on Figure 4-3. The District currently owns an access easement to access the property from Struve Road, but utilizes an alternative route across private property for accessing the site.

8.3. Distribution System

The majority of the distribution system will be constructed within the public ROW, owned by Monterey County. Pipelines installed outside the County ROW will require easements from private landowners.

To provide for distribution system pipeline construction and ongoing maintenance of the pipe segment between Springfield Road and Struve Road, a permanent easement or ROW acquisition and potentially a separate temporary construction access easement will be required on parcel APN 413-012-008 if the construction requires more area than included in the existing permanent ROW access easement. Assuming the new pipeline will be installed within existing 15-foot and 60-foot wide public ROWs on parcels APN 413-051-029, 413-051-021, and 413-051-020, temporary construction access easements may be required during construction on these properties to accommodate construction activities.

To provide for distribution system pipeline construction and ongoing maintenance of the pipe segment crossing McClusky Slough, permanent easements or ROW acquisitions and potentially a separate temporary construction access easement will be required. These acquisitions could occur on the east side, west side, or both sides of McClusky Slough, depending on the willingness of private landowners to cooperate with the District. Affected parcels include APNs 412-032-103, 412-032-014, and 413-012-001.

An easement from Caltrans will be required for the Highway 1 crossing at Springfield Road. Parcels where easement or land acquisition may be required are identified on Figure 4-1.

The distribution system infrastructure will be completed over multiple phases as discussed in Section 11.

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Section 9. Engineering Standards

9.1. Design Standards

The following design standards will be utilized, called-out, and specified throughout the Project plans, specifications, and other documentation:

- American Water Works Association (AWWA) Standards
- American Society for Testing and Materials (ASTM) Standards
- Caltrans Standard Specifications and Details
- Department of Drinking Water
- Monterey County Environmental Health Department
- Monterey County Standard Details

Construction and installation, materials, and methodologies shall comply with the design standards listed, as appropriate.

9.2. Geotechnical Engineering

A geotechnical engineering analysis will be required for the proposed Project. The geotechnical evaluation will include borings along the pipeline route and adjacent to McClusky Slough and the Highway 1 crossing at Springfield Road. Additional borings will be completed at both the Moss Landing Middle School site and the existing SW-1 site. The geotechnical analysis will provide input into the design for the proposed facilities.

9.3. District Reviews and Approvals

Plans, specifications, and estimate will be reviewed by the District at the 30%, 65%, and 100% Final Design stages. The District's comments from each submittal will be integrated prior to submittal of the next submittal package.

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Section 10. Regulatory Requirements

This section documents the anticipated project permitting requirements.

10.1. Permitting Requirements

Required permits from various agencies are documented in the following sections.

10.1.1. California Environmental Quality Act (CEQA)

This project will be required to comply with the CEQA. The District has retained a consultant to develop an environmental document in support of the project.

10.1.2. Caltrans Encroachment Permit

The water transmission main crosses Highway 1 at Springfield Road, which is Caltrans ROW. For this crossing, Caltrans requires an encroachment permit and easement be obtained prior to the start of construction. The design of the pipeline crossing will comply with Caltrans standards.

10.1.3. County of Monterey Encroachment Permit

For water mains constructed with the public ROW, an encroachment permit will be required from Monterey County. Traffic control and roadway reconstruction will comply with Monterey County standards.

10.1.4. Coastal Development Permit

The project is located within the Coastal Zone, regulated by the California Coastal Commission (CCC). A coastal development permit will be required to authorize construction of the proposed improvements.

Additionally, the banks of McClusky Slough may be considered coastal wetlands or Environmentally Sensitive Habitat Area (ESHA) by the CCC.

10.1.5. California Department of Fish and Wildlife

The crossing under McClusky Slough is anticipated to have potential impacts to riparian habitat, which is listed as sensitive habitat by the California Department of Fish and Wildlife (CDFW). A Lake and Streambed Alteration Agreement may be required.

10.1.6. U.S. Fish and Wildlife Service

The project has the potential to impact federally regulated endangered species. A Section 7 or 10 Incidental Take Permit may be required.

10.1.7. U.S. Army Corps of Engineers and RWQCB

McClusky Sough is anticipated to be considered jurisdictional waters of the U.S. and be regulated by the U.S Army Corps of Engineers (ACOE). As a result, Section 401 and 404 permits from the ACOE and Regional Water Quality Control Board (RWQCB) will be required.

10.1.8. Monterey Bay Air Resources District Permit to Construct and Permit to Operate

The proposed back-up generator at the Moss Landing Middle School site will require permitting as a new source of air pollution by the Monterey Bay Air Resources District. This requires two permits, a Permit to Construct and a Permit to Operate.

10.1.9. State Water Resources Control Board Permit Amendment

The State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) requires a permit amendment application be filed for the proposed water system improvements. This amendment application includes submittals prior to the start of construction and extensive technical reports. After the system is constructed, information on the completed system will need to be submitted. DDW staff will also likely require an in-person inspection of the new facilities prior to finalization of the permit amendment and placing the system into service.

10.2. Stormwater General Permit

As a linear underground project (LUP), with surface disturbance of less than one acre, this project is likely exempt from obtaining a stormwater compliance permit.

This Project is outside of the Monterey County Phase II Municipal Separate Storm Sewer System (MS4) permit area. This permit area delineates the urban boundary. As a result, this Project is not subject to compliance with Post-Construction Stormwater Requirements.

Section 11. Project Funding and Implementation Phasing

This section discusses anticipated funding for the Project and phased Project implementation.

11.1. Project Planning and Design Funding

Preparation of this Report, planning, design, and construction of the SW-2 well, and preparation of preliminary (30% complete) contract documents, including geotechnical investigations and topographic and boundary surveys, is being funded by a planning grant from the SWRCB DDW. Initially, this source of funding was intended to cover all costs associated with design and permitting of the Project. The expansion of the Project to include additional customers and realigning pipelines, permitting, and design cannot be completed with the available funds. Completion of these tasks to advance the Project to a bid-ready state will be partially funded with construction funds.

11.2. Construction Funding

The District does not have the capability to fund construction of the proposed improvements through internal sources. External funding will be required for construction and other activities associated with Project construction. A series of conference calls with various Project stakeholders, including the District, the design engineer, the County, the State of California finance department, the Division of Drinking Water, and the District's grant administrator, took place over the period of 2019 in which the scope of work was developed.

Due to the magnitude of the Project costs, the proposed improvements have been divided into primary and secondary elements, based on prioritization. It is the intent of the District to construct the Project's highest priority improvements during an initial project phase, with the remaining infrastructure to be designed and constructed during a future phase. These phases are discussed in Section 11.3.

Construction funding for the Project is anticipated to be obtained through a grant from the State of California. Funding for development of detailed design, permitting, construction, etc. for Future Phases of the Project will be obtained on a separate path. State of California staff indicated construction funding for the Project would likely be available upon completion of the 30 percent design package.

11.3. Implementation Phasing

The proposed SWS infrastructure has been divided into primary and secondary elements. Primary infrastructure elements will be completed during Project implementation. Primary infrastructure elements include:

- Site development and water improvement infrastructure at the Moss Landing Middle School site, including the electrical/chlorination building, fencing, storage tanks, booster pump station, disinfection, electrical and improvements, etc. Items not included at this site include communications equipment and facilities to fill the storage tanks at the site from SW-3;
- Pipeline from the Moss Landing Middle School site across Highway 1, approximately 0.15 miles;
- Pipeline to the west of Highway 1 along Springfield Road including service laterals, hydrants, etc., along the pipeline alignment, approximately 0.5 miles;
- Pipeline south from Springfield Road (at the corner of the agricultural field), approximately 0.25 miles;
- Pipeline to the southeast to the MH Park, including services, hydrants, etc., along the pipeline alignment, approximately 0.3 miles;
- MH Park distribution system, including service laterals, hydrants, etc., along the distribution system piping, approximately 0.6 miles;
- Pipeline from the MH Park to Struve Road, approximately 0.2 miles;

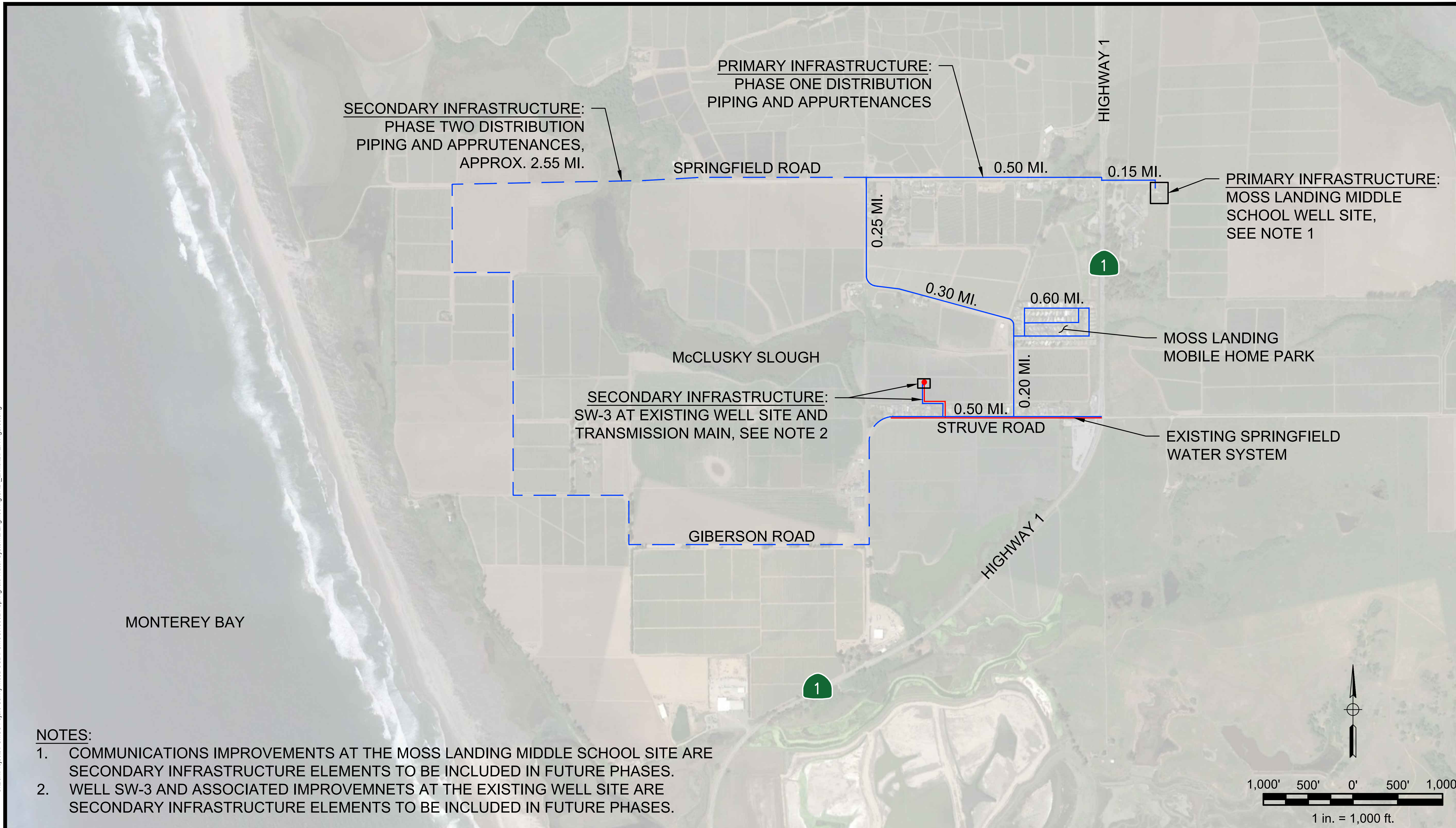
- Replacement of the SWS distribution piping on Struve Road to accommodate fire flow and increased system pressure, including service laterals, hydrants, etc., along the pipeline alignment, approximately 0.5 miles.

Secondary infrastructure elements will be completed during Future Phases of implementation. Secondary infrastructure elements include:

- Construction of a new well (SW-3) at the existing SWS well site;
- Site development and water improvement infrastructure at the existing SWS well site, including electrical/chlorination building, fencing, disinfection, electrical and communication improvements, etc.;
- Improvements at the Moss Landing Middle School site, including communications equipment and facilities to fill the storage tanks at the site from SW-3;
- A new transmission pipeline from SW-3 well to the SWS distribution system on Struve Road;
- Additional distribution system piping on Springfield Road, Giberson Road, and Struve Road, including service laterals, hydrants, etc., along the pipeline alignment, approximately 2.55 miles.

During implementation of the Project, the system will be tied-in to the existing SW-1 discharge on Struve Road. A segment of above ground wellhead piping at SW-1 will be removed and capped. This will allow the District to utilize SW-1 as a back-up source of supply to provide non-potable water in an emergency condition. During implementation of Future Phases of project implementation, SW-1 will be destroyed, and the SW-1 connection point on Struve Road will be used to connect SW-3 to the SWS distribution system.

The division of the primary and secondary infrastructure elements is provided as Figure 11-1.



NOTES:
1. COMMUNICATIONS IMPROVEMENTS AT THE MOSS LANDING MIDDLE SCHOOL SITE ARE SECONDARY INFRASTRUCTURE ELEMENTS TO BE INCLUDED IN FUTURE PHASES.
2. WELL SW-3 AND ASSOCIATED IMPROVEMNETS AT THE EXISTING WELL SITE ARE SECONDARY INFRASTRUCTURE ELEMENTS TO BE INCLUDED IN FUTURE PHASES.

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PRIMARY AND SECONDARY INFRASTRUCTURE
SPRINGFIELD WATER SYSTEM IMPROVEMENTS PROJECT
PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT

FIGURE 11-1

FEBRUARY 2020

Section 12. Construction Cost Opinions

This section discusses the costs associated with construction of the proposed improvements.

12.1. Construction Cost Opinion

Preliminary construction cost opinions have been developed for the Project and Future Phases of the proposed improvements. The detailed cost opinions are included in Appendix F. A summary of the anticipated construction costs is provided in Tables 12-1 and 12-2.

Table 12-1: Project Construction Cost Opinion Summary

Project Element	Estimated Construction Cost
Moss Landing Middle School Site	$2,350,000
Distribution System	$4,630,000
Total	**$6,980,000**

Table 12-2: Future Phases Construction Cost Estimate Summary

Project Element	Estimated Construction Cost
Existing Well Site and Well Construction	$750,000
Distribution System	$3,320,000
Moss Landing Middle School Site	$100,000
Total	**$4,170,000**

These cost opinions should be considered accurate in accordance with the American Association of Cost Engineers (AACE) to a Class 4 cost estimate with an accuracy of -30% to +50%.

12.2. Total Project Costs

An estimate of total project costs has been developed. In addition to construction costs, various additional expenses anticipated to be incurred as part of the project have been estimated based on an assumed percentage of construction costs. The estimated total project costs are summarized in Table 12-3. District administration includes legal review, project management, permitting fees, and public outreach.

Table 12-3: Estimated Total Project Costs

Project Element	Estimated Percentage of Construction Costs	Estimated Construction Cost	
		Project	Future Phases
Construction Costs	-	$6,980,000	$4,170,000
Construction Survey	1%	$69,800	$41,700
Utility Relocation	2%	$139,600	$83,400
Engineering Design	10%	$698,000	$417,000
Design Survey	1%	$69,800	$41,700
Geotechnical Engineering and Hydrogeology	2%	$139,600	$83,400
Construction Management and Inspection	12%	$837,600	$500,400
Environmental and Project Permitting	3%	$209,400	$125,100
Right-of-Way Engineering	1%	$69,800	$41,700
Right-of-Way Acquisition	3%	$209,400	$125,100
District Administration	5%	$349,000	$208,500
Total		**$9,772,000**	**$5,838,000**

Both Project and Future Phases total project costs have been developed based on a Project timeline with the midpoint of construction occurring 36 months from completion of this Report. It is likely Future Phases of the Project will not be constructed on this timeline. Future Phase project costs should be revised as appropriate when a clear path to construction is developed.

Section 13. Project Recommendations and Next Steps

This section presents the recommended project description and discusses anticipated steps and associated schedules for advancing the Project forward to construction.

13.1. Recommended Project

Due to funding limitations as described in Section 11, the Project has been divided into multiple phases. This section describes the first phase defined in this report as the Project.

Water for the Springfield Water System will be provided from a single source as part of the Project. This source is SW-2, a well drilled in 2018 at the Moss Landing Middle School site. SW-2 is located within an easement owned by the District on the northeast corner of the Moss Landing Middle School property. SW-2 has been tested for production capacity and water quality and is anticipated to be a suitable source of supply for a public water system.

The Moss Landing Middle School site will be developed as a new municipal site. The SW-2 well site improvements will include a new submersible well pump, piping, valves, and appurtenances; electrical and communication improvements; chlorination facilities; two new 110,000-gallon bolted steel water storage tanks; a permanent back-up generator; a new booster pump station including a hydropneumatic tank and four pumps to provide fully redundant domestic and fire service; and civil site improvements including fencing and security improvements, hardscape, a new building to house the new well and associated equipment, and miscellaneous other site improvements.

A physical separation between the existing SW-1 well and the improved water system will be created to prevent future supply of contaminated water to the system. SW-1 well will be mothballed, and only used in emergency situations.

The existing distribution system will be replaced, and new Phase One distribution system piping will be constructed to serve the additional customers and to connect to the Moss Landing Middle School well site. Approximately 12,500 linear feet of new 6- and 8-inch water mains will be constructed in Springfield Road, Struve Road, and across private property and unnamed roads through easements. New distribution system piping will include valves, fire hydrants, air release valves, blow-offs, sampling stations, and other appurtenances as appropriate. Water service laterals will be replaced from the existing distribution mains to each residence currently receiving water from the system, and individual water meters will be provided for each new service connection. Customers not served by the existing SWS or MH Park water systems will be provided with new service laterals and meters up to the property line. New distribution system piping will be installed primarily by the open trench method or horizontal directional drilling, at the contractor’s option; distribution piping crossing Highway 1 will be installed in a steel casing installed by the jack and bore method.

The Project includes acquisition of temporary construction access easements, as well as acquisition of permanent easements and/or real property acquisition in several areas.

To provide for distribution system pipeline construction and ongoing maintenance for the pipe segment between Springfield Road and Struve Road, a permanent easement or ROW acquisition will be required, and a separate temporary construction access easement will potentially be required on parcel APN 413-012-008 if the construction requires more area than included in the permanent access easement. Assuming the new pipeline will be installed within existing 15-foot and 60-foot wide existing public rights-of-way on parcels APN 413-051-029, 413-051-021, and 413-051-020, temporary construction access easements may be required during construction on these properties to accommodate construction activities.

13.2. Recommended Future Project Phases

Future Phases of the work are described in this section.

Future Phases will include development of an additional source of potable water supply, anticipated to be a new well, SW-3, to be constructed at the existing SW-1 well site. The capacity and water quality produced by a well at this site is expected to be similar to the completed SW-2 well at the Moss Landing Middle School site, but will need to be verified.

The existing SW-1 site will be enhanced to function as a municipal site. Improvements at the site will include a new potable water supply well, SW-3; a new submersible well pump, piping, valves, and appurtenances; electrical and communication improvements; chlorination facilities; and civil site improvements including fencing and security improvements, hardscape, a new building to house the new well and associated equipment, and miscellaneous other site improvements. The proposed SW-3 will discharge directly into the water distribution system installed in the Project. Roadway improvements within the existing access easement will also be provided. The existing SW-1 will be removed from service and destroyed as required by the County Health Department.

New distribution system piping will be constructed to serve the additional customers. Approximately 13,000 linear feet of new 4- and 6-inch water mains will be constructed in Springfield Road, Giberson Road, Struve Road, and across private property and unnamed roads. New distribution system piping will include valves, fire hydrants, air release valves, blow-offs, sampling stations, and other appurtenances as appropriate. Additional customers served by the expanded system will be provided with new service laterals and meters up to the property line. New distribution system piping will be installed primarily by the open trench method or horizontal directional drilling, at the contractor’s option; approximately 400 feet of distribution piping crossing under McClusky Slough at the eastern end of Springfield Road will be installed by horizontal directional drilling.

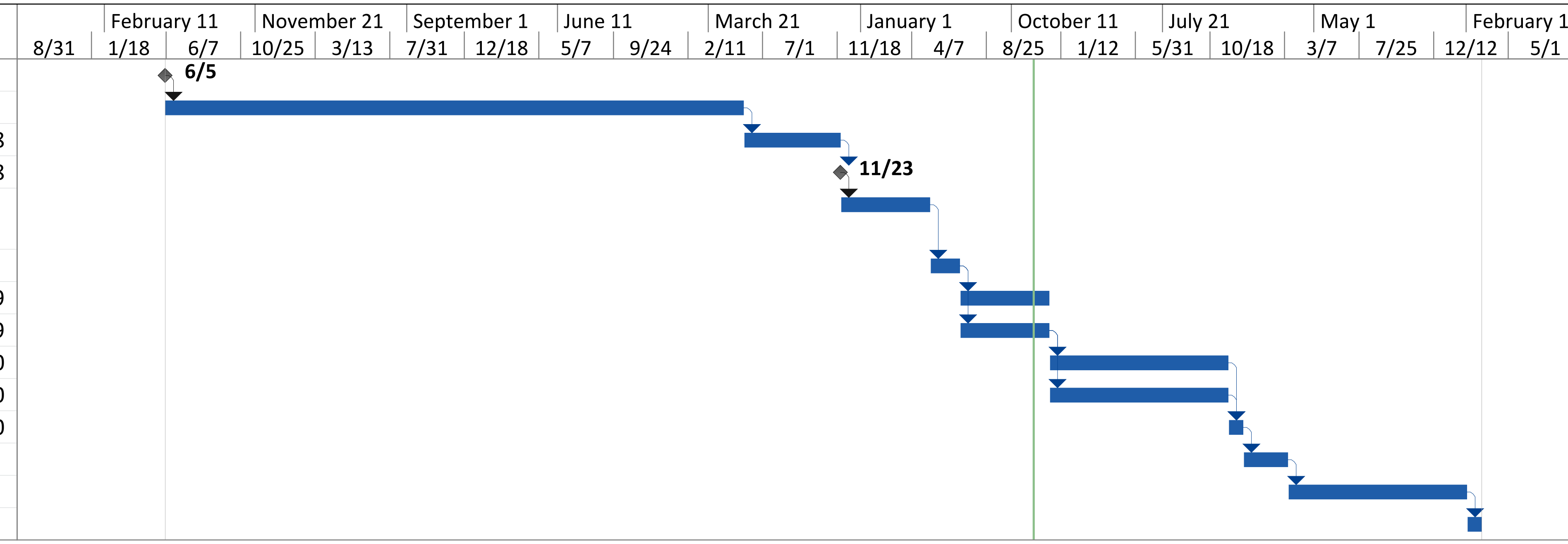
The project includes acquisition of temporary construction access easements, as well as acquisition of permanent easements and/or real property acquisition in several areas. To provide for distribution system pipeline construction and ongoing maintenance for the pipe segment crossing McClusky Slough, a permanent easement or ROW acquisition and potentially a separate temporary construction access easement will be required. These acquisitions could occur on the east side, west side, or both sides of McClusky Slough, depending on the willingness of private landowners to cooperate with the Project.

13.3. Project Schedule

An anticipated Project schedule has been prepared and is included as Figure 13-1. Based on the prepared schedule, the Project is anticipated to be complete by early 2023. Future Phases of the Project will be dependent on obtaining funding for preparation of detailed designs, permitting, construction, etc., and as a result has not been incorporated into the anticipate schedule.

Pajaro/Sunny Mesa Community Services District
Springfeild Water System Improvement Project
Implementation Schedule

ID	Task Name	Duration	Start	Finish
1	Project Initiation	0 days	Fri 6/5/15	Fri 6/5/15
2	SW-2 Planning, Construction, and Reporting	776 days	Fri 6/5/15	Fri 5/25/18
3	Springfield Water System Preliminary Design Repo	130 days	Mon 5/28/18	Fri 11/23/18
4	Submit Preliminary Design Report to State	0 days	Fri 11/23/18	Fri 11/23/18
5	State Review of Preliminary Design Report and Funding Authorization	6 mons	Mon 11/26/18	Fri 5/10/19
6	Topographic Survey, Geotechnical Engineering	2 mons	Mon 5/13/19	Fri 7/5/19
7	Right-of-Way Acquisition	6 mons	Mon 7/8/19	Fri 12/20/19
8	Draft Detailed Design (90%)	6 mons	Mon 7/8/19	Fri 12/20/19
9	Environmental Permitting	12 mons	Mon 12/23/1	Fri 11/20/20
10	Project Permitting	12 mons	Mon 12/23/1	Fri 11/20/20
11	Final Detailed Design	1 mon	Mon 11/23/2	Fri 12/18/20
12	Project Bidding, Bid Review and Contract Award	3 mons	Mon 12/21/2	Fri 3/12/21
13	Project Construction	12 mons	Mon 3/15/21	Fri 2/11/22
14	Project Testing, Start-up and Comissioning	1 mon	Mon 2/14/22	Fri 3/11/22



Project: Springfield Water System
Date: Fri 11/22/19

Task | Milestone | Manual Task | Deadline | Manual Progress

Appendices

Appendix A – Moss Landing Water System Connection Alternative Cost Estimates

OPINION OF PROBABLE CONSTRUCTION COST

MNS ENGINEERS INC.

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Building, Area: Alternative B - Option 1 - Storage Tank at Existing Well Site

Prepared By: NEP
Date Prepared: 10/3/2016
MNS Proj. No. PSMCS.150024

Estimate Type:
☑ Conceptual
☐ Preliminary (w/o plans)
☐ Design Development @
☐ Construction
☐ Change Order
_______ % complete

Current at ENR 10435
Escalated to ENR 11326
Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	8" PVC Transmision Main - Moss Landing Connection to Struve Road	4450	LF	$100.00	$445,000.00	$170.00	$756,500.00		$0.00	$1,201,500.00
2	8" PVC Transmission Main - Struve Road and Connection to Site	5350	LF	$90.00	$481,500.00	$80.00	$428,000.00		$0.00	$909,500.00
3	Access Road	550	LF	$100.00	$55,000.00	$100.00	$55,000.00		$0.00	$110,000.00
4	Existing Well Destruction	2	EA		$0.00		$0.00	$20,000.00	$40,000.00	$40,000.00
5	Existing Building and Chlorination Facility Demolition	1	LS	$5,000.00	$5,000.00	$10,000.00	$10,000.00		$0.00	$15,000.00
6	220,000-Gallon Bolted Steel Water Storage Tank	1	LS		$0.00		$0.00	$250,000.00	$250,000.00	$250,000.00
7	Tank Foundation	1	LS		$0.00		$0.00	$40,000.00	$40,000.00	$40,000.00
8	Back Pressure Sustaining Valve	1	LS	$10,000.00	$10,000.00	$1,500.00	$1,500.00		$0.00	$11,500.00
9	8" Flow Meter	1	LS	$2,500.00	$2,500.00	$500.00	$500.00		$0.00	$3,000.00
10	8" Gate Valve	7	EA	$3,000.00	$21,000.00	$650.00	$4,550.00		$0.00	$25,550.00
11	8" Flex Tend Expansion Joint	2	LS	$6,500.00	$13,000.00	$1,500.00	$3,000.00		$0.00	$16,000.00
12	Booster Pump Station, Building, and Controls	1	LS	$350,000.00	$350,000.00	$50,000.00	$50,000.00		$0.00	$400,000.00
13	3,000-Gallon Hydropneumatic Tank and Surge System	1	LS	$100,000.00	$100,000.00	$40,000.00	$40,000.00		$0.00	$140,000.00
14	Site Fencing	600	LF	$15.00	$9,000.00	$10.00	$6,000.00		$0.00	$15,000.00
15	20' Wide Double Swing Manual Gate	1	EA	$1,000.00	$1,000.00	$1,500.00	$1,500.00		$0.00	$2,500.00
16	Miscellaneous Site Improvements	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00		$0.00	$40,000.00
17	Site Piping	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00		$0.00	$40,000.00
18	Site Electrical Improvments and Lighting	1	LS		$0.00		$0.00	$50,000.00	$50,000.00	$50,000.00
19	Upgraded Electric Service	1	LS		$0.00		$0.00	$50,000.00	$50,000.00	$50,000.00
20	75 KW Back-up Generator	1	LS	$75,000.00	$75,000.00	$25,000.00	$25,000.00		$0.00	$100,000.00
	Subtotals				$1,608,000		$1,421,550		$430,000	$3,459,550
	Division 1 Costs	@	2.00%		$32,160		$28,431		$8,600	$69,191
	Subtotals				$1,640,160		$1,449,981		$438,600	$3,528,741
	Taxes - Materials Costs	@	7.75%		$127,112					$127,112
	Subtotals				$1,767,272		$1,449,981		$438,600	$3,655,853
	Contractor Markup for Sub	@	12.00%						$52,632	$52,632
	Subtotals				$1,767,272		$1,449,981		$491,232	$3,708,485
	Contractor OH&P	@	10.00%		$176,727		$144,998		$49,123	$370,849
	Subtotals				$1,944,000		$1,594,979		$540,355	$4,079,334
	Estimate Contingency	@	30.00%							$1,223,800
	Subtotals									$5,303,134
	Escalate to Midpoint of Construct	@	12.5%							$662,171
	Estimated Bid Cost									$5,965,305
	Total Estimate									$5,965,310
	Total Estimate	at ENR	10435							**$6,000,000**
	Total Estimate	at ENR	11326							**$6,500,000**

This cost estimate is for comparison of Moss Landing Water System connection options and does not include costs associated with the Distribution System and Existing Well Site

OPINION OF PROBABLE CONSTRUCTION COST

MNS ENGINEERS INC

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Prepared By: NEP
Date Prepared: 10/3/2016
MNS Proj. No. PSMCS.150024

Building, Area: Alternative B - Option 2 - Tank at Middle School Site with Offsite Booster Pump Station

Estimate Type:
- ☑ Conceptual
- ☐ Preliminary (w/o plans)
- ☐ Design Development @
- ☐ Construction
- ☐ Change Order
- ________ % complete

Current at ENR 10435
Escalated to ENR 11326
Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	8" PVC Transmision Main - Moss Landing Connection to Struve Road & Struve to Springfield	7100	LF	$100.00	$710,000.00	$170.00	$1,207,000.00		$0.00	$1,917,000.00
2	8" PVC Transmission Main - Struve Road and Springfield Road	6100	LF	$90.00	$549,000.00	$80.00	$488,000.00		$0.00	$1,037,000.00
3	Existing Well Destruction	2	EA		$0.00		$0.00	$20,000.00	$40,000.00	$40,000.00
4	Existing Building and Chlorination Facility Demolition	1	LS	$1,000.00	$1,000.00	$5,000.00	$5,000.00		$0.00	$6,000.00
5	220,000-Gallon Bolted Steel Water Storage Tank	1	LS		$0.00		$0.00	$250,000.00	$250,000.00	$250,000.00
6	Tank Foundation	1	LS		$0.00		$0.00	$40,000.00	$40,000.00	$40,000.00
7	8" Flow Meter	1	LS	$2,500.00	$2,500.00	$500.00	$500.00		$0.00	$3,000.00
8	8" Gate Valve	6	EA	$3,000.00	$18,000.00	$650.00	$3,900.00		$0.00	$21,900.00
9	8" Flex Tend Expansion Joint	2	LS	$6,500.00	$13,000.00	$1,500.00	$3,000.00		$0.00	$16,000.00
10	Booster Pump Station, Building, and Controls	1	LS	$150,000.00	$150,000.00	$40,000.00	$40,000.00		$0.00	$190,000.00
11	Site Fencing	450	LF	$15.00	$6,750.00	$10.00	$4,500.00		$0.00	$11,250.00
12	20' Wide Double Swing Manual Gate	1	EA	$1,000.00	$1,000.00	$1,500.00	$1,500.00		$0.00	$2,500.00
13	Miscellaneous Site Improvements at Moss Landing Middle School Site	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00		$0.00	$40,000.00
14	Site Piping at Moss Landing Middle School Site	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00		$0.00	$40,000.00
15	Site Electrical Improvments and Lighting at Moss Landing Middle School Site	1	LS		$0.00		$0.00	$50,000.00	$50,000.00	$50,000.00
16	Electric Service at Moss Landing Middle School Site	1	LS		$0.00		$0.00	$10,000.00	$10,000.00	$10,000.00
17	Site Piping at Booster Pump Station Site	1	LS	$7,500.00	$7,500.00	$7,500.00	$7,500.00		$0.00	$15,000.00
18	Miscellaneous Site Improvements at Booster Pump Station Site	1	LS	$5,000.00	$5,000.00	$10,000.00	$10,000.00		$0.00	$15,000.00
19	Electric Service at Booster Pump Station Site	1	LS		$0.00		$0.00	$10,000.00	$10,000.00	$10,000.00
20	15 KW Back-up Generator at Booster Pump Station Site	1	LS	$20,000.00	$20,000.00	$10,000.00	$10,000.00		$0.00	$30,000.00
	Subtotals				$1,523,750		$1,820,900		$400,000	$3,744,650
	Division 1 Costs	@	2.00%		$30,475		$36,418		$8,000	$74,893
	Subtotals				$1,554,225		$1,857,318		$408,000	$3,819,543
	Taxes - Materials Costs	@	7.75%		$120,452					$120,452
	Subtotals				$1,674,677		$1,857,318		$408,000	$3,939,995
	Contractor Markup for Sub	@	12.00%						$48,960	$48,960
	Subtotals				$1,674,677		$1,857,318		$456,960	$3,988,955
	Contractor OH&P	@	10.00%		$167,468		$185,732		$45,696	$398,896
	Subtotals				$1,842,145		$2,043,050		$502,656	$4,387,851
	Estimate Contingency	@	30.00%							$1,316,355
	Subtotals									$5,704,206
	Escalate to Midpoint of Construct	@	12.5%							$712,250
	Estimated Bid Cost									$6,416,456
	Total Estimate									$6,416,460
	Total Estimate	at ENR	10435							**$6,400,000**
	Total Estimate	at ENR	11326							**$6,900,000**

This cost estimate is for comparison of Moss Landing Water System connection options and does not include costs associated with the Distribution System and Existing Well Site

OPINION OF PROBABLE CONSTRUCTION COST

MNS ENGINEERS INC

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Prepared By: NEP
Date Prepared: 10/3/2016
MNS Proj. No. PSMCS.150024

Building, Area: Alternative B - Option 3 - Tank at Middle School Site and Increase Pressure of Moss Landing System

Estimate Type:
- ☑ Conceptual
- ☐ Preliminary (w/o plans)
- ☐ Design Development @
- ☐ Construction
- ☐ Change Order
- ______ % complete

Current at ENR 10435
Escalated to ENR 11326
Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	8" PVC Transmision Main - Moss Landing Connection to Struve Road & Struve to Springfield	7100	LF	$100.00	$710,000.00	$170.00	$1,207,000.00		$0.00	$1,917,000.00
2	8" PVC Transmission Main - Struve Road and Springfield Road	6100	LF	$90.00	$549,000.00	$80.00	$488,000.00		$0.00	$1,037,000.00
3	Existing Well Destruction	2	EA		$0.00		$0.00	$20,000.00	$40,000.00	$40,000.00
4	Existing Building and Chlorination Facility Demolition	1	LS	$1,000.00	$1,000.00	$5,000.00	$5,000.00		$0.00	$6,000.00
5	220,000-Gallon Bolted Steel Water Storage Tank	1	LS		$0.00		$0.00	$250,000.00	$250,000.00	$250,000.00
6	Tank Foundation	1	LS		$0.00		$0.00	$40,000.00	$40,000.00	$40,000.00
7	8" Flow Meter	1	LS	$2,500.00	$2,500.00	$500.00	$500.00		$0.00	$3,000.00
8	8" Gate Valve	6	EA	$3,000.00	$18,000.00	$650.00	$3,900.00		$0.00	$21,900.00
9	Back Pressure Sustaining Valve	1	LS	$10,000.00	$10,000.00	$1,500.00	$1,500.00		$0.00	$11,500.00
10	8" Flex Tend Expansion Joint	2	LS	$6,500.00	$13,000.00	$1,500.00	$3,000.00		$0.00	$16,000.00
11	Site Fencing	450	LF	$15.00	$6,750.00	$10.00	$4,500.00		$0.00	$11,250.00
12	20' Wide Double Swing Manual Gate	1	EA	$1,000.00	$1,000.00	$1,500.00	$1,500.00		$0.00	$2,500.00
13	Miscellaneous Site Improvements	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00		$0.00	$40,000.00
14	Site Piping	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00		$0.00	$40,000.00
15	Site Electrical Improvments and Lighting	1	LS		$0.00		$0.00	$50,000.00	$50,000.00	$50,000.00
16	Electric Service	1	LS		$0.00		$0.00	$10,000.00	$10,000.00	$10,000.00
17	PLC Reprogramming at Moss Landing Booster Pump Station	1	LS		$0.00		$0.00	$10,000.00	$10,000.00	$10,000.00
	Subtotals				$1,351,250		$1,754,900		$400,000	$3,506,150
	Division 1 Costs	@	2.00%		$27,025		$35,098		$8,000	$70,123
	Subtotals				$1,378,275		$1,789,998		$408,000	$3,576,273
	Taxes - Materials Costs	@	7.75%		$106,816					$106,816
	Subtotals				$1,485,091		$1,789,998		$408,000	$3,683,089
	Contractor Markup for Sub	@	12.00%						$48,960	$48,960
	Subtotals				$1,485,091		$1,789,998		$456,960	$3,732,049
	Contractor OH&P	@	10.00%		$148,509		$179,000		$45,696	$373,205
	Subtotals				$1,633,600		$1,968,998		$502,656	$4,105,254
	Estimate Contingency	@	10.00%							$410,525
	Subtotals									$4,515,780
	Escalate to Midpoint of Construct	@	12.5%							$563,858
	Estimated Bid Cost									$5,079,638
	Total Estimate									$5,079,640
	Total Estimate	at ENR	10435							**$5,100,000**
	Total Estimate	at ENR	11326							**$5,500,000**

This cost estimate is for comparison of Moss Landing Water System connection options and does not include costs associated with the Distribution System and Existing Well Site

Appendix B – Trenchless Pipeline Installation Technical Memorandum

ALDEA SERVICES LLC

TECHNICAL MEMORANDUM

To: Nicholas Panofsky (MNS)

CC: Paul Greenway (MNS)

From: Paul Headland (Aldea)

Date: 11/17/2015

Re: Draft -Springfield Water System Improvements-Preliminary HDD Feasibility Evaluation (Phase I)

SUMMARY STATEMENT

Based on the preliminary HDD feasibility evaluation for Alternative A, Alternative B1, and Alternative B2 HDD is considered a viable construction alternative for installation of the water transmission pipeline.

It should be noted that the proposed HDD bore alignments (assuming HDPE pipe) are considered to be long (3,000 to 4,500 feet) to extremely long (>4,500 feet). Alignment A (3,206 feet) can be performed in a single bore, Alignment B1 (6,633 feet) and Alignment B2 (6,528 feet) are considered extremely long for a single bore and the bores may need to be split into two separate bores or a single bore using HDD intersect method. Based on preliminary calculations we offer the following observations:

- Alternative A – it <u>would be</u> feasible to perform HDD installation using an 8 inch inside diameter <u>HDPE or steel pipe in a single bore</u>. Note that HDD construction cannot accommodate 90 degree bends and that the alignment will have to be developed with a radius of at least 600 feet assuming HDPE carrier pipe or 1,500 feet assuming a steel carrier pipe. The HDD drillpath will require easements due to the radius impacting some properties along the alignment.

  If pipeline installation using the HDD drillpath is not permitted due to the easements required then Alternative A would have to be performed using either of the following:

  - Three Short HDD Drives – these shorter drives would accommodate the 90 degree bends but would create more disruption and require more construction and pipe laydown areas to be made available.
  - Two Short Open Cut Sections & One HDD Drive - two short open cut sections along Springfield Road (714 feet) and Struve Road (343 feet), and HDD construction along Highway 1 (2604 feet).

- Alternative B1 - it <u>would not be</u> feasible to perform HDD construction using an 8 inch inside diameter <u>HDPE pipe in a single bore</u>. It <u>would be</u> feasible to perform HDD construction using an 8 inch inside diameter <u>steel pipe in a single bore</u> using the HDD intersect method. Construction could alternatively be performed to avoid easements by splitting the bore into two shorter bores or an open cut section along Struve Road (2461 feet) and HDD construction along Highway 1 (4298 feet).

- Alternative B2 - it would not be feasible to perform HDD construction using an 8 inch inside diameter HDPE pipe in a single bore. It would be feasible to perform HDD construction using an 8 inch inside diameter steel pipe in a single bore using the HDD intersect method. Construction could alternatively be performed to avoid easements by splitting the bore into two shorter bores or an open cut section along Struve Road (2134 feet) and HDD construction along Moss Landing Wildlife Area (4394 feet).

The decision for using the HDD intersect method is based on factors such as easement requirements, drillpath ground conditions, drill fluid properties, drillpath length, drillpath depth, drillpath geometry, drillpath alignment topography, entry and exit elevations, availability of HDD equipment, length of the conductor/casing sleeves, and the capacity of overburden to restrain drill fluid pressures.

The decision to install the pipeline using a single long HDD bore, multiple shorter HDD bores, or the HDD intersect method will need to be determined during detailed design.

1.0 PURPOSE

The purpose of Phase 1 of the project is to determine if the construction of the proposed water transmission pipeline is technically feasible using horizontal directional drilling (HDD) for the three (3) pipeline alignment alternatives (Alternative A, Alternative B1, and Alternative B2). This Preliminary HDD Feasibility Evaluation will address the following:

- Review HDD alignments
- Review of ground conditions (soils & groundwater)
- Suitability of ground conditions to HDD construction
- Evaluate drive lengths and alignments with respect to HDD feasibility
- Provide order of magnitude construction cost estimate for each alternative
- Provide preliminary construction schedule estimate for each alternative

2.0 PROJECT BACKGROUND

The Pajaro/Sunny Mesa Community Services District (District) acquired the Springfield Mutual Water Company (SMWC) in 2005. Since the acquisition, the District has been working with the residents of the Springfield/Struve Roads area to improve the potable water system. The Springfield Water System Improvements project is anticipated to serve approximately 66 parcels, and if approved for grant funding, the Moss Landing Mobile Home Park, which includes 105 mobile home sites.

The Springfield water system has documented water quality problems for a number of contaminants. The source of supply is a shallow well located in an active agricultural field. The District originally proposed a project which included a new well at the old school site, a storage reservoir, and a booster pumping station as well as new water distribution system. The District is in the process of obtaining an easement at the abandoned Moss Landing Middle School for new facilities, drilled an uncased well, and took one water quality sample. However, attempts to move forward with construction of this project have been unsuccessful due to lack of funding. The goal of the Springfield Water System Improvements project is to plan and design upgrades to the

Springfield water system to provide a high quality water source, which will provide long-term water supply reliability for the community.

The alternatives under consideration to address improvements to the public water system are as follows:

1) Alternative A - Drill a new well at the site acquired by the district adjacent to the Moss Landing Middle School site. Includes a water transmission pipeline approximately 3,661 feet in length between the Moss Landing Middle School and Moss Landing Mobile Home Park and Springfield residents.
2) Alternative B1 - Consolidate the Springfield water system with the Moss Landing water system by constructing an 8-inch diameter transmission line approximately 6,759 feet length, utilizing HDD on State Route 1 and open cut along Struve Rd.
3) Alternative B2 - Consolidate the Springfield water system with the Moss Landing water system by constructing an 8-inch diameter transmission line approximately 6,528 feet length, utilizing HDD through the Moss Landing State Wildlife Area and open cut along Struve Rd.
4) Alternative C - Drill a new well at the existing Springfield Mutual Well Site. This alternative will require the same system components as Alternative A with alternative pipeline alignments to convey water.

Alternative A, Alternative B1, and Alternative B2 only were evaluated for Task 1.

3.0 INFORMATION PROVIDED

The following information was provided for review during Phase 1 and was used in the evaluation of HDD as the construction method for pipeline installation.

- Request for Proposal (RFP)
- Addendum No. 1 dated February 17, 2015
- Addendum No. 2 dated February 20, 2015
- USDA & NRCS Custom Soil Resource Report & Map for Monterey County, CA (provided by MNS)
- AutoCAD drawing (CCSD-MAP.dwg) showing property boundaries(South of Struve Rd. Only), and existing utilities (provided by MNS)
- Word file with Plan & Profile image of existing “J7” Sewer along Struve Rd. (pp163 and 164 J7 Struve Rd.docx) (provided by MNS)
- Alignment figure in PDF format (provided by MNS)
- Parcel maps in PDF format (provided by MNS)
- Appendix 2 – C Springfield test Well completion report in PDF format (provided by MNS).

4.0 HORIZONTAL DIRECTIONAL DRILLING (HDD) METHOD

The HDD method is a two-stage process. The first stage consists of drilling a small diameter pilot hole (typically 1 to 5 inch diameter) along the desired alignment. The pilot hole is excavated using drill rods with a cutting head for the length of the proposed crossing. The hole is then enlarged (reamed) to a larger diameter by attaching a reamer to the drilling rod until the proposed borehole diameter is obtained. This reaming process can be completed in one step or several steps depending upon the proposed hole diameter. Throughout the reaming process, the hole is kept open (from collapsing) by thick fluid slurry. The final hole diameter is typically 50 percent larger than the proposed pipe diameter. Upon completion of the last reaming step, the carrier pipe is then pulled back through the excavated hole as the drill string is pulled back and extracted. The HDD technique can be used in various types of soil and rock.

The HDD technique requires a relatively large staging area on both sides of the operation at the entry point and the exit point of the proposed water main. Heavy equipment is required on each side of the HDD crossing. The entry side (rig side) requires easy access and a more stable ground. Maxi HDD work areas require space for a HDD rig unit, power unit, generators, drilling fluid mixing/recycling equipment, drill pipe, and downhole tools. A minimum area of approximately 60 feet wide by 150 feet long with no overhead obstructions is required. The exit side (pipe side) is where the pipeline is assembled using pipe-welding (steel pipe) or fusion welding (HDPE) processes prior to pullback. The width of the workspace should be approximately 30 feet to 50 feet wide. Also additional temporary workspace should be obtained in the immediate vicinity of the exit location similar to the entry side to facilitate operation and storage of additional equipment.

The HDD method is typically cost-effective for pipe installation of diameters up to 60 inches and lengths up to 6,000 feet. It is commonly used for pressurized pipelines similar to the proposed slough crossing of the water main. It is an ideal method where precision and accuracy of installation is not critical or detrimental to the installed pipe or existing surface and subsurface facilities/utilities. A potential risk of the HDD method is the potential for inadvertent returns such as mud seepage or “frac out” through the surrounding soils and rock to the surface which may affect exiting facilities and cause contamination of groundwater and surface water.

The drillpath depth is primarily controlled by the obstacle in this case the slough. A minimum of 15 feet of separation beneath the obstacle should be maintained (DCCA 1995). The recommended standard separation distance for challenging drilling conditions is 25 feet this minimum separation distance offers a margin for error in surveying methods both before and during construction.

<u>HDD Intersect Method</u> – this method is used when the length, the soil conditions, or a combination of the two do not allow the use of a single drilling rig to accomplish the bore. In an intersect HDD installation, two directional drilling rigs (a primary and secondary drilling rig) are placed at opposite ends of a project site and start drilling toward each other guided by a precision underground magnetic tracking device. Once the bores are within a pre-determined distance from each other, the primary rig advances its drill string, following behind the secondary rig's retreating downhole assembly. The advancing drill string is then steered toward and ultimately "falls" into the vacated borehole produced by the retreating drill string, creating a continuous single borehole. The borehole is then reamed to the appropriate size and product pipe is pulled.

HDD intersect method has proven to work well for long installations in lowering the required installation-induced down-hole fluid pressure associated with drilling fluid flow and thereby lowering hydraulic fracture potential. The flow path length for fluid flow is significantly decreased in comparison to a single HDD pilot bore. This method is also effective for short installations where conductor casings are required on either end of an HDD bore to support near-surface geologic materials that are considered unfavorable to HDD installation.

5.0 REVIEW OF HDD ALIGNMENTS

A key issue when laying out preliminary HDD alignments is an understanding of the minimum radius of curvature that can be accommodated by the steel drill pipe during construction and the pipeline material (steel or HDPE) during pipeline pullback. The following constraints have been used in developing a preliminary evaluation of the three HDD alignments:

- Drill Pipe - assuming a 4 inch steel drill pipe is used for HDD drilling purposes the radius in feet needs to be 100 times the diameter of the drill string in inches. Conservatively assuming a 4 inch diameter drill pipe the minimum required HDD drillpath radius will need to be 400 feet assuming a FS of 1.5 (4 inch x 40 = 160 feet / 160 x FS 1.5 = 320 feet). The safe minimum yield strength for steel pipe is approximately 30,000 psi (AWWA M11- Steel Water Pipe: A Guide for Design and Installation).
- Steel Carrier Pipe - If steel pipe is used the radius in feet needs to be 100 times the diameter of the pipe in inches. Conservatively assuming a 10 inch diameter carrier pipe the minimum required HDD drillpath radius will need to be 1,500 feet assuming a FS of 1.5 (10 inch x 100 = 1,000 feet / 1,000 x FS 1.5 = 1,500 feet). The pipe wall thickness will be determined during detailed design but is likely to be on the order of 0.5 inches thick.
- HDPE Carrier Pipe - If HDPE pipe is used the radius in feet needs to be 40 times the diameter of the pipe in inches. Conservatively assuming a 10 inch diameter carrier pipe the minimum required HDD drillpath radius will need to be 600 feet assuming a FS of 1.5 (10 inch x 40 = 400 feet / 400 x FS 1.5 = 600 feet). The safe pull stress for HDPE pipe is 1,100 psi (ASTM F 1962-05, Table X1.1 – Apparent Modulus at 73°F).). The pipe wall thickness will be determined during detailed design but is likely to be on the order of 1.00 inch thick.

Steel pipe is made from an alloy of primarily iron and carbon. The steel is then rolled into a cylinder and made into a pipe per requirements. Steel pipes have a high tensile strength and are capable of handling high pressures. The high compressive strength of steel makes it a good material for trenchless applications including HDD. Many types of welded and non-welded joints are available for steel pipe. A primary concern of steel pipe is corrosion. Corrosion issues can be addressed but also significantly add to the unit cost ($/LF) of the pipe material.

http://www.nwpipe.com/product/engineered-steel-water-pipe/

http://www.nwpipe.com/product/permalok-steel-casing-pipe/

HDPE pipe is a polyethylene thermoplastic made from petroleum. HDPE is stronger than typical polyethylene (PE) pipe. It is corrosion resistant and much more flexible than steel pipe. The flexibility of this material is desirable in HDD construction because smaller radius turns are possible. HDPE is typically less expensive than steel pipe. The continuous jointless conduit that results from the butt fusion of HDPE pipes make it an ideal piping material for pull-in installations such as HDD.

http://www.jmeagle.com/products/water_sewer/HDPE_water_sewer.html

Based upon the above it can be seen that steel pipe is much less flexible (100D radius vs 40D radius) than HDPE pipe but has a much higher tensile strength (30,000 psi vs 1,100 psi). The HDPE pipe can limit the required easements outside the existing right of ways due to tighter radius but the drillpath bore lengths are less due to the significantly lower tensile capacity of the HDPE pipe.

In general HDD alignments of 1,000 feet are considered short, alignments of 1,000 feet to 3,000 feet considered medium length, alignments of 3,000 to 4,500 feet are considered long, and alignments of > 4,500 feet are considered extremely long (Trenchless Technology, Najafi, M., 2013).

5.1 Alternative A

Alternative A comprises of approximately 3,206 feet of 8 inch inside diameter water transmission pipeline between the Moss Landing Middle School and Moss Landing Mobile Home Park and Springfield residents located on Struve Road. Route comprises three segments (Springfield Road, Cabrillo Highway, & Struve Road) connected by two 90 degree bends at Springfield Road and Cabrillo Highway, and Cabrillo Highway and Struve Road. HDD construction cannot accommodate 90 degree bends and the alignment will have to be developed with a radius of at least 600 feet assuming HDPE carrier pipe or 1,500 feet assuming a steel carrier pipe. The estimated HDD alignment length is approximately 3,847 feet (3,206 feet x 1.2 = 3,847 feet). The 20 percent additional alignment length is a safety factor added to account for alignment modifications, and vertical and horizontal curves.

The HDD drillpath which will be feasible to construct in a single bore will require easements due to the radius impacting some properties along the alignment. If pipeline installation using a single HDD drive is not permitted due to easement acquisitions then Alternative A could be performed using either three shorter HDD bores (714 feet, 2,604 feet, & 343 feet = 3,661 feet) or two open cut sections (714 feet & 343 feet) and a single HDD bore (2,604 feet) which would accommodate the 90 degree bends. Multiple open cut sections and HDD bores will cause more surface disruption and require more construction work areas and pipe laydown areas.

The base alignment of the pipeline, a HDD alignment assuming HDPE carrier pipe, and a HDD alignment assuming steel carrier pipe are presented on Drawing 1 in Attachment A (HDD Alignment Plans). In addition, the rig side (drill pipe entry/carrier pipe exit) and pipe side (drill pipe exit/carrier pipe entry) construction areas, and the pipe laydown area on the pipe side are shown on Drawing 1.

Easements - Easements will be required where the alignment falls outside the existing pipeline right of way. Below is a list of the properties that fall along the alignment, total of 10 parcels. The HDD alignment (single bore) approach will require a curved alignment where 90 degree bends are shown in order for the drill string during pilot hole drilling and carrier pipe during pipe pullback to go around the curves.

The properties adjacent to Alignment A are as follows:

- Parcel 1 - Moss Landing Middle School (Currently Closed), 8142 Moss Landing Road, Moss Landing, CA 95039 [APN - 413-014-001-000]
- Parcel 2 – Elkhorn Native Plant Nursery, Agricultural Preserve, PO Box 874 Soquel, CA 95073-0874 [APN - 413-014-003-000]
- Parcel 3, Residential – Single Family, 19 Springfield Road, Moss landing, CA 95039-9633 [APN - 413-051-015-000]

- Parcel 4 – Vacant, 1820 Hwy 1, Moss Landing, CA 95039 [APN - 413-051-030-000]
- Parcel 5 – Residential Mobile/Manufactured Home Park, 1900 Salinas Road, Watsonville, CA [APN - 413-051-017-000]
- Parcel 6 - Agricultural Land, Moss Landing, CA 95039 [APN - 413-051-025-000]
- Parcel 7 - Vacant Land, Moss Landing, CA 95039 [APN - 413-051-026-000]
- Parcel 8 – Valero Gas Station, 1940 Hwy 1 Moss Landing, CA 95039-9630 [APN - 413-061-037-000]
- Parcel 9 - Vacant Land, Moss Landing, CA 95039 [APN - 413-061-036-000]
- Parcel 10 - Residential, 67 Struve Road, Moss Landing, CA 95039-9638, [APN - 413-061-034-000]

The Monterrey County Parcel Map for Alignment A and additional details of the parcels are presented on Drawing 4 in Attachment B (Monterrey County Parcel Maps)

The properties impacted by the HDD drillpath (single bore) and requiring easements assuming HDPE carrier pipe are Parcel 1, Parcel 8, and Parcel 9. The properties impacted by the HDD drillpath (single bore) assuming steel carrier pipe are Parcel 1, Parcel 7, and Parcel 8. The steel pipe option will require larger easements due to the larger radius (100 x pipe diameter in inches).

Existing Utilities – based upon the information provided to date the existing utilities along crossing and immediately adjacent to Alternative A are a sewer main and associated manholes on Struve Road. Monterrey County does not have utilities on Springfield Road or Cabrillo Highway. The locations of the known utilities are presented on Figure 7 in Attachment C (Utility Location Maps).

5.2 Alternative B1

Alternative B1 comprises of approximately 6,633 feet of 8 inch diameter water transmission pipeline on Struve Rd and Cabrillo Highway (State Route 1). Route comprises two segments (Struve Road, & Cabrillo Highway) connected by one 120 degree bend at Struve Road and Cabrillo Highway. HDD construction cannot accommodate a tight 120 degree bends and the alignment will have to be developed with a radius of at least 600 feet assuming HDPE carrier pipe or 1,500 feet assuming a steel carrier pipe. The estimated HDD drillpath alignment length is approximately 7,960 feet (6,663 feet x 1.2 = 7,960 feet). The 20 percent additional alignment length is a safety factor added to account for alignment modifications, and vertical and horizontal curves.

The base alignment of the pipeline, a HDD alignment assuming HDPE carrier pipe, and a HDD alignment assuming steel carrier pipe are presented on Drawing 2 in Attachment A (HDD Alignment Plans). In addition, the rig side (drill entry/pipe exit) and pipe side (drill exit/pipe entry) construction areas, and the pipe laydown area on the pipe side are shown on Drawing 2.

Construction could alternatively be performed to avoid easements by splitting the bore into two shorter bores (2,461 feet & 4,298 feet = 6,759 feet) or an open cut section along Struve Road (2,461 feet) and an HDD construction along Highway 1 (4,298 feet).

Easements - Easements will be required where the alignment falls outside the existing pipeline right of way. Below is a list of the properties that fall along the alignment, total of 13 parcels.

The HDD alignment will require a curved alignment between where a 120 degree bend is shown in order for the drill string during pilot hole drilling and the carrier pipe during pipe pullback to go around the curves.

The properties adjacent to Alignment B1 are as follows:

- Parcel 1 - Agricultural, Struve Road, Watsonville, CA [APN - 413-012-014-000]
- Parcel 2 - Agricultural, 64 Struve Road, Moss Landing, CA 95039-9639 [APN - 413-013-001-000]
- Parcel 3 - Agricultural, Watsonville, CA [APN - 413-011-015-000]
- Parcel 4 - Agricultural, Watsonville, CA [APN - 413-031-001-000]
- Parcel 5 - Capurro Ranch, Sundance Berry Farms, Sunrise Growers, Robert Mann Packaging Inc. (RMP), Industrial, Moss Landing, CA 95039 [APN - 413-011-029-000]
- Parcel 6 - Tax Exempts, Watsonville, CA 95039 [APN - 413-032-001-000]
- Parcel 7 - Tax Exempts, Watsonville, CA 95039 [APN - 413-021-001-000]
- Parcel 8 – Tax Exempts, Watsonville, CA 95039 [APN - 413-023-009-000]
- Parcel 9 - Tax Exempts, Moss Landing, CA 95039 [APN - 413-021-002-000]
- Parcel 10 - Tax Exempts, Moss Landing, CA 95039 [APN - 413-022-009-000]
- Parcel 11 - Tax Exempts, Moss Landing, CA 95039 [APN - 413-022-010-000
- Parcel 12 – Commercial, Kayak Connection2370 Hwy 1, Moss Landing, CA 95039-9642 [APN - 413-022-008-000]
- Parcel 13 - Tax Exempts, Moss Landing, CA 95039 [APN - 413-022-006-000]
- Parcel 14 – Tax Exempts, 2375 Hwy 1, Watsonville, CA 95039 [APN - 413-023-005-000]

The Monterrey County Parcel Map for Alignment A and additional details of the parcels are presented on Drawing 5 in Attachment B (Monterrey County Parcel Maps).

The properties impacted by the HDD drillpath and requiring easements assuming HDPE carrier pipe are Parcel 1, Parcel 4, Parcel 8, Parcel 9, Parcel 10 and Parcel 11. The properties impacted by the HDD drillpath and requiring easements assuming steel carrier pipe (larger radius of 100 x D) are Parcel 1, Parcel 3, Parcel 4, Parcel 10 and Parcel 11. Construction could alternatively be performed to avoid easements by splitting the bore into two shorter bores (2461 feet & 4298 feet) or an open cut section along Struve Road (2461 feet) and an HDD construction along Highway 1 (4298 feet).

<u>Existing Utilities</u> - based upon the information provided to date the existing utilities along crossing and immediately adjacent to Alternative B1 are a water supply force main running parallel to Alternative B1 for approximately 2,400 feet along Struve Road and along Cabrillo Highway for approximately 1700 feet stopping at Jetty Rd. At the southern end of the alignment along Cabrillo Highway a sewer main is parallel to the alignment for approximately 700 feet. The location of the known utilities are presented on Figure 8 in Attachment C (Utility Location Maps).

In addition, along Struve Rd. a 16 inch, 14 inch, and 12 inch diameter water pipeline approximately 10 feet deep (likely installed using open cut methods) is aligned parallel to Alternative B1 for approximately 1,600 feet and terminating at Giberson Rd. A Plan & Profile image of existing "J7" Sewer along Struve Rd provided by MNS is presented on Drawing 17 and Drawing 18 in Attachment C (Utility Location Maps).

5.3 Alternative B2

Alternative B2 comprises of approximately 6,528 feet of 8-inch diameter water transmission pipeline on Struve Road, crossing the Cabrillo Highway, through the Moss Landing State Wildlife area, and back onto Cabrillo Highway. Route comprises three segments (Struve Road, Moss Landing Wildlife Area, & Cabrillo Highway) connected by two large radius bends (~2000 feet radius). HDD construction will be able to accommodate the original alignment developed as Alignment B2. The estimated HDD drillpath alignment length is approximately 7,834 feet (6,528 feet x 1.2 = 7,834 feet). The 20 percent additional alignment length is a safety factor added to account for alignment modifications, and vertical and horizontal curves.

The base alignment of the pipeline, which is acceptable using either HDPE or Steel carrier pipe is presented on Drawing 3 in Attachment A (HDD Alignment Plans). In addition, the rig side (drill entry/pipe exit) and pipe side (drill exit/pipe entry) construction areas, and the pipe laydown area on the pipe side are shown on Drawing 3.

Construction could alternatively be performed to avoid easements by splitting the bore into two shorter bores (2134 feet & 4394 feet = 6,528 feet) or an open cut section along Struve Road (2,134 feet) and an HDD bore across Moss Landing Wildlife Area (4394 feet).

<u>Easements</u> - Easements will be required where the alignment falls outside the existing pipeline right of way. Below is a list of the properties that fall along the alignment, 12 parcels. The properties adjacent to Alignment B1 are as follows:

- Parcel 1 - Agricultural, Struve Road, Watsonville, CA [APN - 413-012-014-000]
- Parcel 2 - Agricultural, 64 Struve Road, Moss Landing, CA 95039-9639 [APN - 413-013-001-000]
- Parcel 3 - Agricultural, Watsonville, CA [APN - 413-011-015-000]
- Parcel 4 - Agricultural, Watsonville, CA [APN - 413-031-001-000]
- Parcel 5 - Tax Exempts, Watsonville, CA 95039 [APN - 413-032-001-000
- Parcel 6 – Tax Exempts, Watsonville, CA 95039 [APN - 413-023-009-000]
- Parcel 7 – Moss Landing State Wildlife Area, Tax Exempts, Watsonville, CA [APN - 413-023-008-000]
- Parcel 8 - Tax Exempts, Moss Landing, CA 95039 [APN - 413-022-009-000]
- Parcel 9 - Tax Exempts, Moss Landing, CA 95039 [APN - 413-022-010-000]
- Parcel 10 – Commercial, Kayak Connection, 2370 Hwy 1, Moss Landing, CA 95039-9642 [APN - 413-022-008-000]
- Parcel 11 - Tax Exempts, Moss Landing, CA 95039 [APN - 413-022-006-000]
- Parcel 12 – Tax Exempts, 2375 Hwy 1, Watsonville, CA 95039 [APN - 413-023-005-000]

The Monterrey County Parcel Map for Alignment B2 and additional details of the parcels are presented Drawing 6 in Attachment B (Monterrey County Parcel Maps).

The properties impacted by the Alignment B2 HDD drillpath and requiring easements assuming HDPE or Steel carrier pipe are Parcel 1, Parcel 5, Parcel 6, Parcel 7, Parcel 8, Parcel 9, and

Parcel 11. Alternatively, if the option to construct two shorter bores (2134 feet & 4394 feet) or an open cut section along Struve Road (2134 feet) and an HDD bore across Moss Landing Wildlife Area (4394 feet) no easements will be required.

Existing Utilities - based upon the information provided to date the existing utilities along crossing and immediately adjacent to Alternative B2 are a water supply force main running parallel to Alternative B2 for approximately 2,400 feet along Struve Road. At the southern end of the alignment along Cabrillo Highway a sewer main is parallel to the alignment for approximately 700 feet. The location of the known utilities are presented on Figure 9 in Attachment C (Utility Location Maps).

In addition, along Struve Rd. a 16 inch, 14 inch, and 12 inch diameter water pipeline approximately 10 feet deep (likely installed using open cut methods) is aligned parallel to Alternative B1 for approximately 1,600 feet and terminating at Giberson Rd. A Plan & Profile image of existing "J7" Sewer along Struve Rd provided by MNS is presented on Drawing 17 and Drawing 18 in Attachment C (Utility Location Maps).

The following general comments are provided with respect to the HDD alignments:

- HDD alignment lengths are between 3,925 feet and 6,815 feet in length and considered to be long (3,500 to 4,500 feet) to extremely long (>4,500 feet)
- HDD alignments are within HDD method capabilities
- Ability to perform alignments lengths in a single drive, multiple drives, or HDD intersect method will need to be evaluated during detailed design.

6.0 REPRESENTATIVE EXAMPLES OF HDD PROJECTS

Examples of similar projects are presented below. It should be noted that in general the carrier pipe used is steel which due to its higher tensile strength has significant benefits when installing long and extremely long HDD installations with greater tensile stresses developing in the pipe during pullback.

Project - Houston Ship Channel, La Porte to Baytown, Texas
Contractor - Michels Corporation
Method - HDD Intersect
Length - 12,459 feet
Pipe Diameter - 18 inch
https://www.michels.us/blog/michels-completes-a-world-record/

Project - Hampton Roads Harbor, Virginia
Client - Virginia Natural Gas (VNG)
Contractor - Mears Group
Method - HDD
Length - 7,357 feet
Pipe Diameter - 24 inch (steel pipe)
http://www.mears.net/horizontal-directional-drilling/index.php/hdd/hdd/hampton-roads-harbor-va/

Project – Miami to Miami Beach Crossing, Miami, Florida
Client - Florida Power & Light (FPL)
Contractor - Mears Group
Method - HDD Intersect
Length - 5,188 feet, 5,917 feet, and 5,013 feet
Pipe Diameter - 9 inch (steel pipe)
http://www.mears.net/horizontal-directional-drilling/index.php/hdd/hdd/overtown-venetian-138-kv-line-project/

Project – Kinder Gas Pipeline, Lake Houston, Harris County, Texas
Client – Kinder Morgan
Contractor - Laney Directional Drilling Co
Method - HDD Intersect
Length – 10,971feet
Pipe Diameter – 6 inch (steel pipe)
http://www.pipeline-news.com/feature/hdd-used-replace-kinder-morgan-gas-line-under-lake-houston

7.0 REVIEW OF GROUND CONDITIONS (SOILS & GROUNDWATER)

Based upon the "Geologic Map of the Monterey 30' x 60' Quadrangle and Adjacent Areas", Regional Geologic Map Series, 1:100,000 Scale published by the California Department of Conservation, California Geological Survey, and dated 2002 (Wagner, Greene, Saucedo, & Pridmore) the ground conditions in the vicinity of the project site comprise the following

- Qb - Basin Deposits (Holocene) – silty Clay
- Qe – Eolian Sand (Holocene)
- Qt – Terrace Deposits (Holocene) – Gravel, Sand, Silt, and Clay deposited on stream cut surfaces
- Qmt – Marine Terrace Deposits (Pleistocene) – Gravel, Sand, Silt, and Clay deposited on wave cut surfaces
- Qod – Older Dune Sand (Pleistocene)
- Aromas Sand – Eolian and Fluvial deposits of Clay, Silt, Sand, and Gravel
    - Undivided (Qar)
    - Eolian (Qae)
    - Fluvial (Qaf) Deposits

Excerpts from the "Geologic Map of the Monterey 30' x 60' Quadrangle and Adjacent Areas" including geological map and legend associated with the project area are presented on Drawing 10 and Drawing 11 in Attachment D (Geological Map & Information Excerpts).

Based upon the USGS Fact Sheet 044-03 (dated August 2003) entitled "Geohydrology of Recharge and Seawater Intrusion in the Pajaro Valley, Santa Cruz and Monterey Counties, California" (http://pubs.usgs.gov/fs/fs-044-03/] the general project vicinity ground conditions comprise the following:

- Upper Aquifer System
  - Shallow Alluvial Aquifer (Younger & Older Alluvium) [~ 100 feet thick]
  - Upper Aromas Sand [~150 to 200 feet thick]
- Lower Aquifer System
  - Lower Aromas Sand [~200 feet thick]
  - Purisima Formation – Sandstone, Siltstone (marine)

Geological plan and profiles from the "Geohydrology of Recharge and Seawater Intrusion in the Pajaro Valley, Santa Cruz and Monterey Counties, California" are presented on Drawing 12 and Drawing 13 in Attachment D (Geological Map & Information Excerpts).

Groundwater is present within all the Pleistocene and Holocene age sediments at relatively shallow depths below the existing ground surface.

Based upon the "Maps Showing Geology and Liquifaction Potential of Northern Monterey and Southern Santa Cruz Counties, California", published by USGS, dated 1980 the following formations are present and liquefaction potential noted.

- Qfl – Artificial Fill (Holocene) – heterogeneous mixture of artificially deposited fill material ranging from well compacted sand and silt to poorly compacted sediment high in organic content. Liquefaction potential ranges from low to high depending on degree of compaction.
- Qb – Basin Deposits (Holocene) – unconsolidated plastic clay and silty Clay containing much organic material. Thickness up to 30m thick. Moderate to high liquefaction potential except where water is more than 10m below ground surface. Highly expansive soils develop in these deposits.
- Qsc – Coastal Terrace Deposits of Santa Cruz (Pleistocene) – semiconsolidated generally well worked sand with a few thin relatively continuous layers of gravel. Thickness variable, maximum thickness is 13m. Low susceptibility to liquefaction.
- Qa – Aromas Sand (Plesitocene) – heterogeneous sequence of mainly Aeolian and fluvial sand, silt, clay, and gravel. Total thickness may be greater than 250m. Low susceptibility to liquefaction.
- Qeu – Coastal Terrace Deposits, Undifferentiated (Pleistocene) – semiconsolidated moderately well sorted marine sand containing thin discontinuous gravel rich layers. Thickness variable, generally less than 6m thick. Low susceptibility to liquefaction.

In addition, the Monterey County (MC) GIS Geology Open Data file (liquefaction data set) shows the soils present along Alternative A, Alternative B1, and Alternative B2 alignments and the liquefaction susceptibility. The soil units present along the three (3) alignments are presented in Table 1.

http://montereycountyopendata.montereyco.opendata.arcgis.com/datasets/9dd4c3bb210140e286fcac742235257d_0

Table 1 – Liquefaction Susceptibility by Soil Type

Label	Name	Era	Period	Epoch	Liquefaction Susceptibility
Qb	Basin deposits	Cenozoic	Quaternary	Holocene	High
Qfl	Artificial fill	Cenozoic	Quaternary	Holocene	Variable
Qsc	Stream channel deposits	Cenozoic	Quaternary	Holocene	High
Qa	Aromas Sand, undifferentiated	Cenozoic	Quaternary	Early to Middle Pleistocene	Low
Qem	Eolian deposits	Cenozoic	Quaternary	Pleistocene	Low
Qct	Coastal terraces	Cenozoic	Quaternary	Pleistocene	Low
Qod2	Eolian deposits	Cenozoic	Quaternary	Late Pleistocene	Low

Confirmation of liquefaction potential and soil type present along the selected pipeline alignment should be closely reviewed during detailed design.

Liquefaction is the transformation of soil from a solid to a liquid state as a consequence of increased pore-water pressures, usually in response to strong ground shaking, such as those generated during a seismic event. Loose, granular soils are most susceptible to these effects while more stable silty clay and clay materials are generally somewhat less affected. The liquefaction potential is mentioned as the effects of drilling and vibration need to be considered during detailed design with respect to the presence of soils with liquefaction potential. Excerpts from the “Maps Showing Geology and Liquefaction Potential of Northern Monterey and Southern Santa Cruz Counties, California” showing the site location are presented on Drawing 14 and Drawing 15 in Attachment D (Geological Map & Information Excerpts).

In addition to the above information a test well record for a 630 feet deep well drilled from July 22 to July 25, 2008 by Maggiora Brothers was reviewed. The well is located approximately 30 yards south of the east end of Springfield Road at 1815 Highway 1, Moss Landing, California. The geology for the entire well depth was soil (sand, clay, silts & gravel). The test well log is presented on Drawing 16 in Attachment D (Geological Map & Information Excerpts). The findings presented on the well log concur with the review of available published literature presented above.

8.0 GROUND CONDITIONS SUITABILITY

Based upon an evaluation of the ground conditions based upon available geological information the presence of soils comprising clay, silt, sand, and gravel does not present a problems for pipeline construction using HDD methods.

9.0 DRIVE LENGTHS AND ALIGNMENTS HDD FEASIBILITY EVALUATION

A preliminary evaluation of the drill path was determined in general accordance with the guidelines presented in ASTM F 1962-05 “*Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings*”.

HDD design parameters are outlined in ASTM F 1962 which form the basis of HDD bore design. Arguably the most critical design component of HDD crossings is the maximum pull stress. This parameter may determine the type of pipe required, HDD rig to be used, and ultimately determine the feasibility of the project. The following considerations are key to the design of the vertical bore alignment:

- *Depth of Cover.* This parameter is of concern in regards to inadvertent returns of the drilling mud to the surface as well as maximum pull stress. Generally speaking as depth increases so does maximum pull stress. An important determination of maximizing depth for frac-out concerns and minimizing depth for stress concerns is critical to design.
- *Entry/Exit Angles.* The entry and exit angles are of importance to the project to maintain appropriate depths and maximize the potential curve radii. If typical industry standard entry/exit angles are used they will have minimal impact on the maximum pull stress.
- *Drill Path Radii.* In HDD borings, at least two radii exist; one at the bottom of entry and the other at the divergence of the exit. For horizontally curved alignments greater than two radii may exist. These radii have been found to be critical to the maximum pull stress. To minimize the maximum pull stress it is important to maximize the radii.
- *Limiting Mud Pressure.* Drilling fluid pressure is calculated using the Delft Geotechnical cavity expansion theory as detailed in USACE – Installation of Pipelines beneath Levees Using HDD (CPAR-GL-98-1, dated April 1998).

The following assumptions have been made with respect to the preliminary level HDD drillpath alignments assuming HDPE pipe:

1) Pipe Outside Diameter = 10.75 inch (10 inch NPS)
2) Pipe Inside Diameter = 8.218 inch
3) Bore Entry Angle = 12° (Pipe Exit);
4) Bore Exit Angle = 12° (Pipe Entry);
5) Radius of Curvature = 600 feet (HDPE minimum)
6) Maximum Depth of Cover = 50 feet;
7) Total Horizontal Distance (HDPE)
    a. Alternative A = 3,206 feet
    b. Alternative B1 = 6,633 feet
    c. Alternative B2 = 6,528 feet
8) HDD alignment length = 1.5 x plan length (e.g. Alternative A = 3,206 feet x 1.20 = 3,847 feet)

Preliminary Estimates of pull back stresses for each alternative assuming HDPE carrier pipe are presented in Table 2.

Table 2 – Preliminary Estimate of Pull Back Stresses (HDPE Pipe)

Alternative	Drives	Estimated Total Length (feet)	Estimated Maximum Pull Back stress (psi)	HDPE Pipe Allowable Stress (psi)	Bore Length Acceptable
Alternative A	1	3,847	829	1,100	Yes
Alternative B1	1	7,960	1,510	1,100	No
Alternative B1	1	2,485	584	1,100	Yes
	2	5,475	1,059	1,100	Yes
Alternative B2	1	7,834	1,489	1,100	No
Alternative B2	1	2,561	598	1,100	Yes
	2	5,273	1,024	1,100	Yes

Notes: 1. Allowable stress based upon ASTM 1962 – Table X1.1 – Apparent Modulus of Elasticity and Safe Tensile Stress at 73°F.
2. Bore length acceptable if Estimated Maximum Pull Back Stress is less than Pipe Allowable Tensile Stress.

The safe minimum yield strength for steel pipe is approximately 30,000 psi (AWWA M11- Steel Water Pipe: A Guide for Design and Installation). It can be seen from Table 2 that steel pipe will have more than sufficient tensile capacity for construction assuming a single bore (full length) for all Alternatives.

Based upon Table 2 the following preliminary level observations can be made:

- Alternative A – it would be feasible to perform HDD installation using an 8 inch inside diameter HDPE or steel pipe.
- Alternative B1 & Alternative B2 - it would not be feasible to perform HDD construction using an 8 inch inside diameter HDPE pipe in a single bore. Construction could be performed by splitting the bore into two shorter bores.
- Alternative B1 & Alternative B2 - it would be feasible to perform HDD construction using an 8 inch inside diameter steel pipe in a single bore.

10.0 CONSTRUCTION COST ESTIMATE

A preliminary level estimate of construction cost is provided based upon past projects, and references relating to cost evaluation of HDD projects. Table 3 and Table 4 show some representative costs in $/foot/inch.

Table 3 – Unit Cost by Product Type

Product Type	Water	Wastewater
Number of projects	40	23
Average unit cost ($/foot/inch)	16.7	28.3

Reference – "Analysis of Parameters Affecting Costs of Horizontal Directional Drilling Projects in the United States for Municipal Infrastructure" (Vilfrant, 2010)

Table 4 – Unit Cost by Soil Classification

USCS	GW-GC	SW-SC	ML-OL	MH-OH	PT
Number of projects	7	15	33	5	3
Average unit cost ($/foot/inch)	44.66	24.74	13.74	19.72	32.4

Reference – "Analysis of Parameters Affecting Costs of Horizontal Directional Drilling Projects in the United States for Municipal Infrastructure" (Vilfrant, 2010)

Using $16.70/foot/inch (water pipe) and $24.74/foot/inch (SW/SC Soils) we have a range of between $133.60 to $197.92 per foot of 8 inch pipeline installation using HDD. The project soils at HDD alignment depth a primarily Sand, Silt, and Clay and for cost estimating purposes the higher unit price for Sand soils has been used. For preliminary project cost estimating purposes a rate of $200/foot has been used for estimating project alignment costs as presented in Table 5.

Table 5 – Estimated HDD Construction Costs (Alignment A, Alignment B1, & Alignment B2)

Alternative	Plan Length (feet)	Estimated HDD Drillpath Length (feet)	Estimate Construction Cost ($)
Alternative A	3,661	4,393	$878,640
Alternative B1	6,759	8,110	$1,622,000
Alternative B2	6,528	7,834	$1,566,800

11.0 CONSTRUCTION SCHEDULE ESTIMATE

A preliminary level estimate of the construction schedule is as follows:

- Drill Site Mobilization & Set-up = 2 weeks
- Pilot Hole Drilling = 2 weeks
- Reaming = 1 week
- Pipe Fusion = 2 weeks (can be performed during drilling operations)
- Pullback = 3 days
- Demobilization = 1 week

Total construction duration is estimated to be approximately 7 weeks assuming pipe fusion takes place during drilling operations (pilot hole & reaming).

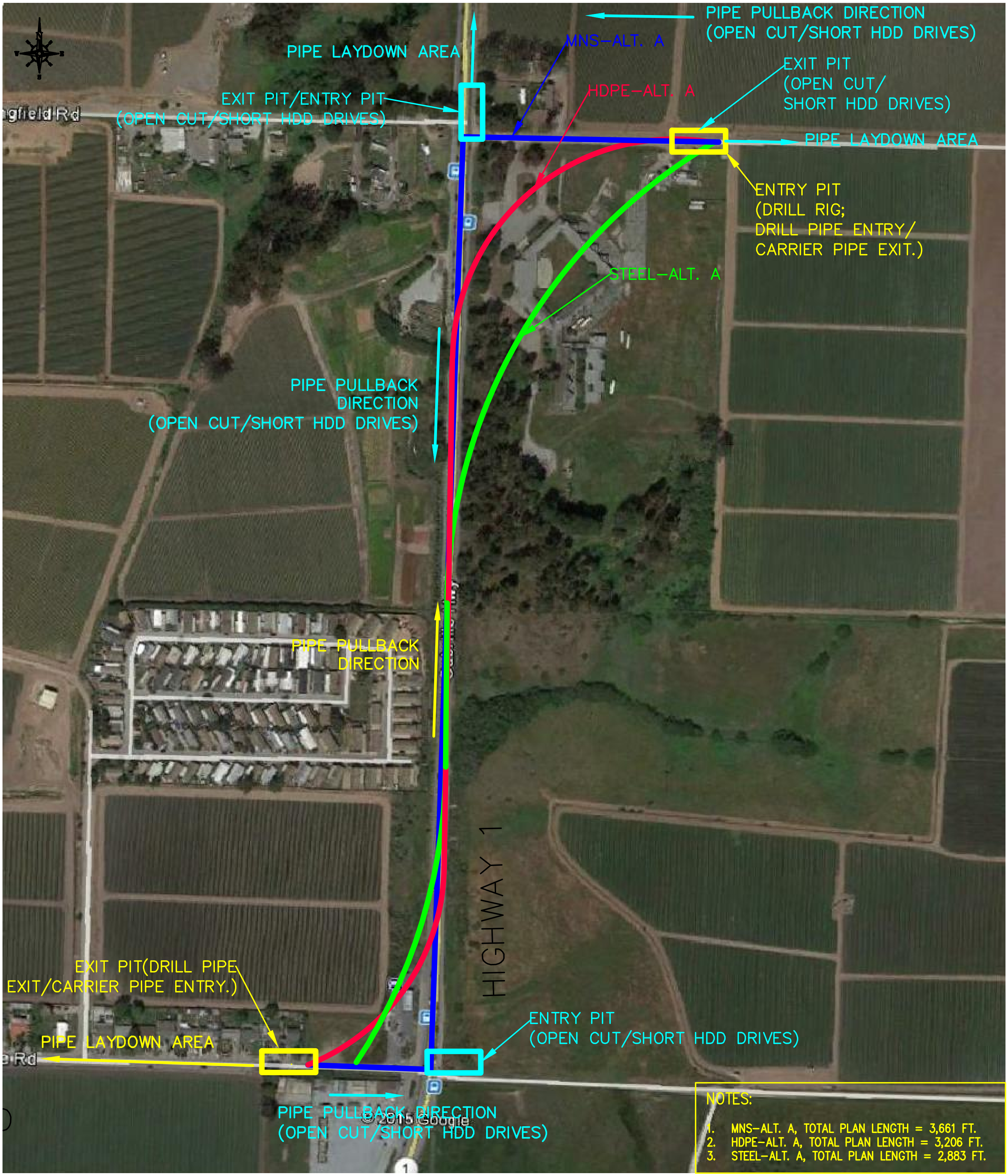
12.0 OTHER CONSIDERATIONS

Geotechnical Investigation - a geotechnical investigation will be required during the detailed design phase of the project. It is recommended that a series of three to five borings be performed along the selected route alternative to confirm design ground conditions and collect samples for laboratory testing to provide soil parameters required for design.

Geotechnical Baseline Report (GBR) – a GBR (or GBR Sheets) should be prepared for the project in accordance with ASCE Guidelines (ASCE, 2007).

ATTACHMENT A

(HDD ALIGNMENT PLANS)



NOTES:

1. MNS–ALT. A, TOTAL PLAN LENGTH = 3,661 FT.
2. HDPE–ALT. A, TOTAL PLAN LENGTH = 3,206 FT.
3. STEEL–ALT. A, TOTAL PLAN LENGTH = 2,883 FT.

P:\1076.00_SRGFLDWTRSYSIMP\DRAWINGS\DWG\SPRINGFIELD – HDD ALTERNATIVES.DWG

CLIENT/OWNER: MNS ENGINEERS INC

DESIGNER: ALDEA SERVICES LLC

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PROJECT:	Springfield Water System Improvements		
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: HDD – Alternative A	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 1	REV:
SCALE: 1/32" = 1'	DATE: 11/11/15	FILE NAME: XX	SHEET 1 OF 1

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PROJECT:	Springfield Water System Improvements		
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: HDD – Alternative B1	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 2	REV:
SCALE: 1/64" = 1'	DATE: 11/11/15	FILE NAME: XX	SHEET 1 OF 1

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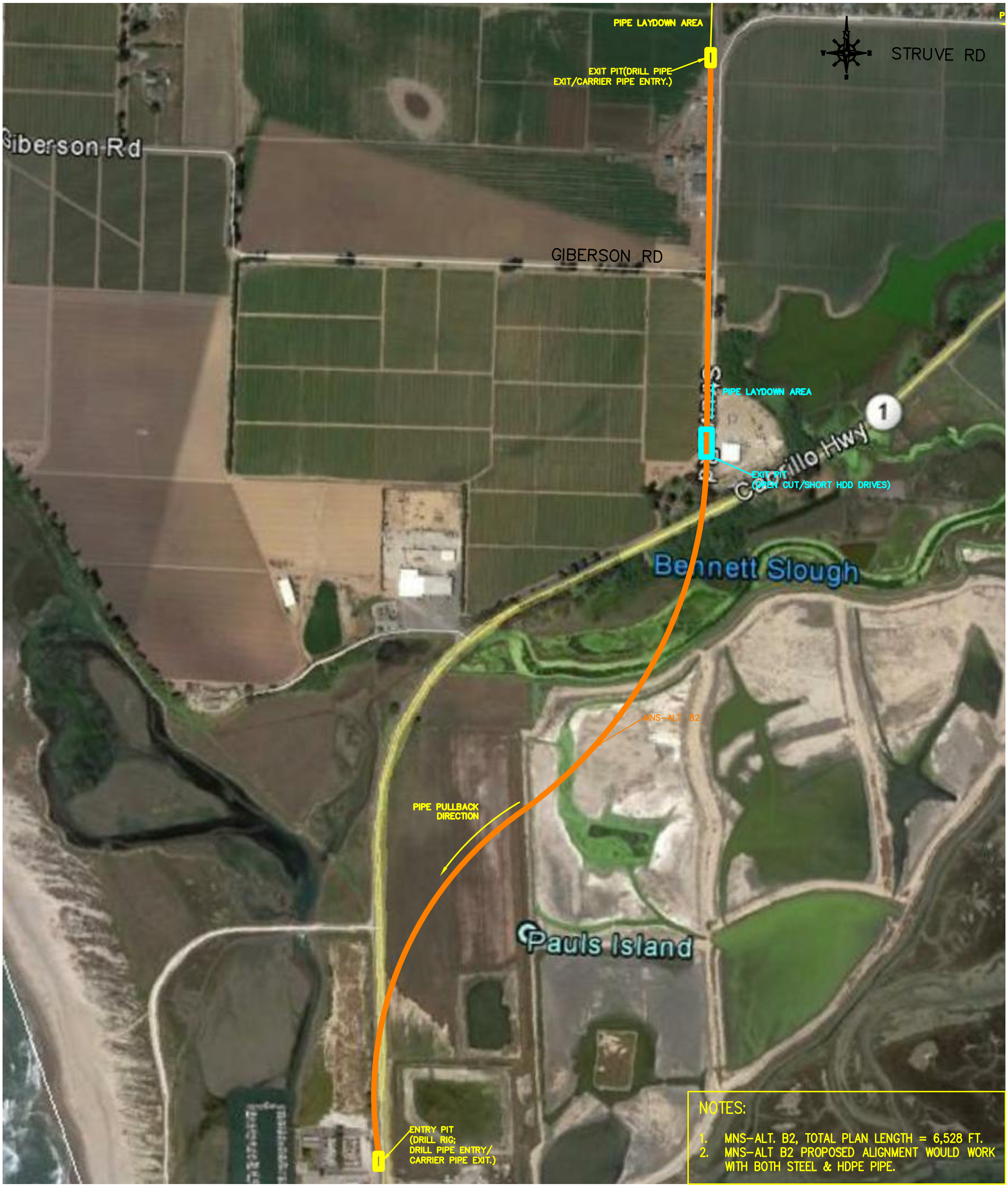

NOTES:

1. MNS-ALT. B2, TOTAL PLAN LENGTH = 6,528 FT.
2. MNS-ALT B2 PROPOSED ALIGNMENT WOULD WORK WITH BOTH STEEL & HDPE PIPE.

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PROJECT: Springfield Water System Improvements

DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: HDD – Alternative B2
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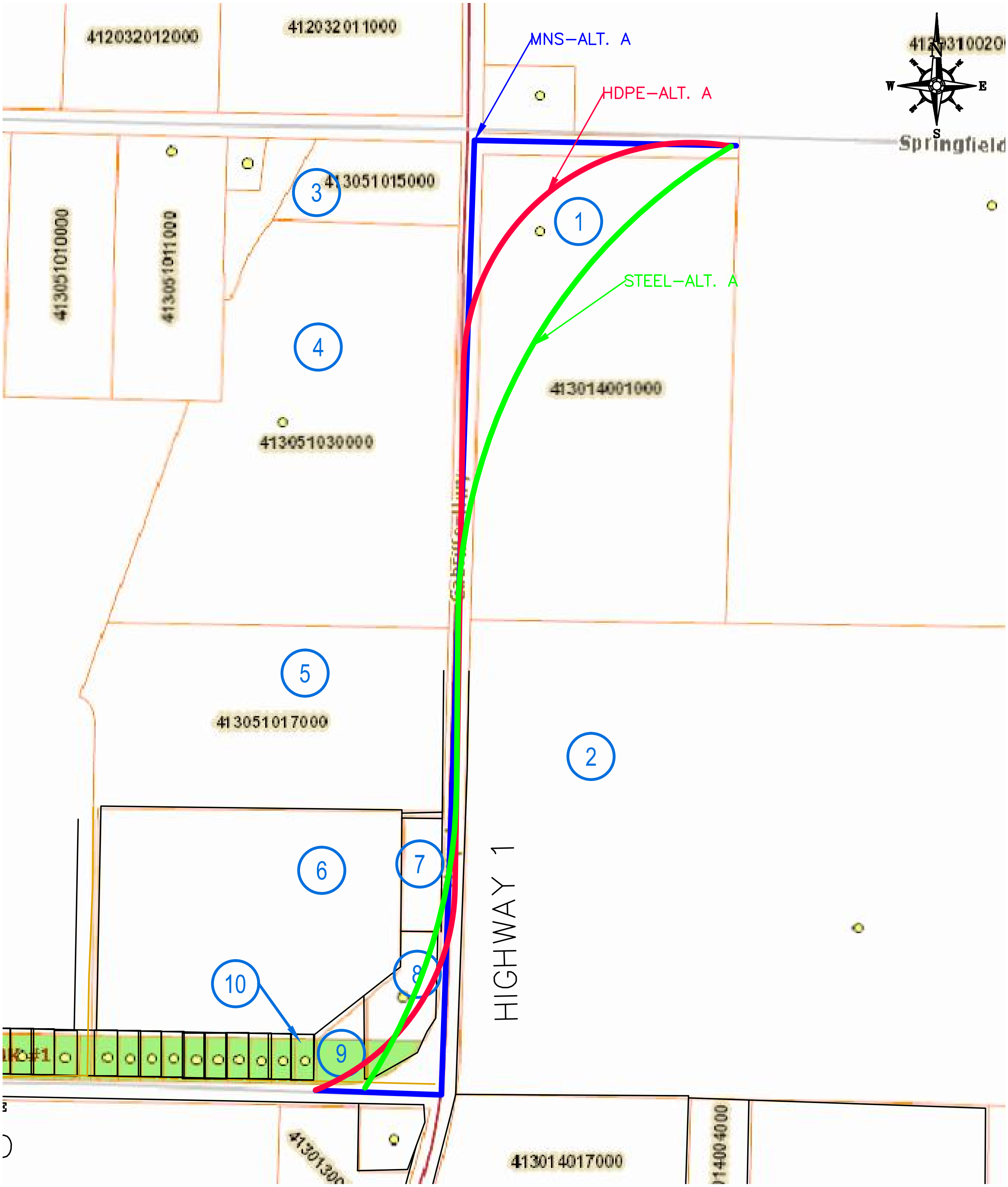
ATTACHMENT B

(MONTERREY COUNTY PARCEL MAPS)



CLIENT/OWNER:	DESIGNER:	PROJECT: Springfield Water System Improvements			
MNS ENGINEERS INC	ALDEA SERVICES LLC 5301 Buckeystown Pike, Suite 425 Frederick, MD 21704 Phone (301)355-9703 Fax (301)355-9705 aldeaservices.com	DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Parcel Map – HDD Alternative A	
		DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 4	REV:
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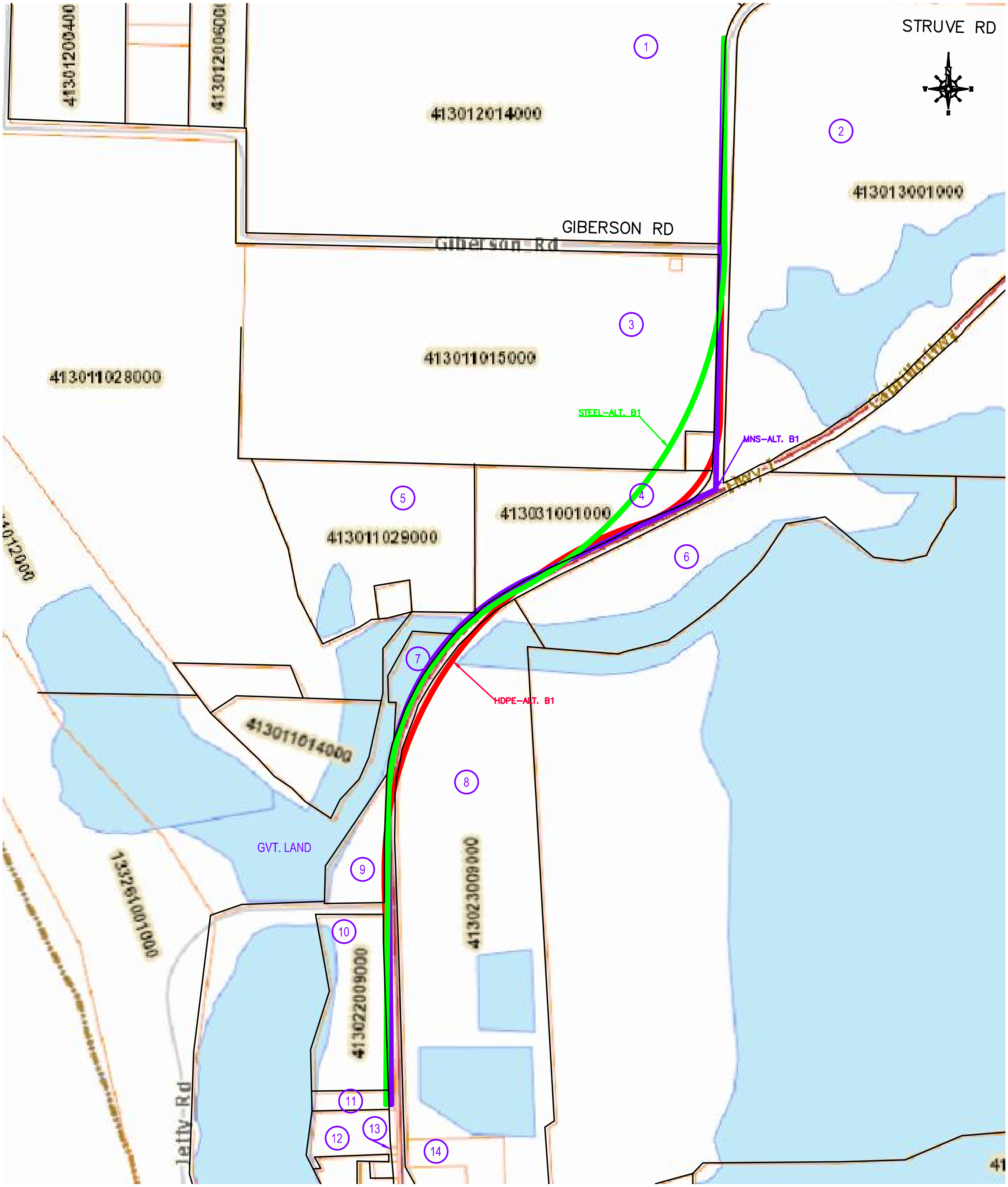

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DESIGNER:

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PROJECT:	Springfield Water System Improvements				
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE:	Parcels - HDD Alternative B1		
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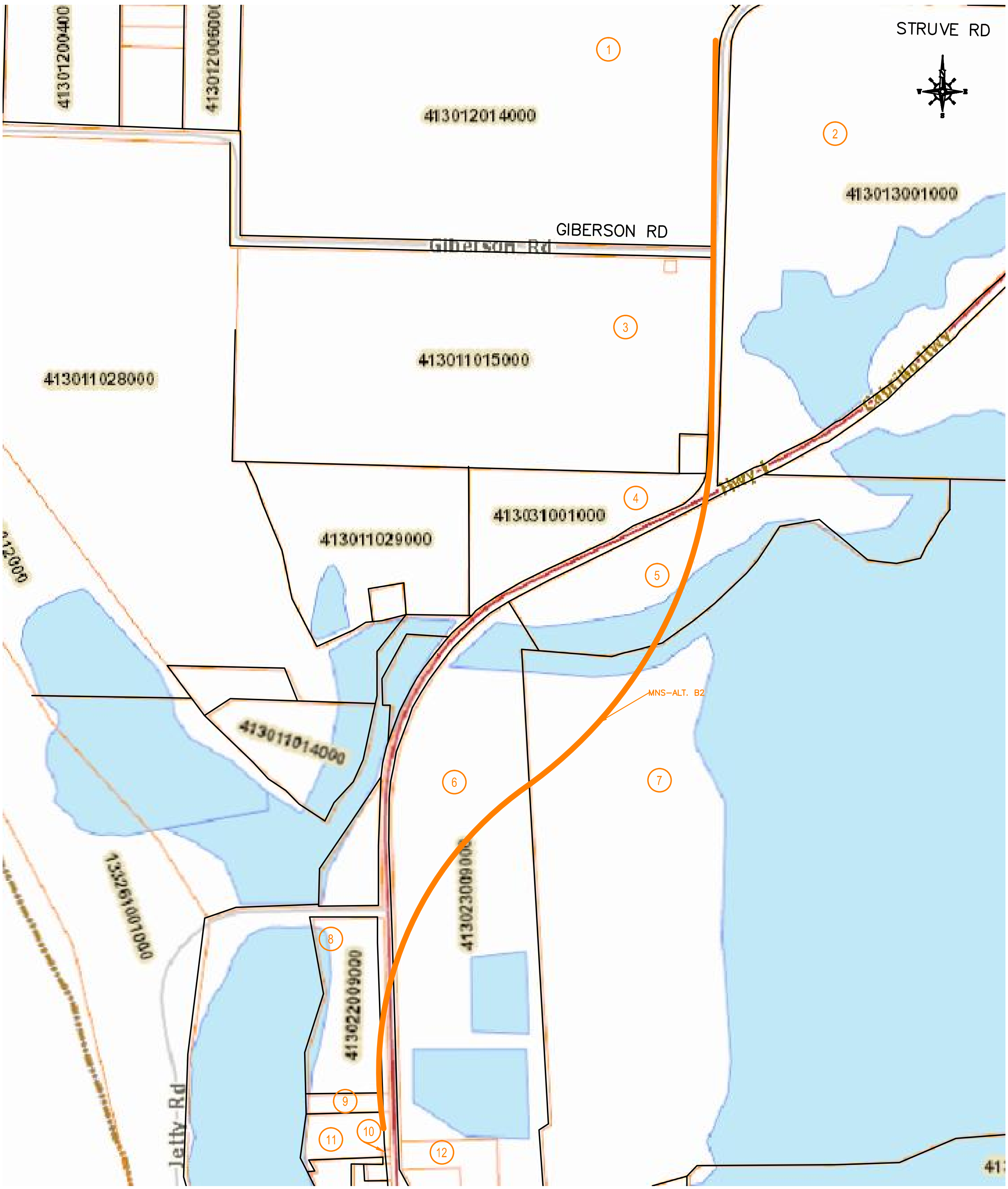

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CLIENT/OWNER:

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PROJECT:	Springfield Water System Improvements		
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Parcels – HDD Alternative B2	
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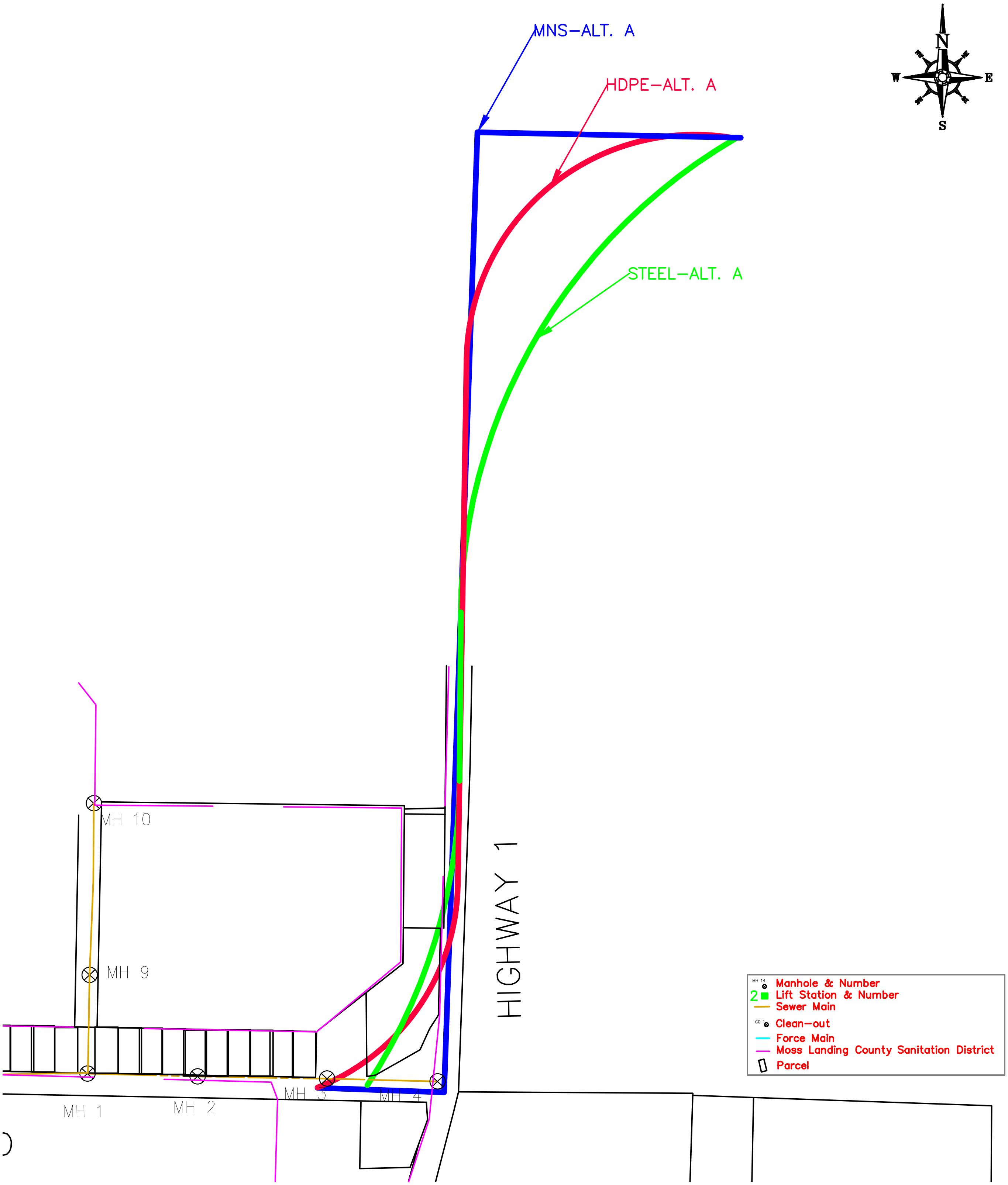
ATTACHMENT C

(UTILITY LOCATION MAPS)



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PROJECT: Springfield Water System Improvements

DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Utilities – HDD Alternative A	
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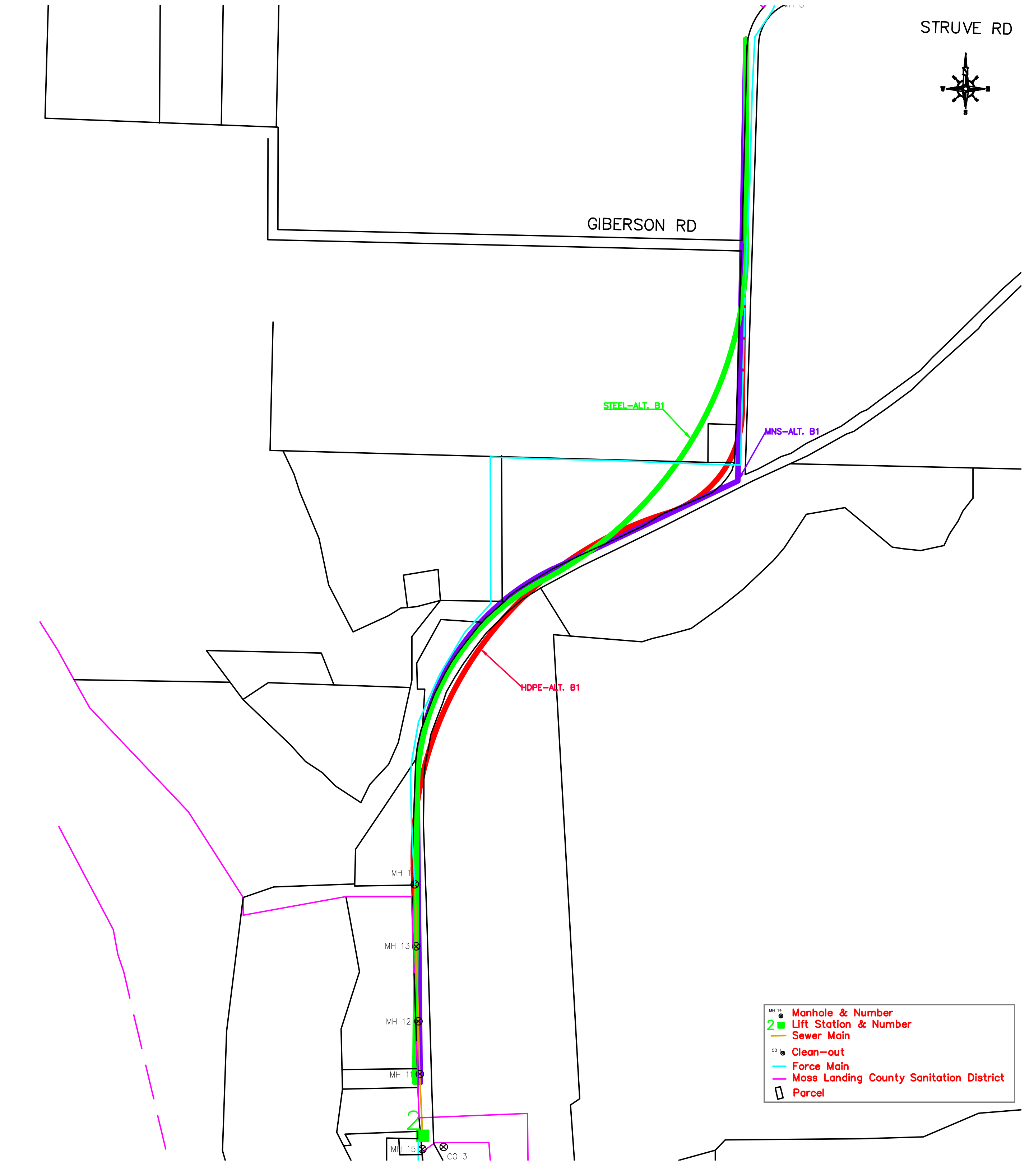

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PROJECT:	Springfield Water System Improvements		
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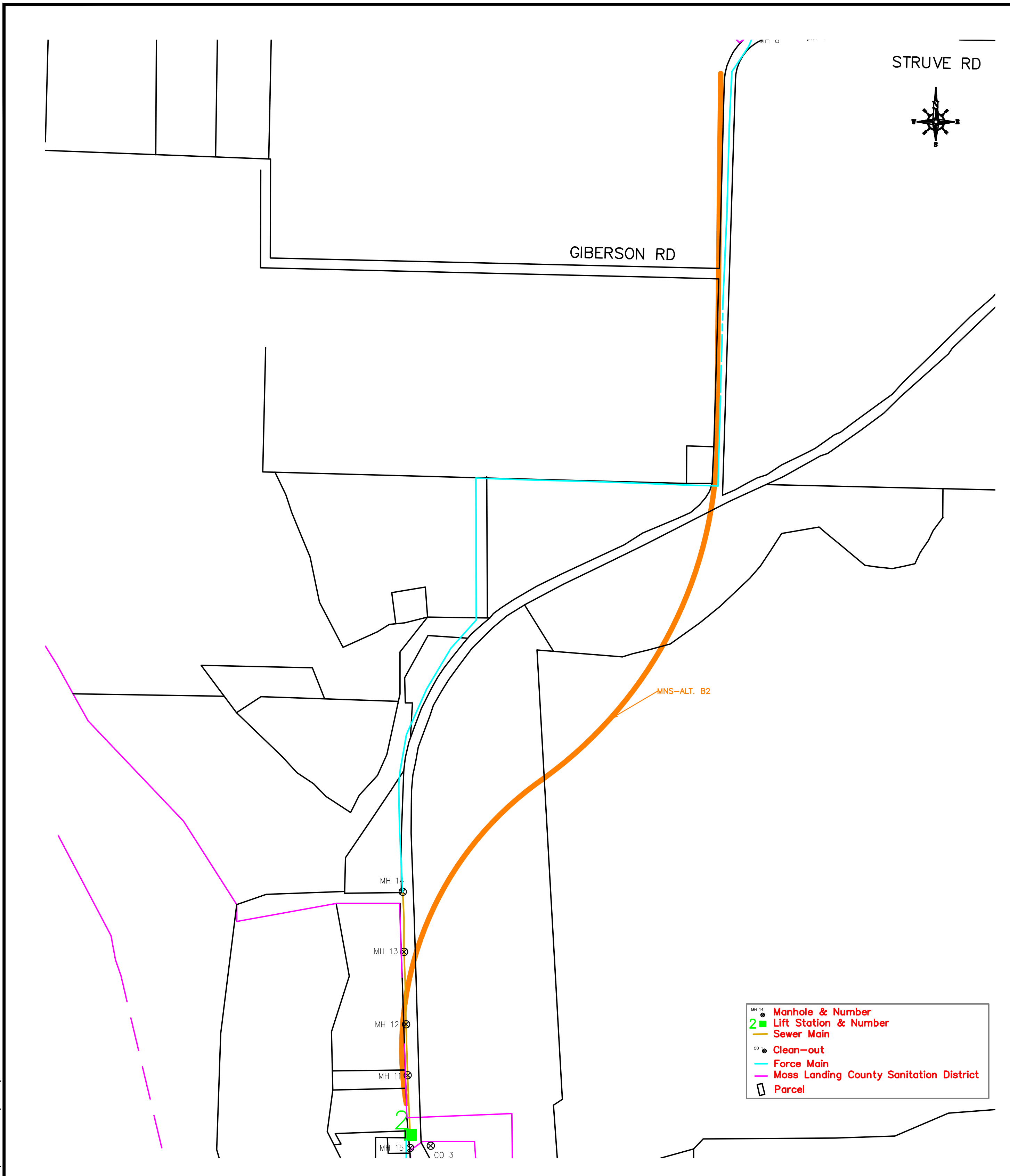

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DESIGNER:

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PROJECT:	Springfield Water System Improvements		
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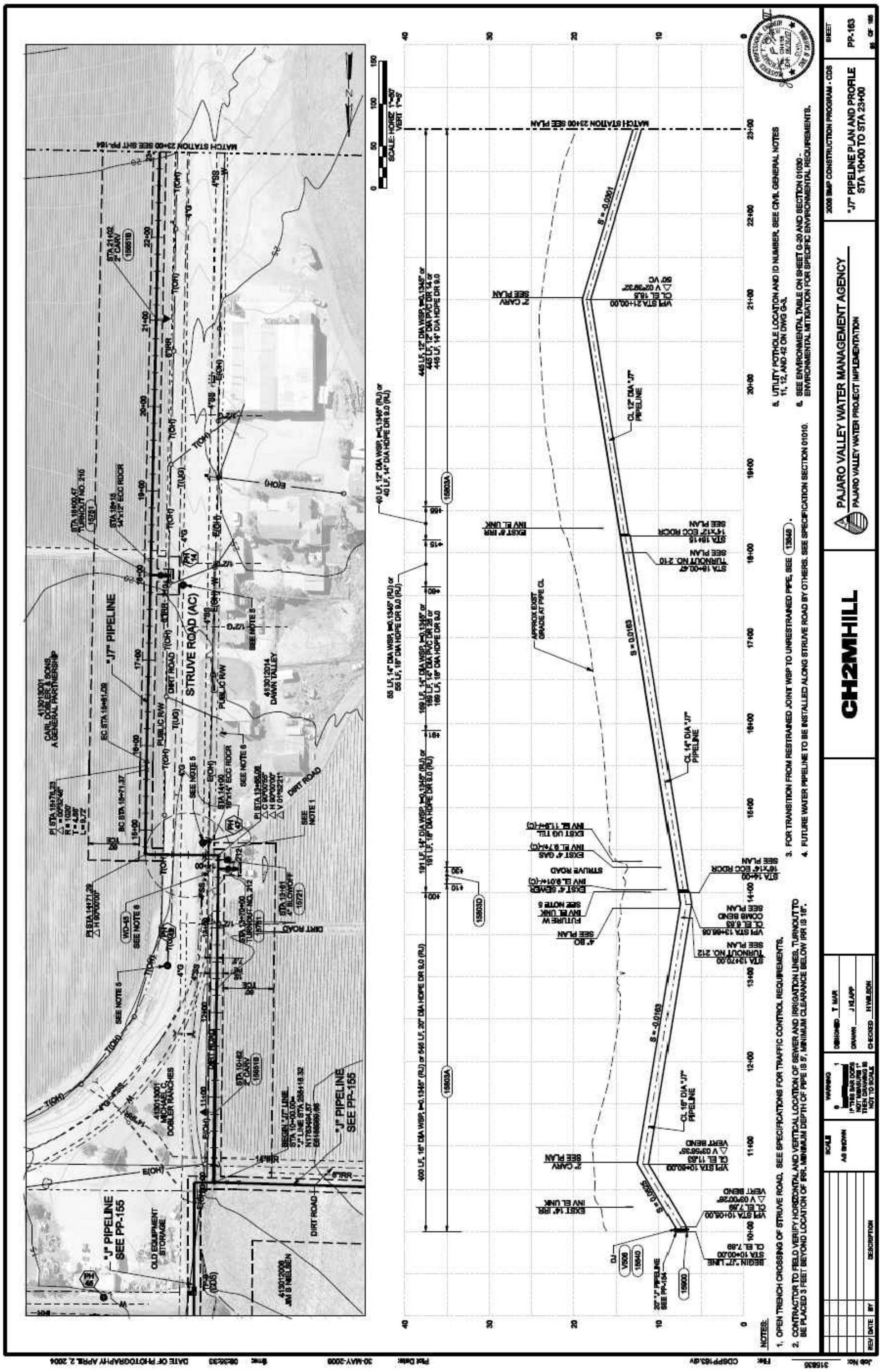

NOTES:

1. Plan & Profile image of existing "J7" Sewer along Struve Rd provided by MNS

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DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: "J7" Water Pipeline	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 17	REV:
SCALE:	DATE: 11/11/15	FILE NAME: XX	SHEET 1 OF 2

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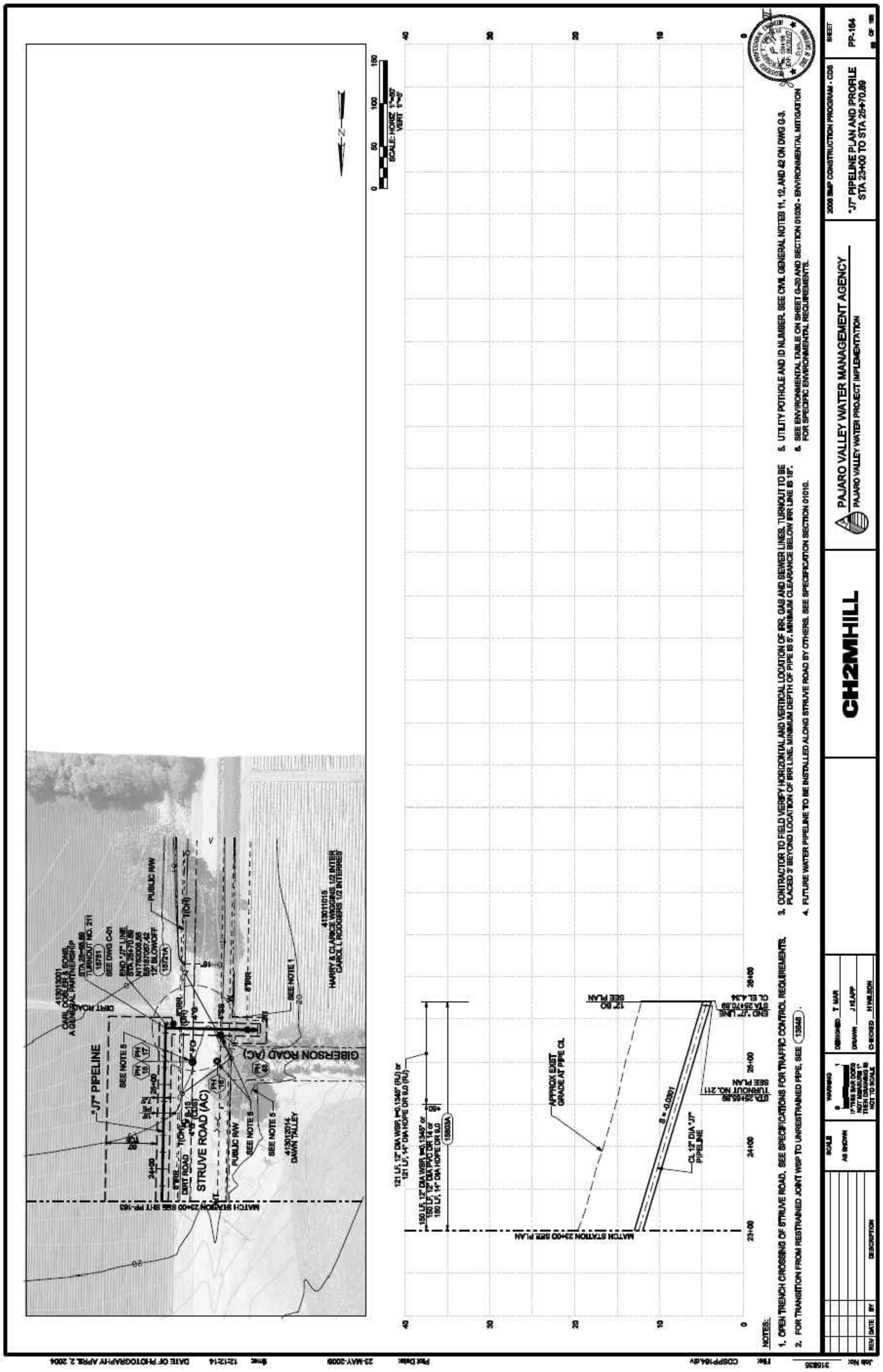

NOTES:
1. Plan & Profile image of existing "J7" Sewer along Struve Rd provided by MNS

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MNS ENGINEERS INC	ALDEA SERVICES LLC 5301 Buckeystown Pike, Suite 425 Frederick, MD 21704 Phone (301)355-9703 Fax (301)355-9705 aldeaservices.com	DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: "J7" Water Pipeline	
		DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 18	REV:
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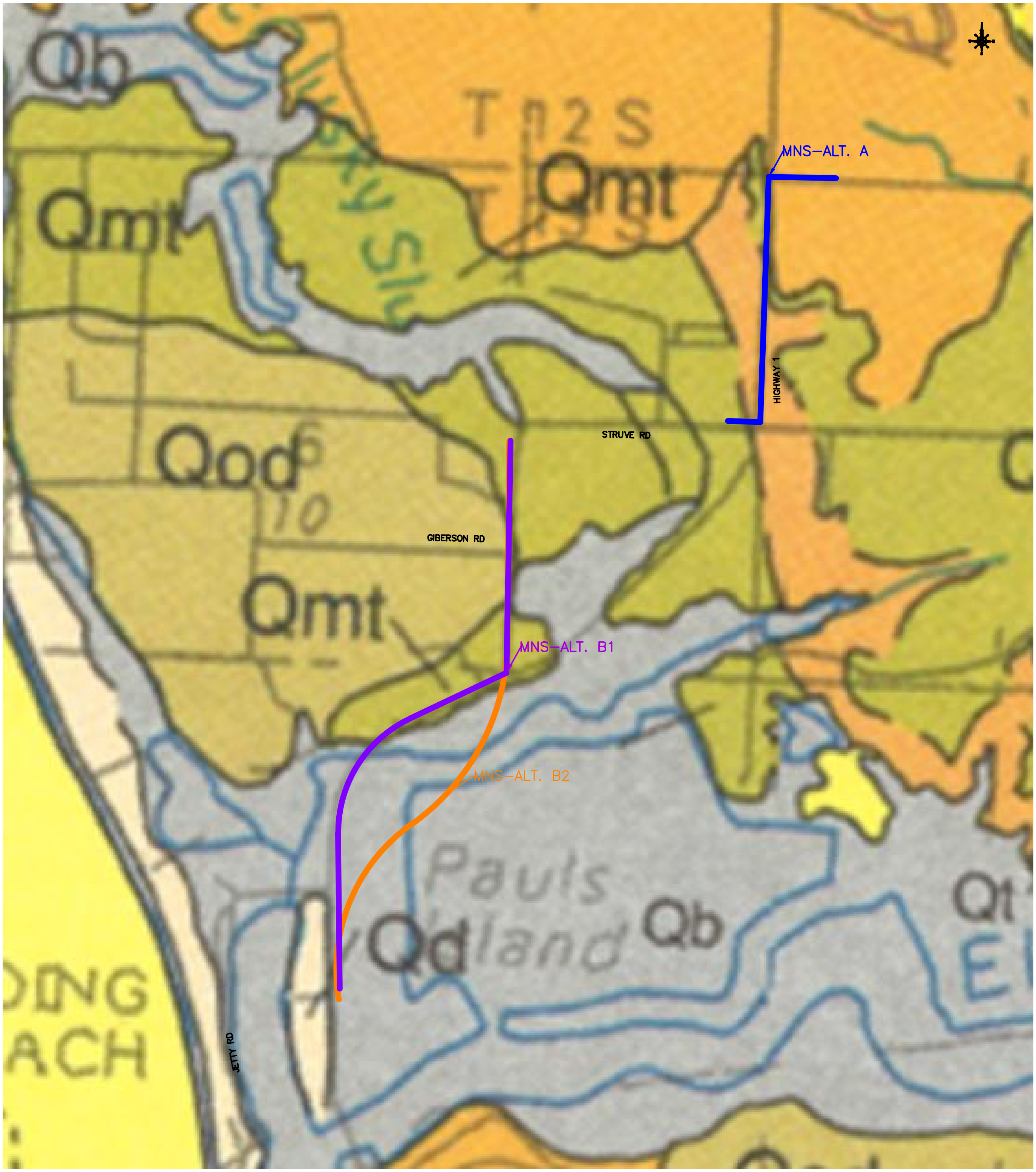
ATTACHMENT D

(GEOLOGICAL MAP & INFORMATION EXCERPTS)



NOTES:

1. Map above excerpted from Geologic Map of the Monterey 30'x 60'Quadrangle and Adjacent Areas", Regional Geologic Map Series, 1:100,000 Scale, published by the California Department of Conservation, California Geological Survey , and dated 2002.

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PROJECT:	Springfield Water System Improvements	
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Geologic Map of Monterey
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 10 / REV:
SCALE: 1/128" = 1'	DATE: 10/23/15	FILE NAME: XX / SHEET 1 OF 1

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NOTES:

1. Legend above excerpted from Geologic Map of the Monterey 30' x 60' Quadrangle and Adjacent Areas", Regional Geologic Map Series, 1:100,000 Scale, published by the California Department of Conservation, California Geological Survey , and dated 2002.

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PROJECT:	Springfield Water System Improvements		
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Geologic Map of Monterey – Legend	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 11	REV:
SCALE:	DATE: 10/23/15	FILE NAME: XX	SHEET 1 OF 1

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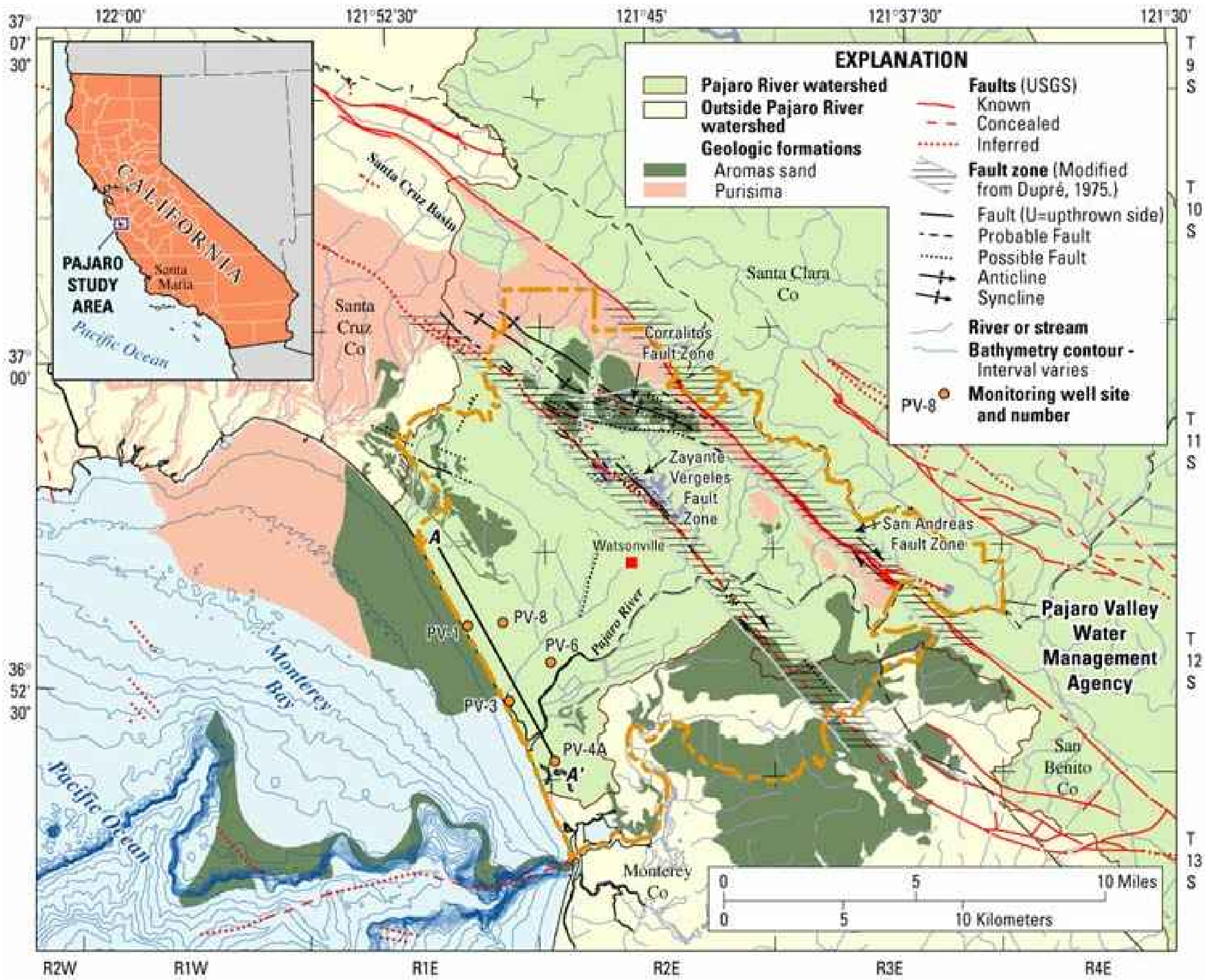

NOTES:

1. Geological plan excerpted from the USGS and Pajaro Valley Water Management Agency "Geohydrology of Recharge and Seawater Intrusion in the Pajaro Valley, Santa Cruz and Monterey Counties, California".

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DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Pajaro Valley Geologic Plan	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 12	REV:
SCALE:	DATE: 10/23/15	FILE NAME: XX	SHEET 1 OF 1

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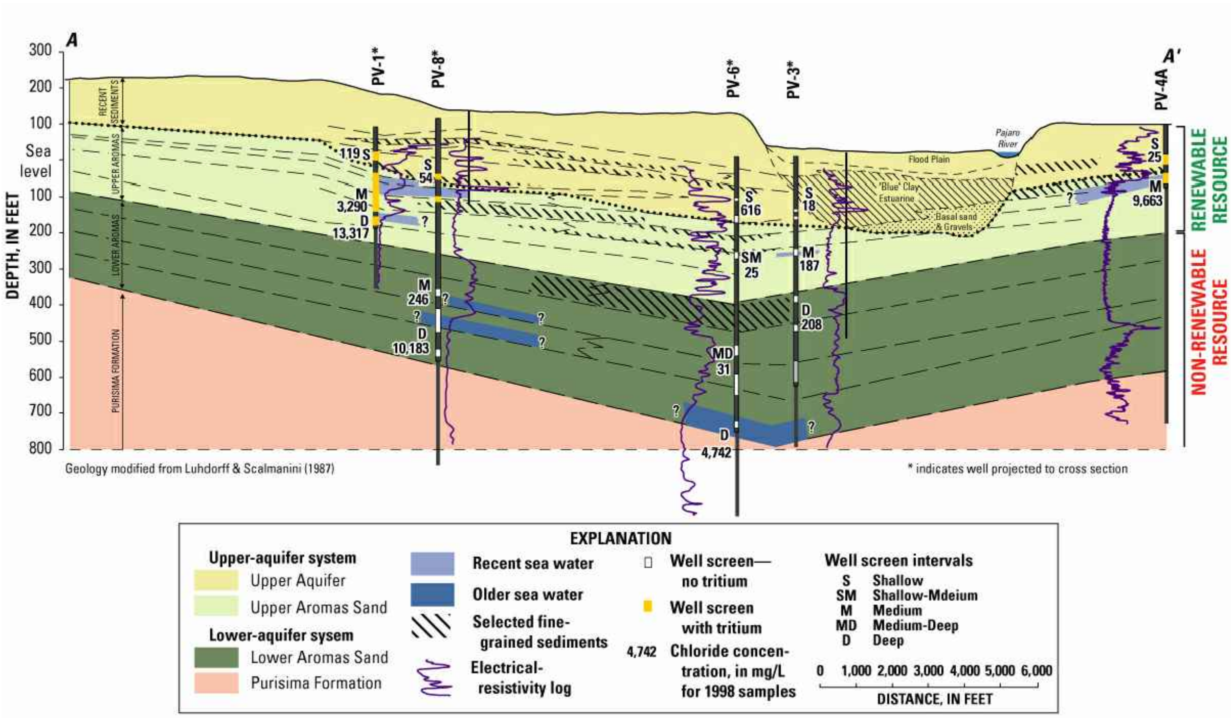

NOTES:

1. Geological profile excerpted from the USGS and Pajaro Valley Water Management Agency "Geohydrology of Recharge and Seawater Intrusion in the Pajaro Valley, Santa Cruz and Monterey Counties, California".

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PROJECT:	Springfield Water System Improvements		
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Pajaro Valley Geologic – Profile A-A'	
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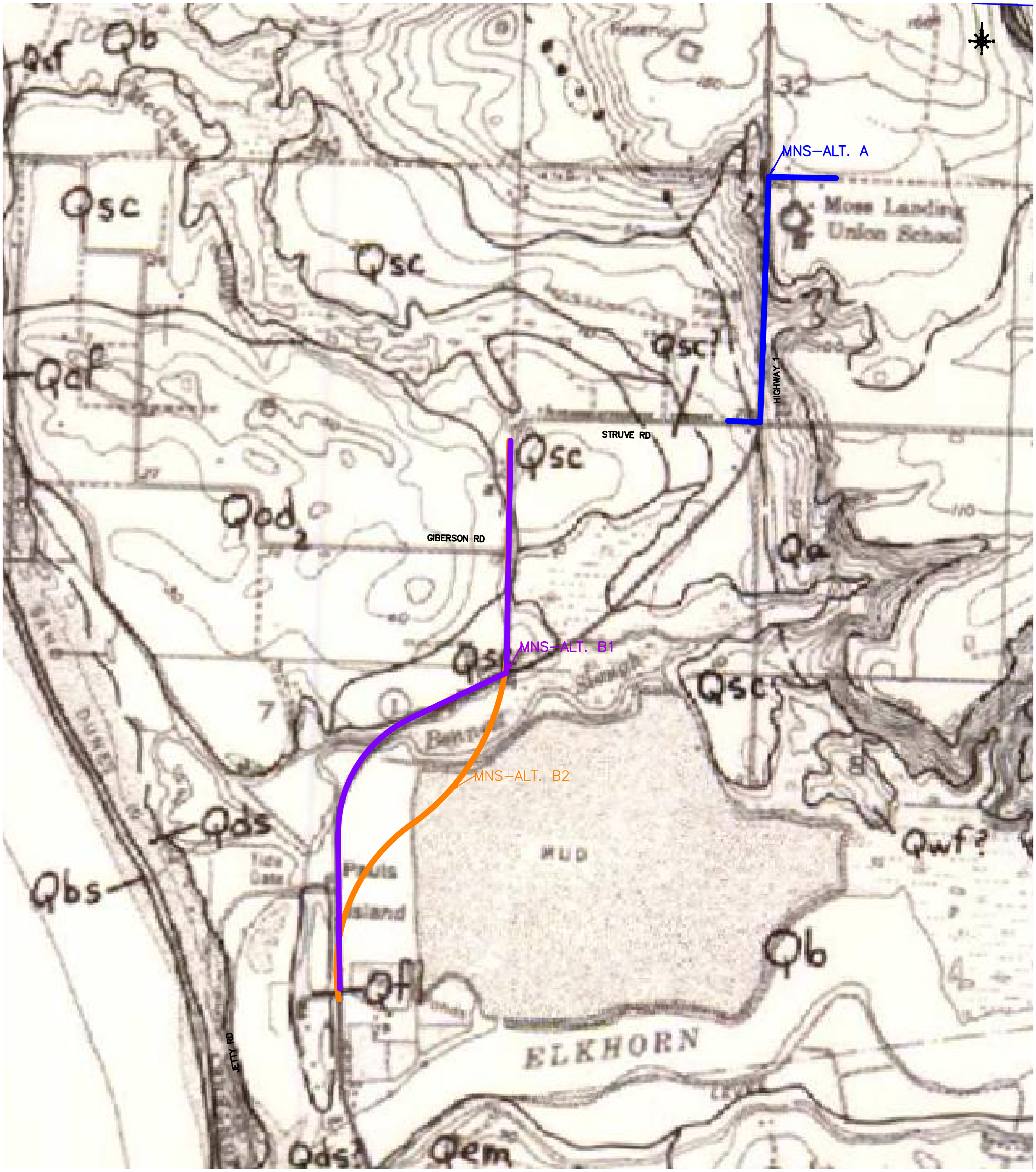

NOTES:
1. Geologic Map above excerpted from Maps Showing Geology and Liquifaction Potential of Northern Monterey and Southern Santa Cruz Counties, California", published by USGS, dated 1980

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aldeaservices.com

PROJECT:	Springfield Water System Improvements		
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Geology and Liquefaction Map	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 14	REV:
SCALE: 1/128" = 1'	DATE: 10/23/15	FILE NAME: XX	SHEET 1 OF 1

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DESCRIPTION OF GEOLOGIC UNITS

Qem — EOLIAN DEPOSITS OF MANRESA BEACH——Weakly to moderately consolidated, moderately well sorted silt and sand deposited in extensive coastal dune fields. Locally grades conformably into underlying coastal terrace deposits of Santa Cruz; elsewhere overlies fluvial facies of terrace deposits of Watsonville. Upper 3–6 m is indurated owing to clay and iron oxide cementation in weathered zone. Permeability and porosity are moderate except in soil zones, where they are generally low. Extensive erosion likely where lower unconsolidated sand exposed to a free face. Relatively low susceptibility to flooding and for liquefaction

Qa — AROMAS SAND (Pleistocene)——Heterogeneous sequence of mainly eolian and fluvial sand, silt, clay, and gravel. Slight angular conformities present throughout the unit; older deposits more complexly folded and faulted than younger deposits. Total thickness may be greater than 250 m. Characterized by maximally developed soils, most with duripans. Low susceptibility to flooding and for liquefaction. Unit locally divided into:

Qae — Eolian deposits——Moderately well sorted sand as much as 60 m thick that contains no intervening fluvial deposits. Several sequences of eolian deposits may be present, each separated by paleosols. The upper 3–6 m of each dune sequence is oxidized and relatively well indurated, and all primary sedimentary structures have been destroyed by weathering; the lower parts of each dune sequence may be relatively unconsolidated below the weathering zone. Porosity and permeability, as well as degree of consolidation, are thus a function of the relative position within the weathering profile. Perched water tables may be present where eolian deposits overlie less permeable fluvial deposits; springs may develop in these areas, and slumps and landslides may develop as well. Severe erosion may occur within this unit when the weathering zone and its protective duripan are breached and the relatively unconsolidated sands are exposed, as evidenced by the extensive colluvial slopes that mantle much of the outcrop area

Qaf — Fluvial deposits——Semiconsolidated, moderately to poorly sorted silty clay, silt, sand, and gravel deposited by meandering and braided streams as well as alluvial fans. Includes beds of relatively well sorted gravel ranging from 3 to 30 m thick that are locally important as aquifers in the region. Locally includes buried soils high in expansive clays, which act as aquicludes. Landslides are common in this unit

Qsc — COASTAL TERRACE DEPOSITS OF SANTA CRUZ——Semiconsolidated, generally well worked sand with a few thin, relatively continuous layers of gravel. Deposited in nearshore high–energy marine environment. Locally grades upward into eolian deposits of Manresa Beach. Thickness variable; maximum approcimately 13 m. Unit thins to north where it ranges from 3 to 6 m thick. As mapped, locally includes many small areas of fluvial and colluvial silt, sand, and gravel, especially at or near old wave–cut cliffsjand some areas of eolian sand. Moderate permeability and porosity. May contain perched water table where underlain by relatively impermeable deposits. Relatively low susceptibility to flooding; low liquefaction susceptibility

Qfl — ARTIFICIAL FILL——Heterogeneous mixture of artificially deposited fill material ranging from well–compacted sand and silt to poorly compacted sediment high in organic content; only locally delineated. Liquefaction susceptibility ranges from high to low, depending on degree of compaction

OLDER COASTAL DUNES——Weakly consolidated, well–sorted sand deposited during at least two periods in the Fort Ord area. Similar in origin and in part correlative with the eolian deposits of Sunset Beach. Physical properties and engineering characteristics similar to eolian deposits of Sunset Beach. Characterized by poorly or medially developed soils. Mapped separately as:

Qod1 — Younger dunes

Qod2 — Older dunes

Qb — BASIN DEPOSITS——Unconsolidated plastic clay and silty clay contain much organic material. Locally contain interbedded thin layers of silt and silty sand. Deposited in a variety of environments including estuaries, lagoons, tidal flats, marsh–filled sloughs, flood basins, and lakes. Thickness highly variable; may be as much as 30 m thick underlying some sloughs. High susceptibility to flooding. Moderate to high liquefaction susceptibility except where water table is more than 10 m below the surface. Highly expansive soils develop on these deposits

Qeu — COASTAL TERRACE DEPOSITS, UNDIFFERENTIATED——Semiconsolidated, moderately well sorted marine sand containing thin, discontinuous gravel–rich layers. May be overlain by poorly sorted fluvial and colluvial silt, sand, and gravel. Thickness variable; generally less than 6 m thick. May be relatively well indurated in upper part of weathered zone; capped by maximally developed soils, some with duripans. Moderate to low porosity and permeability. Local perched water tables in areas where marine sand overlies relatively impervious deposits. Low susceptibility to flooding and for liquefaction

NOTES:
1. Geologic Legend above excerpted from Maps Showing Geology and Liquifaction Potential of Northern Monterey and Southern Santa Cruz Counties, California", published by USGS, dated 1980

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CLIENT/OWNER: MNS ENGINEERS INC	DESIGNER: ALDEA SERVICES LLC, 5301 Buckeystown Pike, Suite 425, Frederick, MD 21704, Phone (301)355–9703 Fax (301)355–9705, aldeaservices.com	PROJECT: Springfield Water System Improvements	
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Geology and Liquefaction Legend	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 15	REV:
SCALE:	DATE: 10/23/15	FILE NAME: XX	SHEET 1 OF 1

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0119536

Page 1 of 1

Owner's Well Number 71081-1

Date Work Began 07/22/2008 Date Work Ended 7/25/2008

Local Permit Agency Monterey County Division of Environmental Health

Permit Number 07-11219 Permit Date 10/18/07

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Mud Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Red sand with clay
30	50	White clay
50	70	Gravel and sand
70	90	Red sand
90	110	Sand and Brown silty clay
110	295	Red sand
295	335	Blue clay and sand
335	360	Blue clay
360	450	Red sand
450	470	Red sand and clay
470	630	Red sand

RECEIVED NOV 09 2010 BY:

Total Depth of Boring 630 Feet

Total Depth of Completed Well 630 Feet

Well Owner

Name Pajaro Sunny Mesa CSD

Mailing Address 136 San Juan Road

City Royal Oaks State CA Zip 95076

Well Location

Address 1815 Highway 1

City Moss Landing County Monterey

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Datum Decimal Lat. Decimal Long.

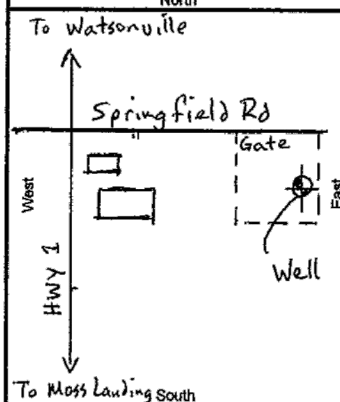
APN Book 413 Page 014 Parcel 001

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
⦿ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Maggiora Bros. Drilling, Inc.
Person, Firm or Corporation

595 Airport Blvd. Watsonville CA 95076
Address City State Zip

Signed C-57 Licensed Water Well Contractor 10-27-10 249957
Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

NOTES:

1. Appendix 2 – C Springfield test Well completion report in PDF format (provided by MNS)

CLIENT/OWNER: MNS ENGINEERS INC

DESIGNER: ALDEA SERVICES LLC
5301 Buckeystown Pike, Suite 425
Frederick, MD 21704
Phone (301)355-9703 Fax (301)355-9705
aldeaservices.com

PROJECT: Springfield Water System Improvements			
DESIGNED BY: XX	CHECKED BY: PH	DRAWING TITLE: Geology and Liquefaction Legend	
DRAWN BY: GM	APPROVED BY: XX	DRAWING NO: 16	REV:
SCALE:	DATE: 10/23/15	FILE NAME: XX	SHEET 1 OF 1

P:\1076.00_SRGFLDWTRSYSIMP\DRAWINGS\DWG\SPRINGFIELD - HDD ALTERNATIVES.DWG

Appendix C – Equipment Information

Well Pumps

TECHNICAL BROCHURE
B50-320L R7

50L, 65L, 95L, 120L, 160L, 250L, 320L
6" Stainless Steel Submersible Pumps

60 HZ HIGH CAPACITY – FOR 6" AND LARGER WELLS

GOULDS
WATER TECHNOLOGY
a xylem brand

FEATURES

Powered for Continuous Operation: All ratings are within the working limits of the motor. Pump can be operated continuously.

New Design Features: Cast 304 SS discharge head and motor adapter.

Field Serviceable: Easy to install and service. All parts easily dismantled if field service is ever necessary.

Diverse Application: Designed for commercial, municipal and agricultural water needs.

Stainless Steel Construction: Durable in most waters.

Bearings: Replaceable, silicon carbide bearings allow excellent abrasives handling and wear resistance.

Built-in Check Valve: Positive sealing, stainless steel check valve assembly incorporated into discharge head.

Impellers: New stainless steel impeller design provides improved efficiency.

Maximum Temperature: 140°F (60°C) for pump.

Four-Fluted Shaft Design: Four sided stainless steel shaft eliminates impeller keys and provides positive drive.

Coupling: Removable heavy duty stainless steel, splined coupling for maximum load-carrying capability.

Suction Strainer: Stainless steel strainer restricts gravel and other debris from entering the pump.

Cable Guard: Stainless steel cable guard surrounds and protects motor leads.

Fasteners: All fasteners are stainless steel.

CentriPro Motors: Designed to NEMA standards. Stainless steel casing resists corrosion. Water filled design provides a constant supply of lubrication. Hermetically sealed stator assures moisture free windings. Durable Kingsbury type thrust bearing absorbs all thrust. Replaceable motor lead assembly.

Certified to NSF/ANSI 61, Annex G.

SPECIFICATIONS

Model	Horsepower Range	Discharge Connection	Recommended GPM Operating Range	GPM at Best Efficiency	Minimum* Well Size	Rotation at Discharge End
50L	3 - 20	3" NPT	17 - 70	50	6" / 8" *	CCW
65L	3 - 40		20 - 90	65		
95L	5 - 40		25 - 130	90		
120L	5 - 50		40 - 170	120		
160L	3 - 60		50 - 240	160	6"	
250L	7.5 - 60		70 - 300	250		
320L	7.5 - 60	4" NPT	100 - 400	320		

* Minimum well size refers only to dimensional fit in a well, the specifier or installer must determine the minimum required well diameter that will insure an adequate supply of water to the pump and also properly cool the motor. See Water End Data Chart for specific diameter by model number.

AGENCY LISTINGS

NSF/ANSI 372 – Drinking Water System Components – Lead Content

CLASS 6853 01 - Low Lead Content Certification Program - - Plumbing Products

NSF/ANSI 61-G

Pump/Water End - Drinking Water System Components - Certified to NSF/ANSI 61, Annex G

"L" SERIES MATERIALS OF CONSTRUCTION

Ref. No.	Part Name	Material	Material Code
1	Discharge Head	Stainless steel	ASTM CF-8 (AISI 304 cast)
2	Check Valve Support	Stainless steel	ASTM CF-8 (AISI 304 cast)
3	Check Valve	Stainless steel	AISI 304 SS
4	Elastomers	Ethylene propylene	EPDM
5	Bolts and Screws	Stainless steel	AISI 304 SS
6	Shaft Sleeve and Bushing	Tungsten carbide	–
7	Thrust Bearing	PTFE+Graphite	–
8	Impeller	Stainless steel	AISI 304 SS
9	Diffuser	Stainless steel	AISI 304 SS
10	Spacer	Stainless steel	AISI 431 SS
11	Tie Rod	Stainless steel	AISI 304 SS
12	Cable Guard	Stainless steel	AISI 304 SS
13	Wear Rings	Technopolymer PPO	Engineered polymer
14	Strainer	Stainless steel	AISI 304 SS
15	Shaft	Stainless steel	AISI 431 SS
16	Shaft Coupling	Stainless steel	AISI 431 SS
17	Motor Adapter	Stainless steel	ASTM CF-8 (AISI 304 cast)

SYSTEM COMPONENTS

- **Pump/Water End:**
  - 50L-250L with 3" NPT discharge.
  - 320L with 4" NPT discharge.
  - 3 HP Water Ends Have 4" Motor Adapters
  - 5 & 7.5 HP Water Ends Have Either a 4" or 6" Motor Adapter (see Water End Data chart)
  - 10 HP and Larger Water Ends Have 6" Motor Adapters
- **Motor:**
  - 4" motor required for 3 HP and 5 HP pumps.
  - 4" or 6" motors can be used for 7.5 HP pumps.
  - 6" motor required for 10 HP and larger pumps.
- **Control Box:** Required for all single phase motors.
- **Magnetic Starter:** A magnetic starter with Class 10 overloads is required for all three phase units.

WATER ENDS AND MOTORS MUST BE ORDERED SEPARATELY AND ARE PACKAGED SEPARATELY.

ORDER NUMBER CODE

65 L 03

Pump Size/Gallons per minute at Best Efficiency Point: 50, 65, 95, 120, 160, 250, 320

Pump Series: L

Horsepower Code = HP

03 = 3
05 = 5 (4" motor)
05-6 = 5 (6" motor)
07-4 = 7.5 (4" motor)
07 = 7.5 (6" motor)
10 = 10
15 = 15
20 = 20
25 = 25
30 = 30
40 = 40
50 = 50
60 = 60

WATER END (PUMP) DATA

Model	Order No.	No. Stages	Min. HP Required	Required Motor Dia.	Dimensions & Weights: Length in.	Length mm	Diameter in.	Diameter mm	Weight lbs.	Weight kg.
	50L03	4	3	4	20.6	522	5.59	142	25	11
	50L05R**	7	5		25.8	656			35	16
	50L05**	8	5	4/6	27.8	706			40	18
50L	50L07**	11	7.5		33.3	844	5.67	144	49	22
	50L10	15	10		40.2	1020			57	26
	50L15	23	15	6	56.9	1446			82	37
	50L20	28	20		65.8	1670			94	43
	65L03	3	3	4	18.6	472	5.59	142	26	12
	65L05**	5	5	4/6	22.2	564			31	14
	65L07**	7	7.5		25.8	656			35	16
	65L10	10	10		31.3	794			44	20
65L	65L15	16	15		42.1	1070	5.67	144	60	27
	65L20	21	20	6	53.0	1346			75	34
	65L25	27	25		63.9	1622			90	41
	65L30*	32	30		98.7	2508	6.97*	177	220	100
	65L40*	41	40		115.0	2922			253	115
	95L05**	3	5		18.6	472	5.59	142	26	12
	95L07**	5	7.5	4/6	22.2	564			31	14
	95L10	7	10		25.8	656			35	16
95L	95L15	10	15		31.3	794	5.67	144	44	20
	95L20	14	20	6	38.5	978			53	24
	95L25	17	25		43.9	1116			62	28
	95L30	21	30		53.0	1346			75	34
	95L40*	28	40		67.3	1710	6.97*	177	156	71
	120L05**	2	5	4/6	16.8	426	5.59	142	22	10
	120L07**	3	7.5		19.5	495			26	12
	120L10	5	10		24.9	633			33	15
	120L15	7	15		30.4	771			40	18
120L	120L20	10	20		38.5	978	5.67	144	51	23
	120L25	12	25	6	43.9	1116			57	26
	120L30	15	30		52.1	1323			68	31
	120L40	20	40		65.7	1668			86	39
	120L50*	24	50		80.9	2055	6.97*	177	179	81
	160L03	1	3	4	14.5	367	5.59	142	18	8
	160L05**	2	5	4/6	17.2	436			22	10
	160L07**	3	7.5		19.9	505			26	12
	160L10	4	10		22.6	574			31	14
	160L15	6	15		28.0	712			37	17
160L	160L20	8	20		33.5	850	5.67	144	44	20
	160L25	9	25	6	36.2	919			46	21
	160L30	11	30		41.6	1057			53	24
	160L40	15	40		52.5	1333			68	31
	160L50	18	50		60.6	1540			77	35
	160L60	20	60		65.7	1668			86	39
	250L07**	2	7.5	4/6	20.8	528			26	12
	250L10	3	10		25.3	643			33	15
	250L15	5	15		34.4	873			44	20
	250L20	7	20		43.4	1103			55	25
250L	250L25	8	25	6	48.0	1218	5.67	144	60	27
	250L30	9	30		52.5	1333			66	30
	250L40	13	40		70.6	1793			88	40
	250L50	16	50		84.2	2138			104	47
	250L60	19	60		97.8	2484			128	58
	320L07**	2	7.5	4/6	21.8	553			27	12
	320L15	4	15		30.8	783			38	17
	320L20	5	20		35.4	898			45	20
320L	320L25	6	25		39.9	1013	5.67	144	50	22
	320L30	8	30	6	49.0	1243			61	27
	320L40	11	40		62.5	1588			78	35
	320L50	13	50		71.6	1818			89	40
	320L60	16	60		84.2	2138			104	47

* Note pump diameter – high pressure models have an exterior casing and larger diameters, verify they will fit your well.

** Pumps can be configured to accomodate a 4" or 6" motor. See product order code.

MOTOR DATA

NOTE: 4" diameter motors are required for 3 and 5 HP "L" Series pumps.
4" or 6" diameter motors can be used for 7.5 HP "L" Series pumps. See Water End Data Chart.
6" diameter motors are required for 10 HP and larger "L" Series pumps.

CENTRIPRO 4" MOTORS

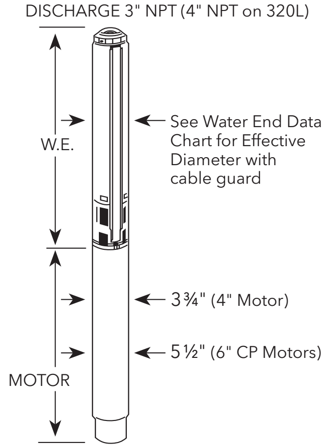
Single Phase Motors – Dimensions and Weights					
Motor Order No.	HP	Motor Dia.	Volts	Length in. (mm)	Weight lbs. (Kg)
M30412	3	4"	230	18.3 (466)	40 (18.1)
M50412	5			27.7 (703)	70 (31.8)
Three Phase Motors – Dimensions and Weights					
M30430	3	4"	200	15.3 (389)	32 (14.5)
M30432			230		
M30434			460		
M50430	5	4"	200	21.7 (550)	55 (24.9)
M50432			230		
M50434			460		
M75430	7.5	4"	200	27.7 (703)	70 (31.8)
M75432			230		
M75434			460		

CENTRIPRO 6" MOTORS

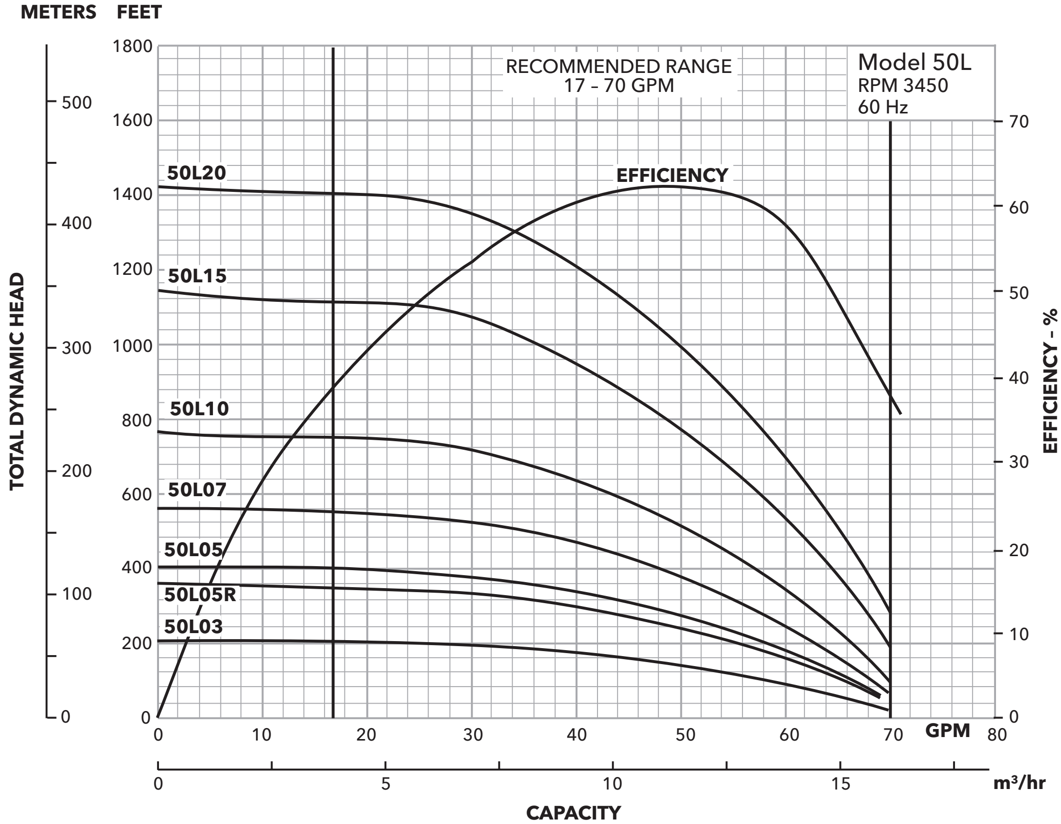
Single Phase Motors – Dimensions and Weights					
Motor Order No.	HP	Motor Dia.	Volts	Length (inches)	Weight (lbs)
6M071	7.5	6"	230	29.9	128
6M101	10	6"	230		
6M151	15	6"	230	33.5	148
Three Phase Motors – Dimensions and Weights					
6M078	7.5	6"	200	24.8	99
6M072			230		
6M074			460		
6M108	10		200	27.0	110
6M102			230		
6M104			460		
6M158	15		200	29.9	128
6M152			230		
6M154			460		
6M208	20		200	31.5	137
6M202			230		
6M204			460		
6M258	25		200	36.2	161
6M252			230		
6M254			460		
6M308	30		200	38.2	176
6M302			230		
6M304			460		
6M404	40			40.6	187
66M504	50			41.7	198
86M504	50	6" x 8"		46.4	353

CENTRIPRO FM-SERIES 6" MOTORS

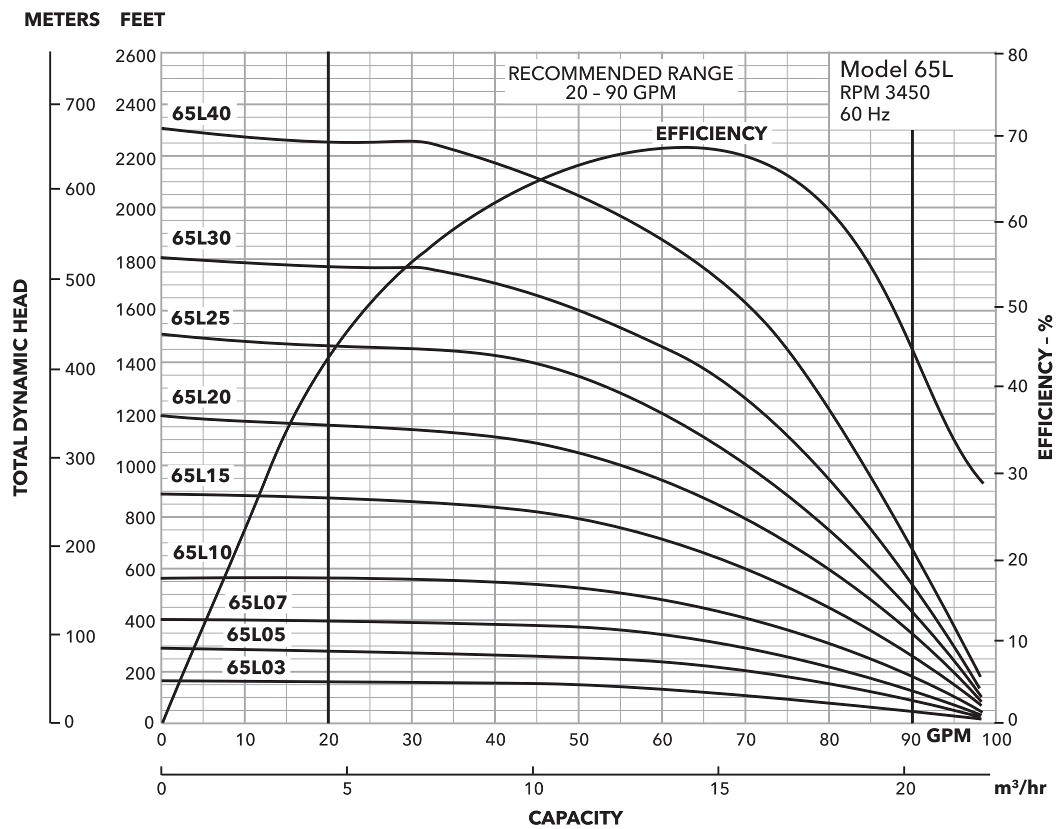
Single Phase Motors Dimensions and Weights					
Motor Order No.	HP	Motor Dia.	Volts	Length (inches)	Weight (lbs)
6F051	5	6"	230	25.6	143
6F071	7.5			28.1	161
6F101	10			30.3	161
6F151	15			32.8	181
Three Phase Motors Dimensions and Weights					
Motor Order No.	**HP**	**Motor Dia.**	**Volts**	**Length (inches)**	**Weight (lbs)**
6F058	5	6"	200-208	23.0	107.0
6F052			230		
6F054			460		
6F078	7.5		200-208	24.3	117.0
6F072			230		
6F074			460		
6F108	10		200-208	25.6	124.0
6F102			230		
6F104			460		
6F158	15		200-208	28.1	127.0
6F152			230		
6F154			460		
6F208	20		200-208	30.3	152.0
6F202			230		
6F204			460		
6F258	25		200-208	32.8	164.0
6F252			230		
6F254			460		
6F308	30		200-208	35.6	185.0
6F302			230		
6F304			460		
6F404	40		460	39.3	207.0
6F504	50		460	54.1	285.0



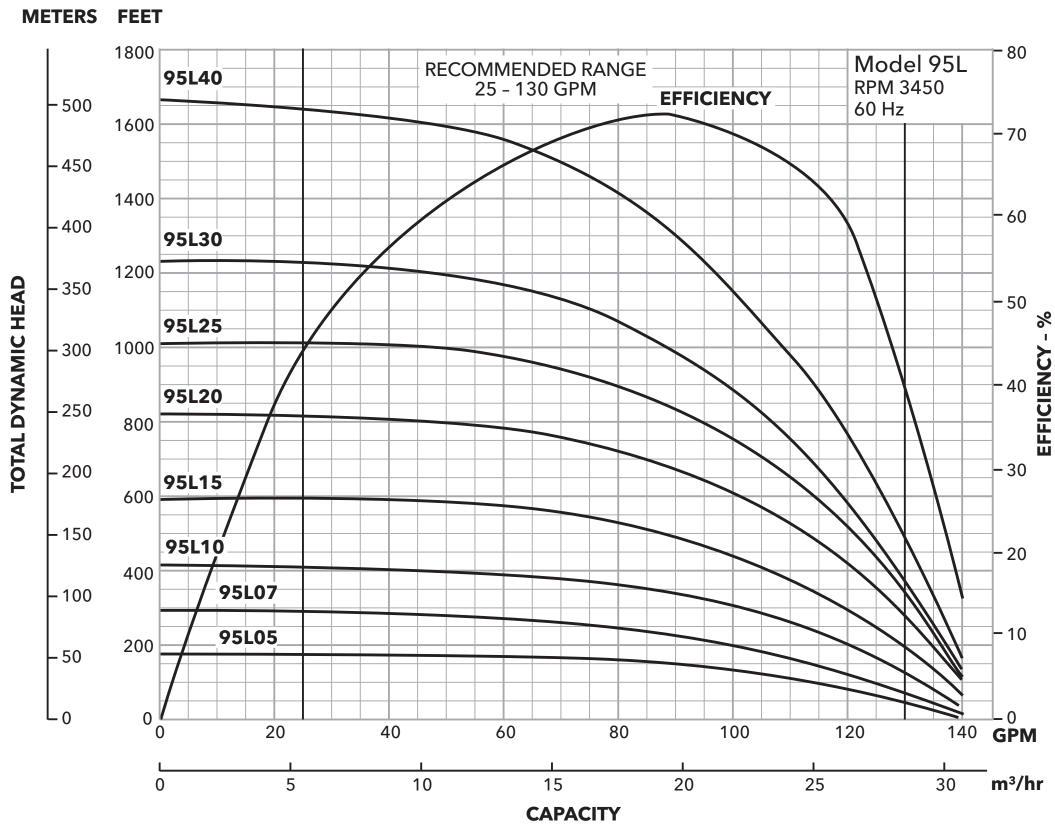
MODEL 50L



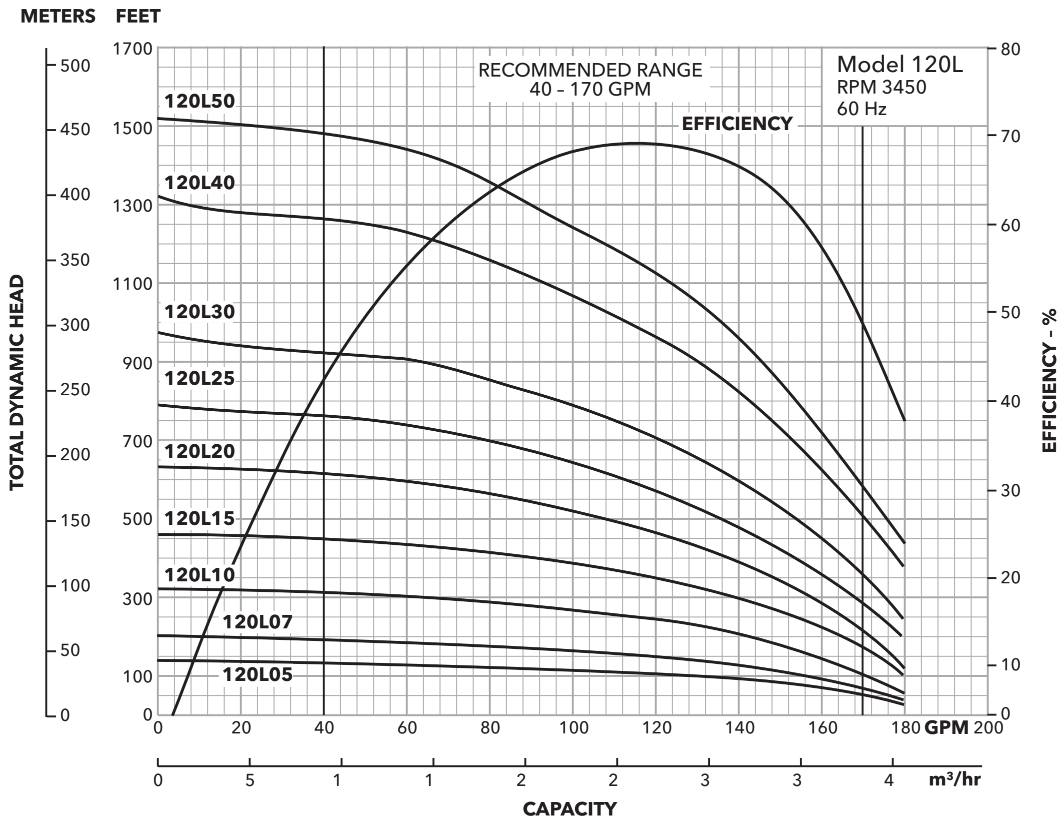
MODEL 65L



MODEL 95L



MODEL 120L



Duty/Fire Pumps

SUBMITTAL

Quote ID: 3302-191120-007:0:3 QTY: 1
VIS-WFTM 7CHC, 3 Stages
RF MACDONALD CO/FRESNO FRESNO

PERFORMANCE ON DESIGN CURVE AT 1765 RPM

	Shut Off	Design [2]	Run Out [5]		
Flow (USGPM)	0.0	200.0	338.0	**Best Efficiency**	80.40 % at 208.0 USgpm
TDH-Bowl (ft)	93.0	80.5	43.9	**Design Flow % BEP**	96.15 %
TDH-Disch Flange (ft)	91.1	77.6	39.5	**Pump Efficiency**	78.89 %
Bowl Efficiency (%)	-	80.30	60.10	**Overall Efficiency**	0.00 %
Guaranteed Bowl Efficiency (%)	-	76.28	-	**NOL Power**	6.2 Hp at 338.0 USgpm
Power (Hp)	2.6	5.1	6.2	**Guaranteed NOL Power**	6.7 Hp at 338.0 USgpm
Guaranteed Power (Hp)	-	5.5	-	**Max Power (NOL) at Max Trim**	7.4 Hp at 338.0 USgpm
NPSHr (ft) [1]	-	5.0	11.3	**Guaranteed Max Power (NOL) at Max Trim**	8.0 Hp at 338.0 USgpm
NPSH Margin (ft) [1]	-	41.3	35.0	**Specified NPSH Ratio**	1.1
Hydraulic Thrust(lb)	326.0	281.0	154.0	**Thrust Load Power Loss**	0.04070 Hp
Thrust (lb)	389.0	342.2	210.0	**Total Flow Derate Factor**	1.00
Pressure-Bowl (psi)	40.3	34.8	19.0	**Total Head Derate Factor**	1.00
Pressure-Disch Flange (psi)	39.4	33.6	17.1	**Total Efficiency Derate Factor**	1.00
Min Submergence (Inch) [3]	-	14.09	17.94	**Actual Submergence**	161.65 in
Friction Loss (ft) [4]	-	1.03	2.50	**Shaft Friction Power Loss**	-0.02 Hp
Lineshaft Elongation (Inch)	0.00000	0.00000	-	**Min Flow (MCSF)**	52.0 USgpm
Column Elongation (Inch)	0.00055	0.00055	-	**kWh per 1000 gal**	0.00000
Lateral (Inch)	0.12945	0.12945	-	**Impeller Running Clearance**	0.13 in

[1] at 1st impeller eye [2] rated values [3] from bottom of pump [4] from bowl to disch flange [5] based on user entered TDH

OPERATING CONDITIONS

Specified Flow	200.00 USgpm
Design TDH (Bowl)	80.5 ft
Rated Speed	1765 RPM
Atmospheric Pressure	14.70 psi
TPL	17.73 ft
Pumping Level	1.00 ft
NPSHa at 1st Impeller	46.3 ft
Well Diameter	14 inch [356mm] Casing

FLUID CHARACTERISTICS

Fluid	Water
Fluid Temperature	68.0 °F
Specific Gravity	1.0000
Viscosity	1.0017 cP
Vapor Pressure	0.3393 psi
Density	62 lbs/ft³

MATERIALS & DIMENSIONS

Bowl Data

Bowl Material	Cast Iron with Glass Enamel
Bowl Material Derate Factor	1.00
Impeller Material	316SS
Impeller Matl Derate Factor	1.00
Bowl Shaft Material	416SS
Impeller Attachment	Taper Lock
Taper Lock Material	416SS
Discharge Bowl Material	Cast Iron
Suction Type	Bowl
Bowl Bolting Material	316SS
Motor Adapter	8" [203.2 mm]
Motor Adapter Bearing	Bronze
Discharge Bowl Bearing	Bronze
Intermediate Bowl Bearing	Bronze
Impeller Trim	4.94 in
Max Impeller Trim	5.25 in

Bowl Data

Thrust K-Factor	3.5 lb/ft
Thrust K-Factor	3.5 Lb/Ft
Bowl Pressure Limit	350 psi
Shut Off Lateral	0.12945 in
Design Lateral	0.12945 in
Bowl Assembly Length (BL)	37.33 in
Bowl Shaft Diameter	1 3/16" [30.2 mm]
Impeller Balance	Dynamic Two Plane Balance
Bowl Wear Ring	416SS
Impeller Wear Ring	Not Included
Bowl Diameter (D)	7.50 in
Min Column Diameter	4 in
Max Column Diameter	6 in
Bowl Shaft Length	55.50 in
Bowl Shaft Power Limit	128.15 Hp

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

Certified By		
Project	Pajaro PCW Vertical Turbine VIC Submersible Pumps	
Tag		
PO Number		
Serial Number		

SUBMITTAL

Quote ID: 3302-191120-007:0:3 QTY: 1
VIS-WFTM 7CHC, 3 Stages
RF MACDONALD CO/FRESNO FRESNO

Bowl Specials

Column Data

Column Type	Threaded
Column Diameter	4" [102mm]
Column Pipe Material	Carbon Steel

Column Data

Max Column Section Length	120 in

Column Specials

Head Data

Well Diameter	14 inch [356mm] Casing
Discharge Elbow Material	Carbon Steel
Head Flanged Rating	150 # Flange

Head Data

Well Head Size	4" [102mm]
Sanitary Well Seal	Yes

Head Specials

Includes Power Cable Sealing Design

Motor Data

Driver Type	Submersible
Manufacturer	Hitachi
HP Rating	7.5 Hp
Speed [Poles]	1800 rpm [4 pole]
Voltage	460 V
Phase / Frequency	3 PH / 60 Hz
Efficiency / Config	Standard
Motor Adapter	8" [203.2 mm]
Motor Flange	8 in
ML [Motor Length]	37.40 in

Motor Data

MD [Motor Diameter]	8.00 in
SF / Insulation**	1.15 Y
Motor Provided By	Xylem
Motor Mounted By	Customer
Motor Part Number	S11931H
Driver Size Criteria	Max power on design curve (NOL)
Allow Service Factor	No

Motor Specials

SS Motor Shroud

Coating Data

Bowl OD	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Column ID	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Column OD	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Can ID	Not Included

Coating Data

Can OD	Not Included
Head ID	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Head OD	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Steel Sub Base	Not Included

Testing Data

Performance Testing	Bowl Assembly Only Non-Witness Lab Motor
Acceptance Grade	2B
Hydrostatic Testing	Bowl Assembly Non-Witness

Miscellaneous Specials

Weight Data

Total Bowl Weight	136 lbs
Unit Bowl Weight	80 lbs / 28 lbs
Total Column Weight	119 lbs
Unit Column Weight	11 lbs

Weight Data

Head Weight	**Refer to Factory**
Motor Weight	364 lbs
Total Weight	**Refer to Factory**
Total Rotating Weight	50 lbs

INFO, WARNING & ERROR MESSAGES

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

Certified By		
Project	Pajaro PCW Vertical Turbine VIC Submersible Pumps	
Tag		
PO Number		
Serial Number		

BaseValue	Invalid	BaseValue is invalid
	Invalid	is invalid
	Warning	Dimensions could not be found for one or more components, please override dimensions that show 9999.0 with the correct values.

Our offer does not include specific review and incorporation of any Statutory or Regulatory Requirements and the offer is limited to the requirements of the design specifications. Should any Statutory or Regulatory requirements need to be reviewed and incorporated then the Customer is responsible to identify those and provide copies for review and revision of our offer.

Our quotation is offered in accordance with our comments and exceptions identified in our proposal and governed by our standard terms and conditions of sale – Xylem Americas attached hereafter.

For units requiring performance test, all performance tests will be conducted per ANSI/HI 14.6 standards unless otherwise noted in the selection software submittal documents. Test results meeting with grade 2B tolerances for pumps with a rated shaft power of 134HP or less and grade 1B for greater than 134HP will be considered passing.

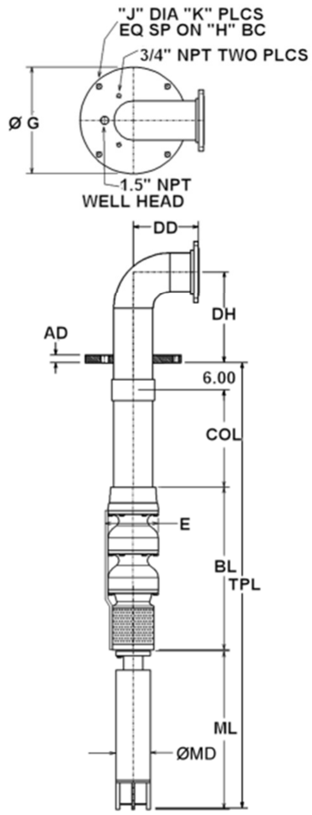
Customer is responsible for verifying that the recommendations made and the materials selected are satisfactory for the Customer's intended environment and Customer's use of the selected pump. Customer is responsible for determining the suitability of Xylem recommendations for all operating conditions within Customer's and/or End User's control. Xylem disclaims all warranties, express or implied warranties, including, but not limited to, warranties of merchantability and fitness for a particular purpose and all express warranties other than the limited express warranty set forth in the attached standard terms and conditions of sale – Xylem Americas attached hereafter.

Xylem does not guarantee any pump intake configuration. The hydraulic and structural adequacies of these structures are the sole responsibility of the Customer or his representatives. Further, Xylem accepts no liability arising out of unsatisfactory pump intake field operating conditions. The Customer or his representatives are referred to the Hydraulic Institute Standards for recommendations on pump intake design. To optimize the hydraulic design of a field pump intake configuration, the Customer should strongly consider performing a detailed scale model pump intake study. However, the adequacies of these recommendations are the sole responsibility of the Customer.

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED		
Certified By		
Project	Pajaro PCW Vertical Turbine VIC Submersible Pumps	
Tag		
PO Number		
Serial Number		

OUTLINE DRAWING

Quote ID: 3302-191120-007:0:3 QTY: 1
VIS-WFTM 7CHC, 3 Stages
RF MACDONALD CO/FRESNO FRESNO



DIMENSIONS

Discharge Head Size	4.00 in
J [Mounting Flange Hole Dia]	1.12 in
H [Mounting Flange Bolt Circle]	18.75 in
Dim G [Mounting Flange Dia]:	21.00 in
DD [Disch Flange Stickout]	7.38 in
DH [Disch Flange Height]	11.00 in
AD [Mounting Flange Thickness]	9999.00 in
Column Length (COL)	132.00 in
E	7.50 in
BL [Bowl Assembly Length]	37.33 in
TPL [Total Pump Length]	212.73 in
ML [Motor Length]	37.40 in
MD [Motor Diameter]	8.00 in
Head Flange	4"-150#

PUMP DATA

Column Diameter	4" [102mm]
Lineshaft Diameter	1 in [25.4 mm]
Specified Flow	200.00 USgpm
Specified TDH	80.00 ft
Pumping Level	1.00 ft
Motor Manufacturer	Hitachi
Driver Type	Submersible
Selected Motor Power	7.50 Hp
Motor Speed	1765 RPM
Phase / Frequency	3 PH / 60 Hz
Voltage	460 V

WEIGHTS

Total Bowl Weight	136 lbs
Unit Bowl Weight	80 lbs / 28 lbs
Total Column Weight	119 lbs
Unit Column Weight	11 lbs
Head Weight	**Refer to Factory**
Motor Weight	364 lbs
Total Weight	**Refer to Factory**
Total Rotating Weight	50 lbs

NOTES	
1	Total Pump Length ± 1.0 inch.
2	Tolerance on all dimensions is .12 or ± .12 inch per 5 ft, whichever is greater.
3	All dimensions shown are in inches unless otherwise specified.
4	Drawing not to scale.
5	½" NPT – Gauge Conn (plugged)
6	Driver may be rotated at 90º intervals about vertical centerline for details refer to driver dimension drawing.
7	Refer to product IOM for impeller setting requirements.
8	This assembly has been designed so that its natural frequency responses avoid the specific operating speeds by an adequate safety margin. The design has assumed the foundation to be rigid.

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CROSS SECTION DRAWING

Quote ID: 3302-191120-007:0:3 QTY: 1
VIS-WFTM 7CHC, 3 Stages
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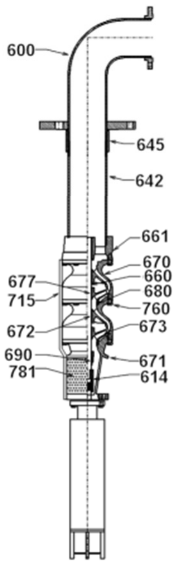

BILL OF MATERIALS

ITEM	PART NAME	CODE	MATERIAL	ASTM#
Head Assembly				
600	Well Head	9645	Carbon Steel Fab	A53
Column Assembly				
642	Column Pipe Material	6501	Black Pipe Sch 40	A 53
645	Column Coupling	9645	Carbon Steel Fab	A53
Bowl Assembly				
614	Coupling-Sub Motor	2218	SST 416	A582M
660	Shaft - Bowl	2227	SST 416	A582 S41600
661	Discharge Bowl	1003	Cast Iron Cl30	A48 CLASS 30B
664	Bearing - Discharge Bowl	1618	Bronze Bismuth	B584 Modified
670	Bowl - Intermediate	6911	Cast Iron Cl30 Enamel	A48
671	Motor Adapter	1018	Ductile Iron 65-45-12	A536
672	Bearing - Intermediate Bowl	1618	Bronze Bismuth	B584 Modified
673	Impeller	1203	SST 316	A744M
677	Taper Lock-Impeller	2217	SST 416	A582M
680	Wear Ring-Bowl	1232	SST CA15	A743M
681	Wear Ring - Impeller	NA	Not Included	NA
690	Bearing - Motor Adapter	1618	Bronze Bismuth	B584 Modified
715	Guard-Cable	3215	SST 304	A240M
758	Capscrew-(Motor)	2228	SST 304	A276
781	Screen-Suction	3211	SST 316	A240M
789	Washer - Upthrust	6266	Tivar 1000	None
NA	Check Valve	NA	Not Included	NA

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED	
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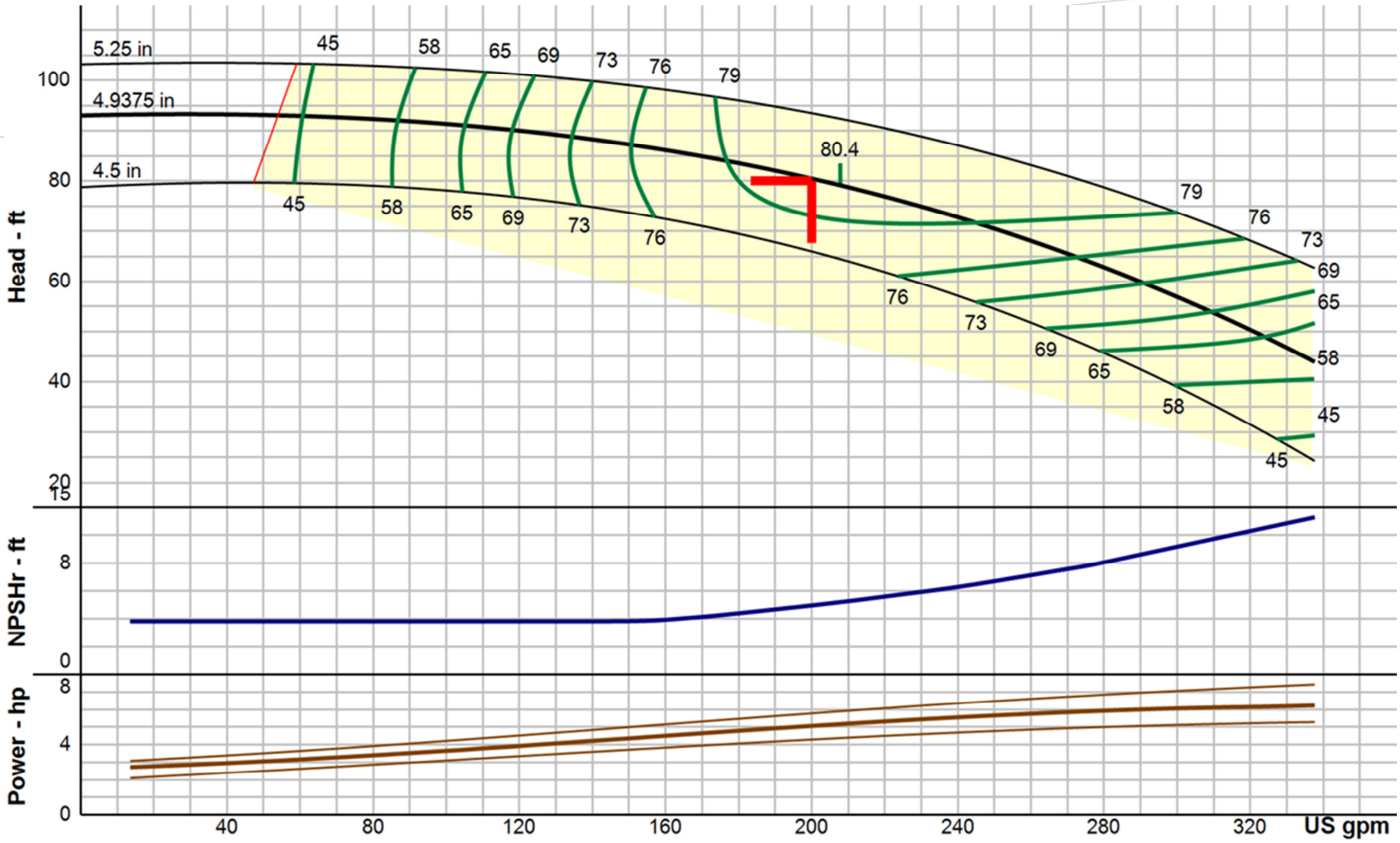
PERFORMANCE CURVE

Quote ID: 3302-191120-007:0:3 QTY: 1
VIS-WFTM 7CHC, 3 Stages
RF MACDONALD CO/FRESNO FRESNO



Curve & hydraulic data presented is nominal performance based on ANSI/HI 14.6 acceptance grade 2B.
Design values are guaranteed within the following tolerances: Flow ± 8%, Head ± 5%, and optionally either Power + 8% or Efficiency - 5% at manufacturer's discretion.

CURVE DATA

Specified Flow	200.00 USgpm
Specified TDH	80.00 ft
Rated Speed	1765 RPM
Atmospheric Pressure	14.70 psi
Pumping Level	1.00 ft
NPSHa at Grade	33.9 ft
NPSHa at 1st Impeller	46.3 ft
Well Diameter	14 inch [356mm] Casing
Fluid	Water
Fluid Temperature	68.0 °F
Specific Gravity	1.0000
Viscosity	1.0017 cP
Vapor Pressure	0.3393 psi
Density	62 lbs/ft³
Design Flow	200.0 USgpm
Min Flow (MCSF)	52.0 USgpm
Design TDH (Bowl)	80.5 ft
Design TDH (Disch Flange)	77.6 ft
Design Pressure (Bowl)	34.8 psi
Design Pressure (Disch Flange)	33.6 psi
Shut Off TDH (Bowl)	93.0 ft

Shut Off TDH (Disch Flange)	91.1 ft
Shut Off Pressure (Bowl)	40.3 psi
Shut Off Pressure (Disch Flange)	39.4 psi
Run Out Flow	338.0 USgpm
Run Out TDH (Bowl)	43.9 ft
Run Out TDH (Disch Flange)	39.5 ft
Run Out Pressure (Bowl)	19.0 psi
Run Out Pressure (Disch Flange)	17.1 psi
Bowl Efficiency at Design	80.30 %
Guaranteed Bowl Efficiency	76.29 %
Best Efficiency	80.40 %
BEP Flow	208.0 USgpm
Design Flow % BEP	96.15 %
Pump Efficiency	78.89 %
Friction Loss at Design	1.03 ft
Power at Design	5.1 Hp
Guaranteed Power	5.5 Hp
NOL Power	6.2 Hp
Guaranteed NOL Power	6.7 Hp
Max Power (NOL) Flow	338.0 USgpm
Max Power (NOL) at Max Trim	7.4 Hp
Guaranteed Max Power (NOL) at	8.0 Hp

Max Trim	
Max Power (NOL) Flow at Max Trim	338.0 USgpm
Recommended Power	7.50 Hp
Allow Service Factor	No
kWh per 1000 gal	0.00000
NPSHr at Design	5.0 ft
NPSH Margin at Design	41.3 ft
Min Submergence at Design	14.09 in
Actual Submergence	161.65 in
Thrust at Design	342.2 lb
Thrust at Shut Off	389.0 lb
Thrust at Run Out	210.0 lb
Bowl Material	Cast Iron with Glass Enamel
Bowl Material Derate Factor	1.00
Impeller Material	316SS
Impeller Matl Derate Factor	1.00
Total Flow Derate Factor	1.00
Total Head Derate Factor	1.00
Total Efficiency Derate Factor	1.00
Curve ID	E6207CCPC2

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Quote ID: 3302-191120-007:0:4 QTY: 1
VIS-WFTM 13CMC, 1 Stage
RF MACDONALD CO/FRESNO FRESNO

PERFORMANCE ON DESIGN CURVE AT 1730 RPM

	Shut Off	Design [2]	Run Out [5]		
Flow (USGPM)	0.0	1150.0	1555.0	**Best Efficiency**	83.00 % at 1065.0 USgpm
TDH-Bowl (ft)	95.0	74.2	51.2	**Design Flow % BEP**	107.98 %
TDH-Disch Flange (ft)	94.0	71.1	49.4	**Pump Efficiency**	81.47 %
Bowl Efficiency (%)	-	82.30	73.80	**Overall Efficiency**	0.00 %
Guaranteed Bowl Efficiency (%)	-	78.18	-	**NOL Power**	27.5 Hp at 1497.0 USgpm
Power (Hp)	19.1	26.2	27.2	**Guaranteed NOL Power**	29.7 Hp at 1497.0 USgpm
Guaranteed Power (Hp)	-	28.3	-	**Max Power (NOL) at Max Trim**	29.1 Hp at 1541.0 USgpm
NPSHr (ft) [1]	-	15.0	28.8	**Guaranteed Max Power (NOL) at Max Trim**	31.4 Hp at 1541.0 USgpm
NPSH Margin (ft) [1]	-	31.3	17.5	**Specified NPSH Ratio**	1.1
Hydraulic Thrust(lb)	921.0	717.0	496.0	**Thrust Load Power Loss**	0.10398 Hp
Thrust (lb)	1092.8	869.2	626.6	**Total Flow Derate Factor**	1.00
Pressure-Bowl (psi)	41.1	32.1	22.2	**Total Head Derate Factor**	1.00
Pressure-Disch Flange (psi)	40.7	30.8	21.4	**Total Efficiency Derate Factor**	1.00
Min Submergence (Inch) [3]	-	28.53	33.86	**Actual Submergence**	163.38 in
Friction Loss (ft) [4]	-	0.46	0.79	**Shaft Friction Power Loss**	-0.02 Hp
Lineshaft Elongation (Inch)	0.00000	0.00000	-	**Min Flow (MCSF)**	266.0 USgpm
Column Elongation (Inch)	0.00077	0.00066	-	**kWh per 1000 gal**	0.00000
Lateral (Inch)	0.12923	0.12934	-	**Impeller Running Clearance**	0.13 in

[1] at 1st impeller eye [2] rated values [3] from bottom of pump [4] from bowl to disch flange [5] based on user entered TDH

OPERATING CONDITIONS

Specified Flow	1150.00 USgpm
Design TDH (Bowl)	74.2 ft
Rated Speed	1730 RPM
Atmospheric Pressure	14.70 psi
TPL	18.29 ft
Pumping Level	1.00 ft
NPSHa at 1st Impeller	46.3 ft
Well Diameter	16 inch [406mm] Casing

FLUID CHARACTERISTICS

Fluid	Water
Fluid Temperature	68.0 °F
Specific Gravity	1.0000
Viscosity	1.0017 cP
Vapor Pressure	0.3393 psi
Density	62 lbs/ft³

MATERIALS & DIMENSIONS

Bowl Data

Bowl Material	Cast Iron with Glass Enamel
Bowl Material Derate Factor	1.00
Impeller Material	Bronze
Impeller Matl Derate Factor	1.00
Bowl Shaft Material	416SS
Impeller Attachment	Taper Lock
Taper Lock Material	416SS
Discharge Bowl Material	Cast Iron
Suction Type	Bowl
Bowl Bolting Material	316SS
Motor Adapter	8" [203.2 mm]
Motor Adapter Bearing	Bronze
Discharge Bowl Bearing	Bronze
Intermediate Bowl Bearing	Bronze
Impeller Trim	9.06 in
Max Impeller Trim	9.20 in

Bowl Data

Thrust K-Factor	9.5 lb/ft
Thrust K-Factor	9.5 Lb/Ft
Bowl Pressure Limit	340 psi
Shut Off Lateral	0.12923 in
Design Lateral	0.12934 in
Bowl Assembly Length (BL)	37.38 in
Bowl Shaft Diameter	1 15/16" [49.2 mm]
Impeller Balance	Dynamic Two Plane Balance
Bowl Wear Ring	416SS
Impeller Wear Ring	Not Included
Bowl Diameter (D)	12.38 in
Min Column Diameter	8 in
Max Column Diameter	10 in
Bowl Shaft Length	32.50 in
Bowl Shaft Power Limit	600.39 Hp

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Project	Pajaro PCW Vertical Turbine VIC Submersible Pumps	
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Quote ID: 3302-191120-007:0:4 QTY: 1
VIS-WFTM 13CMC, 1 Stage
RF MACDONALD CO/FRESNO FRESNO

Bowl Specials

Column Data

Column Type	Threaded
Column Diameter	8" [203mm]
Column Pipe Material	Carbon Steel

Column Data

Max Column Section Length	120 in

Column Specials

Head Data

Well Diameter	16 inch [406mm] Casing
Discharge Elbow Material	Carbon Steel
Head Flanged Rating	150 # Flange

Head Data

Well Head Size	8" [203mm]
Sanitary Well Seal	Yes

Head Specials

Includes Power Cable Sealing Design

Motor Data

Driver Type	Submersible
Manufacturer	Hitachi
HP Rating	30 Hp
Speed [Poles]	1800 rpm [4 pole]
Voltage	460 V
Phase / Frequency	3 PH / 60 Hz
Efficiency / Config	Standard
Motor Adapter	8" [203.2 mm]
Motor Flange	8 in
Motor Shroud	Included
ML [Motor Length]	44.09 in

Motor Data

MD [Motor Diameter]	8.00 in
SF / Insulation**	1.15 Y
Motor Provided By	Xylem
Motor Mounted By	Customer
Motor Part Number	S16931H
Driver Size Criteria	Max power on design curve (NOL)
Allow Service Factor	No

Motor Specials

SS Motor Shroud

Coating Data

Bowl OD	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Column ID	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Column OD	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Can ID	Not Included

Coating Data

Can OD	Not Included
Head ID	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Head OD	Tnemec 141 (NSF approved): Expoxy applied at 16 mils min
Steel Sub Base	Not Included

Testing Data

Performance Testing	Bowl Assembly Only	Non-Witness	Lab Motor
Acceptance Grade	2B		
Hydrostatic Testing	Bowl Assembly, Discharge Head	Non-Witness	

Miscellaneous Specials

Weight Data

Total Bowl Weight	425 lbs
Unit Bowl Weight	425 lbs
Total Column Weight	246 lbs
Unit Column Weight	22 lbs

Weight Data

Head Weight	290 lbs
Motor Weight	450 lbs
Total Weight	1411 lbs
Total Rotating Weight	83 lbs

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Quote ID: 3302-191120-007:0:4 QTY: 1
VIS-WFTM 13CMC, 1 Stage
RF MACDONALD CO/FRESNO FRESNO

INFO, WARNING & ERROR MESSAGES

BaseValue	Invalid	BaseValue is invalid
	Invalid	is invalid

Our offer does not include specific review and incorporation of any Statutory or Regulatory Requirements and the offer is limited to the requirements of the design specifications. Should any Statutory or Regulatory requirements need to be reviewed and incorporated then the Customer is responsible to identify those and provide copies for review and revision of our offer.

Our quotation is offered in accordance with our comments and exceptions identified in our proposal and governed by our standard terms and conditions of sale – Xylem Americas attached hereafter.

For units requiring performance test, all performance tests will be conducted per ANSI/HI 14.6 standards unless otherwise noted in the selection software submittal documents. Test results meeting with grade 2B tolerances for pumps with a rated shaft power of 134HP or less and grade 1B for greater than 134HP will be considered passing.

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OUTLINE DRAWING

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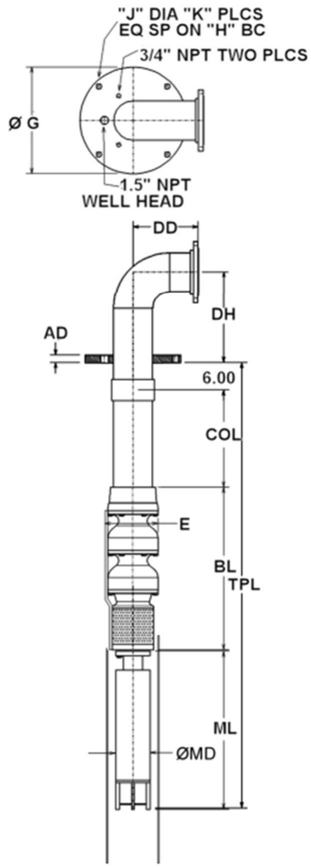

DIMENSIONS

Discharge Head Size	8.00 in
J [Mounting Flange Hole Dia]	1.12 in
H [Mounting Flange Bolt Circle]	21.25 in
Dim G [Mounting Flange Dia]:	23.50 in
DD [Disch Flange Stickout]	14.38 in
DH [Disch Flange Height]	20.00 in
AD [Mounting Flange Thickness]	1.56 in
Column Length (COL)	132.00 in
E	13.75 in
BL [Bowl Assembly Length]	37.38 in
TPL [Total Pump Length]	219.47 in
ML [Motor Length]	44.09 in
MD [Motor Diameter]	8.00 in
Head Flange	8"-150#

PUMP DATA

Column Diameter	8" [203mm]
Lineshaft Diameter	1 in [25.4 mm]
Specified Flow	1150.00 USgpm
Specified TDH	73.00 ft
Pumping Level	1.00 ft
Motor Manufacturer	Hitachi
Driver Type	Submersible
Selected Motor Power	30.00 Hp
Motor Speed	1730 RPM
Phase / Frequency	3 PH / 60 Hz
Voltage	460 V

WEIGHTS

Total Bowl Weight	425 lbs
Unit Bowl Weight	425 lbs
Total Column Weight	246 lbs
Unit Column Weight	22 lbs
Head Weight	290 lbs
Motor Weight	450 lbs
Total Weight	1411 lbs
Total Rotating Weight	83 lbs

NOTES	
1	Total Pump Length ± 1.0 inch.
2	Tolerance on all dimensions is .12 or ± .12 inch per 5 ft, whichever is greater.
3	All dimensions shown are in inches unless otherwise specified.
4	Drawing not to scale.
5	½" NPT – Gauge Conn (plugged)
6	Driver may be rotated at 90º intervals about vertical centerline for details refer to driver dimension drawing.
7	Refer to product IOM for impeller setting requirements.
8	This assembly has been designed so that its natural frequency responses avoid the specific operating speeds by an adequate safety margin. The design has assumed the foundation to be rigid.

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CROSS SECTION DRAWING

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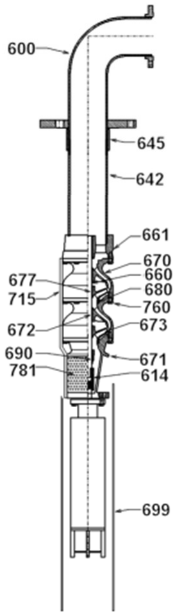

BILL OF MATERIALS

ITEM	PART NAME	CODE	MATERIAL	ASTM#
Head Assembly				
600	Well Head	9645	Carbon Steel Fab	A53
Column Assembly				
642	Column Pipe Material	6501	Black Pipe Sch 40	A 53
645	Column Coupling	9645	Carbon Steel Fab	A53
Bowl Assembly				
614	Coupling-Sub Motor	2218	SST 416	A582M
660	Shaft - Bowl	2227	SST 416	A582 S41600
661	Discharge Bowl	1003	Cast Iron Cl30	A48 CLASS 30B
664	Bearing - Discharge Bowl	1618	Bronze Bismuth	B584 Modified
670	Bowl - Intermediate	6911	Cast Iron Cl30 Enamel	A48
671	Motor Adapter	1018	Ductile Iron 65-45-12	A536
672	Bearing - Intermediate Bowl	1618	Bronze Bismuth	B584 Modified
673	Impeller	1398	Silicon Bronze C87610	B584
677	Taper Lock-Impeller	2217	SST 416	A582M
680	Wear Ring-Bowl	1232	SST CA15	A743M
681	Wear Ring - Impeller	NA	Not Included	NA
690	Bearing - Motor Adapter	1618	Bronze Bismuth	B584 Modified
715	Guard-Cable	3215	SST 304	A240M
758	Capscrew-(Motor)	2228	SST 304	A276
781	Screen-Suction	3211	SST 316	A240M
789	Washer - Upthrust	6266	Tivar 1000	None
NA	Check Valve	NA	Not Included	NA

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PERFORMANCE CURVE

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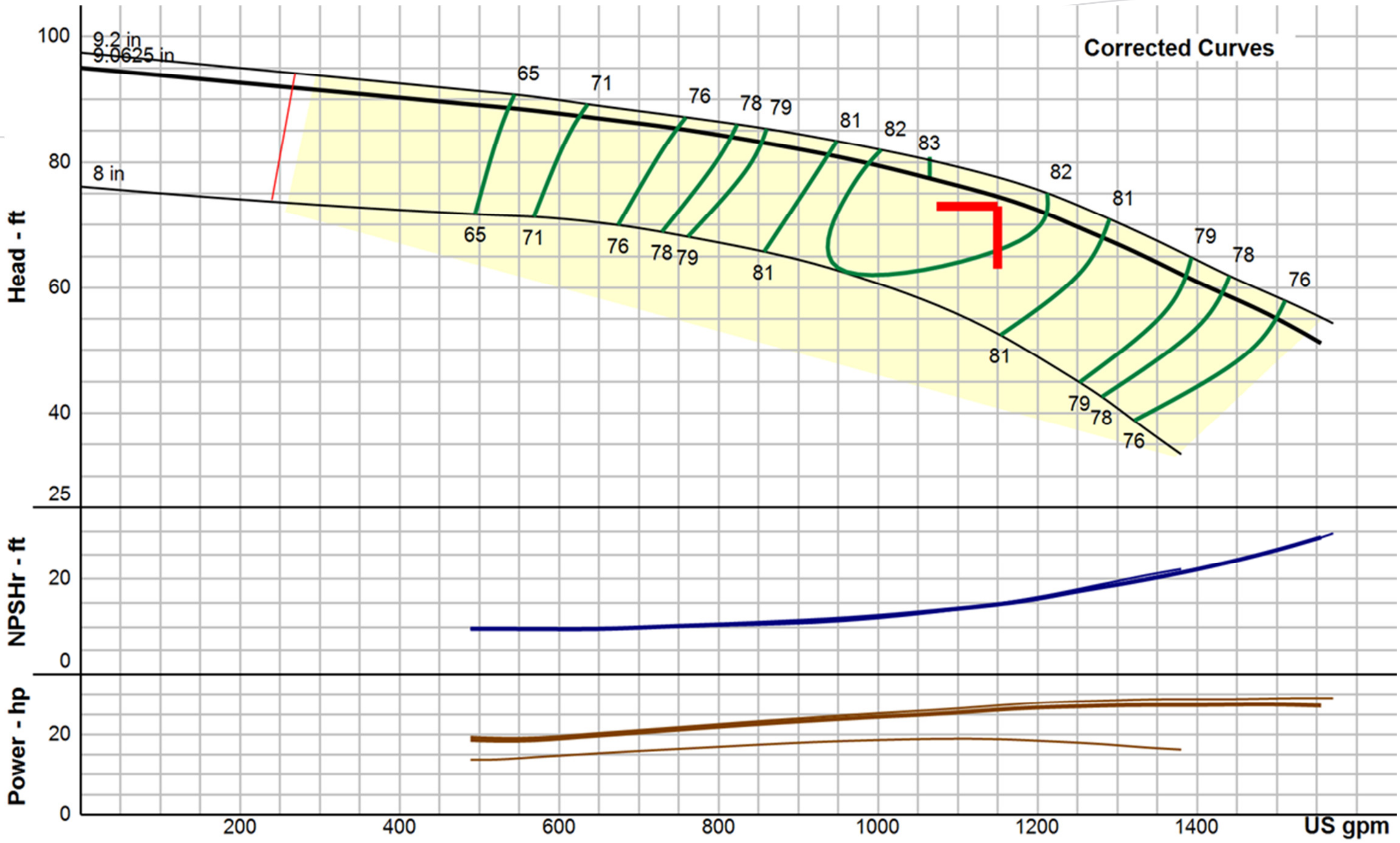

Curve & hydraulic data presented is nominal performance based on ANSI/HI 14.6 acceptance grade 2B.
Design values are guaranteed within the following tolerances: Flow ± 8%, Head ± 5%, and optionally either Power + 8% or Efficiency - 5% at manufacturer's discretion.

CURVE DATA

Specified Flow	1150.00 USgpm
Specified TDH	73.00 ft
Rated Speed	1730 RPM
Atmospheric Pressure	14.70 psi
Pumping Level	1.00 ft
NPSHa at Grade	33.9 ft
NPSHa at 1st Impeller	46.3 ft
Well Diameter	16 inch [406mm] Casing
Fluid	Water
Fluid Temperature	68.0 °F
Specific Gravity	1.0000
Viscosity	1.0017 cP
Vapor Pressure	0.3393 psi
Density	62 lbs/ft³
Design Flow	1150.0 USgpm
Min Flow (MCSF)	266.0 USgpm
Design TDH (Bowl)	74.2 ft
Design TDH (Disch Flange)	71.1 ft
Design Pressure (Bowl)	32.1 psi
Design Pressure (Disch Flange)	30.8 psi
Shut Off TDH (Bowl)	95.0 ft

Shut Off TDH (Disch Flange)	94.0 ft
Shut Off Pressure (Bowl)	41.1 psi
Shut Off Pressure (Disch Flange)	40.7 psi
Run Out Flow	1555.0 USgpm
Run Out TDH (Bowl)	51.2 ft
Run Out TDH (Disch Flange)	49.4 ft
Run Out Pressure (Bowl)	22.2 psi
Run Out Pressure (Disch Flange)	21.4 psi
Bowl Efficiency at Design	82.30 %
Guaranteed Bowl Efficiency	78.19 %
Best Efficiency	83.00 %
BEP Flow	1065.0 USgpm
Design Flow % BEP	107.98 %
Pump Efficiency	81.47 %
Friction Loss at Design	0.46 ft
Power at Design	26.2 Hp
Guaranteed Power	28.3 Hp
NOL Power	27.5 Hp
Guaranteed NOL Power	29.7 Hp
Max Power (NOL) Flow	1497.0 USgpm
Max Power (NOL) at Max Trim	29.1 Hp
Guaranteed Max Power (NOL) at	31.4 Hp

Max Trim	
Max Power (NOL) Flow at Max Trim	1541.0 USgpm
Recommended Power	30.00 Hp
Allow Service Factor	No
kWh per 1000 gal	0.00000
NPSHr at Design	15.0 ft
NPSH Margin at Design	31.3 ft
Min Submergence at Design	28.53 in
Actual Submergence	163.38 in
Thrust at Design	869.2 lb
Thrust at Shut Off	1092.8 lb
Thrust at Run Out	626.6 lb
Bowl Material	Cast Iron with Glass Enamel
Bowl Material Derate Factor	1.00
Impeller Material	Bronze
Impeller Matl Derate Factor	1.00
Total Flow Derate Factor	1.00
Total Head Derate Factor	1.00
Total Efficiency Derate Factor	1.00
Curve ID	E6413CGPC1

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

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Tag	
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Chlorine Analyzer

CL17 CHLORINE ANALYZER

Applications

- Beverage
- Collection Systems
- Drinking Water
- Field Use
- Food QC Lab
- Pharmaceutical
- Power
- Semiconductor
- Wastewater

Dependable, colorimetric DPD free or total chlorine analysis.

Accurate, Reliable Results

The Hach CL17 Chlorine Analyzer uses colorimetric DPD chemistry to monitor water continuously for free or total residual chlorine. The CL17 analysis method is not affected by changes in chlorine concentration, sample pH, temperature, flow or pressure, thus offering more accuracy than other methods in today's market.

Simple, Predictable Maintenance

Monthly routine maintenance for the CL17 can usually be performed in 15 minutes, including changing reagents and cleaning the colorimetric cell. No special tools are required. For typical use, the CL17 will operate unattended for 30 days. Challenging applications may require more frequent cleaning.

Factory Calibrated

The CL17 Chlorine Analyzer is factory calibrated. A built-in electronic calibration curve is preprogrammed into the instrument. This instrument does not require recalibration unless specified by your regulatory agency for compliance reporting purposes.

EPA Compliant

The CL17 is compliant with US EPA regulation 40 CFR 140.74. Both Method 4500-CL G and Method 334.0 can be used for measuring residual chlorine in drinking water.

HACH®

Be Right™

Specifications*

Range	0 to 5 mg/L free or total residual chlorine
Accuracy	± 5 % or ±0.03 mg/L (ppm) as CL_2, whichever is greater
Lower Limit of Detection (LOD)	0.03 mg/L (ppm)
Cycle Time	2.5 minutes
Inlet Pressure	1 to 5 psig (0.07 to 0.34 bar), .5 psi is optimum
Pressure Limit	Inlet Pressure to Sample Conditioning: 1.5 to 75 psi (0.1 bar to 5.2 bar)
Inlet	1/4-inch OD polyethylene tube, quick-disconnect fitting
Drain	1/2-inch ID flexible hose, hose barb
Air Purge	0.1 cfm (0.17 m^3/h) instrument quality air at max. 20 psig (ca. 1.4 bar) with 1/4-inch OD tube, quick disconnect fitting
Sample Flow Rate	200 to 500 mL per minute minimum
Sample Temperature	5 to 40 °C (41 to 104 °F)
Operating Temperature Range	5 to 40 °C (41 to 104 °F)
Operating Humidity	Up to 90% at 40 °C (104 °F) maximum
Interferences	Other oxidizing agents such as bromide, chlorine dioxide, permanganate and ozone will cause a positive interference. Hexavalent chromium will cause a positive interference: 1 mg/L Cr^{6+} = approximately 0.02 mg/L as Cl_2. Hardness must not exceed 1,000 mg/L as $CaCO_3$.
Recorder Outputs	One 0/4-20 mA with an output span programmable over any portion of the 0 to 5 mg/L range. Recommended load impedance 3.6 to 500 ohms, 130 V isolation from earth ground.
Alarm	Two alarms selectable for sample concentration alarm, analyzer system warning, or analyzer system shut-down alarm. Each is equipped with an SPDT relay with contacts rated for 5A resistive load at 230 V AC.
Certifications	Europe, CE Approved with: EN 61326-1 CISPR 11 EN 61010-1 IEC 60529 North America: UL 61010A-1 CAN/CSA C22.2 No. 1010.1-92
Power Requirements (Voltage)	100 - 115/230 V AC
Power Requirements (Amps)	2.5 A
Power Requirements (Hz)	50/60 Hz
Display	LCD, 3-1/2 inch digit measurement readout and six-character alphanumeric scrolling text line
Light Source	Class 1 LED (light emitting diode) with a peak wavelength of 520 nm; 50,000 hours estimated minimum life
Enclosure Construction	ABS plastic, two clear polycarbonate windows, IP62-rated with the gasketed door latched.
Mounting Style	Wall mount
Dimensions Metric (H x W X D)	454 mm x 314 mm x 179 mm
Weight	23.13 lbs. (10.49 kg)

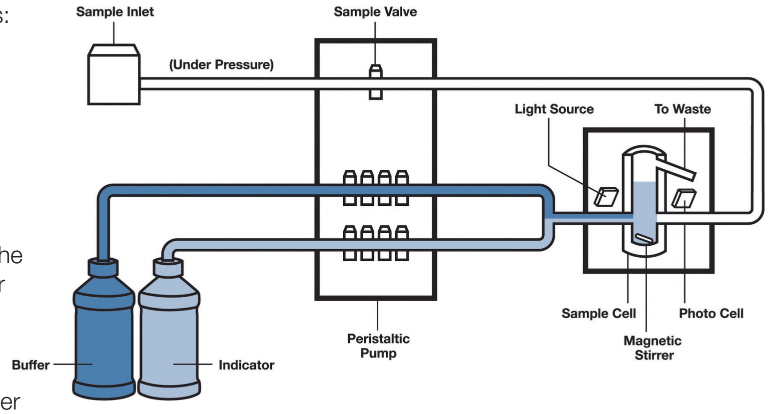
**Subject to change without notice.*

Principle of Operation

The CL17 Chlorine Analyzer has three operating components:

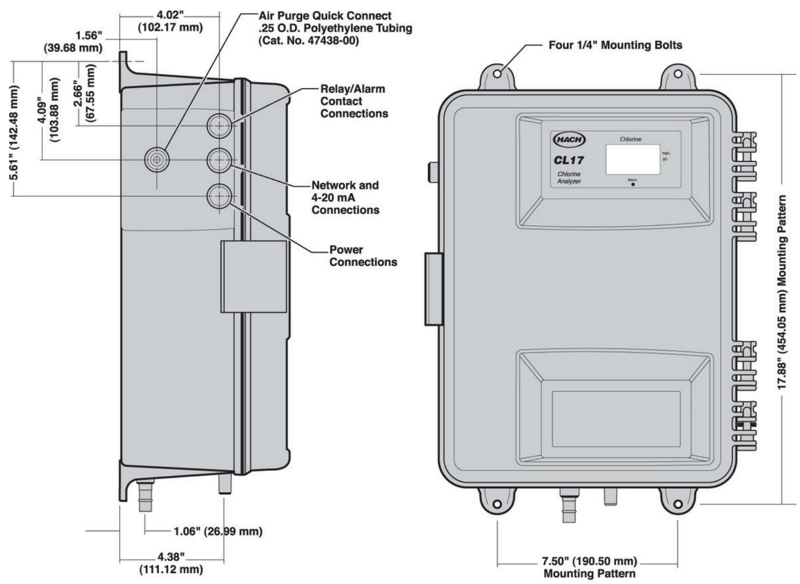
- A linear peristaltic pump to precisely control the volume of incoming samples and reagents.
- A colorimeter with seal-free, solid-state mixing system that includes a self-cleaning stir bar.
- One-month supply of reagents (indicator and buffer)

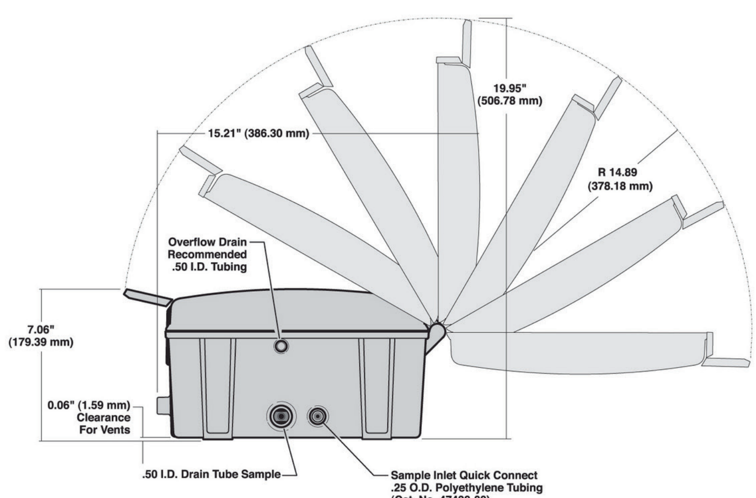
A zero reference point is established with the first sample in the cycle by measuring blank absorbance. (This compensates for the sample's color intensity and turbidity before the chlorine measurement is made.) Then, indicator and buffer reagents are added to the sample while a magnetic stirrer mixes the solution and the sample changes color. A compact colorimeter then measures the light transmitted through the sample. The measured color intensity is compared to a reference standard. Finally, the sample cell is flushed with new sample so that the cycle can repeat itself every 2.5 minutes.



Dimensions

The CL17 is designed to be wall-mounted with four 1/4-inch screws. Adequate clearance must be left at the sides and bottom of the case for plumbing and electrical connections. The sample inlet connection is 1/4-inch quick-disconnect fitting and the drain connection is 1/2-inch I.D. flexible hose. Electrical connections are inside the instrument case. Holes for three 1/2-inch conduit fittings are provided.





Ordering Information

Hach CL17 Chlorine Analyzers are shipped with a one-month supply of reagents, maintenance kit, installation kit, and manual. (The power cord is ordered separately.)

5440001 Model Cl17 Free Residual Chlorine Analyzer

5440002 Model Cl17 Total Residual Chlorine Analyzer

5440003 Model Cl17 Free Residual Chlorine Analyzer with AquaTrend® Network Capability

5440004 Model Cl17 Total Residual Chlorine Analyzer with AquaTrend® Network Capability

Accessories

5448800 North American Power Cord Kit with Strain Relief, 125V

5448900 European Power Cord Kit with Strain Relief, 230V

5444300 Maintenance Kit, 1 year, includes tubing, caps, funnel, and fittings

5444301 Maintenance kit, 1 year, includes preassembled tubing, caps, funnel, and fittings.

4643600 Sample Inlet Flow Meter

5449000 Cl17 Calibration/Verification Kit

Reagents

Reagents

2556900 Free Chlorine Reagent Set

2557000 Total Chlorine Reagent Set

2297255 Cl17 DPD Indicator Powder (Free and Total)

2314011 CL17 Free Chlorine Indicator Solution

8867711 CL17 Free Chlorine Buffer Solution

2263411 CL17 Total Chlorine Indicator Solution

2263511 CL17 Total Chlorine Buffer Solution

HACH COMPANY World Headquarters: Loveland, Colorado USA

United States: 800-227-4224 tel 970-669-2932 fax orders@hach.com
Outside United States: 970-669-3050 tel 970-461-3939 fax int@hach.com
hach.com

LIT1626 Rev 7
C14 Printed in U.S.A.

Flow Meter

MC Propeller

CONFIGURATION SHEET
MAIN LINE FLOWMETER

MODEL MW500 / MZ500

DESCRIPTION

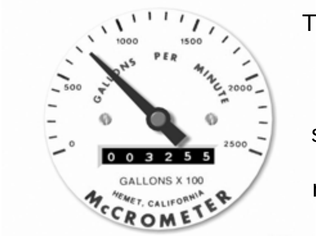
Model MW500 and MZ500 Main Line Propeller Flowmeters are manufactured to comply with the applicable provisions of the American Water Works Association Standard No. C704-02 for propeller type flowmeters. The model MW500 is designed for a maximum continuous working pressure of up to 150 psi and is fitted with AWWA Class D flanges. The model MZ500 is designed for a continuous working pressure of up to 300 psi and is fitted with ANSI B16.5 Class 300 flanges. The impeller and drive assembly are easily removed through the top flange connection. The meter flow tubes are coated with fusion-bonded epoxy for maximum corrosion protection, and integral flow straightening vanes reduce upstream flow turbulence. As with all McCrometer propeller flowmeters, standard features include a magnetically coupled drive, instantaneous flowrate indicator and straight reading, six-digit totalizer.

Impellers are manufactured of high-impact plastic, capable of retaining their shape and accuracy over the life of the meter. Each impeller is individually calibrated at the factory to accommodate the use of any standard McCrometer register. The MW500 and MZ500 can be field-serviced without the need for factory recalibration. Factory lubricated stainless steel bearings are used to support the impeller shaft. The shielded bearing design limits the entry of materials and fluids into the bearing chamber providing maximum bearing protection.

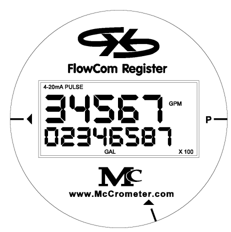
The instantaneous flowrate indicator is standard and available in gallons per minute, cubic feet per second, liters per second and other units. The register is driven by a flexible steel cable encased within a protective vinyl liner. The register housing protects both the register and cable drive system from moisture while allowing clear reading of the flowrate indicator and totalizer.

INSTALLATION

Standard installation is horizontal mount. If the meter is to be mounted in the vertical position, please advise the factory. A straight run of full pipe the length of five diameters ahead and one diameter behind the meter is the minimum normally recommended.



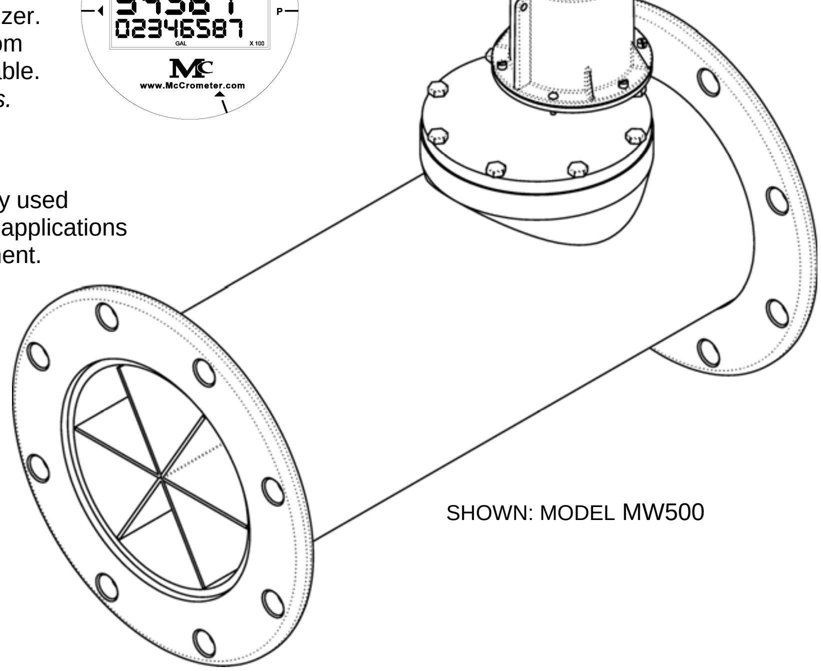
The McCrometer Propeller flowmeter comes with a standard instantaneous flowrate indicator and straight-reading totalizer. An optional FlowCom register is also available. *Typical face plates.*



APPLICATIONS

The McCrometer propeller meter is the most widely used flowmeter for municipal and wastewater treatment applications as well as agricultural and turf irrigation measurement. Typical applications include:

- Water and wastewater management
- Center pivot systems
- Sprinkler irrigation systems
- Drip irrigation systems
- Golf course and park water management
- Gravity turnouts from underground pipelines
- Commercial nurseries



SHOWN: MODEL MW500

Lit#24517-20 Rev 2.1/10-12

McCROMETER
3255 West Stetson Avenue
Hemet CA 92545 USA
951-652-6811 / FAX 951-652-3078
www.mccrometer.com

MAIN LINE FLOWMETER MODEL MW500 / MZ500

SPECIFICATIONS

PERFORMANCE

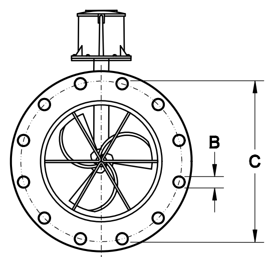
ACCURACY: ±2% of reading guaranteed throughout range.
RANGE: See dimensions chart below
HEAD LOSS: See dimensions chart below
MAXIMUM TEMPERATURE: (Standard Construction) 160°F constant
PRESSURE RATING: Model MW500: 150 psi
Model MZ500: 300 psi

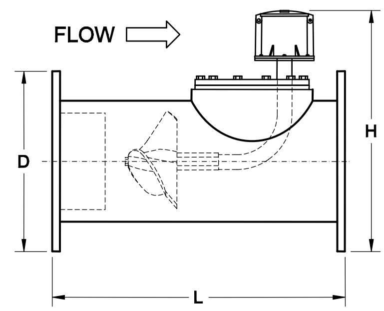
MATERIALS

BEARING ASSEMBLY: Impeller shaft is 316 stainless steel. Ball bearings are 440C stainless steel.
MAGNETS: (Permanent type) Alnico
BEARING HOUSING: Brass; Stainless Steel optional
REGISTER: An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged cover with locking hasp.
IMPELLER: Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter. High temperature impeller is optional.

OPTIONS

- International flange standards available
- Other than standard laying lengths available
- Register extensions available
- Forward/reverse flow measurement
- All stainless steel construction
- High temperature construction
- "Over Run" bearing assembly for higher-than-normal flowrates
- Electronic propeller meter available in all sizes of this model
- A complete line of flow recording/control instrumentation
- Certified calibration test results
- Canopy boot





McCROMETER reserves the right to change design or specifications without notice.

MW500/MZ500	DIMENSIONS														
Meter and Nominal Pipe Size	**2**	**2 1/2**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**	**30**	**36**
Maximum Flow U.S. GPM	250	250	250	600	1200	1500	1800	2500	3000	4000	5000	6000	8500	12,500	17,000
Minimum Flow. U.S. GPM	40	40	40	50	90	100	125	150	250	275	400	475	700	1200	1500
Approx. Head Loss in Inches at Max. Flow	29.50	29.50	29.50	23.00	17.00	6.75	3.75	2.75	2.00	1.75	1.50	1.25	1.00	1.00	1.00
MW500															
Approx. Shipping Weight-lbs.	36	36	43	54	115	135	197	325	465	530	744	890	1,293	1450	1650
B (inches)	3/4	3/4	3/4	3/4	7/8	7/8	1	1	1 1/8	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 5/8
C (inches)	4 3/4	5 1/2	6	7 1/2	9 1/2	11 3/4	14 1/4	17	18 3/4	21 1/4	22 3/4	25	29 1/2	36	42 3/4
D (inches)	6	7	7 1/2	9	11	13 1/2	16	19	21	23 1/2	25	27 1/2	32	38 3/4	46
H (inches)	11 3/4	12 1/4	12 1/2	15 1/4	16 1/4	18 1/2	21 3/4	24 1/4	25 1/4	28 1/2	29 1/4	32 1/2	36 3/4	42 3/4	49 1/4
L (inches)	14	16	16	20	22	24	26	28	42	48	54	60	60	60	60
No. of Bolts per Flange	4	4	4	8	8	8	12	12	12	16	16	20	20	28	32
No. of Topplate Bolts	6	6	6	6	8	8	12	12	12	12	16	16	16	16	16
MZ500															
Approx. Shipping Weight-lbs.	50	55	62	90	145	220	340	430	650	820	1,315	1,508	2,165		
B (inches)	3/4	7/8	7/8	7/8	7/8	1	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 3/8	1 5/8		
C (inches)	5	5 7/8	6 5/8	7 7/8	10 5/8	13	15 1/4	17 3/4	20 1/4	22 1/2	24 3/4	27	32		
D (inches)	6 1/2	7 1/2	8 1/4	10	12 1/2	15	17 1/2	20 1/2	23	25 1/2	28	30 1/2	36		
H (inches)	12	12 1/2	12 7/8	15 3/4	17	19 1/4	22 1/2	25	26 1/4	29 1/2	32 3/4	34	38 3/4		
L (inches)	20	20	20	24	26	28	30	32	42	48	54	60	60		
No. of Bolts per Flange	8	8	8	8	12	12	16	16	20	20	24	24	24		

Note: *Flanges meet ASTM-A-181 specs.* *Larger flowmeters on special order.*

Lit#24517-20 Rev 2.1/10-12

McCROMETER
3255 West Stetson Avenue
Hemet CA 92545 USA
951-652-6811 / FAX 951-652-3078
www.mccrometer.com

Hydropneumatic Tank Controller

hydropneumatic **surge** & **pressure** controller

SCUP 700

PULSCO

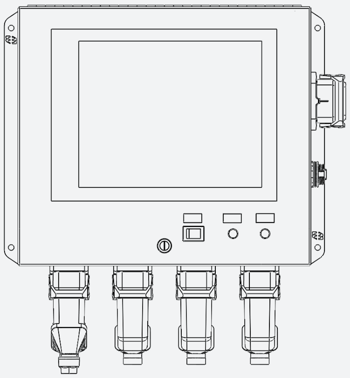
The PULSCO **ADVANTAGE**

PULSCO's Skypark 700 Series hydropneumatic controller are pre-engineered solutions for either surge or pressure control systems. The **Skypark 700 Series** has been designed for ease of installation, maintenance, and operation. The control logic was developed based on PULSCO's expertise and experience in fulfilling customer needs. The controllers fully stand alone or can be easily connected to any SCADA or PLC network regardless of communication protocol. The **Skypark 700 Series** is ideal for new installations or refurbishments.

- Designed to meet most surge and pressure control applications out of the box.
- Off the shelf models available for quick turnaround.
- Intuitive touch screen interfaces.
- Supports both Ethernet and relay communication to SCADA systems.
- Alarm & data logs saved on the controller, easily downloadable in CSV format to a USB.
- Automatic reboot after power interruption.
- Remote monitoring services available.

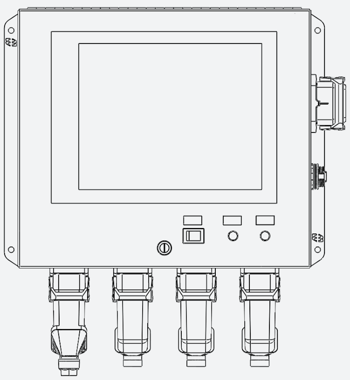
700-1801

Skypark Series™ hydropneumatic controller



Skypark 740 (SCP-740)
Pressure Controller

The controls maintain water system pressure between a specified range to reduce system pumps cycling.



Skypark 750 (SCP-750)
Surge Controller

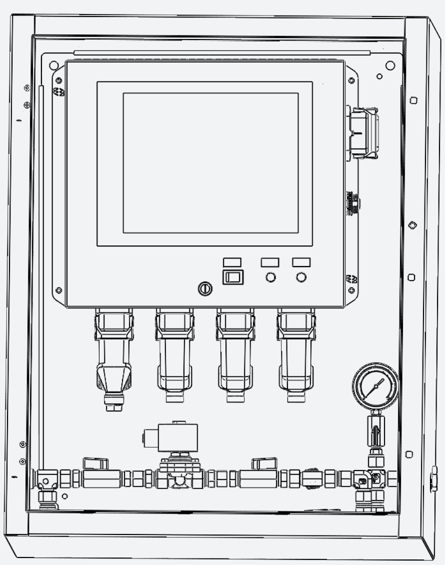
The controls maintain the volume of air required to mitigate pressure spikes in pipelines caused by sudden pump startup, shutdown, or valve closure.

Off the shelf units
Multi-tank control
Analog input surge suppression
Standard 120v (additional voltages available)

Interface
12" HMI color touch screen
Change set points using keypad entry display
View and download event history

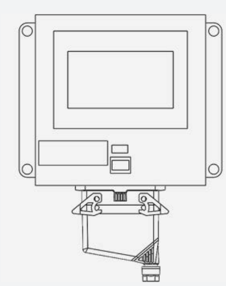
Communication
Standard ethernet TCP/IP
(additional protocol support available)
Remote session support
Remote monitoring services available

Installation
Wall mounted NEMA 4X enclosure.
Indoors or outdoors
Rated for operation from -20 to 120 ˚F (-28 to 48 ˚C)
No drilling needed for conduit connections



Skypark 7X0-PA (SCP-7X0-PA)
Pneumatic Assembly

Either the SCP-740 or the SCP-750 are integrated with complete level control assembly for ease of job site installation. The add and vent air solenoids, bypass and isolation ball valves, pressure gauge, and all piping and fittings needed for a full and complete level control assembly are pre-piped and wired inside a NEMA 4 outer enclosure.



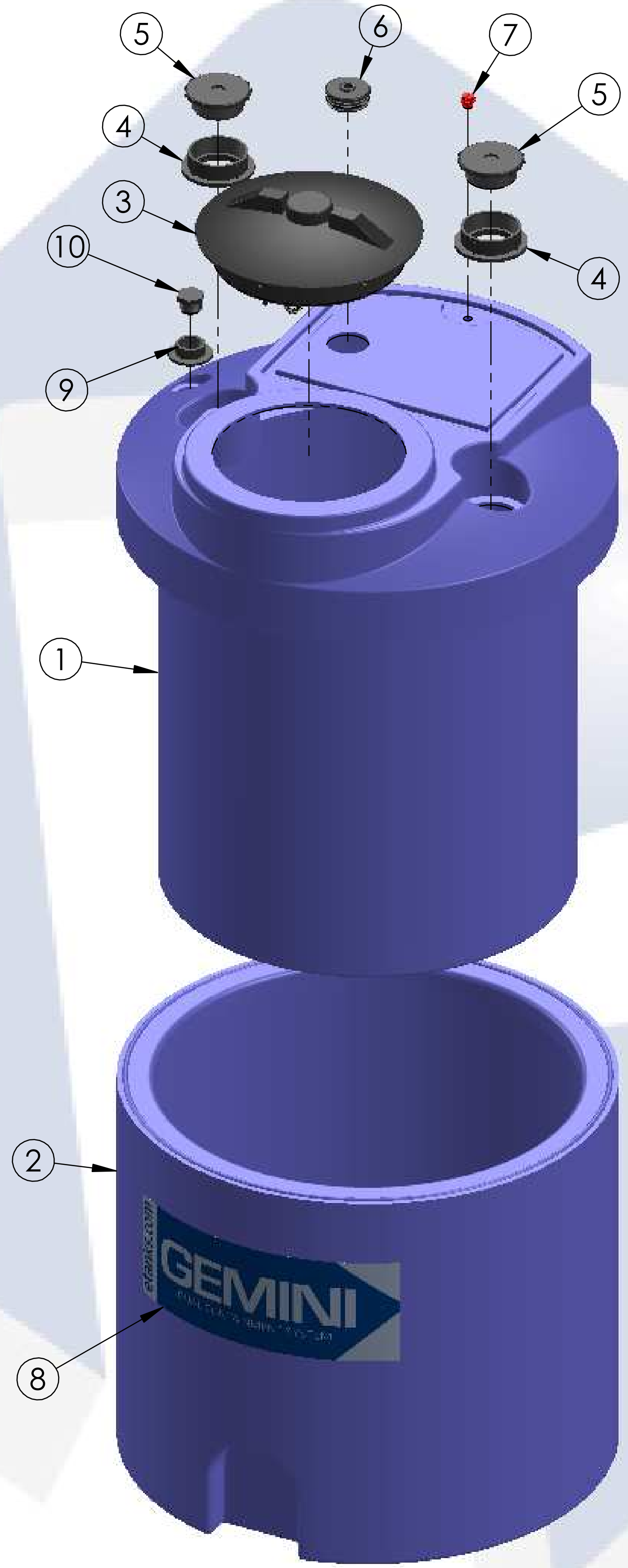
Skypark 730 (SCP-730)

Small and affordable panel for two-analog and four-digital outputs. Wall-mount NEMA 4 with 7" HMI touch screen interface. Ethernet TCP/IP communication standard with downloadable data log.

Sodium Hypochlorite Storage Tank

20 GALLON GEMINI	PART NUMBER	
	BLUE	NATURAL
STANDARD (1.5 SPG)	01-14871	01-1073
HD (1.9 SPG)	01-29773	01-29764

ISO VIEW
(ASSEMBLED)



TRIMETRIC VIEW
(EXPLODED)

ITEM NO.	DESCRIPTION	QTY.
1	20G GEMINI PRIMARY TANK	1
2	20G GEMINI SECONDARY TANK	1
3	8" TWIST LID ASSEMBLY	1
4	2" FNPT SPIN WELD FITTING, PE	2
5	2" THREADED PLUG, PE	2
6	2" CAPLUG / GROMMET SUB-ASSY	1
7	RED CAPLUG / O-RING SUB-ASSY	1
8	MOLD IN GRAPHIC	1
9	3/4" FNPT SPIN WELD FITTING, PE	1
10	3/4" THREADED PLUG, PE	1

NOTES:
1. CAPACITY: 20 GAL. NOMINAL
2. APPROXIMATE WEIGHT: 28 LBS
3. TANK MATERIAL: LLDPE W/ UV INHIBITOR
4. SERVICE PRESSURE: ATMOSPHERIC

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ±1/4"
ANGULAR: ± .5°
ONE PLACE DECIMAL: ± .25
TWO PLACE DECIMAL: ± .125
THREE PLACE DECIMAL: ± .063

TANK MATERIAL: LLDPE
INNER TANK S/N:
OUTER TANK S/N:
CUSTOMER PO#
DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	MSM	11/25/13
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		

ALTERNATIVE VERSIONS

MATERIALS: XLPE, PPL, PVDF
COLORS: NATURAL, BLUE OR BLACK
AVAILABLE WITH FRP WRAP

CALL FOR PART NUMBERS

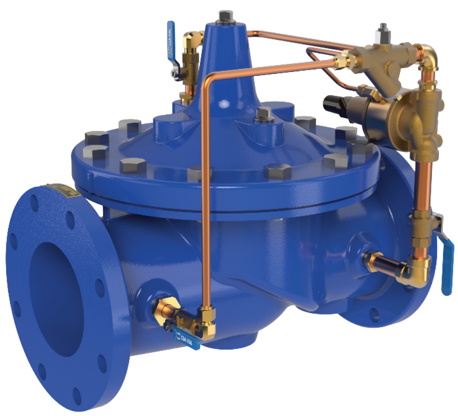
PEABODY engineering

PROJECT: **20 GALLON GEMINI TANK ASSEMBLY**
CUSTOMER: **PEABODY STANDARD**
SITE/LOCATION: -
DRAWING#: **SEE TABLE**
SIZE: **B** | DESC.: **PEABODY 20 GALLON GEMINI** | REV.: **A**
SCALE: 1:6 | SHEET 1 OF 2

Back Pressure Sustaining Valve

MODEL 650-01

Pressure Relief & Pressure Sustaining Valve



- **Accurate Pressure Control**
- **Optional Check Feature**
- **Fast Opening to Maintain Line Pressure**
- **Slow Closing to Prevents Surges**
- **Completely Automatic Operation**

The Cla-Val Model 650-01 Pressure Relief Valve is actuated by line pressure through a pilot control system, opening fast to maintain steady line pressure but closing gradually to prevent surges. Operation is completely automatic and pressure settings may be easily changed. This valve can be used for pressure relief, pressure sustaining, back pressure, or unloading functions in a bypass system.

If a check feature is added, and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber, closing the valve to prevent return flow.

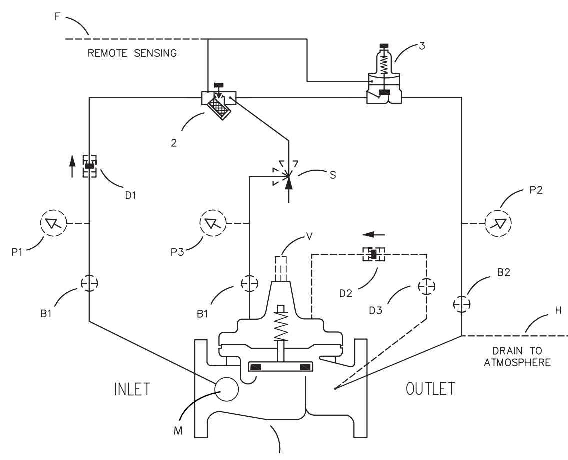
Schematic Diagram

Item	Description
1	100-20 Hytrol Main Valve
2	X42N-2 Strainer & Needle Valve
3	CRL-60 Pressure Relief Control

Optional Features

Item	Description
B	CK2 Isolation Valve
D	Check Valves with Isolation Valve
F	Remote Pilot Sensing
H	Drain to Atmosphere
M	X144 e-FlowMeter
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator

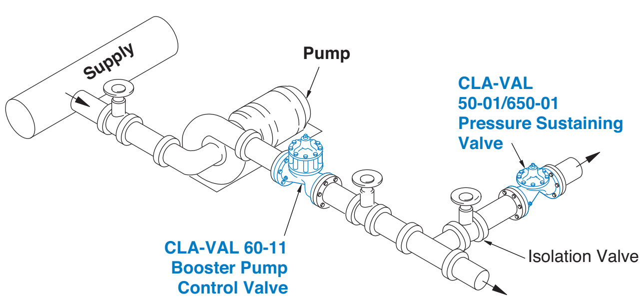
see page 3 for approvals



Typical Applications

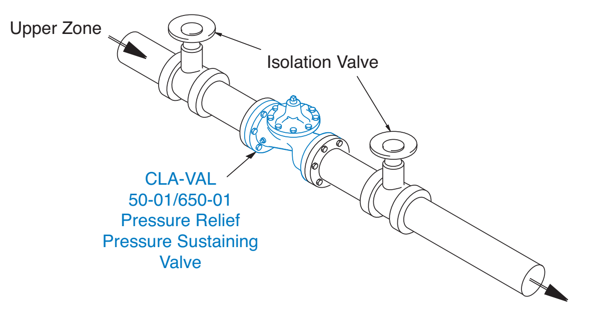
Pressure Relief Service

This fast opening, slow closing relief valve provides system protection against high pressure surges on pump start up and pump shut down by dissipating the excess pressure to a safe location.



Pressure Sustaining Service

When installed in a line between an upper zone and a lower area of heavy demand, the valve acts to maintain desired upstream pressure to prevent "robbing" of the upper zone. Water in excess of pressure setting is allowed to flow to an area of heavy demand, control is smooth, and pressure regulation is positive.

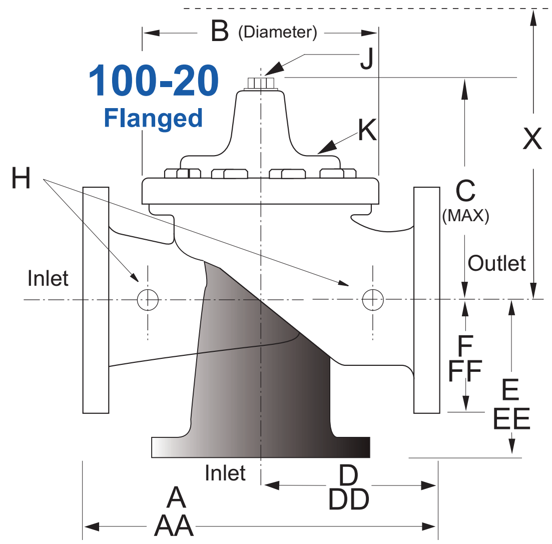


Model 650-01 (Uses 100-20 Hytrol Main Valve)

Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 Class	300 Class
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
UNS 87850	Bronze	B16.24	225	400

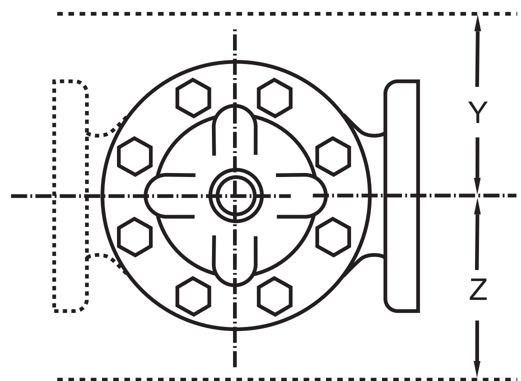
Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
Valves for higher pressure are available; consult factory for details



Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	3" - 48" 80 - 1200 mm	3" - 16" 80 - 400 mm	3" - 16" 80 - 400 mm
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard Stainless Steel is Optional		
Disc	Buna-N® Rubber		
Diaphragm	Nylon Reinforced Buna-N® Rubber		
Stem, Nut & Spring	Stainless Steel		

For material options not listed, consult factory.
Cla-Val manufactures valves in more than 50 different alloys.



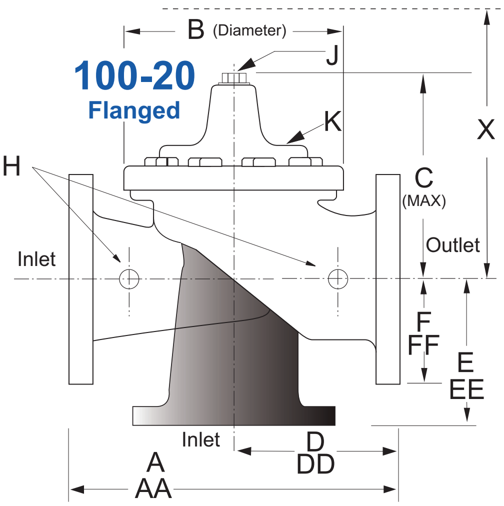
Model 650-01 Dimensions (In Inches)

Valve Size (Inches)	3	4	6	8	10	12	14	16	18	20	24	30	36	48
A 150 ANSI	10.25	13.88	17.75	21.38	26.00	30.00	34.25	35.00	42.12	48.00	48.00	63.25	65.00	88.0
AA 300 ANSI	11.00	14.50	18.62	22.38	27.38	31.50	35.75	36.62	43.63	49.62	49.75	63.75	67.00	90.62
B Diameter	6.62	9.12	11.50	15.75	20.00	23.62	27.47	28.00	35.44	35.44	35.44	53.19	56.00	66.00
C Maximum	7.00	8.62	11.62	15.00	17.88	21.00	20.88	25.75	25.00	31.50	31.50	43.94	54.75	59.00
D 150 ANSI	—	6.94	8.88	10.69	CF*	17.00	CF*	CF*	CF*	CF*	21.06	—	—	—
DD 300 ANSI	—	7.25	9.38	11.19	CF*	17.75	CF*	CF*	CF*	CF*	CF*	—	—	—
E 150 ANSI	—	5.50	6.75	7.25	CF*	13.75	CF*	CF*	CF*	CF*	15.94	—	—	—
EE 300 ANSI	—	5.81	7.25	7.75	CF*	14.75	CF*	CF*	CF*	CF*	CF*	—	—	—
F 150 ANSI	3.75	4.50	5.50	6.75	8.00	9.50	11.00	11.75	15.88	14.56	17.00	19.88	25.50	34.00
FF 300 ANSI	4.12	5.00	6.25	7.50	8.75	10.25	11.50	12.75	15.88	16.06	19.00	22.00	27.50	38.50
H NPT Body Tapping	0.375	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
J NPT Cover Center Plug	0.50	0.50	0.75	0.75	1.00	1.00	1.25	2.00	2.00	2.00	2.00	2.00	2.00	2.00
K NPT Cover Tapping	0.375	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Stem Travel	0.60	0.80	1.10	1.70	2.30	2.80	3.40	4.50	4.50	4.50	6.50	7.50	7.50	8.50
Approx. Ship Weight (lbs)	45	85	195	330	625	900	1250	1380	2365	2551	2733	6500	8545	13100
Approx. **X** Pilot System	13	15	27	30	33	36	36	41	40	46	55	68	79	86
Approx. **Y** Pilot System	10	11	18	20	22	24	26	26	30	30	30	39	40	47
Approx. **Z** Pilot System	10	11	18	20	22	24	26	26	30	30	30	39	42	49

***Consult Factory**

For sizes 18 through 36-inches, use the 650-66 E-Sheet

Model 650-01 Metric Dimensions (Uses 100-20 Hytrol Main Valve)

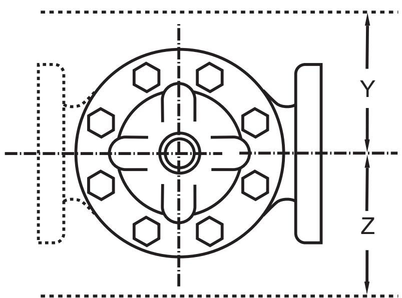


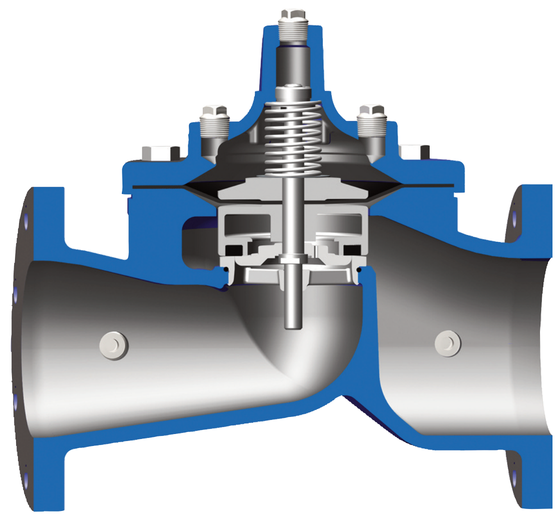
Valve & Pilot Approvals

NSF/ANSI 372: National Lead Free Mandate "Reduction of Lead in Drinking Water Act"

NSF International recognizes Cla-Val as complying with NSF/ANSI 61 and all applicable requirements.

Cla-Val fulfills the requirements described in the American Water Works Association's (AWWA) Standard for Pilot-Operated Control Valves: C530:12





Model 650-01 Dimensions (In mm)

Model 100-20 Reduced Port Hytrol Main Valve

Valve Size (mm)	**80**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**600**	**750**	**900**	**1200**
A 150 ANSI	260	353	451	543	660	762	870	889	1070	1219	1219	1607	1651	2235
AA 300 ANSI	279	368	473	568	695	800	908	930	1108	1260	1263	1619	1702	2302
B Diameter	168	232	292	400	508	600	698	711	900	900	900	1351	1422	1676
C Maximum	178	219	295	381	454	533	530	654	635	800	800	1116	1391	1499
D 150 ANSI	—	176	226	272	CF*	432	CF*	CF*	CF*	CF*	535	—	—	—
DD 300 ANSI	—	184	238	284	CF*	451	CF*	CF*	CF*	CF*	CF*	—	—	—
E 150 ANSI	—	140	171	184	CF*	349	CF*	CF*	CF*	CF*	405	—	—	—
EE 300 ANSI	—	148	184	197	CF*	368	CF*	CF*	CF*	CF*	CF*	—	—	—
F 150 ANSI	95	114	140	171	203	241	279	289	403	370	432	505	648	864
FF 300 ANSI	105	127	159	191	222	260	292	324	403	408	483	559	699	978
H NPT Body Tapping	0.375	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
J NPT Cover Center Plug	0.50	0.50	0.75	0.75	1.00	1.00	1.25	2.00	2.00	2.00	2.00	2.00	2.00	2.00
K NPT Cover Tapping	0.375	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Stem Travel	15	20	28	43	58	71	86	86	114	114	114	165	191	216
Approx. Ship Weight (kgs)	20	39	89	150	284	409	568	627	681	1157	1249	2951	3876	5942
Approx. **X** Pilot System	331	381	686	762	839	915	915	1042	1016	1169	1397	1728	2007	2185
Approx. **Y** Pilot System	254	280	458	508	559	610	661	661	762	762	762	991	1016	1194
Approx. **Z** Pilot System	254	280	458	508	559	610	661	661	762	762	762	991	1067	1245

***Consult Factory**

For sizes 450 through 1200mm, use 650-66 E-Sheet

650-01 Valve Selection	100-20 Pattern: Globe (G), Angle (A), End Connections: Flanged (F) Indicate Available Sizes															
	Inches	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
	mm	80	100	150	200	250	300	350	400	450	500	600	750	900	1000	1200
Basic Valve 100-20	Pattern	G	G, A	G, A	G, A	G	G	G	G	G	G	G	G	G	G	G
	End Detail	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Suggested Flow (gpm)	Maximum	260	580	1025	2300	4100	6400	9230	9230	16500	16500	16500	28000	33500	57000	57000
	Maximum Surge	440	990	1760	3970	7050	11000	15900	15900	28200	28200	28200	56500	58600	90000	90000
Suggested Flow (Liters/Sec)	Maximum	16	37	65	145	258	403	581	581	1040	1040	1040	1764	2115	3596	3596
	Maximum Surge	28	62	111	250	444	693	1002	1002	1777	1777	1777	3560	3700	5678	5678

100-20 Series is the reduced internal port size version of the 100-20 Series.

Notes:
- For sizes 18 through 36-inches / 450mm though 900mm, use 650-66 E-Sheet
- Many factors should be considered in sizing pressure relief valves including inlet pressure, outlet pressure and flow rates.
- For sizing questions or cavitation analysis, consult Cla-Val with system details.

Pilot System Specifications

Adjustment Ranges

0 to 75 psi Max.
20 to 105 psi
20 to 200 psi *
100 to 300 psi

***Supplied unless otherwise specified. Other ranges are available, please consult factory.**

Temperature Range

Water: to 180°F

Materials

Standard Pilot System Materials

Pilot Control:	Low Lead Bronze
Trim:	Stainless Steel Type 303
Rubber:	Buna-N® Synthetic Rubber

Optional Pilot System Materials

Pilot Systems are available with optional Aluminum, Stainless Steel or Monel materials.

Pilot Approvals

NSF/ANSI 372: National Lead Free Mandate "Reduction of Lead in Drinking Water Act"

When Ordering, Specify:

1. Catalog No. 650-01
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded, Flanged, Grooved
6. Trim Material
7. Adjustment Range
8. Desired Options
9. When Vertically Installed

Main Valve Options

EPDM Rubber Parts
Optional diaphragm, disc and o-ring fabricated with EPDM synthetic rubber

Viton® Rubber Parts - suffix KB
Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber

Epoxy Coating - suffix KC
NSF 61 Listed and FDA approved, fusion bonded epoxy coating

Dura-Kleen® Stem - suffix KD
Fluted design prevents dissolved minerals build-up on the stem

LFS Trim
Designed to regulate precisely and smoothly at typical flow rates as well as lower than the industry standard of 1 fps, without decreasing the valve's capacity

Valve Options

X141 Pressure Gauge

X101AR Valve Position Indicator with Air Release

X101 Valve Position Indicator

X144 e-FlowMeter

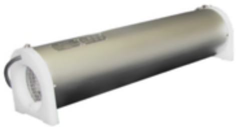
X43H Strainer

Stainless Steel Pilot

Tank Mixer

Medora Corporation
3225 Highway 22 • Dickinson, ND 58601
Tel: (701) 225-4495 • www.MedoraCo.com

www.gridbee.com
www.solarbee.com



Budget Estimate (Purchase)
GridBee GS Series Electric Potable Water Tank Mixers
Last Updated: March 14, 2018 - Note: Please verify price before ordering.

Performance Guaranteed or your Money Back. The GS Mixers are the most effective and competitively priced mixers on the market, with the lowest life cycle cost and the best warranty. Specifications are available at www.MedoraCo.com
Installing the mixer is well within the capabilities of most cities and contractors. Usually the unit is installed directly under the hatch, no need to center it in tank. A GS Series Electric Mixer 11 minute Installation Video is available at: http://potablewater.medoraco.com/mixers/gridbee-electric

Description	GS-12	GS-9
GS Submersible Electric Mixer: with 75 ft of in-tank submersible electrical cable	**$9,580**	**$6,880**
GS Submersible Electric Mixer: with 150 ft of in-tank submersible electrical cable	**$9,970**	**$7,270**
Freight cost for each basic system:	**$100**	**$80**
Horsepower, Voltage, Phase: GS Mixers are available on request at the same price: 240vAC 1PH and 460vAC 3PH	0.50 hp, 120vAC, 1PH	
Mixer length x diameter, inches: 12" or larger hatch size required, no need to enter or drain the tank	36" x 10"	24" x 10"
Weight: submersible mixer only	75 lbs	65 lbs
Maximum recommended tank volumes for moderate conditions:* * The GS-12 is recommended for higher turnover rate, or ice issues, or areas with high heat.	8 MG (million gallons)	3 MG (million gallons)

Options

Mix-Guard Replacement Program: Covers beyond the warranty,
it replaces the mixer for Acts of God, lightning, vandalism, power problems, handling damage or any other issue.
Annual Cost: While in 5 year warranty: GS-12 $450, GS-9 $350 - When beyond the 5 year warranty: GS-12 $850, GS-9 $690

Chemical injection interior hose: per 100 ft	**$230**
Chemical injection exterior hose: per 50 ft SS braided hose w/ quick connect	**$360**
Chemical injection hose penetration thru fitting: for steel tanks	**$445**
Control Box A (120v): UL listed, NEMA 4X, 120vAC/1ph, with SCADA monitoring, HOA switch, indicator light, locking latch	**$1,090** Shipped with mixer for electrical contractor installation
Control Box B (120v) : UL listed, NEMA 4X, 120vAC/1ph, w/ timer but No SCADA, on/off switch, indicator light, locking latch	**$695** Shipped with mixer for electrical contractor installation
Control Box A (240v): UL listed, NEMA 4X, 240vAC/1ph, with SCADA monitoring, HOA switch, indicator light, locking latch	**$1,400** Shipped with mixer for electrical contractor installation
Factory Delivery and Placement: Installing the above mixer is within the scope of work that most cities and contractors can perform	**$13,000** Varies with tank height and tank construction
STH-8400 Submersible Electric Potable Water Tank Heater: 316 SS, includes a control panel, float switch, 50' of electrical cable, chain, etc. Fits through 12" or larger roof opening. Nominal 240VAC/1PH	**$6,800 + $100 Freight** Typically used in cold climates when the tank has less then 10% turnover
Portable Disinfectant Boost System: An electric or engine-driven air compressor (4 cfm @ 60 psi) is required to operate the air-powered diaphragm pump; air compressor is not included	**$8,720** **FOB Factory** 

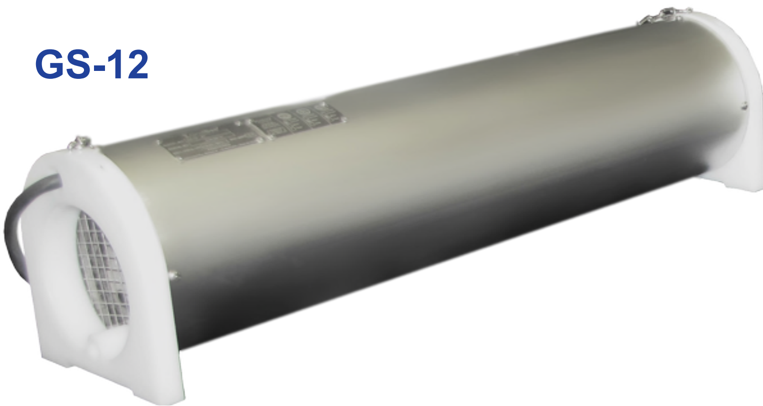
Manual Digital Thermometers: Do your own before and after temperature profile with: Fish Hawk TD to 300' depth in 5' increments: $250

GridBee®

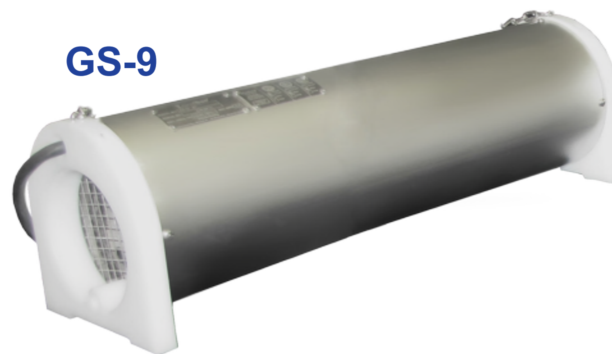
GS Electric Mixers

Effective. Efficient. Affordable.

GS-12



GS-9

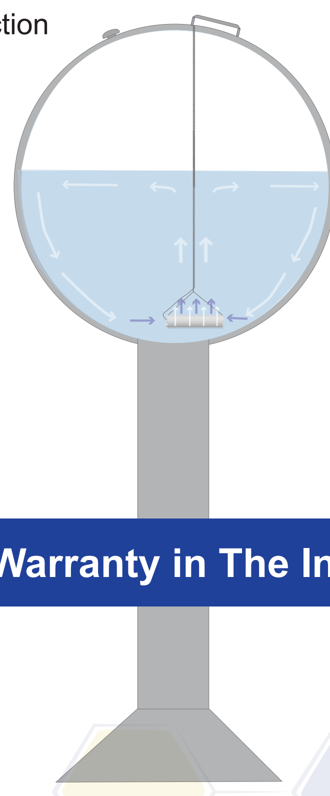


Benefits

- Active mixing 24 hours a day
- Creates a consistent mix & water age surface to floor
- Ensure uniform disinfectant distribution
- Minimize chemical disinfectant usage & disinfection by-products
- Eliminate ice damage to tanks in cold climates
- Reduce nitrification in chloraminated systems
- Prevent stagnation, thermal stratification, and short-circuiting
- Eliminate energy intensive & costly deep-cycling and/or flushing of tanks
- Lowest life-cycle cost
- 5-year warranty
- Installation & other videos available on YouTube

Features

- Engineered for easy deployment. Everything you need is in the box!
- No tank entry required
- Quiet operation
- Utilizes efficient sheet mixing technology
- SCADA control panels available
- Liquid disinfectant boosting port
- 316SS Construction



GridBee® SolarBee®
Potable Water Equipment
Certified to
NSF/ANSI Standard 61
& NSF/ANSI Standard 372
(Formerly Annex G for lead-free content)
For more information visit:
www.medoraco.com/NSF-UL-CSA

Best Warranty in The Industry!

Medora Corporation GridBee® SolarBee®

www.medoraco.com | 866-437-8076 | info@medoraco.com

1722_20161108

GridBee®

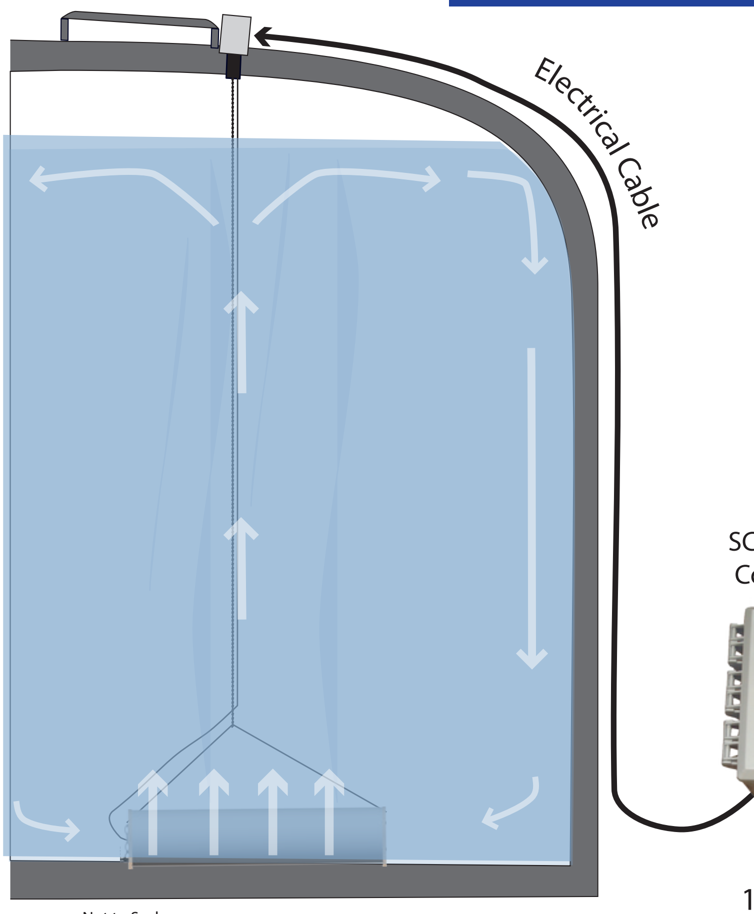
GS Electric Mixers

Overview

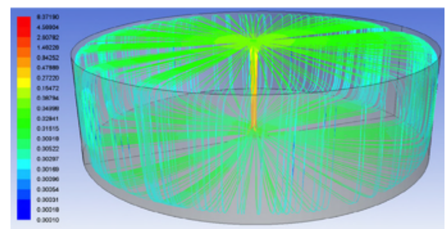
GridBee GS Mixers are easily installed through a 12 inch diameter or larger hatch or other tank opening. They thoroughly mix the entire tank volume from the tank floor to the water surface resulting in consistent disinfectant residuals, even temperature profiles, and uniform water age.

Everything Needed for a Fast & Efficient Deployment is Included!

Watch GridBee GS-12 Installation Video on YouTube!



Not to Scale



CFD Model

Optional SCADA / Timer Control Panel

120VAC Source Power

Chain

Top of Tank Junction Box

Chain Grab Tools

Kellem Grip

Cord Fixture Bolt

Hole Saw

Lexel Sealant

Cord Seal Cap

Specifications

GS-12	Assembled machine is 3 ft (0.9 m) long X 10 inch (25.4 cm) in diameter and weighs 75 lbs (34 kg).
GS-9	Assembled machine is 2 ft (0.6 m) long X 10 inch (25.4 cm) in diameter and weighs 65 lbs (34 kg).

Medora Corporation GridBee® SolarBee®

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1856_20161108

Appendix D – Hydrogeologic Report

DRILLING, WATER QUALITY, AND YIELD RESULTS, SPRINGFIELD WELL NO. 2, PAJARO / SUNNY MESA COMMUNITY SERVICES DISTRICT, MONTEREY COUNTY, CALIFORNIA

Report prepared for:
MNS Engineers, Inc.

Prepared by:
Mark Woyshner
Gustavo Porras
Barry Hecht

Balance Hydrologics, Inc.

May 2018

A report prepared for:

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Drilling, Water Quality, and Yield Results, Springfield Well No. 2, Pajaro / Sunny Mesa Community Services District, Monterey County, California

by

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Hydrologist/Hydrogeologist

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Hydrologist/Geologic Engineer

Barry Hecht, CHg, CEG
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May 25, 2018

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1. INTRODUCTION

The Pajaro/Sunny Mesa Community Services District (District) provides potable water service to various unincorporated communities, serving approximately 1,470 residents. The service areas are physically separate, each having their own water system. The Springfield community water system[1] (CA2700771) serves 34 connections along Struve Road in northern Monterey County. Springfield is a disadvantaged community of about 200 residents, many of them farmworkers. For the period 2009 to 2018 (**Table 1**), the Average Annual Demand (AAD) of the system was 6.6 million gallons (20 acre-feet), with an Average Day Demand (ADD) of 18,000 gallons (or 12.5 gpm continuous pumping). The maximum ADD for the period of record was 21,393 gallons during 2017 (or 14.9 gpm continuous pumping), and the Maximum Day Demand (MDD) was 42,150 gallons on June 15, 2016 (or 29.3 gpm continuous pumping).

The Springfield water system is currently on active status without system storage. Raw water storage is available solely in the aquifer; there is no substantive treated water storage. Water is supplied to the distribution system by one well, located a little over a mile from the Monterey Bay and from the Elkhorn Slough to the south and east of the site (**Figure 1**). The well is within a low-lying area at elevation 19 feet above sea level (asl), and surrounded by agricultural land-uses. The well was completed in April 1982 to a depth of 172 feet below ground surface (ft bgs) with perforations between 122 and 172 feet. Contaminated with nitrate and seawater, the well has not met State Title 22 drinking water standards since at least 1996. Current nitrate levels hover close to 300 mg/L (as NO_3), chloride concentrations exceed 900 mg/L and total dissolved solids (TDS) concentrations are approximately 3,000 mg/L. The maximum contaminant levels (MCLs) for these contaminants are 45 mg/L for nitrates, 250 mg/L (with an upper level at 500 mg/L) for chloride, and 500 mg/L (with an upper limit of 1,000 mg/L) for TDS.[2] Pajaro Valley Water Management Agency (PVWMA) implements water-quality objectives of 150 mg/L for chloride, and also for sodium (100 mg/L) and sodium absorption ratio (SAR=4.0), which were selected with consideration to the relative salt tolerances of crops grown in the Pajaro Valley and based on guidelines for irrigation in the Central

[1] A Community Water System is a public water system that has 15 to 199 service connections used by year-long residents, or regularly serves at least 25 year-long residents, and regulated by the county health department. Large water systems that have 200 or more service connections used by year-long residents are regulated by the California State Water Resources Control Board.

[2] Chloride and TDS are metrics generally used to characterize the extent seawater intrusion. Nitrate has a Title 22 primary standard intended to protect public health, while chloride and TDS are secondary standards and consumer acceptance levels.

Coast Regional Basin Plan (CCRWQCB, 2011). The water well drillers report and analytical lab reports for the Springfield Well No. 1 are found in **Appendix A**.

The District has been working with the residents of the Springfield/Struve Roads area to improve the water system since 2005 when the system was acquired. The District acquired a 100-ft by 130-ft easement at the northeast corner of the discontinued Moss Landing Middle School (APN 413-014-001; POR OF LOT 2 SEC 2 T13S R2W) for a new well, storage and treatment facilities. The property is located within a rural, farming setting on Springfield Road, 700 ft east from Highway 1. The address for the property is 1812 Springfield Road, Moss Landing, California 95039-9652. The site is at elevation 142 ft asl (WGS84, based on Google Earth) and located approximately 3,500 feet northeast from the existing Springfield Well No. 1 (**Figure 1**). A test hole was drilled at the site in July 2008 to a depth of 630 ft bgs. A geophysical electric log was conducted and a groundwater quality sample collected. The geophysical log suggests fresh water at depth; the lab results showed the nitrate concentration at 4.9 mg/L (as nitrate), chloride concentration was 40 mg/L, and TDS 370 mg/L. The well drillers report, geophysical log, and analytical lab report for the test hole are found in **Appendix B**.

The District was awarded a California Department of Water Resources (DWR) Integrated Regional Water Management (IRWM) Implementation grant funding for planning and preparation of contract documents to upgrade the water system. Three alternatives are proposed with regard to improving the Springfield water supply:

- Alternative A. Drill a new well at the school site (preferred);
- Alternative B. Connect to the Moss Landing Water System approximately 7,200 feet to the south of the community; and,
- Alternative C. Drill a new (deeper) well at the existing well site.

The new well may also serve the Moss Landing Mobile Home Park, which has 105 connections, and 30 single family home connections along Springfield & Giberson Roads, as well as storage per County Fire District requirements. The ADD is estimated to increase to 62,400 gallons (or 43 gpm), and the MDD to 119,000 gallons (83 gpm). The AAD would increase to 23 million gallons (or 70 acre-feet).

1.1 Purpose of Report

The test-hole site at the northeast corner of Moss Landing Middle School appeared to be a favorable location for a new water-supply well based on:

a) the results of lithologic and geophysical logging and water-quality sampling from the test hole at this location indicates 'fresh' water quality (**Appendix B**);

b) the site is not prone to flooding (**Figure 2** and **Figure 3**); and

c) water storage at the site would be at a higher elevation, providing head to the distribution system.

In November 2017, the District installed the Springfield Well No. 2 (a test well) at the middle school site, and followed with a step-drawdown test, a constant-rate pumping and recovery test, and sampling for Title 22 water-quality and groundwater age-dating analyses. This report summarizes the results of the well drilling and testing and assesses its potential as a sustainable water-supply source.

In addition, we reviewed published reports relevant to the site, drillers reports (well logs) provided to us by DWR (summarized and illustrated as lithologic profiles across the project site), and water-quality data[3] to address the following questions:

a) To what degree will Alternative A, the Springfield Well No. 2 solve the Springfield system's water-quality limitations?

b) If Alternative A is not feasible, then will Alternative C, a deeper well the existing well site provide suitable water quality from a regional hydrogeologic perspective?

1.2 Acknowledgments

This work was conducted with technical assistance and guidance of Martin Feeney, PG CEG CHg, Consulting Hydrogeologist and of Nick Panofsky, PE, Senior Project Engineer at MNS Engineers, Inc. Maggiora Bros. Drilling installed the new Springfield Well No. 2 and assisted with the yield test by installing the pump, piping, portable generator, and discharge hoses, as well as troubleshooting field problems that arose. Newman Well Surveys performed the e-log during drilling the Springfield Well No. 2. Pajaro / Sunny Mesa staff assisted with access and troubleshooting field problems. Guadalupe Rocha coordinated pumping of his irrigation well on Springfield Road during the yield test, and permitted our monitoring of water levels in the well. Scott Hawkins of Hawkins

[3] Water-quality data from wells in the vicinity of the project site monitored by the Pajaro Valley Water Management Agency (PVWMA) are considered proprietary under their agreement with the well owners and were not available for this study.

Engineering permitted our monitoring of water levels in the well supplying water to their business at 1813 Springfield Rd, Moss Landing, CA 95039. Mark Harris, facilities director for the discontinued Moss Landing Middle School permitted our monitoring of water levels in the well supplying water to the school site (aka. PVWMA well #992). School facilities caretaker and family graciously tolerated living with the inconveniences of noise and drainage during the drilling and pumping of the Springfield Well No. 2. Roger Van Horn, R.E.H.S., Supervisor Drinking Water Protection Service / Well Program, Monterey County Health Department, Environmental Health Bureau provided oversight for the installation, yield and water-quality testing of the Springfield Well No. 2.

2. HYDROGEOLOGIC SETTING

The project site is located within the Pajaro Valley Groundwater Basin (DWR sub-basin 3.2) and within the Springfield subarea, which extends from the coast to the Elkhorn Slough and northward to the Pajaro River alluvial floodplain. The hydrogeology of Pajaro Valley and adjacent parts of the Monterey Bay has been compiled in numerous studies and summarized in the following reports: Hanson and others, 2014; DDA, 2013; Hanson, 2003a, 2003b; Johnson and others, 1988; Luhdorff & Scalmanini, 1988; Fugro West, 1995; and HEA, 1978. Quoting and paraphrasing from these reports and from published geologic maps and reports (Rosenberg, 2001; Dupre, 1990; and Dupre and Tinsley, 1980), we prepared this report section describing of the geologic and hydrogeologic conditions related to the project site. In summary, water supply in the Springfield subarea is locally constrained by water-quality problems. Chronic storage depletion and groundwater pumping drawing water levels below sea level have induced seawater intrusion largely in the upper Aromas Sands and overlying sands and gravels (“alluvial aquifer”). Recharge to the aquifer has caused widespread nitrate contamination, limiting sources for potable water supplies. Attempts to mitigate seawater intrusion in the subarea by reducing groundwater pumping have shown success (PVWMA Basin Management Plan Update).

2.1 Depositional History

The alluvial aquifers in the Pajaro Valley are underlain by granitic basement rocks of Cretaceous age (Salinian Block) that generally occur at depths of 2,000 to 4,000 ft along the coast and are exposed locally along ridges just east of Royal Oaks Park, several miles to the east in Prunedale. Overlying these basement rocks are minimally permeable consolidated rocks of Eocene to Miocene age composed of mostly marine shales, mudstones, clay, silt, fine sand, conglomerate, and minor deposits of volcanic rock.

In the early Pliocene, a primary hydrologic connection between the San Joaquin Valley and the Pacific Ocean is believed to have existed within the ancestral Santa Cruz Basin, which extended along the northeast side of the Gabilan Range through the Santa Cruz Mountains. Throughout the Pliocene, this marine depositional basin received generally fine- to coarse-grained sediments, which became the upper Purisima Formation. The Purisima Formation is poorly consolidated and underlies the Pajaro Valley at depths ranging from at or near land surface along the northern and eastern boundaries, to as much as 800 or 900 feet near the mouth of the Pajaro River (and near the project site).[4]

By late Pliocene, uplift of the Santa Cruz Mountains segmented the Santa Cruz Basin to form the Watsonville Basin. The Watsonville area has since been a stable to subsiding depositional center and the locus of fluvial, alluvial-fan, and eolian activity throughout the Quaternary, or about the last 2.7 million years. These deposits are mapped as Aromas Sands, which unconformably overly the Purisima Formation. The Upper and Lower Aromas members of this formation are considered to be the primary aquifers in the Pajaro Valley. The average specific capacity (Cs) of wells in the Springfield subarea – nearly all of which are developed in the Aromas aquifer -- is 4.1 gallons per minute per foot of drawdown (gpm/ft), and the maximum is 40 gpm/ft (Fugro, 1995).

Similar to the Purisima Formation, the Aromas Sands thicken coastward. The upper part of the Aromas Sands outcrops in the northern part of the Watsonville area. Together with higher rainfall (up to 30 inches per year), the sandy formation north and west of the town of Corralitos, it is a major groundwater recharge area for the Pajaro Valley. In this area north of the alluvial floodplain of the Pajaro River, the Aromas Sands are characterized as a heterogeneous mixture of cross-stratified sand, silt and gravel deposited by a series of aggrading fluvial and alluvial-fan systems. The Aromas Sands extend south under the Springfield subarea, where they are complexly interbedded with eolian and marine deposits (near the project site). South of the Pajaro River, the Aromas Sands outcrop on the fringe of the Springfield terrace subarea, where they are overlain by younger but similarly complex eolian and marine deposits (**Figure 4**). Aromas Sands also outcrop east of the Elkhorn Slough.

It is believed that an ancestral San Benito River once entered the Monterey Bay via the Elkhorn Slough, to be subsequently diverted into the Watsonville region by movement along the San Andreas Fault and/or capture by the Pajaro River. The ancestral San Benito River would seem to have been an early source of sediment forming the Aromas Sands deposit at the project site, while later deposition would be from the Pajaro River.

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[4] South of the ancestral Santa Cruz Basin, the Purisima Formation consists of relatively less permeable marine silt, clay, and fine sand units, suggesting deposition outside of the main drainage. The upper Purisima Formation is believed to inter-tongue with the deposits that comprise the 400-ft aquifer of the Salinas Valley, interpreted to consist of continental deposits associated with the lower Paso Robles Formation.

In addition, multiple glacioeustatic[5] cycles are recorded in the Aromas sands, with fining-upward sequences of fluvial and estuarine sediments during periods of rising sea level (transgression), and fluvial dissection and eolian and littoral marine sediments deposited during periods of declining sea level. Massive fine-grained deposits are present to the south of the Springfield subarea and at depth along the coast (as noted at deep boreholes PV-5, PV-4 and PV-4A in **Appendix C** and boreholes E and F in **Appendix D**), likely representing deposition within an ancestral submarine canyon. The Elkhorn Slough and related estuarine mud deposits also broarder Springfield area east of the project site. The presence of these thick fine-grained deposits appear to have possibly isolated the area from the effects of inland pumping and documented seawater intrusion south and east of these deposits.

Terrace deposits, unconsolidated alluvium, dune deposits, and younger marine sediments blanket the Aromas Sands (**Figure 4**), and are variable spatially and ranging in thickness from about 15 to 380 feet in the Pajaro Valley. A fine-grained confining layer ranging from 15 to 55 feet thick (referred to as the basal confining layer) generally separates these deposits from the Aromas Sands. While the Watsonville area has been a stable or subsiding basin through the Quaternary, a series of coastal terraces have formed to the north is response to glacioeustatic fluctuation in sea level superimposed on the tectonically uplifting Santa Cruz Mountains. Six sets of marine terraces have been mapped in the Santa Cruz region, ranging in elevation from 60 to 790 feet above sea level. The lowest terrace complex (Santa Cruz terrace) consists of three distinct interglacial shorelines, the youngest likely relating to the Springfield coastal terrace (at the project site). The coastal terraces at the project site, though, are mostly buried by and interbedded with eolian deposits.

2.2 Hydrogeologic Framework

For the purpose of groundwater flow modeling, the hydrogeologic framework representing the Pajaro Basin has been simplified to six discrete model layers:

- Two layers of the alluvial/eolian/marine deposits representing a shallow coarse-grained layer and a basal fine-grained confining unit;

[5] Seven or eight times during the past 1,000,000 years, so much of the earth's water was locked up in glaciers that sea level fell about 300 to 420 feet. Each time glaciers melted, sea level rose back up to essentially the same level it now occupies. These are called '*glacioeustatic cycles'.* Glacioeustatic cycles are known to have occurred back into the start of the Pliocene epoch or even earlier.

- Three layers of the Aromas Sand representing the upper Aromas, an upper Aromas basal finer-grained confining unit, and a lower Aromas unit; and
- One layer representing a combination of the Purisima Formation and other minor pre-Pliocene bedrock units.

2.3 Springfield Area Lithology

Drillers reports (well logs) were requested and received from the California Department of Water Resources (DWR) for the project vicinity shown in **Figure 1**. The logs were reviewed and 31 of the deepest logs selected for lithologic analysis, in addition to the logs from the existing source Well No. 1 and test hole. Each log is identified in **Figure 5** with a unique DWR log number. The lithology from each well was entered into the borehole manager of RockWorks16 (by RockWare®) for cross-sections plotting and interpretation. Lithologic categories were based on logged grain sizes (clay, clay and sand, clay with gravel, gravel and sand, sand, and sand with clay) and color (blue/grey, red/brown, and white/yellow). Also included were categories of shale/clay layer, sandstone/hard layer, oyster shells, and top soil. As a preliminary evaluation, the data were used to create a three-dimensional lithologic model using lateral blending to interpolate lithologic categories between the boreholes. The model results were then used to profile intervening lithology types on selected cross sections of logs.

Profile A-A' (**Figure 6**) extends 11,000 feet eastward from wells PV-4 and PV-4A (near the coast), through McClusky Slough, well 315502 (the deepest log at 1,260 ft), and through the existing water-supply well and proposed new well site for the Springfield water system. Profile A-A' includes a 1,600 ft swath on each side of the section, within which lithologic logs were projected to the section line. Profile B-B' (**Figure 7**) extends 13,000 feet northeastward from PV-5 (near the coast), through the existing water-supply well and proposed new well site for the Springfield water system, and ends at PV-7 (north of the project site and near Elkhorn Slough).

The profiles generally show the well-layered coarse-grained deposits separated by segments of fine-grained deposits. The deepest well in the area (DWR no. 315502) identifies thick segments of blue clay with streaks of brown sandy clay below 700 ft and hard shale and clay starting at a depth of 920 ft, interbedded with sandstone and layers of find sand and sandy clays. This 900-ft depth is interpreted as the top of the Purisima Formation. The well is screened to draw groundwater from the Purisima and had chloride concentrations unacceptable for agriculture.

The fine-grained deposits in the overlying Aromas Sands are variable spatially and in depth and thickness. Thick segments of blue clay are identified along the coast below an elevation of about 150 feet below sea level (bsl), and interbedded with sands and clayey sands at depth. USGS staff (Muir, 1972, and Johnson and others, 1980) have characterized Elkhorn Slough as a 550-foot-deep uniform plug of blue clays. Thin deposits of sand and gravel, likely older terrace deposits, are interbedded with brown clay generally overlay the blue clay.

Clay horizons thin considerably inland. In the vicinity of the existing well and proposed new well location, the upper and lower Aromas Sands can be generally differentiated by blue clays found at an elevation of 150 ft to 250 ft bsl. It is likely that this zone corresponds to the blue clay identified at the project test hole (Well No. 2) site at a depth of 295 ft to 360 ft (**Appendices B and F**). Clay horizons are thicker east of the project site (near Elkhorn Slough) with generally more brown clay beds (indicating oxidized zones).

Aromas Sand deposits persist across the Springfield area and form the aquifers from which wells draw water. The upper and lower Aromas Sands are well layered and appear to be reasonably connected across the project area, suggesting that lower Aromas Sands should be present at depth at the Springfield water system existing-well location. Likewise, seawater intrusion and nitrate contamination documented in the upper Aromas Sands would likely extend beneath the new well site when pumped.

2.4 Aquifer Recharge

The aquifers across the Springfield terrace and lowlands are composed of well-layered marine and terrestrial coarse-grained deposits separated by inter-fingering fine-grained deposits. The fine-grained deposits potentially restrict vertical movement of groundwater, though their discontinuous extent, particularly in the Springfield area, may allow for vertical flow of local rainfall recharge through and around these aquitards. Well pumping drawdown increases groundwater gradients and can capture local rainfall recharge, as seen in the Springfield Well No. 1, which at a depth 172 ft bgs is contaminated with nitrate and potentially other agricultural chemicals. The Springfield Well No. 2 site, however, is not contaminated by nitrate-laden local recharge at a depth of 600 ft bgs (further discussed in water quality sampling results section below).

The Pajaro River is also a source of recharge, as identified from boron concentrations in groundwater (**Figure 8;** see HEA, 1978 and Woyshner and Hecht, 2012). However, the lateral extent to which the Pajaro River recharges alluvial aquifer is not known. The river is sealed off from the Springfield area by recent heavy blue clays of the recently-deposited Pajaro Valley floor (Rosenberg's basinal clays, 2001), but high permeabilities beneath the valley floor in the alluvial aquifer likely allow subsurface flow beneath the valley, both from the river water recharged further upstream and from the large dunefields of the San Andreas Terrace immediately northwest of the river.

Hydraulic gradients across the Springfield area, however, have been flat to landward during recent times (**Appendix I**). Fugro (1995) plotted groundwater contours across the Springfield subarea for the dry seasons of 1979, 1983, and 1994. Groundwater elevations had fallen from roughly sea level with a zero hydraulic gradient, to 10 to 20 feet below sea level with northwesterly hydraulic gradient at the project area in 1994. North of the project area, the hydraulic gradient was easterly, drawing seawater toward inland pumping. Similar results are shown for Fall of 1987, 1992, 1998, and 2006 (Hanson and others, 2014), and for recent measurements by PVWMA (Feeney, 2016). These results, as well as seawater intrusion evidence (see Section 2.5 below) do not support the notion of recharge from the Pajaro River reaching the Springfield area during recent years.

The boron plume beneath the floor of the eastern Pajaro Valley, nevertheless, was deflected toward Elkhorn Slough in the 1960s and 1970s (see **Figure 8**), which is most easily understood as a manifestation of southeastward recharge from those dunefields. If so, then managed recharge of the San Andreas dunefields may benefit the Springfield aquifers, potentially as far south as the project site.

2.5 Seawater Intrusion

The Alluvium[6], Aromas Sands, and Purisima Formation are hydrogeologically connected to the ocean through a number of outcrops in Monterey Bay. Coarse-grained deposits persist over large areas and control the depth of well pumping and related seawater intrusion, while the fine-grained deposits may potentially constrain seawater intrusion vertically. Groundwater levels have been near or below sea level at most coastal monitoring wells, and at some inland water-supply wells (including the Springfield subarea). Since the 1970s, groundwater levels have been below the estimated water

[6] For simplicity, the unconsolidated alluvium, eolian deposits, and younger marine sediments the blanket the Aromas Sands are generally referred to as the alluvial aquifer.

levels required to impede seawater intrusion (even during the wet years peaking in 1998 and 2006).

The upper confined or semiconfined Quaternary aquifer -- consisting of the main water-bearing unit of the alluvium and the upper part of the Aromas Sand -- exhibits seawater intrusion. The aquifer's depth near the coast is interpreted as corresponding to an intruded interval of 100 to 200 feet below sea level. The existing Springfield water system Well No. 1 is in this seawater intruded zone. The shallow-alluvial aquifer and parts of the upper Aromas Sands are also being replenished by recharge, and represents a renewable groundwater resource (**Figure 9**).

The Springfield area, as well as other coastal areas of the Pajaro basin, is affected by two forms of seawater intrusion: 1) a relatively shallow, pumping-induced intrusion generally well above the base of fresh groundwater; and 2) a base of natural groundwater intrusion related to the difference in specific gravities between fresh and saline water (see **Figure 9**). The deep seawater intrusion has been dated as old seawater (Hanson 2003a, b). Fresh groundwater is generally found between the shallow zone intruded with seawater and the deep old seawater, and was dated to have been recharged thousands of years ago at some parts of the upper and the lower Aromas Sands. It is unclear if pumping in the interval 300–600 ft below sea level has caused seawater intrusion along the coastal margin but it seems reasonable to be expected.

The Pajaro Valley Water Management Agency operates a Coastal Distribution System pipeline (CDS) that delivers supplemental water to the coast for growers to reduce groundwater pumping. The CDS pipeline to the Springfield subarea has operated since 2009. Significant improvement to chloride, sodium and TDS concentrations in groundwater was observed until water year 2014 when CDS supplies became limited, deliveries reduced, and groundwater pumping increased because of the drought. Concentrations have since returned to pre CDS levels, illustrating the sensitivity of the sea intrusion to existing groundwater pumping.

2.6 Locally Significant Seawater Intrusion

Resistivity logs (also called electric logs, or ‘e-logs’) are useful to identify seawater intrusion[7] and are available for several deep boreholes in the Springfield area (**Figure 10**). Two sets of e-logs were available: a) Seven e-logs shown from the Capurro Ranch well study (Eaton Drilling, 1993), shown in **Appendix C** and locations on Profile C-C’ (**Figure 11**); and b) Five well logs from the Pajaro Valley groundwater investigation (L&S, 1988), shown in **Appendix D** and locations on Profile D-D' (**Figure 12**).

A good example of a seawater intrusion signature is found at the 160 to 190 ft depth at PV-4A (**Appendix C**), where chlorides in the 7,000 to 9,000 mg/L range have been observed (Hanson, 2003a, b; L&S, 1988). Near-coast borehole PV-4 also shows seawater intrusion, and it is uncertain whether boreholes PV-4B and PV-5 show seawater intrusion. At the inland borehole PV-7 (approximately 4,000 ft north of the proposed-well site), old seawater may be present below a depth of 790 ft.

Of the Capurro borehole sites in 1993 (**Appendix D**), Site F (near PV-4 and PV-4A) likely shows a seawater intrusion signature, and interestingly, as does site D at the 175 to 210 ft depth interval. Site D is closest to the existing water-supply well, about 1,000 ft to the southwest. A freshwater water signature is found at site D from 280 ft to 490 ft, implying freshwater also at depth at the existing water-supply well site. There is possibly saltwater perched on clays at about 500 ft to 515 ft at site D. It is uncertain if near-coastal borehole site E is intruded with seawater, and as with PV-4B, site G is unclear. Inland sites A, B and C show freshwater signatures (**Figure 10**). This potentially freshwater area corresponds with the area shown outside of the elevated chloride and sulfate envelope (Hanson, 2003) in **Figure 13**.

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[7] In general silt, clay and shale have the lowest resistivity, and sand and gravel with fresh water have medium to high resistivity. Resistivity decreases as salinity increases, and a sand aquifer intruded with seawater would have a low resistivity.

3. INSTALLATION AND YIELD TESTING OF SPRINGFIELD WELL NO. 2

Maggiora Bros. Drilling (Maggiora) of Watsonville, California was contracted by the District to carry out the drilling, development, and pump-testing of the Springfield Well No. 2. Newman Well Surveys subcontracted to Maggiora to perform down-hole geophysical surveys, consisting of resistivity, spontaneous potential, and gamma logs, generally referred to as an e-log (**Appendix F**). Gustavo Porras of Balance Hydrologics was present during the drilling activities to take hydrologic observations (**Appendix E**) and to log the lithologic composition of the borehole cuttings (**Appendix F**). He also coordinated and monitored the aquifer tests, conducted following the completion of the well, and collected water-quality samples for laboratory analyses.

3.1 Water Well Drilling and Development

The Springfield Well No. 2 was drilled from November 6 to 8, 2017. Based on the 2008 driller's log and e-log, the target depth for the placement of 100 feet of perforated well casing was the lower Aromas Red Sands formation, below blue clay found at a depth of 295 to 360 ft bgs and inter-fingering clay noted from 450 to 470 ft bgs. An Ingersoll Rand TH60 mud-rotary rig and 8 3/4-inch bit were used to drill a pilot hole to a depth of 615 feet below ground surface (bgs). Drill cuttings were sampled at a 5-foot interval for lithological identification. The borehole was e-logged on November 8th. A comparison of the logs with the 2008 logs confirmed that the groundwater quality had not degraded from seawater intrusion, a known issue in the Pajaro Groundwater Basin.

The borehole was reamed to 16 inches on November 13th to the 15th, with casing installed on November 16th. On November 17th, an 8/16" gravel pack material and the cement seal was placed in the well annulus using a tremie. Balance staff and an inspector for Monterey County observed placement of the pack material from the bottom of the well to a depth of 470 ft bgs, and then placement of the cement sanitary seal from 470 ft to ground surface. Starting on November 20th, the well was swabbed and air-lift developed in 20-ft sections. Balance staff were not present during development of the well. After development, we measured the static depth to water in the well at 145 ft bgs on December 8, 2017.

3.2 Well Yield Testing

Balance planned and directed a step-drawdown test ('step test') and a 9-hour constant-rate yield test, with Maggiora as the pumping contractor. Following well completion, Maggiora installed a Berkeley submersible turbine pump model 7T-350 with a 60 HP pump at a depth of 470 feet below ground surface (bgs) and a 4-inch diameter steel pipe extended from the pump to the surface, where a butterfly valve was installed to control the flow rate. Pumped water was discharged to a 4-inch diameter flexible hose extending about 300 feet south onto the school field, an area extending approximately 600 feet south from the site.

In addition to monitoring drawdown in the well Springfield Well No. 2 while conducting the yield tests, we concurrently monitored water levels in three other wells (**Figure 14**):

- The domestic well located 440 feet west from the Springfield well at the Hawkins Engineering house, 1813 Springfield Rd, Moss Landing, CA 95039;
- The School Well located 700 feet south from the Springfield well, labeled PVWMA well 992; and,
- Guadalupe Rocha's irrigation well located 1,500 feet east from the Springfield well.

All four wells were equipped with a submersible Micro-Diver® datalogger, which recorded water level every 5 minutes.[8] Hand measurements of the depth to water were also periodically taken with a Solinst® electronic-tape water-level sounder and used to calibrate the datalogger records.

On Tuesday December 19, 2017, the step test was conducted (**Figure 15**), which consisted of pumping at 327 gpm for three hours (the minimum flow rate possible with a 100 psi backpressure), then increasing to 425 gpm for three hours (the maximum flow rate with butterfly valve completely open). Following review of the step-test results by Roger Van Horn at Monterey County Environmental Health, who corresponded with the State Water Board, an 8-hour constant-rate pumping test was required to be conducted at the same time as the Rocha agricultural well was being used. In accord with this request, we conducted a 9-hour constant-rate pumping test at 400 gpm on Wednesday, February 21, 2018, after Guadalupe Rocha started using his well for the season (**Figure 18**).[9] The use of the Rocha well started on February 12th as rainfall had

[8] The Micro-Diver datalogger installed in the Rocha well became tangled in the well and all data were not retrievable.

[9] Per Monterey County source capacity testing procedures, the Springfield well was pumped for one hour on the day before the constant rate test for the purpose of obtaining an accurate static water level value.

been below normal since the start of the water year, with 0.12 inches during October, 0.92 inches during November, 0.32 inches during December, 3.14 inches during January, and 0.17 inches during February.[10] It did not rain during the yield tests and had not rained for 21 days prior to the step test[11] and for 27 days prior to the constant-rate test.

On the day of the constant-rate test, the Rocha well was pumped at a rate of 900 gpm, which started about an hour before pumping the Springfield well, and ended about an hour before the Springfield well pumping stopped. The School Well and the Hawkins Well both appeared unaffected by simultaneously pumping the Springfield well and the Rocha well, relative to apparent short-term pumping spikes at each well (**Figure 20**). A 9-hour drawdown recovery test immediately followed the pumping test. Drawdown in the Springfield well recovered 98 percent of its total drawdown by the end of the 9-hour recovery period (**Figure 18**).

3.3 Aquifer Properties

Results of transmissivity, specific capacity, saturated hydraulic conductivity, and well efficiency calculations are summarized in **Table 2**.

Transmissivity (T) is a common aquifer coefficient that characterizes how easily water moves through the aquifer (a measure of permeability), and can be used to quantify groundwater flow and to estimate well efficiency. Drawdown data collected at the Springfield No. 2 well during the step test (**Figure 16** and **Figure 17**), the constant-rate pumping test (**Figure 19**) and recovery test (**Figure 21**) were analyzed using the modified nonequilibrium equation graphical method (Cooper and Jacob, 1946) to estimate T. The transmissivity was estimated at 24,000 gallons per day per foot (gpd/ft).

Specific capacity (Cs) is the well function describing the quantity of water that a well can produce per unit drawdown of water level in the well. It is the pumping rate divided by the water level drawdown in the well, in gallons per minute per foot drawdown. The estimated 24-hour Cs for the Springfield well is 8.8 gpm/ft (**Figure 19**).[12]

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[10] Measured at the Castroville CIMIS station (No. 019).

[11] With the exception of 0.02 inches on December 3rd.

[12] The 24-hour Cs can be used to estimate drawdown at the source well for the estimated maximum day demand on the well by the water system.

The average specific capacity of wells in the Springfield subarea is 4.1 gpm/ft (Fugro, 1995).

The efficiency of a pumped well is expressed as the theoretical drawdown divided by the actual drawdown, and is best estimated with a distance-drawdown graph (if available). A more commonly applied alternative method of estimating well efficiency is given by dividing the estimated 24-hour Cs by a theoretical Cs, which is estimated using a relationship to Transmissivity (T). [13] The theoretical Cs for confined aquifers is given by Cs = T / 2,000. The estimate for well efficiency ranges from 66 percent (using the pumping test derived T) to 73 percent (using the recovery test derived T) (**Table 2**).[14] Though higher pumping rates can decrease efficiency, in most wells a substantial portion of the head loss is attributed to laminar flow rather than turbulent flow. In the Springfield well, 66 percent of the head loss can be attributed to laminar flow (**Table 2**).

Hydraulic conductivity (K, also known as permeability) is used in the groundwater flow model and was estimated by dividing T by the aquifer thickness (b), which is the depth for the well minus the depth of the overlying confining clay layer. The estimated saturated hydraulic conductivity is $5x10^{-3}$ centimeters per second (cm/s), which is also expressed as 106 gpd/ft^2 or 14.2 ft/day. The transmissivity and hydraulic conductivity values are similar to reported values by Hanson and others (2014).

3.4 Boundary Effects

When a well is pumped it introduces a stress to the aquifer and lowers hydraulic pressures and water levels in the vicinity of the well. With continued pumping, this effect propagates outward from the well, which can be conceptually represented as a "cone of depression". A recharge boundary is shown in the time-drawdown graph as reduced drawdown after the cone of depression encounters a stream, lake, or other recharge source. Vertical leakage from overlying beds is also shown as reduced drawdown in the time-drawdown graph. Conversely, a no-flow or low-permeability boundary results in increased drawdown after the cone of depression encounters a zone of lower permeability such as a change in lithology or a fault. After 7 hours of pumping the Springfield well at 400 gpm, reduced drawdown can be noted in the

[13] The relationship of aquifer transmissivity (T) to specific capacity (Cs) is found in Appendix 16.D of Driscoll (1983) or p. 128 of DWR Bulletin No. 118-2 (June 1974).

[14] Estimates using recovery data from a pumped well are generally more accurate than the estimates using drawdown data because residual-drawdown measurements are more accurate.

time-drawdown graph (**Figure 19**), which is most reasonably attributed to vertical leakage from overlying beds, considering the depositional history and geologic framework of the Springfield area and the relatively distal locations of potential recharge sources. No low-permeability or no-flow boundaries were observed in the time-drawdown graph.

3.5 Area of Influence

As an initial assessment, the area of influence of a pumped well is commonly estimated using the Cooper-Jacob (1946) distance-drawdown equation, which is an approximation of the Theis (1935) analytical model[15]. Based on the estimates of aquifer transmissivity from the 9-hour pumping and recovery test (discussed above) and using a reported nominal storage coefficient[16] for the lower Aromas aquifer (Hanson and others, 2014), we estimated the radius of influence for the Springfield well for two cases (**Table 3**):

- Case A, the area of influence which would develop at hour 7 (prior to observed vertical leakage from overlying beds) during the 9-hour constant-rate pumping test at 400 gpm using a transmissivity value estimated with the residual drawdown data; and,
- Case B, the area of influence which might develop during late dry-season conditions while pumping at the proposed average day demand of the expanded Springfield water system -- 43 gpm for 60 days -- as an example of seasonal pumping.[17]

As a confirmation, the selected storage coefficient (S) of 0.0015 allowed for the Case A calculated drawdown to match with the observed drawdown at hour 7 of the 9-hour pumping test. Though the results of Case A predict drawdown at the Hawkins Well and School Well from pumping the Springfield well, in fact, the School Well and the Hawkins Well both appeared unaffected by simultaneously pumping the Springfield Well and

[15] In practice, area-of-influence calculations are generally applied for guidance in groundwater management with the caveat of having quantitatively low resolution as a predictive tool. The resolution to a unit of 1-foot would seem reasonable for the conditions at the site.

[16] The storage coefficient is the volume of water released from the aquifer given a unit decline in hydraulic head per unit surface area. Similar to porosity, it is unitless. The storage term in unconfined aquifers is known as specific yield (Sy) and ranges in value from 0.01 to 0.30, while in confined aquifers it is called storativity (S) and ranges 0.005 to 0.0005. Aquifers with S values of 0.005 to 0.01 appear transitional.

[17] We chose 60 days to compare results with the groundwater model results.

the Rocha well, while occasional drawdown spikes were recorded in each well from brief pumping (**Figure 20**). This suggests the School Well and the Hawkins Well are perhaps marginally isolated from the Springfield Well, which draws groundwater from a depth of 490 to 590 feet (elevation -350 to -450 ft) in the lower Aromas aquifer.

Also as an initial (first order) assessment, we used the WinFlow Solver[18], an analytical tool in AquiferWin32® v5 software, to illustrate a conceptual area of influence (or cone-of depression) if the well were pumped at the proposed average day demand (ADD) of 43 gpm for the expanded Springfield water system (as shown in Case B in **Table 3**). The analytical models developed (**Figure 22**) illustrates drawdown for two-dimensional steady-state groundwater flow in a horizontal plane. Results are shown for general (and simplified) groundwater conditions with and without areal recharge. The recharge rate applied was within an assumed area around the well, selected to match the ADD pumping rate of the well. The 1-ft drawdown contour is commonly used to estimate a theoretical area of influence. **Table 4** summarizes the parameters and assumptions of the calculations.

We also ran a two-dimensional transient groundwater flow model with particle tracking to illustrate the radial distance from the well equivalent to the amount pumped at a given time step, and given an effective porosity of 0.2 and an aquifer depth of 225 ft (the depth from the bottom of the well to the overlying confining clay of the lower Aromas aquifer). Results for 60 days and for 60 years of continuous pumping at the ADD rate of 43 gpm are shown in **Figure 23**. Drawdown at 60 days resembles the steady-state model results. At 60 years of pumping, the volume of water pumped is equivalent to an area based on the radial distance of 1,140 ft (shown in **Figure 23**) multiplied by the aquifer depth of 225 ft and the porosity of 0.2. At a practical level, though, the extraction of groundwater from the aquifer would not occur nearly as uniformly as this calculation, but rather, groundwater flow would follow preferential paths within the aquifer to the perforations in the well casing. Extracted groundwater would be replaced by groundwater flow within the aquifer, with lateral flow generally prevailing but also with vertical flow from overlying beds (as was apparent in the pumping test results). Though impossible to predict given the limitations of the available data, as a rough indication with many caveats, this calculation suggests potentially many

[18] Developed by Strack (1989), primary assumptions for the calculations are that groundwater flow is in the direction of a horizontal hydraulic head, occurs in an infinite homogeneous aquifer (the same in all directions and locations). Though these assumptions are never strictly met in any real-world aquifer system, they are suitable and common practice to assist the placement of pumping wells and as a first assessment of localized changes to groundwater elevations.

decades (to possibly more than a century) of similar water quality as described in Section 4 (below), if pumped at the proposed ADD. This suspicion is largely owing to the depth and thickness of the aquifer relative to the pumping rate, and assuming groundwater quality is locally similar in the vicinity of the well as identified in **Figure 23**. Related time-step calculations are as follows:

Time Step (years)	Groundwater Pumped [1] (MG)	Aquifer Volume [2] (cu ft)	Area around well [3] (sq ft)	Radius from well [4] (ft)
10	228	1.52E+08	6.77E+05	464
20	456	3.05E+08	1.35E+06	657
30	684	4.57E+08	2.03E+06	804
40	912	6.10E+08	2.71E+06	929
50	1,140	7.62E+08	3.39E+06	1,038
60	1,368	9.14E+08	4.06E+06	1,137
70	1,596	1.07E+09	4.74E+06	1,229
80	1,824	1.22E+09	5.42E+06	1,313
90	2,052	1.37E+09	6.10E+06	1,393
100	2,280	1.52E+09	6.77E+06	1,468
200	4,560	3.05E+09	1.35E+07	2,077

Notes:

1. Based on the proposed average day demand pf 62,424 gallons per day.
2. Based on an effective porosity of 0.2.
3. Based on an aquifer thickness of 225 ft.
4. Based on $A = \pi r^2$

4. WATER QUALITY

4.1 Springfield Well No. 2

We collected groundwater samples from the Springfield Well No. 2 while conducting the yield tests and delivered the samples to California certified analytical laboratories for the following initial suite analyses recommended by Monterey County Environmental Health and required by the California Title 22 drinking water standards for public water systems:

- General mineral, general physical, Title 22 inorganics (includes boron) by Soil Control Labs;
- Hexavalent Chromium (EPA test method 218.7) by BSK Labs;
- Perchlorate (EPA test method 314.0) by BSK Labs;
- Chlorinated acid herbicide organic chemicals (EPA test method 515.4) by BSK Labs;
- Volatile organic chemicals (EPA test method 324.2) by BSK Labs;
- Semi-Volatile organic chemicals (EPA test method 325.3) by BSK Labs;
- Carbamate organic chemicals (EPA test method 531.1) by BSK Labs;
- Diquat (EPA test method 549.2) by BSK Labs;
- Gross Alpha (SM 7110C) by BSK Labs; and
- Radium-228 (EPA test method 904.0) by Pace Analytical.

The lab reports are found in **Appendix G** and results summarized in **Table 5**. All results were below the Title 22 maximum contaminant levels (MCLs). In addition, all of the organic chemicals tested were not detected, with the exception of Toluene (likely a residual from well casing manufacturing) which tested 0.63 µg/L, marginally exceeded the method reporting limit of 0.5 µg/L but well below its MCL of 150 µg/L. In particular, total dissolved solids (TDS) was 410 mg/L and chloride was 54 mg/L, indicating that the aquifer is not intruded with sea water, either recent or ancient. Nitrate (as N) was 0.12 mg/L, marginally exceeded the method reporting limit of 0.1 mg/L, and far lower than other available drinking waters in the area.

In addition to the Springfield Well No. 2 samples, groundwater samples were also previously collected by the District on July 28, 2008 from the test hole at the Springfield Well No. 2 site and analyzed for general mineral, general physical and Title 22 inorganics (**Appendix B**). The major ions results were plotted in a Piper diagram (**Figure 24**), a commonly-used method to characterize (or 'fingerprint') and water from different sources for comparison.[19] Groundwater from Springfield Well No. 2 is characterized as a calcium-magnesium-sodium bicarbonate groundwater, a type of groundwater common in Monterey Bay Area. It is also a 'hard' water, equally from calcium and magnesium ions.

4.2 Springfield Well No. 1

The Springfield Well No. 1 draws on shallow groundwater from perforations between 122 and 172 ft bgs. Groundwater samples were previously collected by the District on September 30, 2011 from the Springfield Well No. 1 and analyzed for general mineral, general physical and Title 22 inorganics (**Appendix A**). The water from Springfield Well No. 1 is dominated by chloride and has a significantly higher TDS concentration relative to the sample from Springfield Well No. 2. Current nitrate levels are close to 300 mg/L, chloride concentrations exceed 900 mg/L and TDS concentrations are approximately 3,000 mg/L. Cation proportions, however, are similar in the samples from the two Springfield wells (**Figure 24**), which likely suggests a cation exchange control, otherwise the proportion of sodium would be greater and calcium less. This suggests that areal recharge from agricultural fields may be as or more significant than seawater intrusion.

4.3 Water Quality Implications to Discontinued Use of the Springfield Well No. 1

As described in an above section of this report, the Aromas Sands are hydrogeologically connected to the ocean, and the Springfield area, as well as other coastal areas of the Pajaro basin, is affected by seawater intrusion. Two forms of seawater intrusion have been identified: 1) a relatively shallow, pumping-induced intrusion (as seen in the Springfield Well No 1); and 2) a base of natural intrusion related to the difference in specific gravities between fresh and saline water. The Pajaro Valley Water Management Agency has also implemented a Coastal Distribution System pipeline that delivers supplemental water to the coast for growers to reduce groundwater pumping for agricultural irrigation.

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[19] Piper diagrams (Piper, 1944) show the relative concentration of major cations and anions, in milliequivalents per liter, to the total ionic content of the water.

The Springfield Well No. 2 draws groundwater from a zone of the lower Aromas aquifer, which is apparently not intruded with seawater and not contaminated with nitrates. Discontinuing the use of the Springfield Well No. 1 and potentially also the source well serving the Moss Landing Mobile Home Park should improve the local conditions for shallow, pumping-induced seawater intrusion, as well as drawing down nitrates and agricultural chemicals. Likewise, replacing these shallow source wells with groundwater pumped from the Springfield Well No. 2 -- distributing recharge and flow to the well over a broader area more centrally located in the Springfield area – should also initially improve these local conditions, but not without uncertainty to the long-term cumulative effects. The evaluation of long-term cumulative effects requires consideration of the pumping rates of other wells in the area and how they currently, and in the future, will vary by season, in particular, other wells drawing on the lower Aromas aquifer.

5. GROUNDWATER AGE DATING

The age of groundwater is the length of time since the water has been isolated from the atmosphere, or the time since groundwater recharge. A groundwater sample from a well is always a mixture of water molecules with an age distribution that may span a wide range. Several methods have been developed to estimate groundwater age, and owing to uncertainties in each method, multiple methods are typically used for a given field condition to cross-check results. In addition, age-dating techniques are used as means to independently affirm a conceptual understanding of the groundwater system based on other lines of evidence – such as geologic, hydrogeologic, geophysical, water quality, modeling and historical evidence -- rather than as a conclusive result.

5.1 Earlier Published Work for the Springfield Area

Hanson (2003a, b) plotted major ion data from surface-water sources and groundwater depths collected within the coastal Pajaro Valley and grouped the results relative to the source and groundwater age. Seven water-type groups were identified: 1) Recent ground water; 2) Older ground water; 3) Recent seawater intrusion; 4) Older seawater; 5) Very old ground water; 6) Pajaro River water; and 7) Local runoff. PV4-A in the Springfield subarea showed recent seawater intrusion, located near the coast on Jensen Road north of McClusky Slough (**Figure 5** and **Figure 9**).

We added the two water samples from the Springfield Wells No. 1 and 2 to the Hanson's Piper diagram (**Figure 25**). The Springfield Well No. 2 sample is grouped with samples from shallow wells and from agricultural drain water, characterized as Recent Fresh Groundwater. In fact, it is nearly identical to the signature of agricultural drain water, suggesting that groundwater recharge from the agricultural fields surrounding the supply well may be a primary source of recharge to the well. This inference is supported by the high nitrate concentrations in the well water (consistently on the order of 300 mg/L). It is, though, reasonable to conclude that both agricultural drainage and seawater intrusion constrain drinking water supplies in the project area.

The sample Springfield Well No. 2 is grouped along with samples from nested wells (PV-6), located at the corner of W. Beach St. and San Andreas Rd. (**Figure 9**). Samples collected at PV-6 were characterized as Older Fresh Groundwater at depths up to 640 ft. Hanson (2003a, b) suggested that the old fresh water is a non-renewable resource (not locally recharged by rain), which implies that groundwater pumping from this deeper zone would be replace largely by lateral flow, potentially enhancing seawater intrusion. The sample collected from the 730 to 750 ft depth interval at PV-6 was characterized as Old Seawater (connate groundwater). Likewise, the e-log at PV-7, located about 4,000 ft north of the test-well site, suggests seawater at a depth of 790 ft. By analogy with PV-6 and PV-7, old seawater could be present deeper than drilled at the Springfield No. 2 site.

5.2 Groundwater Age-Dating Methods

Relatively common methods used to estimate groundwater age include:

a) the travel time of groundwater from the point of recharge as calculated by Darcy's law combined with an equation of continuity;

b) the decay of radionuclides which have entered water from contact with the atmosphere, such as tritium (hydrogen-3) and carbon-14;

c) the accumulation in groundwater of products of radioactive reactions in the subsurface, such as radiogenic helium (helium-4);

d) anthropogenic constituents such as chlorofluorocarbons (CFCs) and sulfur hexafluoride (SF6); and

e) matching the chronology of past climates with paleoclimate indicators in water, such as the ratio of stable isotopes of water (hydrogen-2/oxygen-18) or the concentration of noble gasses.

There other methods as well (Clark and Fritz, 1997; Cook and Herczeg, 2000; Davis and Bentley, 1982; Kendall and McDonnell, 1998).

We used seven laboratory methods to date the groundwater samples collected from the Springfield Well No. 2: tritium-helium; chlorofluorocarbon (CFCs); sulfur hexafluoride (SF6); radiogenic helium; carbon-14; stable isotopes of oxygen and hydrogen; and noble gases. Tritium-helium, CFCs and SF6 date the young or modern fraction of groundwater, while radiogenic helium and carbon-14 methods date the old (or ancient) groundwater fraction. Concentrations of noble gases and the stable isotopes of oxygen and hydrogen were used to interpret the recharge temperature and conditions.

We collected groundwater samples on December 19, 2017 following 4 hours of pumping the well during a step-drawdown test terminating at a rate of 425 gallons per minute. USGS sampling methods[20] were used, and for the noble gas and helium isotope samples, we used the crimped copper-tube sampling method. Samples were sent to two laboratories and analyses:

- Samples were sent to the Dissolved and Noble Gas Lab at the University of Utah[21] for CFC, SF_6, tritium, and noble gas analyses; and,
- Samples were sent to the Environmental Isotope Laboratory at the University of Waterloo[22] for the analysis of isotopes of oxygen (^{18}O), hydrogen (^{2}H, ^{3}H), and carbon (^{13}C, ^{14}C).

5.3 Groundwater Age Dating Results

Results for age-dating analyses of groundwater samples collected from the Springfield Well No. 2 (summarized in **Table 6**) indicate a mixture of modern water and pre-modern water, with pre-modern groundwater dated at 2,300 years before present. The presence of modern water suggests recent recharge to the lower Aromas aquifer, implying that the aquifer has a potential to be managed as a renewable freshwater resource. The following sub-sections detail the results.

5.3.1 Tritium-Helium

The tritium-helium method dates ‘modern’ groundwater, that component of groundwater recharged subsequent to the late-1950s and early 1960s, when atmospheric testing of nuclear arsenals took place, peaking in 1963. It also helps to coarsely estimate the fraction of pre-modern groundwater in a sample, and dates groundwater wholly recharged before 1952 where samples contain no tritium (or at a practical level < 1 pCi/L or < 0.3 TU). In this report, water containing measurable tritium is interpreted as modern water, and water not containing measurable tritium is interpreted as pre-modern.[23] Given the depth of the Springfield Well No. 2, we considered it possible to obtain a zero-tritium result.

20 https://water.usgs.gov/lab/

21 https://noblegaslab.utah.edu/index.php

22 http://www.uweilab.ca/

23 The problem to define the tritium concentration at the time of groundwater recharge is complex, and most studies make only a qualitative judgment of groundwater age based on tritium concentrations.

Tritium (^3H) is a naturally-occurring radioactive isotope of hydrogen with a half-life of 12.32 years and derived in the stratosphere interaction with cosmic radiation. Continental heating mixes the upper atmosphere and releases tritium from the stratosphere into the troposphere – a phenomenon known as the 'Spring Leak'. Tritium is removed from the lower atmosphere by precipitation and molecular exchange, and the ocean is a sink. Across North America, tritium concentrations in precipitation, therefore, generally increase with latitude and distance from the ocean. Within California, tritium concentrations are lowest at the coast and increase inland.

Normally in very low abundance, tritium concentrations in the atmosphere increased several orders of magnitude above the background levels from above ground nuclear weapons testing during the 1950s and early 1960s, releasing tritium to the atmosphere until the nuclear test ban went into effect in 1963. Since that time, tritium's decay to stable helium isotope (^3He) has since progressively decreased tritium concentrations in the atmosphere. In groundwater, tritium is isolated from the atmosphere and also undergoes natural decay. Measurement of both tritium and its daughter product helium-3 in a groundwater sample allows for the calculation of the initial tritium concentration present at the time of groundwater recharge. This helium ingrowth method is described in detail on the USGS Reston Groundwater Dating Laboratory website[24]. Given that the concentrations are so small, tritium is reported in a unique concentration unit call a 'tritium unit' or TU.[25] The reported age is the mean age of that portion of the groundwater sample that contains measurable tritium.

Tritium concentrations in the groundwater sample collected from the Springfield Well No. 2 were 0.05 TU which is interpreted as not detected. In addition, the measured noble gas concentrations did not facilitate calculation of helium-3 daughter product to estimate the concentration the time of recharge. These results do not confirm the presence of modern water (<60 years).

5.3.2 Chlorofluorocarbons and Sulfur Hexafluoride

Chlorofluorocarbons – CCl_3F (CFC-11), CCl_2F_2 (CFC-12), $Cl_2FC\text{-}CClF_2$ (CFC-113) – are synthetic compounds and have no natural sources. The measurement of CFC concentrations in groundwater can date that fraction of groundwater recharged from

24 https://water.usgs.gov/lab/3h3he/background/

25 One tritium unit (TU) is equivalent to one tritium atom per 10^{18} hydrogen atoms. Tritium is also reported in terms of activity (pico-Curies per liter, *p*Ci/L) or decay (disintegrations per minute per liter, dpm/L), whereas 1 TU = 7.2 dpm/L = 3.2 *p*Ci/L.

the 1940s (at on the onset of industrial production) through the mid to late 1990s when atmospheric concentrations peaked. Sulfur hexafluoride (SF_6) is a trace atmospheric gas but with significant synthetic production beginning in the 1960s for use in high voltage electrical switches. Unlike CFCs with declining atmospheric mixing ratios, atmospheric concentrations of SF_6 continue increase, and therefore can potentially date post-1990s groundwater. The dating methods and its applications are detailed in International Atomic Energy Agency (IAEA, 2006), Plummer and Busenberg (2000), and Ekwurzel and others (1994).

CFCs were first synthesized in 1928 as replacements for the toxic ammonia, methyl chloride, and sulfur dioxide refrigerants that were in use since the late 1800s. Commercial production began in 1930 and CFCs gradually replaced older refrigerants in cooling devices. After the mid-1940s, CFCs became the preferred aerosol propellants, and were widely used as solvents and degreasers, and as blowing agents for plastic foam. By the 1950s and 1960s, CFCs were widely used in the air-conditioning of homes, commercial buildings and automobiles. CFCs are a prime contributor to stratospheric ozone depletion, and as a result of the Montreal Protocol on Substances that Deplete the Ozone Layer (an international agreement to phase out production of CFCs) air mixing ratios of CFC-11, CFC-12 and CFC-113 peaked in the northern hemisphere in about 1994, 2001 and 1996, respectively. The estimate of the atmospheric lifetime of CFC-11 is 45 ± 7 years, 87 ± 17 years for CFC-12, and 100 ± 32 years for CFC-113.[26]

SF_6 a colorless, odorless, nonflammable, nontoxic, extremely stable gas with excellent insulating and arc-quenching properties. Its estimated atmospheric lifetime is 800 to 3200 years, and is also stable in reducing groundwater environments. Industrial production of SF_6 began in 1953 with the introduction of SF_6-filled electrical switches. The SF_6 atmospheric mixing ratio has since rapidly increased owing to the following conditions: (1) its long lifetime in the atmosphere; (2) its low solubility in water; (3) its high stability in soils and groundwater; and (4) the other lack of natural sinks. SF_6 is an

[26] The atmospheric lifetime, or residence time, of a molecule can be simply thought of as the time it remains in the atmosphere. [Note: there is a trend to use lifetime when referring to the loss by a chemical process, and residence time when the loss is by a physical process, but the two terms are generally interchangeable.] The lifetime of an atmospheric pollutant, such as a CFC, is the time for the concentration to return to its natural (or baseline) level as a result of either being converted to another chemical compound or being taken out of the atmosphere via a sink. Species may have multiple different loss processes, and the combination of these processes estimates the overall lifetime. For many long-lived species, such as CFCs, loss processes include photochemical breakdown in the stratosphere, oxidation and deposition processes in the troposphere, and degradation in the hydrosphere or in soils.

extremely potent greenhouse gas, with the highest value measured for any gas, estimated to be 23,900 times that of CO_2. Because of its low solubility, apparent ages can be very sensitive to excess air.

Given that the bomb tritium signal has decayed to a point where results can be difficult to interpret in many groundwater systems, especially in coastal California, CFCs and SF_6 results can strengthen the interpretation of tritium results. Our basic approach is to confirm the recharge of modern water, and water containing measurable CFCs and SF_6 is interpreted as modern water, and water not containing measurable CFCs and SF_6 is interpreted as pre-modern.

The CFC and SF_6 results in the groundwater sample collected from the Springfield Well No. 2 indicate a component of modern (or young) groundwater (see **Table 6**).

5.3.3 Carbon-14

Like tritium, carbon-14 is formed in the upper atmosphere by interaction with cosmic rays, and also was formed during above-ground nuclear-weapons testing until the ban in 1963. Atmospheric carbon-14 is incorporated into carbon dioxide (CO_2), mixed in the atmosphere, and distributed in precipitation as a bicarbonate ion. Carbon-14 is consumed by plants and accumulates in soil, carbonate rocks and minerals. Carbon-14 is distributed subsurface as bicarbonate and carbonate ions in groundwater recharge. With a half-life of 5,730 years, carbon-14 dates pre-modern groundwater, on the order of hundreds to thousands of years. Carbon-14 age estimates can be complicated with abundance of carbonate minerals or organic material in the aquifer or recharge areas. Where chemical complications are minimal (such as at the Springfield well site), groundwater dates with a +/- 20 percent accuracy may be possible, otherwise estimates may easily have an error band of roughly 100 percent (Davis and Bentley. 1982). Carbon-14 results indicated pre-modern groundwater fraction recharged approximately 2,300 years before present. This result is in line with published results in the Springfield area (see Section 5.1 and results from Hanson's (2003) PV-4A sample).

5.3.4 Radiogenic Helium

The subsurface accumulation of ^4He is from the decay of heavy radionuclides in the earth's crust – primarily uranium (U) and thorium (Th) decay – and known as 'radiogenic helium' or 'terrigenic helium'. It increases in groundwater with time, and hence increases along a groundwater flow path. However, the newly formed ^4He resides in solid material and the rate at which is diffuses into groundwater is not well known, and thus precise age dating is not possible. Similar to Carbon-14, the method dates pre-modern groundwater, on the order of hundreds to thousands of years. Groundwater with a subsurface residence time greater than a few hundred years usually contains detectable radiogenic helium.

The problem to define the radiogenic helium concentration at the time of groundwater recharge is complex and based on the measurement of noble gases in groundwater. Noble gas derived parameters (recharge temperature, excess air, terrigenic helium-4, terrigenic helium isotope ratio and tritiogenic helium-3) were calculated using the unfractionated excess air (UA) model, simplest excess-air model. The calculation of radiogenic helium in the Springfield Well No. 2 sample was inconclusive and did not confirm the presence of pre-modern water.

5.3.5 Noble Gases

The solubility of the noble gases (He, Ne, Ar, Kr, and Xe) in water vary as a function of temperature and pressure. The concentrations of noble gases in groundwater should, therefore, reflect the surface temperature at the time of groundwater recharge, provided that recharge is reasonably rapid and goes directly to the aquifer. Water table temperatures inferred from dissolved noble gas concentrations (noble-gas temperatures, NGT) are useful as a quantitative proxy for air temperature change since the last glacial maximum (Cey and others, 2009). The result of the noble-gas recharge temperature was 13.3°C (56°F), similar to current recharge temperatures. As with most groundwater, water temperatures approximate the mean annual air temperature for the region. The mean annual average air temperature at the Castroville CIMIS station #19 is 11.7°C (53.1°F).[27] The higher noble-gas recharge temperature corresponds to the geothermal gradient of 25°C per 1000 meters (or about 1°F per 75 ft), as well as uncertainties related to the calculation of the noble-gas recharge temperature.

The concentrations of noble gases in groundwater are also used to estimate the quantity of 'excess air' – air bubbles entrained during recharge and fluctuations in the water table that subsequently dissolve at depth in groundwater. The concentration of excess air provides valuable information about the recharge process, and is an important consideration when calculating the tritium-helium age, as well as

[27] http://www.cimis.water.ca.gov/UserControls/Reports/MonthlyReportViewer.aspx

groundwater age using CFCs and SF_6. Excess air was calculated at 33 percent of equilibrium Neon equilibrium at the noble-gas recharge temperature.

5.3.6 Stable Isotopes of Water

The two stable isotopes of hydrogen (^1H and ^2H) and the three stable isotopes of oxygen (^{16}O, ^{17}O, and ^{18}O) are frequently used to help understand the origin and movement and groundwater. Oxygen-18 and hydrogen-2 (deuterium) are heavy isotopes[28] and their relative abundances in water change slightly (or fractionate) during physical phase change processes such as evaporation, condensation, and snowmelt. They are either enriched or depleted based the greater energy required to break the hydrogen bonds of heavy isotopes than water containing lighter isotopes (and consequently, they will react more slowly). Heavy isotopes, therefore, are enriched in the more condensed phases. Water with a higher deuterium and oxygen-18 content is generally found near the coast, at low elevations, in warm rains, and in water which has undergone partial evaporation. Lower deuterium and oxygen-18 content (i.e., greater negative values) is found inland, at higher elevations, in cooler climates, and in evaporated water. The stable isotopes of water plot within the range of coastal waters under current climatic conditions (**Figure 25**).

At a given coastal location where there are no imported Sierran waters (such as from Hetch Hetchy) to confound results and a negligible groundwater flow gradient, stable isotopes of water may support a conclusion of pre-modern groundwater recharged during a colder climate. This was the case of coastal groundwater sample (PV-3D) in the Pajaro Groundwater Basin (Hanson, 2003a, b). These results are shown in **Figure 25**, as an example.

The relationship of $\delta^{18}O$ to δ^2H is known as the meteoric (or meteorological) water line (MWL). If a local meteoric water line (LMWL) is not available (reflecting local variations in climate, rainfall seasonality, and geography), it is common practice to use the global meteoric water line (GMWL) as a reference against which to compare sampling results. Departures from the GMWL can be caused by evaporation (known as an evaporation line), deuterium excess (from re-evaporation and precipitation of terrestrial water),

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28 Isotopes are atoms of the same element that have different numbers of neutrons, thus have different masses. Deuterium (^2H) has one neutron and one proton, and is approximately equal to twice the mass of protium (^1H). All isotopes of oxygen have eight protons but an oxygen atom with a mass of 18 (^{18}O) has 2 more neutrons than oxygen with a mass of 16 (^{16}O). Oxygen-18 and deuterium occur in water at abundances of 0.204% of all oxygen atoms and 0.015% of all hydrogen atoms, respectively.

seawater intrusion, and groundwater reaction with minerals. **Figure 25** shows a seawater mixing line as well as the global meteoric water line.

6. CONCLUSIONS AND RECOMMENDATIONS

The Pajaro/Sunny Mesa Community Services District (District) has acquired grant funding to evaluate alternatives to replace the source well (Springfield Well No. 1) for the Springfield community water system, which is contaminated with nitrate and seawater. The Springfield Well No. 1 is located a little over a mile from the coast and from the Elkhorn Slough, at an elevation of 19 feet above sea level (ft asl). It draws groundwater from a depth of 122 to 172 feet below ground surface (ft bgs), from a zone demonstrated to be intruded with seawater across the area. The well is surrounded with agricultural fields in sandy soils, within a gently sloping shallow swale draining to McClusky Slough, and subject flooding and recharge from agricultural drainage. Both seawater and agricultural drainage are likely sources of contamination to the existing well.

The preferred alternative to replace the Springfield Well No. 1 with a new well (Springfield Well No. 2) at a site approximately 3,500 feet northeast from the existing well, at the northeast corner of the discontinued Moss Landing Middle School. Another alternative proposed is to install a new well deeper at the Springfield Well No. 1 site. Springfield Well No. 2 is further from the ocean but closer to the Elkhorn Slough than Springfield Well No. 1, and at an elevation 142 ft asl, rather than 19 ft asl. During drilling of Springfield Well No. 2 in November 2017 to a depth of 600 ft bgs, the geophysical logging indicated water-quality conditions similar to the favorable conditions measured at a test hole drilled at the site in 2008, thus supporting completion of the test well.

The Springfield Well No. 2 was completed to a depth of 600 feet with an 8-inch diameter PVC casing, with 100 feet of screen casing from 490 to 590 feet (an elevation from -348 to -448 feet), and with a 470-ft cement seal from the surface. Subsequent yield testing (a step-drawdown test and a constant-rate pumping and recovery test) and water-quality sampling confirmed that the Springfield Well No. 2 is suitable for use as a new water-supply source well. In addition, the well site is not prone to flooding, and water storage at the site would be at a higher elevation than at the Springfield Well No. 1 site, providing head to the distribution system.

The two project sites are located within the southern portion of Springfield subarea of the Pajaro Valley Groundwater Basin. Primary aquifers within the basin are found in the Aromas Sands and overlying alluvial deposits. The Aromas Sands have a complex depositional history and are composed of well-layered marine and terrestrial coarse-grained deposits separated by extensive fine-grained deposits. Coarse-grained deposits persist over large areas and control the depth of well pumping. The fine-grained deposits potentially restrict vertical movement of groundwater, though their discontinuous extent, particularly in the Springfield area, may allow for vertical flow of local rainfall recharge through and around these aquitards. In fact, drawdown data from the 9-hour constant-rate pumping test indicated vertical seepage from overlying beds. Thicker segments of fine-grained deposits interbedded with sand layer are found south and east of the project sites, related to the Elkhorn Slough, and west of the site along the coast. Although the Aromas Sands are complexly layered, the deposits have been generally grouped as lower and upper aquifers, separated by a defined fine-grained layer, and an overlying alluvial aquifer. This geologic framework is generally applicable at both project sites.

Seawater intrusion across the Springfield subarea is fundamentally related to a chronic storage depletion from groundwater pumping drawing water levels below minimum levels required to inhibit seawater intrusion. Two forms of seawater intrusion have been identified:

1) A relatively shallow, pumping-induced intrusion in the upper Aromas Sands and alluvial aquifer. Attempts to mitigate seawater intrusion by reducing groundwater pumping have shown success, though generally not effective during dry years when alternative supplies are limited and groundwater pumping increased.

2) A base of natural groundwater intrusion dated as old seawater is related to the difference in specific gravities between fresh and saline water. Based on geophysical logs and water-quality data related to the logs, old seawater can be assumed in the Springfield subarea below depths of 700 to 800 ft bgs.

In general, the Springfield Well No. 2 draws on fresh groundwater potentially found between the two forms of seawater intrusion. The groundwater at these depths has generally been characterized as “old fresh groundwater”, dated with a sample collected from the well to have been recharged 2,300 years before present. The groundwater sample from the well was also found to contain modern (<60 years) groundwater. The well draws groundwater from an elevation from 348 to 448 feet below sea level. With pumping, it is reasonable to assume a fair likelihood for this deeper groundwater to be intruded with seawater, particularly if the groundwater flow is largely vertically confined. Results from the 9-hour constant rate pumping test at 400 gpm indicated vertical leakage from overlying beds, which is consistent with the depositional history and geologic framework of the aquifers, and thus suggest that areal recharge may be significant. The existing extent of intrusion in the zone of deep fresh groundwater is uncertain and likely variable spatially. Based on geophysical logs, inland areas and areas in the southern portion of the Springfield subarea would seem to be less intruded with seawater, which corresponds with water quality results from the Springfield Well No. 2.

The key to managing the source aquifer as a renewable resource is to develop an understanding of recharge. Generally speaking, groundwater is not a sustainable resource, unless extraction is balanced by recharge, and identifying the sources of recharge and flow to a well is critical for sustainable groundwater management. Recharge is particularly relevant at both project sites because they are situated in an area sensitive to seawater intrusion and contamination from overlying agricultural chemicals. Preliminary calculations suggest that the general size of Springfield area surrounding the Springfield Well No. 2 is of a reasonable magnitude that areal recharge may potentially compensate pumping at the proposed 43 gpm average day demand for the expanded Springfield water system. It is also known that the Pajaro River recharges the groundwater basin, though other pumpers between the river and the project sites limit this source of recharge.

In conclusion, based on the evidence presented in this report, the Springfield Well No. 2 is suitable for use as a new source well for the Springfield public water system. Preliminary area-of-influence calculations suggest (with a high degree of uncertainty) that it may continue to be suitable for many decades (and possibly more) if pumped at the proposed 43 gpm average day demand. The well, however, has a yield that far exceeds demand requirements for the expanded water system, which thus has an inherent risk and tendency to over-pump the aquifer. In this regard, we recommend (a) developing a monitoring program to help guide the use of the well with a goal to better understand recharge rates sources to the well, and (b) frequent collaboration with Pajaro Valley Water Management Agency on results of their groundwater quality monitoring in the Springfield area and the state of their Coastal Distribution System (CDS) delivery of supplemental water to the Springfield area.

Little water-quality information is available specifically at depth at the Springfield Well No. 1 site. However, based on information assembled in this report, evaluating groundwater conditions by drilling and e-logging a pilot hole, and completing and testing a well deeper at the Springfield Well No. 1 site, would be a reasonable approach and may be potentially productive, if the need arises.

7. GENERAL LIMITATIONS

Balance Hydrologics has prepared this memo for the client's exclusive use on this particular project. It was prepared in general accordance with the accepted standard of practice existing in California and Nevada at the time the investigation was performed. No other warranties, expressed or implied, are made.

This preliminary evaluation is based in large part on work performed by experts and contractors in related fields, information provided by the client, and upon hydrogeologic reference values commonly used in the area or developed by sources generally held to be reliable, such as geologic and isohyetal maps. We have not independently verified their validity, accuracy or representativeness to this or other sites. If readers are aware of additional data, observations, conditions, or forthcoming changes to the bases of our decisions, please let us know at the first opportunity, such that this report may be revised.

It should be recognized that interpretation and evaluation of subsurface conditions is a difficult and inexact art. Judgment leading to conclusions and recommendations presented above were partially based on existing information and personal communications during drought conditions, which in total represent an incomplete picture of the site. Data collected for this study have shown intraformational variability in texture that greater than previously thought, probably because textural variability had not been specifically sought in the larger-scale regional studies. More extensive studies can substantially reduce some of the uncertainties associated with such questions. If the client wishes to reduce the uncertainty beyond the level associated with this study, Balance should be notified for additional consultation.

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TABLES

Table 1. Groundwater pumped from the Springfield water system well, 2009 to 2018, Monterey County, California.

	2009 (gallons)	2010 (gallons)	2011 (gallons)	2012 (gallons)	2013 (gallons)	2014 (gallons)	2015 (gallons)	2016 (gallons)	2017 (gallons)	2018 (gallons)	Average (gallons)	Maximum (gallons)
January	335,852	422,620	573,716	471,988	454,784	569,976	531,828	552,099	563,992	617,848	509,470	617,848
February	299,200	401,676	513,876	381,480	418,132	471,240	487,696	433,990	429,726	449,548	428,656	513,876
March	394,196	382,976	509,388	372,504	463,012	534,820	584,936	620,092	685,168	628,320	517,541	685,168
April	539,308	421,124	554,268	397,188	454,784	536,316	557,260	504,152	476,326	570,724	501,145	570,724
May	483,956	442,816	639,540	467,500	673,948	605,132	523,600	514,624	706,112	na	561,914	706,112
June	494,428	648,516	559,504	546,788	552,024	682,924	604,384	676,416	774,928	na	615,546	774,928
July	601,392	599,896	597,652	588,676	667,964	657,492	534,072	606,852	721,072	na	619,452	721,072
August	586,432	568,480	602,888	586,432	634,304	594,660	585,684	670,806	620,765	na	605,606	670,806
September	543,796	572,220	548,284	523,600	699,380	513,876	634,304	699,305	878,975	na	623,749	878,975
October	512,380	531,080	499,664	628,320	540,056	559,504	526,667	560,925	734,536	na	565,904	734,536
November	558,756	617,848	454,036	442,068	537,812	550,378	412,597	624,580	640,288	na	537,596	640,288
December	463,760	501,908	428,604	485,452	609,620	520,758	455,532	526,966	576,708	na	507,701	609,620
Total Annual Demand	**5,813,456**	**6,111,160**	**6,481,420**	**5,891,996**	**6,705,820**	**6,797,076**	**6,438,560**	**6,990,807**	**7,808,596**	incomplete	**6,594,280**	**7,808,596**
Average Day Demand (ADD)	15,927	16,743	17,757	16,098	18,372	18,622	17,640	19,101	21,393	incomplete	18,054	21,393
ADD Per Capita [1]	80	84	89	80	92	93	88	96	107	incomplete	90	107
ADD Per Connection [2]	468	492	522	473	540	548	519	562	629	incomplete	531	629
Average Continuous Rate (gpm)	11.1	11.6	12.3	11.2	12.8	12.9	12.2	13.3	14.9	incomplete	12.5	14.9
Max Month	July	June	May	October	September	June	September	August	September	incomplete	--	--
Max Day Date	na	na	5/10/11	10/3/12	9/23/13	3/25/14	6/17/15	6/15/16	7/5/15	incomplete	--	--
Max Day Demand (MDD)	na	na	28,424	25,058	26,928	34,932	26,255	42,150	35,156	incomplete	**31,272**	42,150
MDD Per Connection [2]	--	--	836	737	792	1,027	772	1,240	1,034	incomplete	920	1,240
Max Day Rate (gpm)	na	na	19.7	17.4	18.7	24.3	18.2	29.3	24.4	incomplete	21.7	29.3

Notes:

1. The Average Daily Demand Per Capita assumes a total of 200 consumers.
2. The Average Daily Demand per Connection assumes 34 connections.
3. Data source: Metered results reported by Pajaro/Sunny Mesa Community Services District.

Table 2. Summary of yield test calculations, Springfield Well #2 well, Pajaro / Sunny Mesa CSD, Monterey County, CA

	Step Test (12/19/2017)		**Constant-Rate Test** (2/21/2018)	
	Step 1	Step 2	Pumping	Recovery
Total depth (feet bgs)	600	600	600	600
Depth to bottom of confined aquifer, (feet bgs)	375	375	375	375
Pumping duration (hours)	3.17	2.83	9	9
Pumping rate, Q (gpm)	328	425	400	400
Drawdown at end of pumping, s (feet)	34.7	48.9	43.4	--
Recovery at 9 hours (ft)	--	--	--	42.6
Percent recovery	--	--	--	98%
Estimated 24-hr drawdown, s (feet)	--	--	45.6	--
24-hr specific capacity, Cs=Q/s (gpm/ft)	--	--	8.8	--
Drawdown slope, s	4	4	4	4.4
Transmissivity, T (gpd/ft) [1]	21648	28050	26400	24000
Aquifer thickness, b (ft) [3]	225	225	225	225
Hydraulic conductivity, K=T/b (gpd/ft^2)	96	125	117	107
Hydraulic conductivity, K (cm/s)	4.5E-03	5.9E-03	5.5E-03	5.0E-03
Well efficiency [4]				
Theoretical specific capacity, Cs (gpm/ft) [2]	--		13.2	12.0
Efficiency, E = $Cs_{(24\text{-hr})}$ / $Cs_{(theoretical)}$	--	--	66%	73%
s/Q (ft/gpm)	0.106	0.115	--	--
slope, C	--	--	9.47E-05	--
intercept, B	--	--	7.48E-02	--
Percentage of head loss attributed to laminar flow, $L_p = BQ/(BQ+CQ^2)$	--	--	66%	--

Notes:

1. Method assumes (a) full penetration of the aquifer, and perhaps more importantly, (b) the hydraulic conductivity ("permeability") of the shallow and deeper zones are similar (homogeneous conditions), and (c) the hydraulic conductivity is the same in all directions (isotropic conditions). Although the assumptions are never strictly met in any natural aquifer system, they are commonly suitable to roughly estimate bulk aquifer properties. Results seem reasonable for comparative purposes despite marked geologic differences.
2. The relationship of aquifer transmissivity (T) to specific capacity (Cs) is found in Appendix 16.D of Driscoll (1983) or p. 128 of DWR Bulletin No. 118-2 (June 1974).
3. Aquifer thickness, b = well depth - bottom of confining clay
4. Well efficiency, E, is the ratio of the theoretical drawdown (assuming no turbulence) to the actual drawdown in the well.

Table 3. Estimated radius of influence of pumping Springfield Well No. 2, Pajaro / Sunny Mesa CSD, Monterey County, California.

Case A. Constant-rate pumping test at 400 gpm (7 hours)

Given:	Transmissivity, T	24000 gpd/ft	3208 ft^2/day
	Storativity, S	0.0015	selected to match drawdown at perimeter of the 16-inch drill hole with theoretical drawdow
	Pumping rate, Q	400 gpm	0.89 cfs
	Pumping duration, t	0.29 days	7 hours
	Drawdown in well	43.37 ft	pumping test data
	Well efficiency	66%	pumping test result
	Theoretical drawdown at 100% efficiency	28.62 ft	at perimeter of the 16-inch drill hole

Find: drawdown, s(r,t):

Distance from well r (ft)	$u=(1.87*r^2*S)/(T*t)$	W(u)	**Drawdown** s max (ft) = (264*Q/T) * W(u)	
0.67	1.8E-07	6.50	**28.59**	radius of 16-inch diameter drill hole
5	1.0E-05	4.75	**20.89**	
10	4.0E-05	4.15	**18.24**	
50	1.0E-03	2.75	**12.09**	
100	4.0E-03	2.15	**9.44**	
440	7.8E-02	0.86	**3.78**	Hawkins well
700	2.0E-01	0.46	**2.01**	School well
1500	9.0E-01	-0.21	**0.00**	Rocha well
3000	3.6E+00	-0.81	**0.00**	Elkhorn Slough

Case B. Dry-seasson pumping at 43 gpm (60 days)

Given:	Transmissivity, T	24000 gpd/ft	3208 ft^2/day
	Storativity, S	0.0015	
	Pumping rate, Q	43 gpm	0.10 cfs
	Pumping duration, t	60 days	

Find: drawdown, s(r,t):

Distance from well r (ft)	$u=(1.87*r^2*S)/(T*t)$	W(u)	**Drawdown** s max (ft) = (264*Q/T) * W(u)	
0.67	8.7E-10	8.81	**4.17**	radius of well casing
5	4.9E-08	7.06	**3.34**	
10	1.9E-07	6.46	**3.06**	
50	4.9E-06	5.06	**2.39**	
100	1.9E-05	4.46	**2.11**	
440	3.8E-04	3.17	**1.50**	Hawkins well
700	9.5E-04	2.77	**1.31**	School well
1500	4.4E-03	2.11	**1.00**	Rocha well
3000	1.8E-02	1.51	**0.71**	Elkhorn Slough

Method:

Theoretical drawdown was calculated using Cooper and Jacob modified nonequilibrium Theis equation (Driscoll, F.G., 1986, Groundwater and Wells, 2nd Ed., p. 219).
The modified nonequilibrium equation is valid for values of u less than about 0.05, otherwise values are approximate.
Theis' nonequilibrium equation is based on the following assumptions:

a) The water-bearing formation is uniform in character and the hydraulic conductivity is the same in all directions.
b) The formation is uniform in thickness and infinite in areal extent.
c) The formation receives no recharge from any source.
d) The pumped well penetrates, and receives water from, the full thickness of the water-bearing formation.
e) The water removed from storage is discharged instantaneously when the head is lowered.
f) The pumping well is 100 percent efficient.
g) All water removed from the well comes from aquifer storage.
h) Laminar flow exists throughout the well and aquifer.
i) The water table or potentiometric surface has no slope.

Notes:

1. The modified nonequilibrium equation is valid for values of u less than about 0.05, otherwise values are approximate.
2. Transmissivity (T) estimated from 9-hour constant-rate pumping test at 400 gpm and recovery results.

Table 4. Parameters and assumptions for area of influence calculations, Springfield water system, Pajaro / Sunny Mesa CSD, Monterey County, CA.

Scenario	Average Day Demand steady state flow no recharge	Average Day Demand steady state flow areal recharge at ADD rate	Average Day Demand transient flow no recharge	
Well pumping (gpm)				
Springfield Well No.1	43	43	43	
Springfield Well No.2	0	0	0	
Software				
Graphical user interface	AquiferWin32 v.5	AquiferWin32 v.5	AquiferWin32 v.5	
Analytical solver [1]	WinFlow	WinFlow	WinFlow	
Simulation	2-D steady state	2-D steady state	2-D transient flow	
Aquifer parameters [3]				
Aquifer top (ft) (confining clay)	-375	-375	-375	
Aquifer bottom (ft) (bottom of well)	-600	-600	-600	
Porosity	0.2	0.2	0.2	
Hydraulic parameters [3]				
Hydraulic conductivity (gpd/ft^2)	106	106	106	
Storage coefficient	0.0015	0.0015	0.0015	
Leakage factor (ft)	0	0	0	
Base map [4]				
Origin X (ft)	0	0	0	
Origin Y (ft)	0	0	0	
Height (ft)	30344	30344	30344	
Width (ft)	32137	32137	32137	
Contour window				
Origin X (ft)	10000	10000	10000	
Origin Y (ft)	9000	9000	9000	
Height (ft)	15000	15000	15000	
Width (ft)	14000	14000	14000	
Reference head (green arrow on figures) [5]				
Head (ft of water)	0	0	0	
Gradient	0	0	0	
Angle from x-axis (E=0; N=90)	0	0	0	
X location (ft from lower left corner)	28930.5	28930.5	28930.5	
Y location (ft from lower left corner)	3928.05	3928.05	3928.05	
Areal recharge				
Radii of oval around well (ft)	0	R1=6000, R2=8000	0	
Recharge area (sq ft)	0	150796447	0	
Rate (ft per day)	0	0.000055343	0	
Target drawdown results			60 days	60 years
Rocha Well (ft)	1.01	0.08	1.00	2.22
School Well (ft)	1.33	0.38	1.32	2.54
Hawkins Well (ft)	1.51	0.56	1.50	2.72

Notes:

1. The WinFlow Solver simulates two dimensional steady-state and transient groundwater flow. The steady-state module simulates groundwater flow in a horizontal plane using analytical functions developed by Strack (1989). The transient module uses equations developed by Neuman (1972) for unconfined aquifers.
2. Nominal values based on available information.
3. Values based on step test and 9-hr constant-rate test.
4. USGS 7.5 minute topographic quadrangle maps Moss Landing, CA and Prundale, CA.
5. The reference head defines a point where the head an hydraulic gradient is known. In the steady-state model, the reference head is always constant and never changes during simulations.

Table 5

Summary of water-quality results of groundwater samples collected from the Springfield Well No. 2, Pajaro / Sunny Mesa Community Services District, Monterey County, California.

PARAMETER	UNITS	RL	MCL	LABORATORY RESULTS				
				Test Hole	Completed Springfield Well #2			
DESCRIPTORS								
Sample I.D.	--	--	--	Test Hole	Well #2	Well #2	Well #2	Well #2
Latitude (GoogleEarth, WGS84)	deg min sec	--	--	37.162214	37.162214	37.162214	37.162214	37.162214
Longitude (GoogleEarth, WGS84)	deg min sec	--	--	-122.011046	-122.011046	-122.011046	-122.011046	-122.011046
Ground elevation (GoogleEarth, WGS84)	feet	--	--	142	142	142	142	142
Lab used	--	--	--	Soil Control	Soil Control	BSK Associates	Pace Analytical	BSK Associates
Lab number	--	--	--	8070803-01	7120730-01	A7L2428	30240447	A8B2807
Sample collected by	--	--	--	rs	gp	gp	gp	gp
Field filtered (for acid-preserved samples)	--	--	--	no	yes	yes	yes	yes
FIELD MEASUREMENTS								
Date	MM/DD/YY			7/28/2008	12/19/2017	12/19/2017	12/19/2017	2/21/2018
Time	HH:MM			11:45	17:00	16:25	16:25	18:37
Pumping rate	gpm	--	--		425	425	425	410
Pumping duration	hours				4	4	4	9
Specific conductance (@ 25°C)	umhos/cm				657	657	657	659
Conductance (@ field temp)	umhos/cm				695	695	695	691
Temperature	deg C				22	22	22	22.5
WATER QUALITY INDICATORS								
Alkalinity (total)	mg/L CaCO3	2	--	220	240			
Hardness (total)	mg/L CaCO3	5	--	220	250			
Hydroxide	mg/L CaCO3	2	--	0	0			
pH	pH Units	0.1	--	8.2	7.8			
Specific conductance (@ 25°C)	umhos/cm	1	900/1600	570	700	690		
Total dissolved solids (TDS)	mg/L	10	500/1000	370	410			
TDS/SC	--	--	--	*0.65*	*0.59*			
Color	color units	5	15	12	0			
Odor threshold at 60°C	TON	1	3	0	0			
Turbidity	NTU	0.02	5	94	0.1			
GENERAL MINERALS								
Bicarbonate (as CaCO3)	mg/L	--	--	*221*	*246*			
Bicarbonate (HCO3)	mg/L	2	--	270	300			
Calcium (Ca)	mg/L	0.5	--	43	41			
Carbonate (as CaCO3)	mg/L	--	--	*0*	*0*			
Carbonate (CO3)	mg/L	2	--	0	0			
Chloride (Cl)	mg/L	1	250/500	40	55			
Magnesium (Mg)	mg/L	0.5	--	27	35			

Table 5

PARAMETER	UNITS	RL	MCL	LABORATORY RESULTS				
				Test Hole	Completed Springfield Well #2			
Potassium (K)	mg/L	0.5	--	2.5	2.5			
Sodium (Na)	mg/L	0.5	--	51	51			
Sulfate (SO4)	mg/L	1	250/500	33	54			
Major Cations (Ca+Mg+K+Na)	meq/L	--	--	*6.65*	*7.21*			
Major Anions (HCO3+CO3+Cl+SO4)	meq/L	--	--	*6.24*	*7.59*			
Ion Balance (Cations/Anions)	--	--	--	*1.07*	*0.95*			
TITLE 22 PRIMARY STANDARDS, INORGANIC								
Aluminum (Al)	mg/L	0.05	1	4.6	0			
Antimony (Sb)	mg/L	0.006	0.006	0	0			
Arsenic (As)	mg/L	0.002	0.010	0	0			
Barium (Ba)	mg/L	0.1	1	0	0			
Beryllium (Be)	mg/L	0.001	0.004	0	0			
Cadmium (Cd)	mg/L	0.001	0.005	0	0			
Chromium (Cr)	mg/L	0.001	0.05	0.016	0.0073			
Copper (Cu)	mg/L	0.05	1.0/1.3	0	0			
Cyanide (CN) (total)	mg/L	0.1	0.2	0	0			
Fluoride (F)	mg/L	0.1	2	0.14	0.15			
Lead (Pb)	mg/L	0.005	0.015	0	0			
Mercury (Hg)	mg/L	0.001	0.002	0	0			
Nickel (Ni)	mg/L	0.01	0.1	0.013	0			
Nitrate as (NO3)	mg/L	1	45	4.9	*0.53*			
Nitrate as (N)	mg/L	0.1	10	*1.11*	0.12			
Nitrite (as N)	mg/L	0.1	1	0	0			
Nitrate + Nitrite (as N)	mg/L	0.1	10	1.1	0.12			
Selenium (Se)	mg/L	0.005	0.05	0	0			
Thallium (Tl)	mg/L	0.001	0.002	0	0			
TITLE 22 SECONDARY STANDARDS, INORGANIC								
Iron (Fe)	mg/L	0.05	0.3	7.9	0			
Manganese (Mn)	mg/L	0.02	0.05	0.18	0			
Sliver (Ag)	mg/L	0.01	0.1	0	0			
Zinc (Zn)	mg/L	0.05	5	0.13	0			
OTHER CONSTITUENTS								
Boron (B)	mg/L	0.1	--	0.17	0.27			
MBAS (surfactants)	mg/L	0.025	0.5	0	0			
Perchlorate (ClO4-)	ug/L	2	1.0/6.0			0		
Hexavalent Chromium (Cr6)	ug/L	0.05	--			6.6		

Table 5

PARAMETER	UNITS	RL	MCL	LABORATORY RESULTS: Test Hole	LABORATORY RESULTS: Completed Springfield Well #2
RADIONUCLIDES					
Gross Alpha	pCi/L	0.758 (MDA95)	15		2.52 +/- 0.291 (MDA95=1.06)
Radium-228	pCi/L	0.821 (MDC)	5		0.549 +/- 0.322 (MDC=0.616)
Chlorinated Acid Herbicides by GC-ECD (EPA 515.4)					
2,4,5-T	ug/L	1			0
2,4,5-TP (Silvex)	ug/L	1			0
2,4-D	ug/L	10			0
Bentazon	ug/L	2			0
Dalapon	ug/L	10			0
Dicamba	ug/L	105			0
Dinoseb	ug/L	2			0
Pentachlorophenol	ug/L	0.2			0
Picloram	ug/L	1			0
Surrogate: DCPAA	Acceptable range: 70-130 %				94%
Volatile Organics by GC-MS (EPA 524.2)					
1,3-Dichloropropane	ug/L	0.5			0
1,4-Dichlorobenzene	ug/L	0.5			0
2,2-Dichloropropane	ug/L	0.5			0
2-Butanone	ug/L	5			0
2-Chlorotoluene	ug/L	0.5			0
2-Hexanone	ug/L	10			0
4-Chlorotoluene	ug/L	0.5			0
4-Methyl-2-Pentanone	ug/L	5			0
Acetone	ug/L	10			0
Benzene	ug/L	0.5			0
Bromobenzene	ug/L	0.5			0
Bromochloromethane	ug/L	0.5			0
Bromodichloromethane	ug/L	0.5			0
Bromoform	ug/L	0.5			0
Bromomethane	ug/L	0.5			0
Carbon Tetrachloride	ug/L	0.5			0
Chlorobenzene	ug/L	0.5			0
Chloroethane	ug/L	0.5			0
Chloroform	ug/L	0.5			0
Chloromethane	ug/L	0.5			0
cis-1,2-Dichloroethene	ug/L	0.5			0
cis-1,3-Dichloropropene	ug/L	0.5			0
Dibromochloromethane	ug/L	0.5			0
Dibromomethane	ug/L	0.5			0
Dichlorodifluoromethane	ug/L	0.5			0

Table 5

PARAMETER	UNITS	RL	MCL	LABORATORY RESULTS				
				Test Hole	Completed Springfield Well #2			
Dichloromethane	ug/L	0.5				0		
Di-isopropyl ether (DIPE)	ug/L	3				0		
Ethyl tert-Butyl Ether (ETBE)	ug/L	0.5				0		
Ethylbenzene	ug/L	0.5				0		
Hexachlorobutadiene	ug/L	0.5				0		
Isopropylbenzene	ug/L	0.5				0		
m,p-Xylenes	ug/L	0.5				0		
Methyl-t-butyl ether (MTBE)	ug/L	0.5				0		
Naphthalene	ug/L	0.5				0		
n-Butylbenzene	ug/L	0.5				0		
n-Propylbenzene	ug/L	0.5				0		
o-Xylene	ug/L	0.5				0		
para-Isopropyltoluene	ug/L	0.5				0		
sec-Butylbenzene	ug/L	0.5				0		
Styrene	ug/L	0.5				0		
tert-Amyl Methyl Ether (TAME)	ug/L	3				0		
tert-Butyl alcohol (TBA)	ug/L	2				0		
tert-Butylbenzene	ug/L	0.5				0		
Tetrachloroethene (PCE)	ug/L	0.5				0		
Toluene	ug/L	0.5				0.63		
trans-1,2-Dichloroethene	ug/L	0.5				0		
trans-1,3-Dichloropropene	ug/L	0.5				0		
Trichloroethene (TCE)	ug/L	0.5				0		
Trichlorofluoromethane	ug/L	5				0		
Vinyl Chloride	ug/L	0.5				0		
Surrogate: 1,2-Dichlorobenzene-d4	Acceptable range: 70-130 %					104%		
Surrogate: Bromofluorobenzene	Acceptable range: 70-130 %					105%		
Total 1,3-Dichloropropene	ug/L	0.5				0		
Total Trihalomethanes	ug/L	0.5				0		
Total Xylenes	ug/L	0.5				0		
Semi-Volatile Organics by GC-MS (EPA 525.3)								
Alachlor	ug/L	1				0		
Atrazine	ug/L	0.5				0		
Benzo(a)pyrene	ug/L	0.1				0		
Bis(2-ethylhexyl) adipate	ug/L	3				0		
Bis(2-ethylhexyl) phthalate	ug/L	3				0		
Bromacil	ug/L	10				0		
Butachlor	ug/L	0.38				0		
Diazinon	ug/L	0.25				0		
Dimethoate	ug/L	10				0		
Metolachlor	ug/L	0.5				0		

Table 5

PARAMETER	UNITS	RL	MCL	LABORATORY RESULTS				
				Test Hole	Completed Springfield Well #2			
Metribuzin	ug/L	0.5				0		
Molinate	ug/L	2				0		
Propachlor	ug/L	0.5				0		
Simazine	ug/L	1				0		
Thiobencarb	ug/L	1				0		
Surrogate: 1,3-Dimethyl-2-nitrobenzene	Acceptable range: 70-130 %					108%		
Surrogate: Benzo(a)pyrene-d12	Acceptable range: 70-130 %					123%		
Surrogate: Triphenyl Phosphate	Acceptable range: 70-130 %					100%		
Carbamates by HPLC (EPA 531.1)								
3-Hydroxycarbofuran	ug/L	3						0
Aldicarb	ug/L	3						0
Aldicarb Sulfone	ug/L	2						0
Aldicarb Sulfoxide	ug/L	3						0
Carbaryl	ug/L	5						0
Carbofuran	ug/L	5						0
Methomyl	ug/L	2						0
Oxamyl	ug/L	20						0
Diquat by HPLC (EPA 549.2)								
Diquat	ug/L	4				0		

NOTES

Observer key: gp = Gustavo Porras (Balance Hydrologics); rs = Rodney Schmidt (Pajaro Sunny Mesa)

RL = lab reporting limit, a level down to which can be quantified with reliability; a result below this level is shown as 0 or not detected; blank value = not tested

MCL = California Title 22 Maximum Contaminant Level as listed by California Administrative Code, Title 22.

Bold red font indicates a laboratory result exceeding its MCL.

MDA95 = minimal detectable activity; MDC = minimal detectable concentration

Table 6

Results for age-dating analyses of groundwater samples collected from the Springfield Well No. 2, Pajaro / Sunny Mesa Community Services District, Monterey County, California

Sample location	Springfield Well No. 2
Latitude (GoogleEarth, WGS84)	36.837933°N
Longitude (GoogleEarth, WGS84)	121.768676°W
Ground surface elevation (GoogleEarth, WGS84)	142
Well depth (ft)	600
Aquifer type	Pleistocene Aromas Sands Formation
Sample date	12/19/2017
Sampled by	Balance
Well use (gpm)	425 (end of step test)
Depth to water (ft)	195
Specific conductance (µmhos/cm at 25°C)	700
Water temperature (°C)	22
Laboratory used	U. Waterloo (isotopes, C14) U. Utah (CFCs, SF6, tritium, noble gases)
Stable isotope ratios	
$\delta^{2}H$ (per mil)	-40.49 (repeat -40.52)
$\delta^{18}O$ (per mil)	-6.44 (repeat -6.59)
$\delta^{13}C$ (per mil)	-16.00 (-15.66)
Carbon-14 ± CSU (percent modern carbon)[1]	66.09 ± 0.24
Uncorrected radiocarbon age (years BP)[2]	3,300
Corrected radiocarbon age (years BP)[3]	2,300
Tritium result[4]	
Tritium activity ± CSU (pCi/L)	0.15± 0.08
Tritium Units (TU)	0.05± 0.02
Initial tritium estimate at recharge[5]	
Tritium activity ± CSU (pCi/L)	calculation not possible
Tritium Units (TU)	calculation not possible
Tritium/Helium-3 age (years)	Pre-modern (>60 yrs)
Dissolved noble gases	
Argon (cm^3STP/g)	4.27E-04
Helium-3/Helium-4 (R)	1.23E-06
Helium-4 (cm^3STP/g)	6.14E-08
Krypton (cm^3STP/g)	8.67E-08
Neon (cm^3STP/g)	2.61E-07
Xenon (cm^3STP/g)	1.21E-08
Excess Air (% of equil. Ne)[6]	33%
Radiogenic helium (% of equil. He)[7]	0%
Radiogenic helium age (years)	0
Noble-gas recharge temperature (°C)[8]	13.3
Chlorofluorocarbons[9]	
CFC-11 (pptv)	128
CFC-12 (pptv)	137
CFC-113 (pptv)	12.8
CFC-11 (piston-flow model recharge year)	1976
CFC-12 (piston-flow model recharge year)	1970
CFC-113 (piston-flow model recharge year)	1975
Sulfur hexafluoride[10]	
SF6 (pptv)	2.05
SF6 (piston-flow model recharge year)	1988

Table 6

Results for age-dating analyses of groundwater samples collected from the Springfield Well No. 2, Pajaro / Sunny Mesa Community Services District, Monterey County, California

Notes:

[1] C-14 measurements are normalized to -25 permil using $\delta^{13}C$ values to correct for fractionation by photosynthesis.

[2] RCAge (years BP) = -8033*LN(PMC/100) - (year sampled - 1950)/1.03; where -8033 represents the mean lifetime of Carbon-14 (Stuiver and Polach, 1977) and 0 BP = 1950 AD.

[3] The half-life of C-14 is 5,730 yrs. Assuming only radioactive decay of 100 pmc in the recharging groundwater and neglecting geochemical reactions that occur between groundwater and aquifer materials, groundwater having 90 pmc would have recharged 370 years before present (BP), and ground water having 50 pmc would have been recharged 5,730 years BP. C-14 activity of groundwater at the time of recharge is rarely equal to 100 pmc because of reactions that occur between infiltrating water, soil gases (primarily carbon dioxide), and carbonate minerals in the unsaturated zone. C-14 activity of recharge water in well-leached, carbonate-poor settings should be about 85±3 pmc (Vogel and Ehhart 1963). Our result was corrected with a C-14 activity of 88 pmc, reported by Hanson (2003) in the lower Pajaro Valley including the Springfield area. Reported recharge water values by Izbicki and Michel (2004) in the Mohave Desert area, and by Balance Hydrologics in the Montara area agree with this value.

[4] Tritium is reported in terms of activity (picocuries per liter, pCi/L), or decay (disintegrations per minute per liter, dpm/L. One tritium unit (TU) = 7.2 dpm/L = 3.2 pCi/L.

[5] In groundwater, tritium is isolated from the atmosphere and undergoes natural decay to the stable helium isotope (3He) with a half-life of 12.34 years. The daughter product helium-3 is added to the tritium result to estimate the tritium concentration at time of recharge and age. Results less than 1 pCi/L (0.31 TU) are assumed to be primarily pre-modern groundwater, recharged before mid-1950s.

[6] Measured dissolved gas concentrations are often greater than expected for equilibrium conditions, and this 'excess air' is attributed to entrainment of air bubbles in the vadose zone during recharge and water table fluctuation, which subsequently dissolve at depth under higher fluid pressure. Typical amounts of excess air observed in groundwater range from 0 to 30 cubic centimeters (STP)-air per kg-water.

[7] Reported as a percent of equilibrium, radiogenic helium increases in groundwater with time from the decay of heavy radionuclides, and hence increases along a groundwater flow path.

[8] The conservative behavior of noble gases allows for the estimation of water table temperatures at the time of groundwater recharge, which is generally near the mean annual surface temperature. It is common to measure the concentrations multiple noble gases in a groundwater sample to calculate the noble-gas recharge temperature (as well as the excess air).

[9] Chlorofluorocarbons (CFCs) are synthetic compounds and have no natural sources. CFC concentrations in groundwater can date that fraction of groundwater recharged from the 1940s at on the onset of industrial production through the mid to late 1990s when atmospheric concentrations peaked. CFC-12 has the highest range of atmospheric concentrations, and therefore is most sensitive for dating groundwater. CFCs do degrade under anaerobic conditions.

[10] Sulfur hexafluoride (SF6) is primarily of anthropogenic origin but also occurs naturally in fluid inclusions in some minerals and igneous rocks, and in some volcanic and igneous fluids. SF6 is extremely stable, with an estimated atmospheric lifetime of 800 to 3200 years. Significant production of SF6 began in the 1960s for use in high voltage electrical switches. Atmospheric concentrations continue to increase.

[11] Unit definitions: CSU = 1-sigma combined standard uncertainty; cm3STP/g = cubic centimeters per gram at standard temperature and pressure; pptv = parts per trillion by volume.

FIGURES

Figure 1. Existing well 1 and test well 2, Springfield water system, Pajaro / Sunny Mesa Community Services District, Monterey County, California. Source of base map: USGS 7.5-minute quadrangle, Moss Landing, 1994

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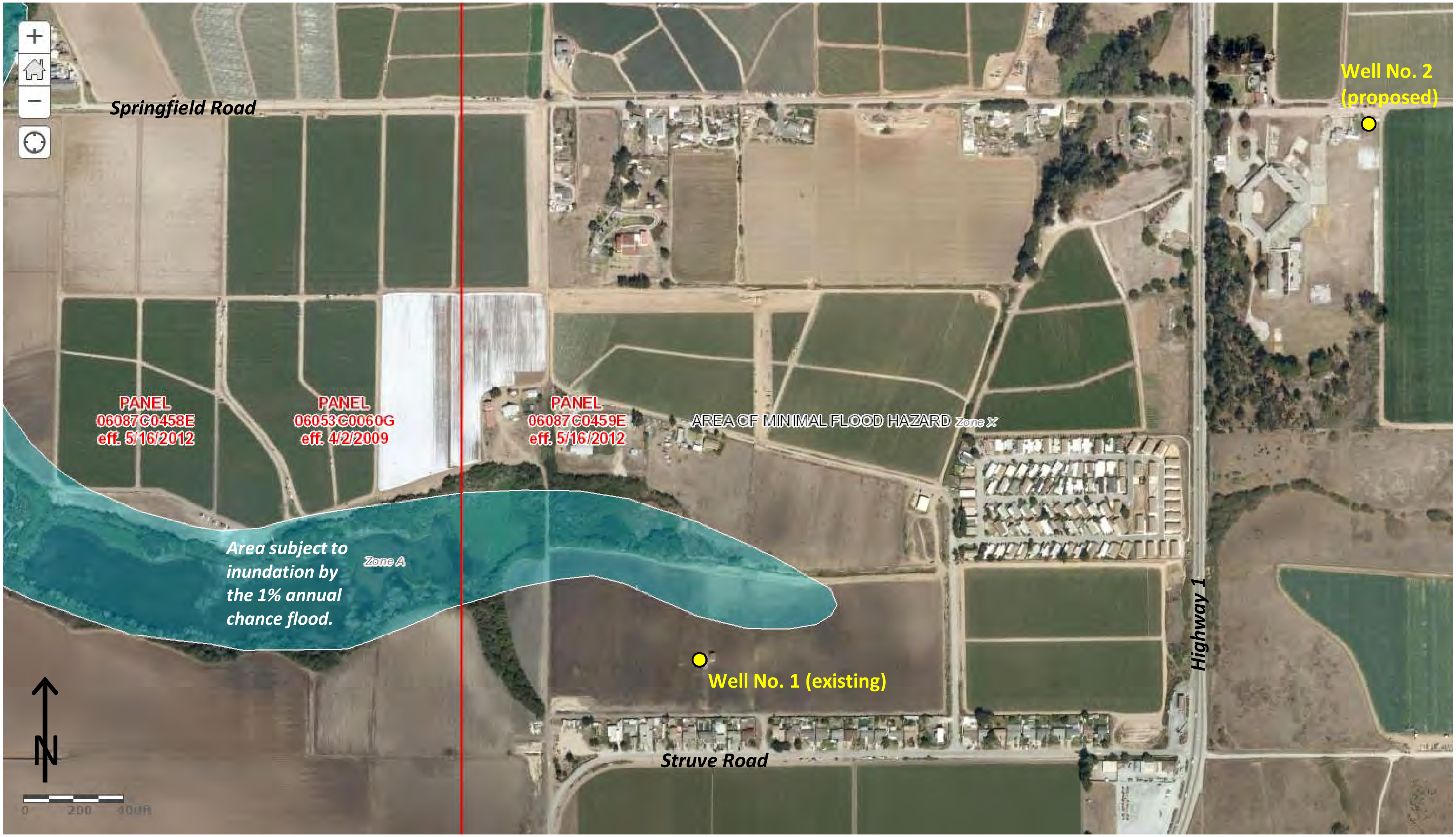

Figure 2. FEMA flood hazard at existing well no. 1 and proposed well no. 2, Springfield water system, Moss Landing, CA. The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. Zone A identifies the area subject to inundation by the 1% annual flood chance with no published base-flood elevations. Zone X is outside of the 0.2% annual chance floodplain. Source: Flood Insurance Rate Map (FIRM), Monterey County, California, panel 60 of 2050, map no. 06053C0060G, effective date April 2, 2009.

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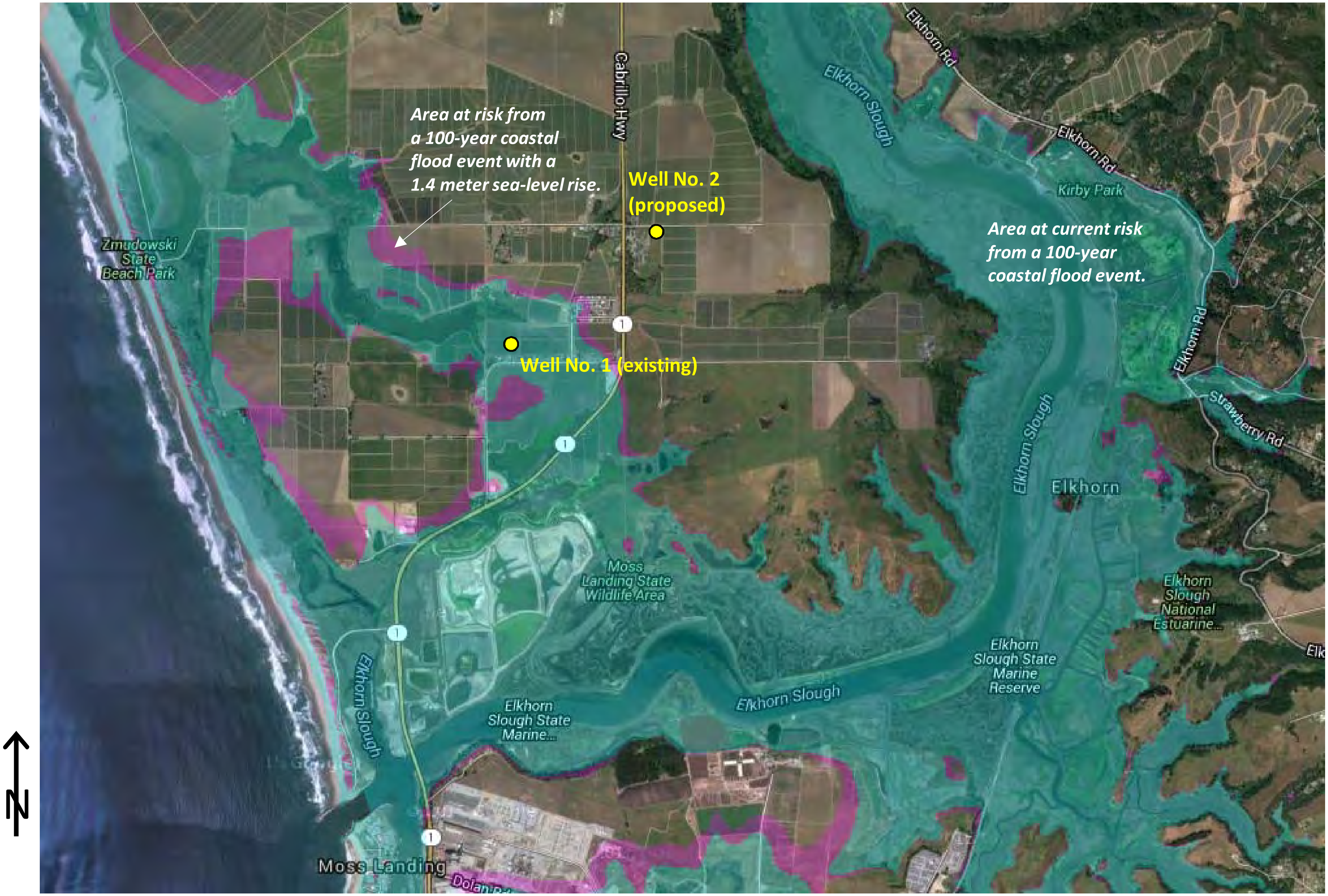

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Figure 3. Coastal flooding and sea-level rise hazard at existing well no. 1 and proposed well no. 2, Springfield water system, Moss Landing, CA. Data not intended to be used in lieu of Flood Insurance Studies and Flood Insurance Rate Maps issued by the Federal Emergency Management Agency (FEMA).
Source: Pacific Institute, 2009. Sea Level Rise Maps. http://www.pacinst.org/reports/sea_level_rise/maps/.
Heberger and others, 2009, http://pacinst.org/publication/the-impacts-of-sea-level-rise-on-the-california-coast/

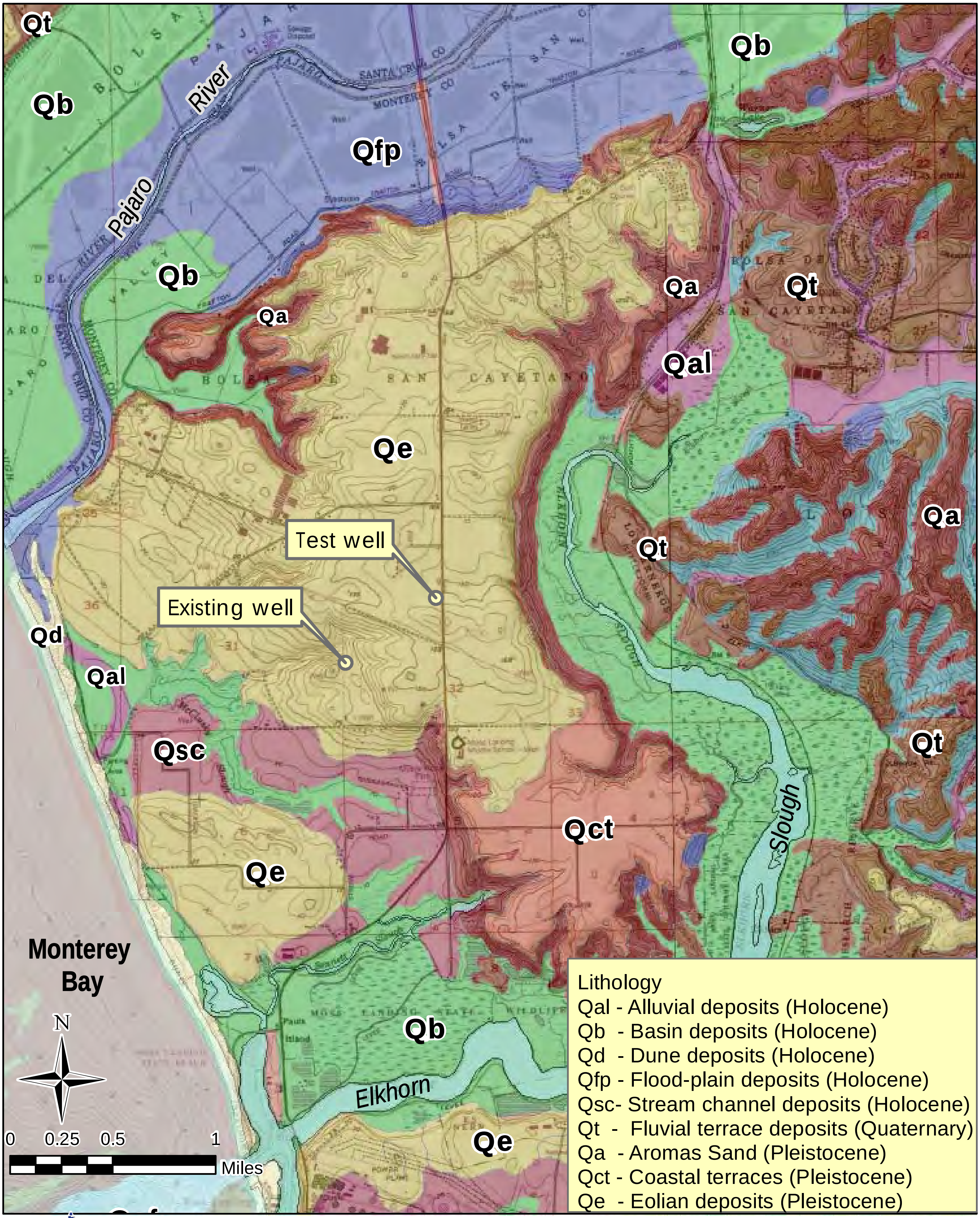

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Figure 4. Surface geology, Springfield water system, Pajaro Sunny Mesa Community Services District, Monterey County, California.

Source: Monterey County GIS and mapping data (Rosenberg, 2001)

215021 Pajaro Sunny Mesa_10-3-15.mxd

Figure 5. Lithologic log and profile locations, Springfield area, Pajaro/Sunny Mesa Community Services District, Monterey County, California. Photo source: Google Earth. Imagery Date: 4/13/2015. Well completion reports from California Department of Water Resources. The logs shown were used to create a three-dimensional lithologic model. Profile A-A' includes a 1,600 ft swath on each side of the section, within which lithologic logs were projected.

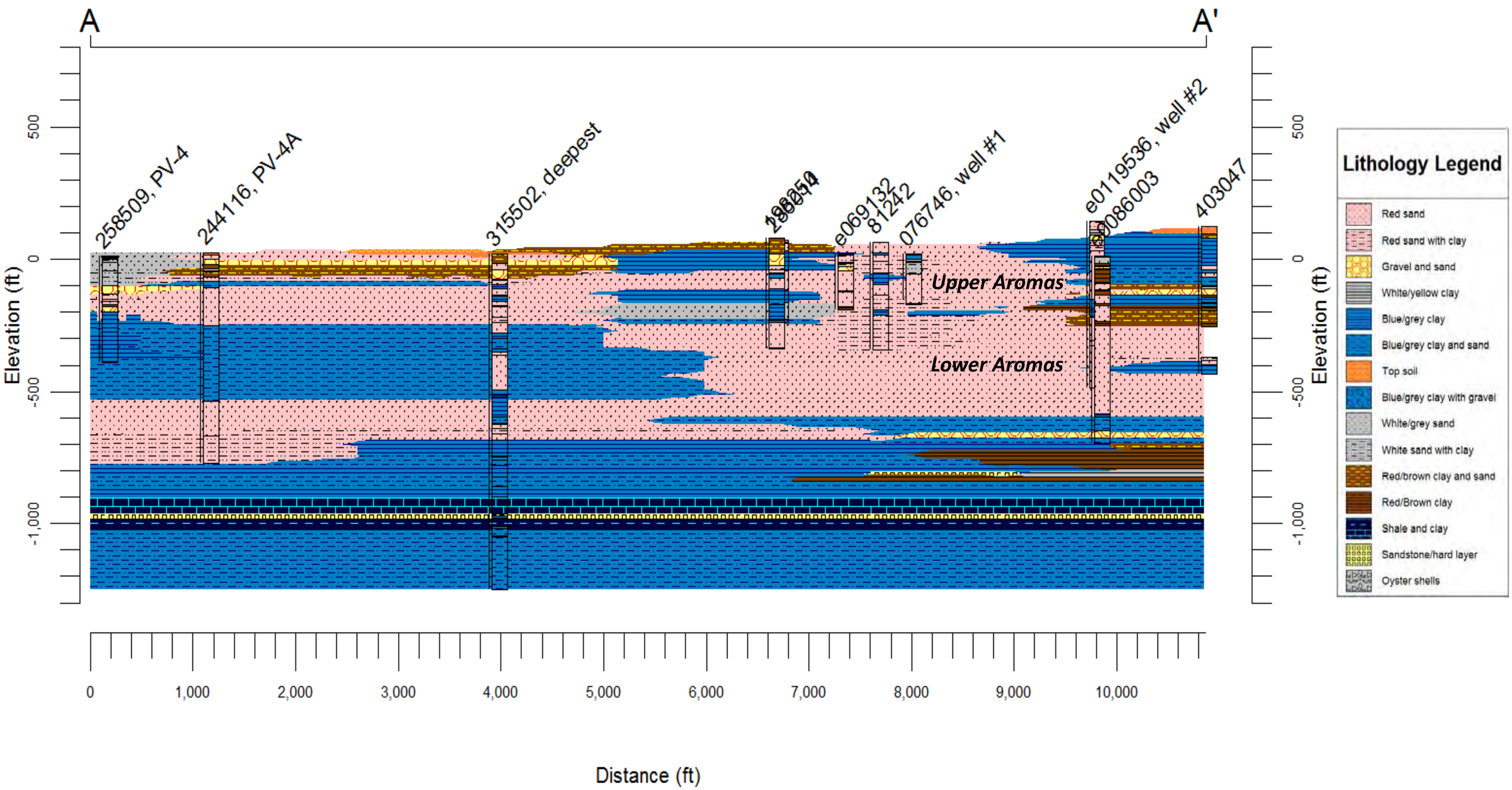

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Figure 6. Lithology profile A-A', Springfield area, Pajaro/Sunny Mesa Community Services District, Monterey County, California. The logs shown are projected within a 1,600 ft swath on each side of the cross section. Intervening lithology was based on lateral blending of data from all logs used to create a three-dimensional lithologic model.

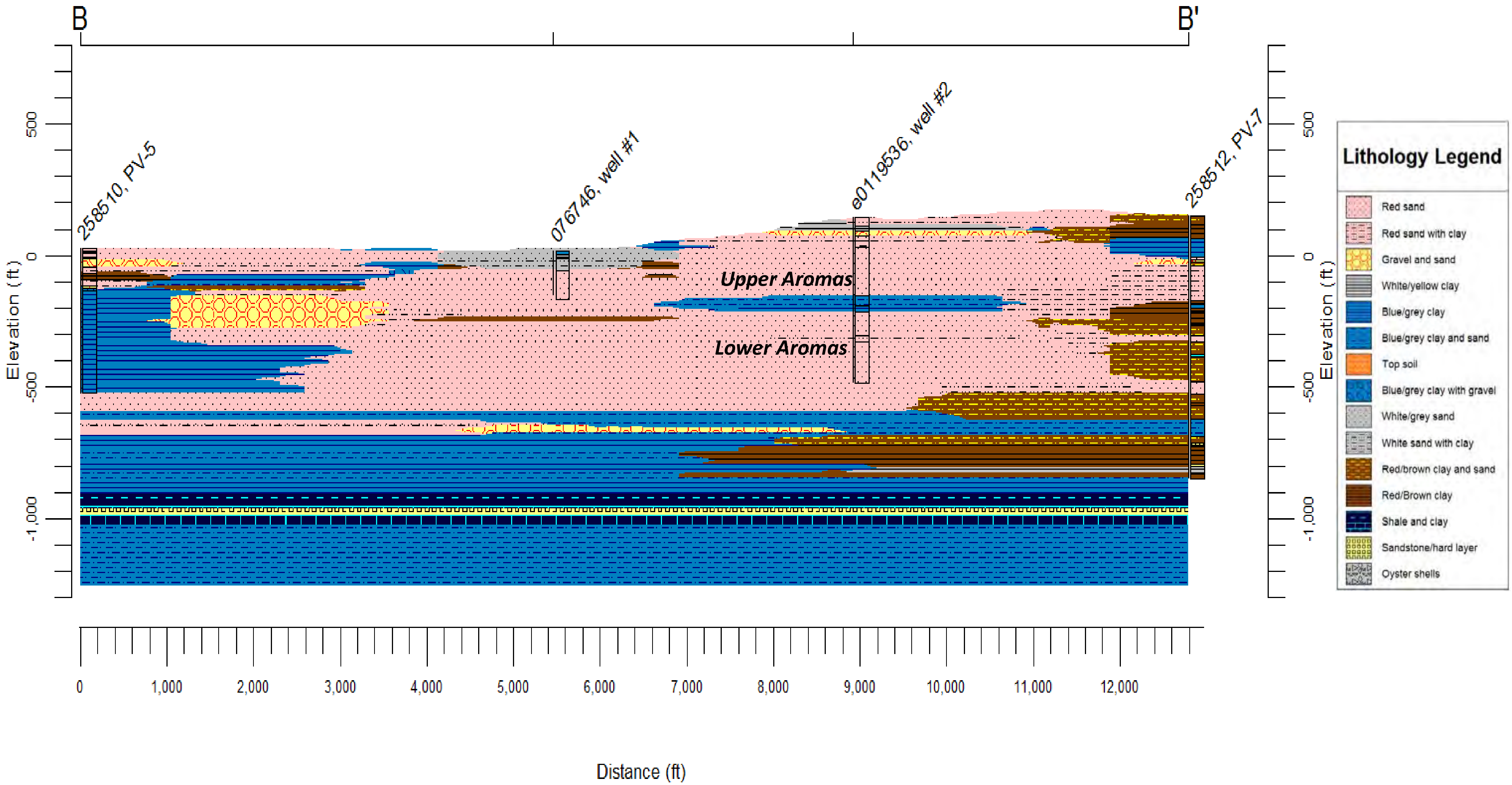

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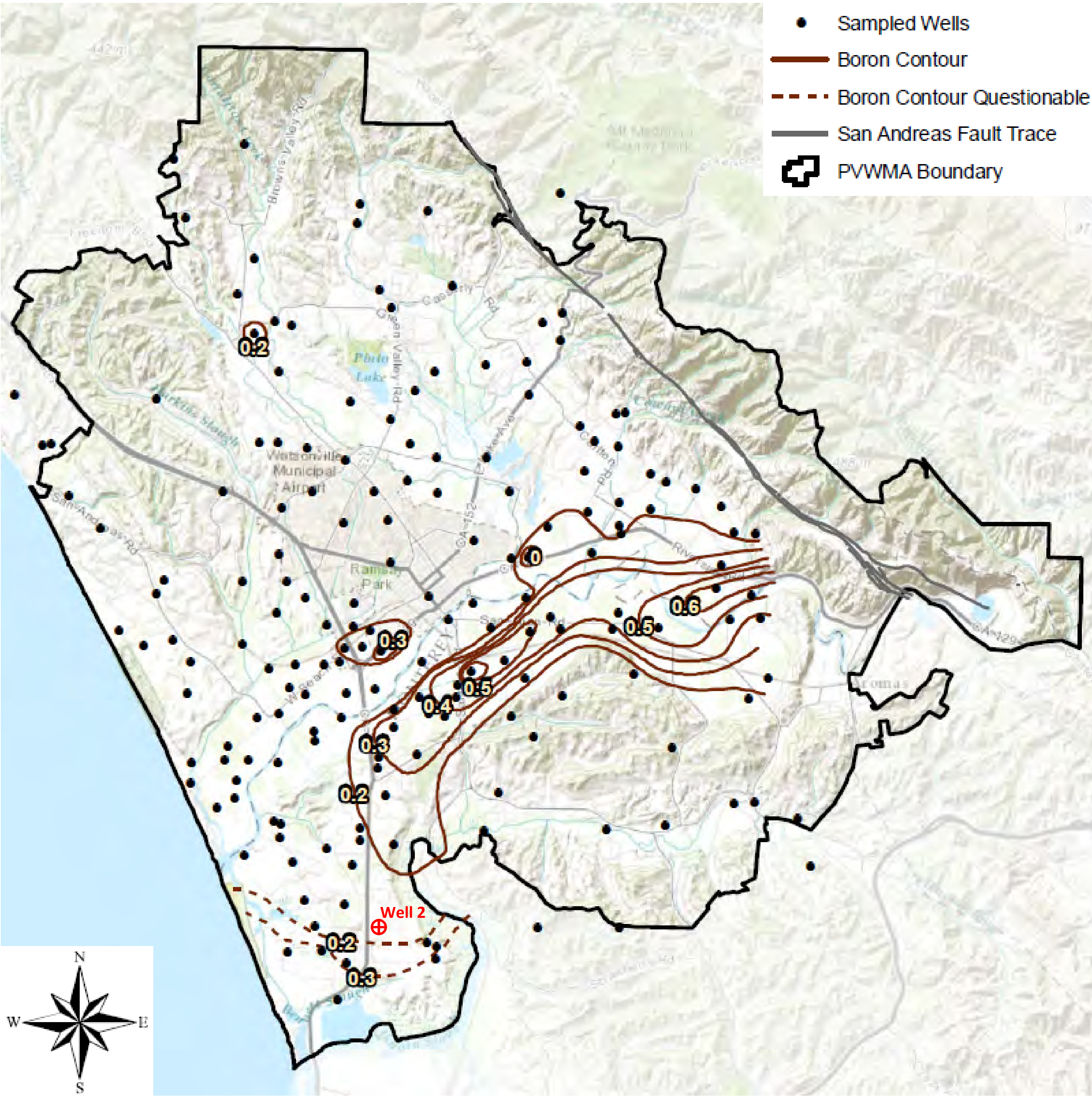
Figure 7. Lithology profile B-B', Springfield area, Pajaro/Sunny Mesa Community Services District, Monterey County, California. Intervening lithology was based on lateral blending of data from all logs used to create a three-dimensional lithologic model.



Boron plume identifies recharge from the Pajaro River. Other than sea water, the Pajaro River is the only significant natural source of boron in the Pajaro groundwater basin. The Pajaro River recharges moderate concentrations of naturally-occurring boron to groundwater as if flows west from the San Andreas Rift Zone, the source of the boron. Concentrations in the Pajaro River are highest when flows are low, and at times exceeding 1 mg/L, while the boron concentration of seawater is 4.5 mg/L (Hem, 1986). Boron concentrations in groundwater is, therefore, a water-quality fingerprint of groundwater recharge from the Pajaro River.

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Figure 8. Boron concentrations in groundwater, Pajaro River area, Monterey County, California. Data source: HEA, 1978; updated for PVWMA Basin Management Plan Update DEIR (Denise Duffy & Associates, 2013)

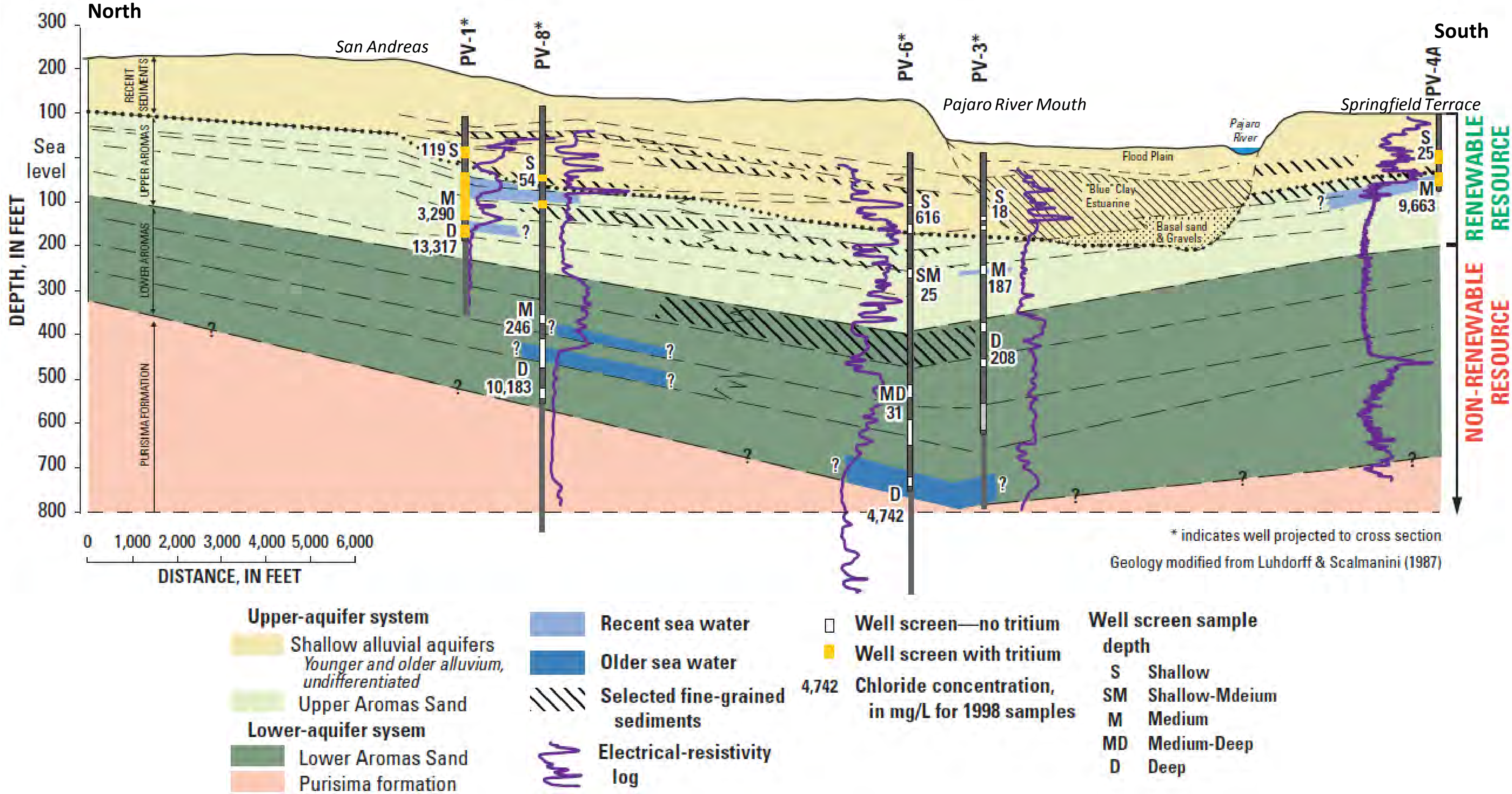

Figure 9. Geology and water-quality attributes along the coast in the Pajaro Valley, Santa Cruz and Monterey Counties, California. The alluvial aquifers are composed of well-layered marine and terrestrial coarse-grained deposits separated by extensive fine-grained deposits. The fine-grained deposits potentially restrict vertical movement of groundwater and constrain seawater intrusion (vertically). Coarse-grained deposits persist over large areas and control the pumpage and related seawater intrusion. Since the 1950s, groundwater levels have been near or below sea level at most coastal monitoring wells, and at some inland water-supply wells (including the Springfield subarea) been below the estimated water levels required to stop seawater intrusion. Groundwater recharged since 1950 and chemically and isotopically similar to local surface waters was characterized as a renewable resource, while underlying groundwater recharged thousands of years ago was generally characterized as a nonrenewable resource, implying a significant degree of aquifer confinement. Source: Hanson, 2003.

215021 cross sections.xlsx, geologic xsect

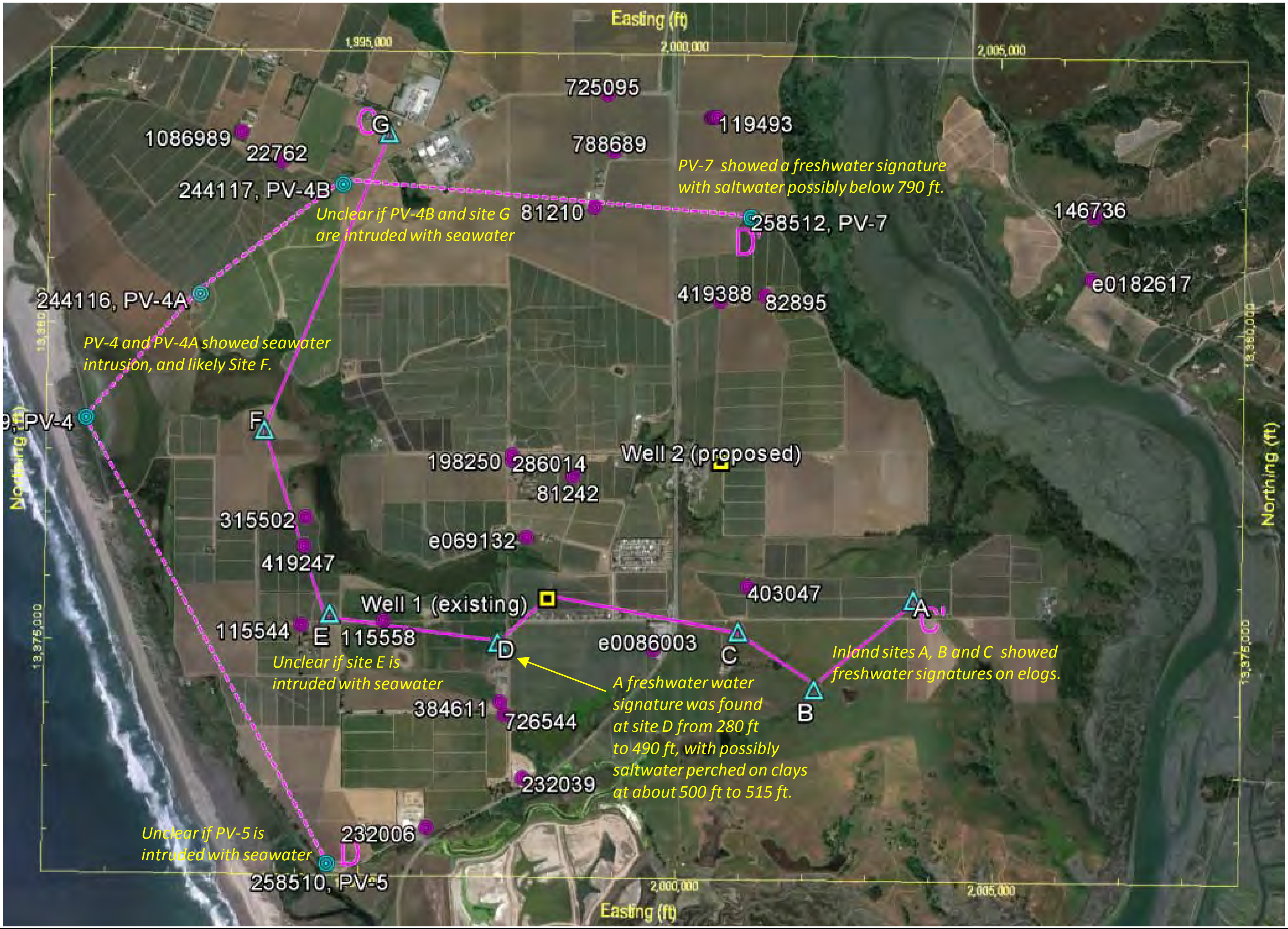

Figure 10. Elog and profile locations, Springfield water system area, Monterey County, California.
Photo source: Google Earth. Imagery Date: 4/13/2015. Elog sources: Capurro Ranch well study, 3/31/1993, Eaton Drilling Co., Inc. (designated by letters A through G along profile C-C'); and Pajaro Valley groundwater investigation, November 1988, Luhdorff and Scalmanini Consulting Engineers (designated as PV series along profile D-D').

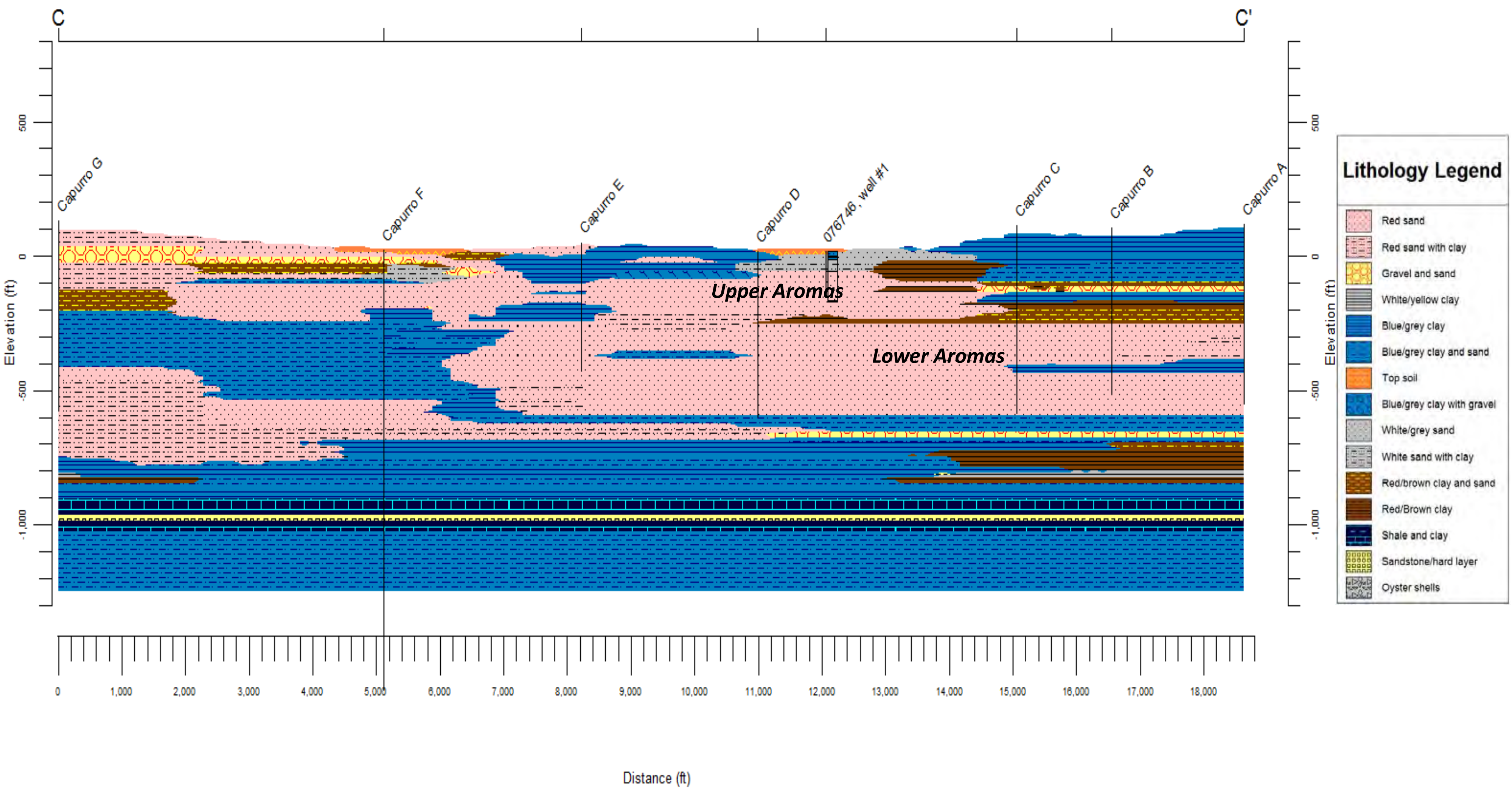

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Figure 11. Profile C-C', Elog locations, Springfield area, Pajaro/Sunny Mesa Community Services District, Monterey County, California. Elog source: Capurro Ranch well study, 3/31/1993, Eaton Drilling Co., Inc. Intervening lithology based on lateral blending of data from DWR well completion reports used to create a three-dimensional lithologic model.

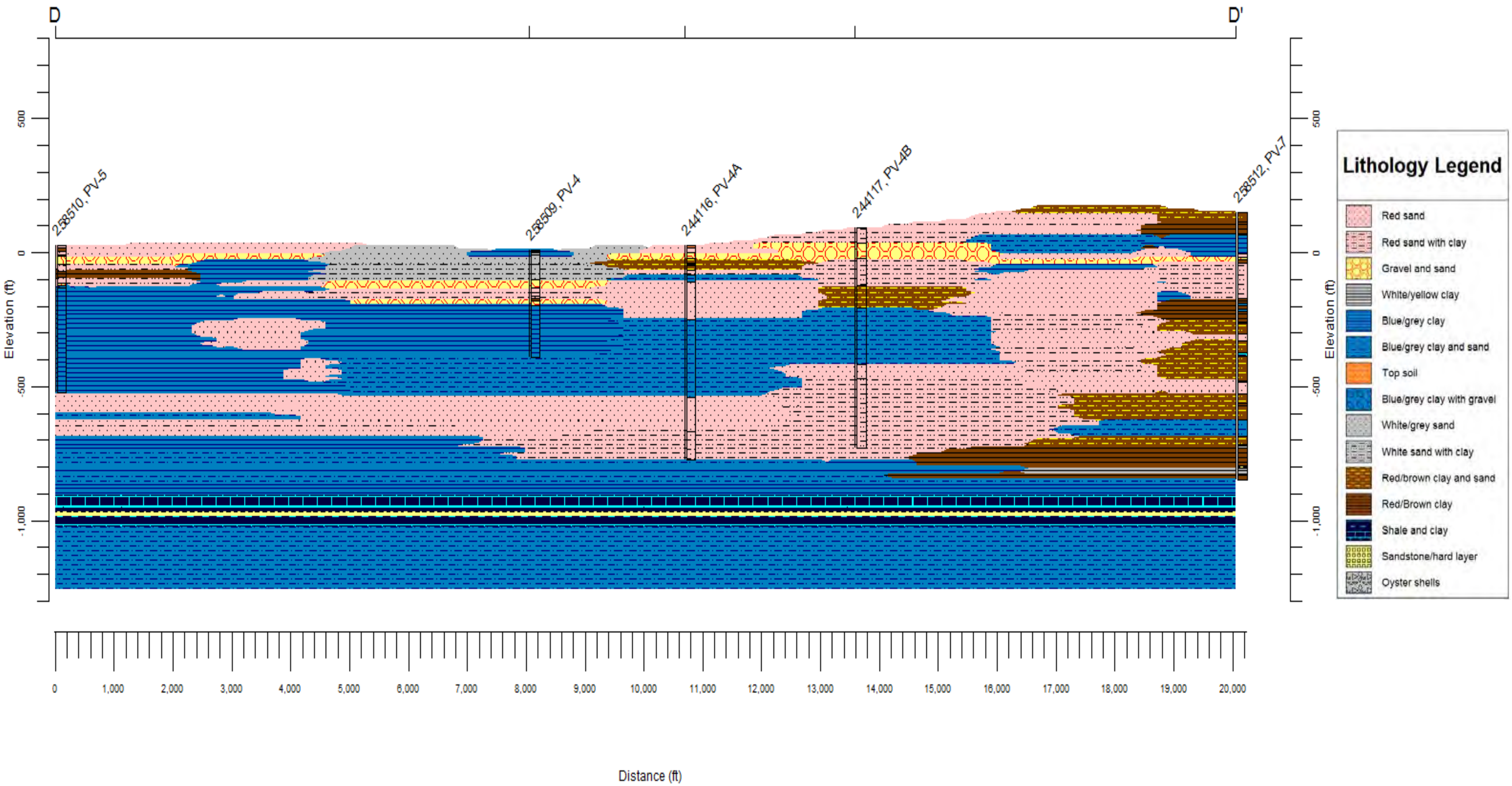

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Figure 12. Profile D-D', Elog locations, Springfield area, Pajaro/Sunny Mesa Community Services District, Monterey County, California. Elog source: Pajaro Valley groundwater investigation, November 1988, Luhdorff and Scalmanini Consulting Engineers. Intervening lithology based on lateral blending of data from DWR well completion reports used to create a three-dimensional lithologic model.

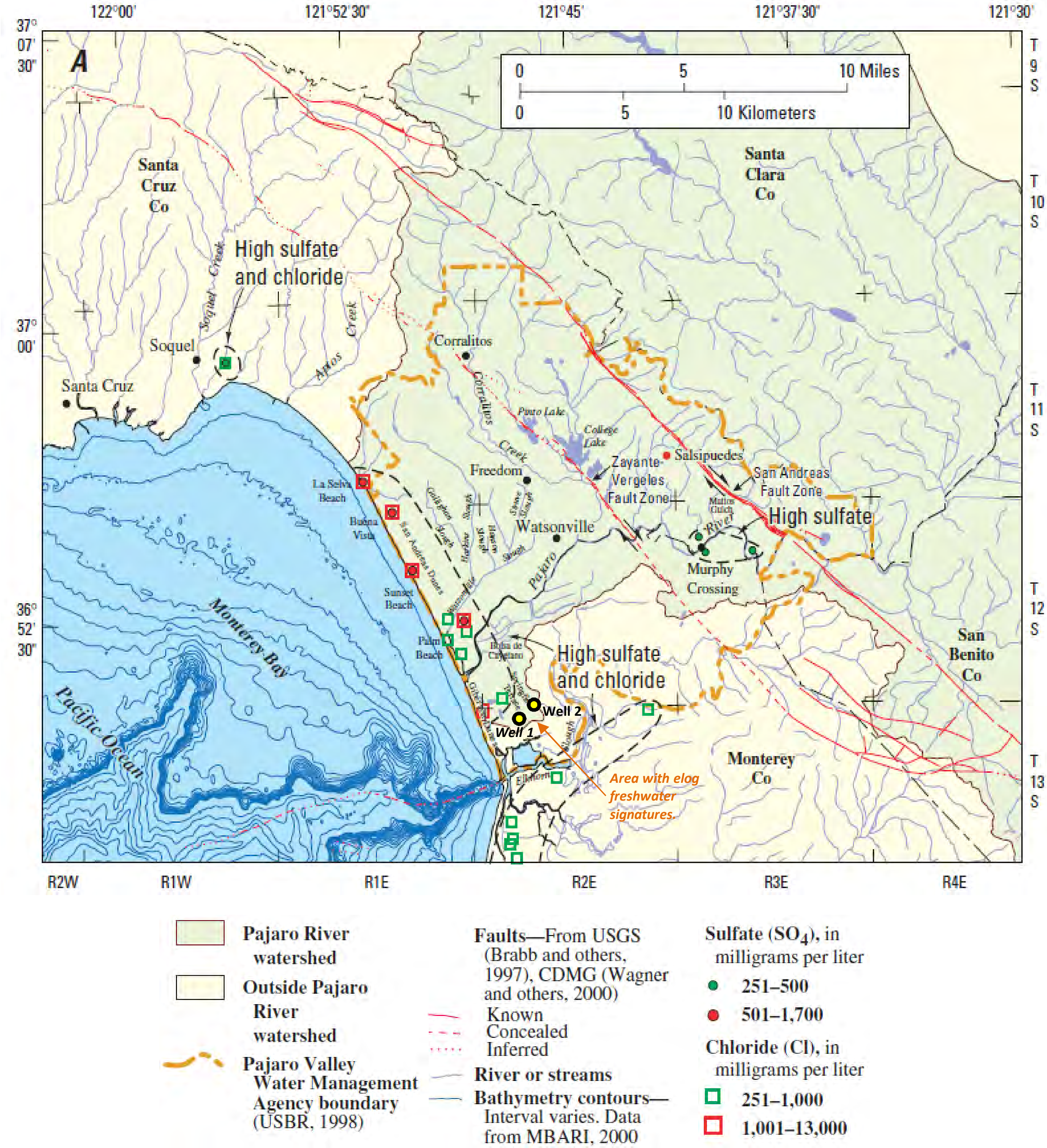

Figure 13. Inferred chloride and sulfate concentrations in groundwater, Pajaro Valley, Monterey County, California. Figure source: Hanson, 2003, Figure 18. Elog sources: Two sets of elogs were available: a) Seven elogs shown from the Capurro Ranch well study (Eaton Drilling, 1993); and b) Five well logs from the Pajaro Valley groundwater investigation (L&S, 1988).

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Figure 14. Test well no. 2 relative to neighboring wells, Springfield water system, Pajaro / Sunny Mesa Community Services District, Monterey County, California.
Source or base photo: Google Earth.

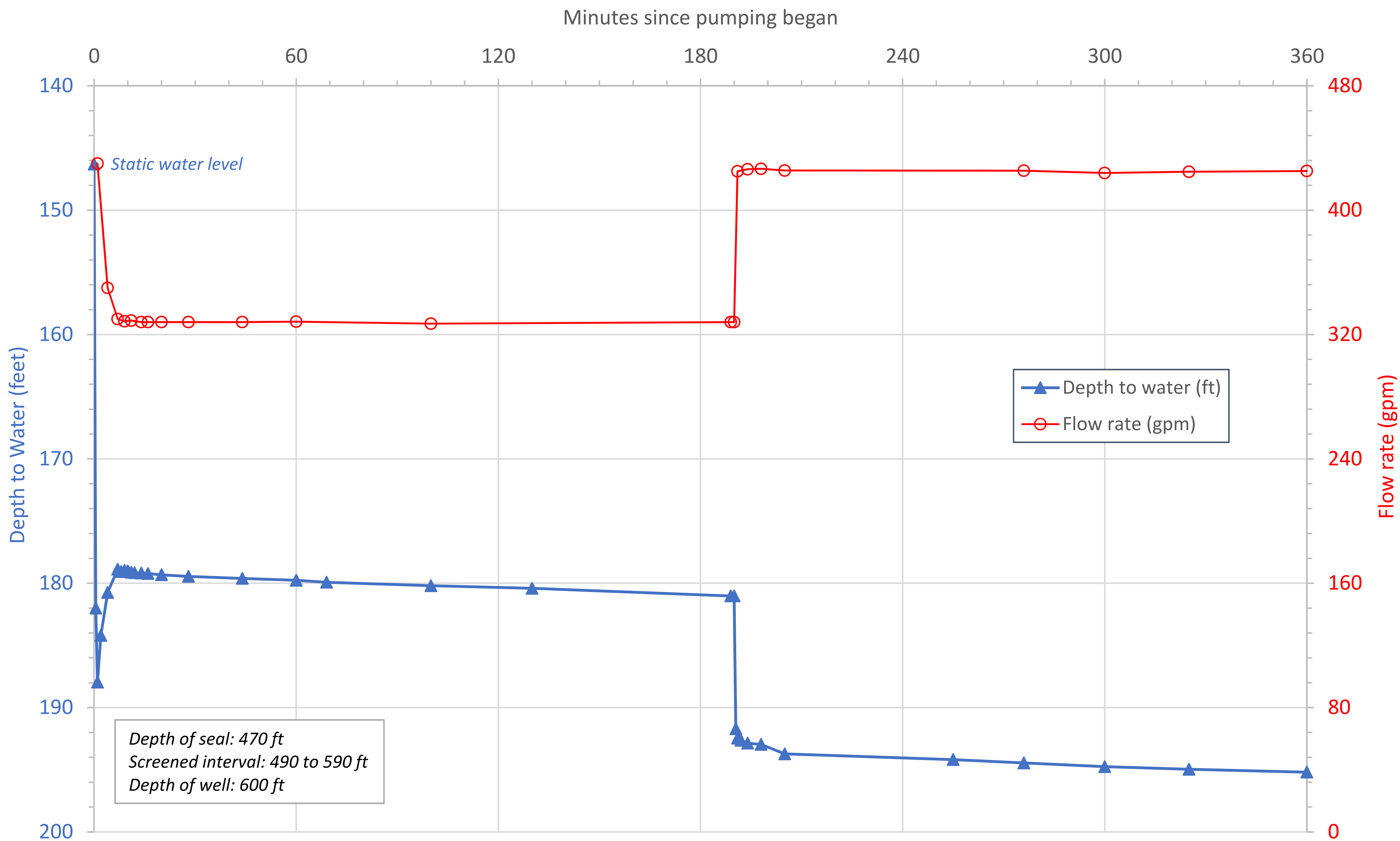

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Figure 15. Depth to water during step test at Springfield Well No. 2, December 19, 2017, Pajaro / Sunny Mesa Community Services District, Monterey County, CA

215021 Springfield well test_2-21-18_(20180423).xlsx, Step Test DTW

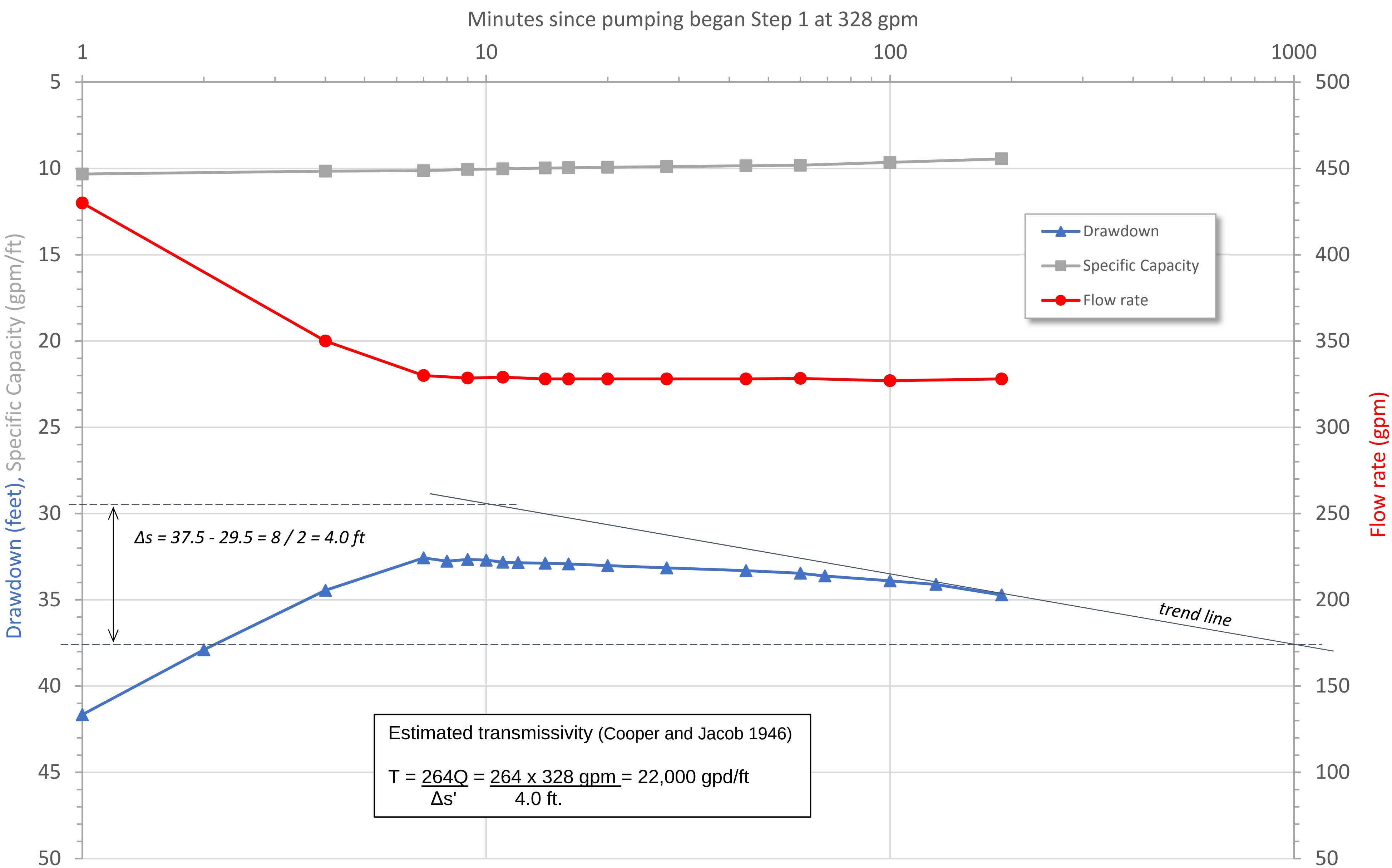

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Figure 16. Time-drawdown graph for first step of step test, 328 gpm at Springfield Well No. 2, December 19, 2017, Pajaro / Sunny Mesa Community Services District, Monterey County, CA

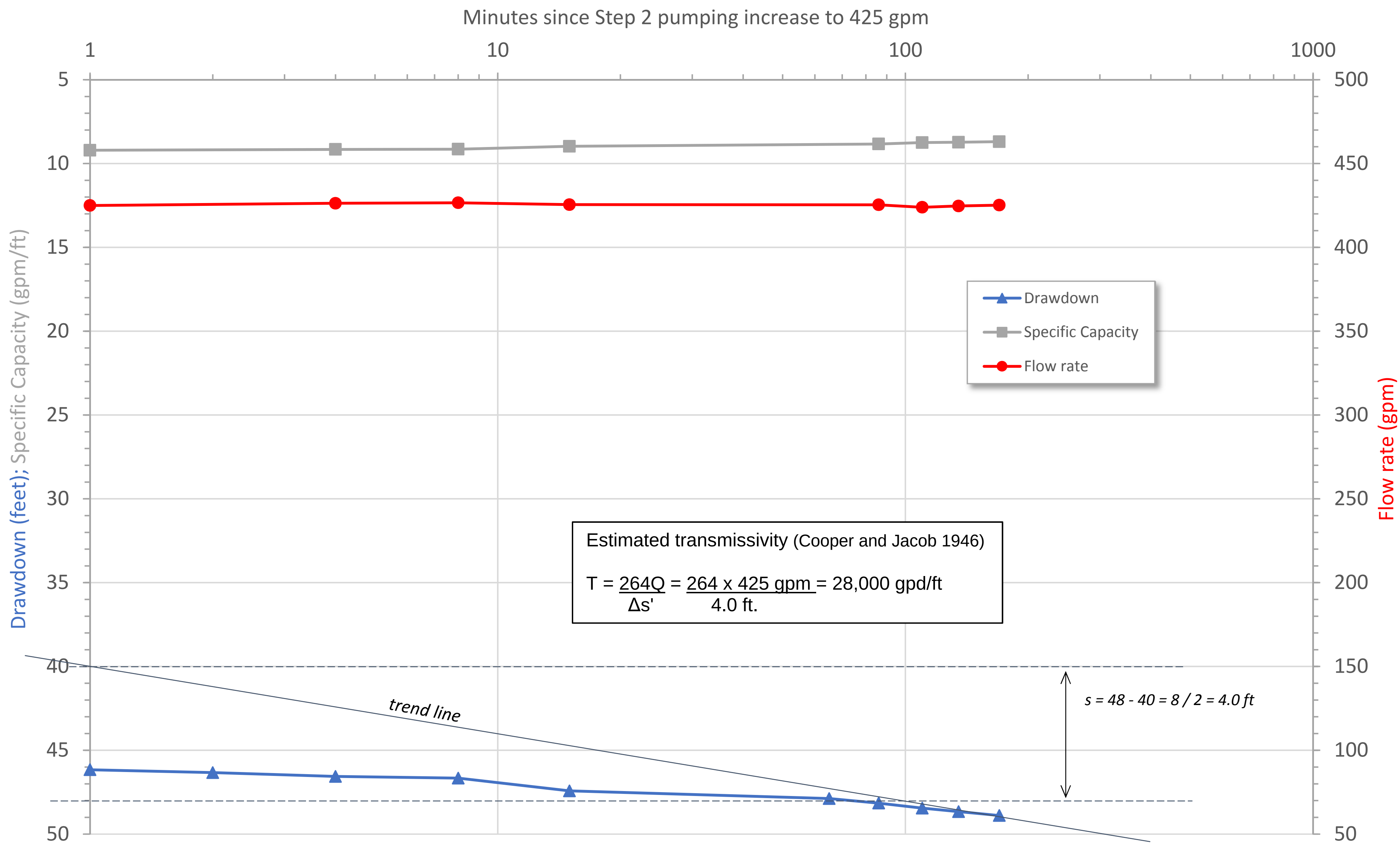

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Figure 17. Time-drawdown graph for second step of step test, 425 gpm at Springfield Well No. 2, December 19, 2017, Pajaro / Sunny Mesa Community Services District, Monterey County, CA

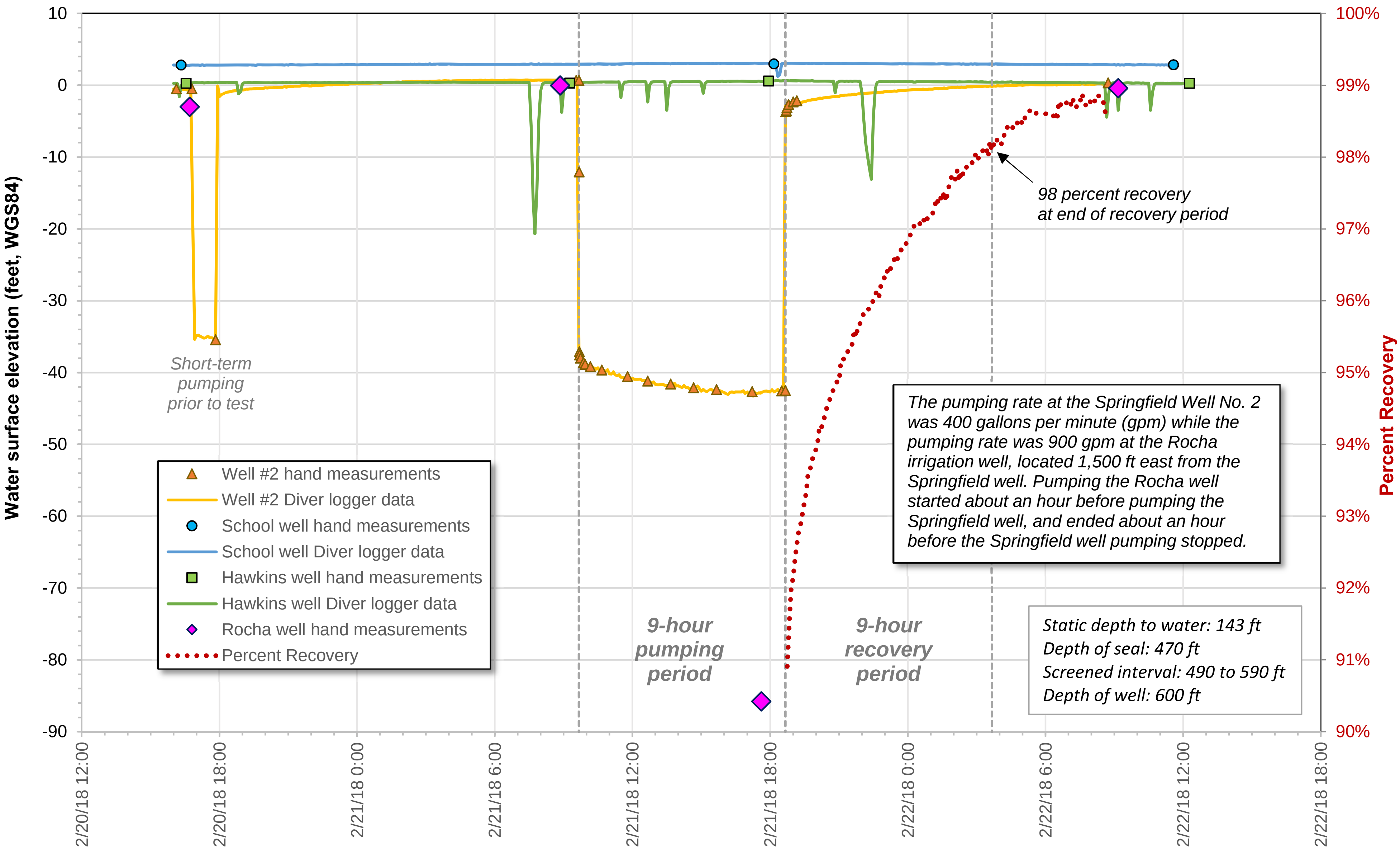

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Figure 18. Water surface elevations during pumping and recovery of 9-hour aquifer test, Springfield Well No. 2, February 21-22, 2018, Pajaro / Sunny Mesa Community Services District, Monterey County, CA

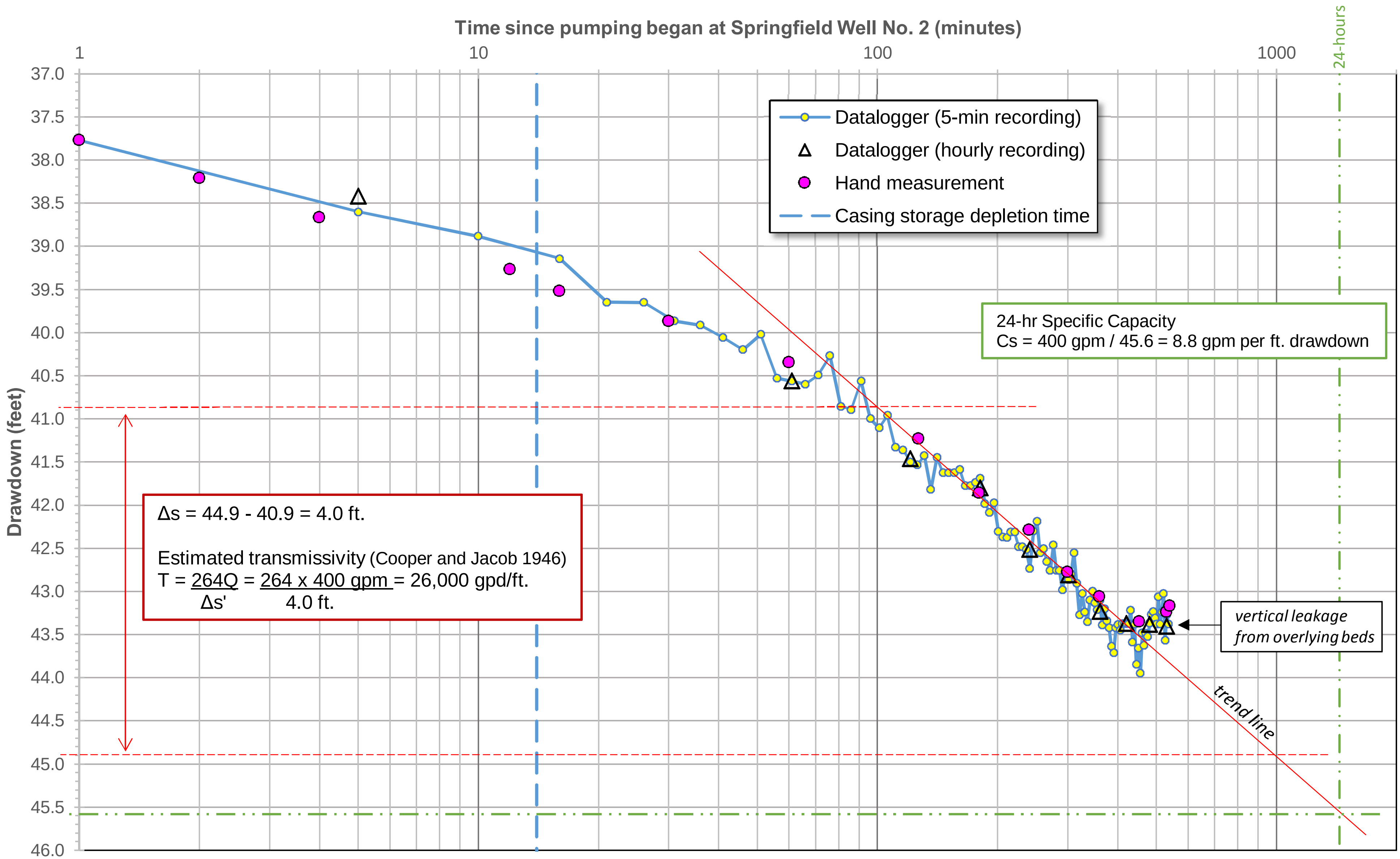

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Figure 19. Time-drawdown graph for 9-hour pumping test at Springfield Well No. 2, February 21-22, 2018, Pajaro / Sunny Mesa Community Services District, Monterey County, California

215021 Springfield well test_2-21-18_(20180423).xlsx, Drawdown Chart (2)

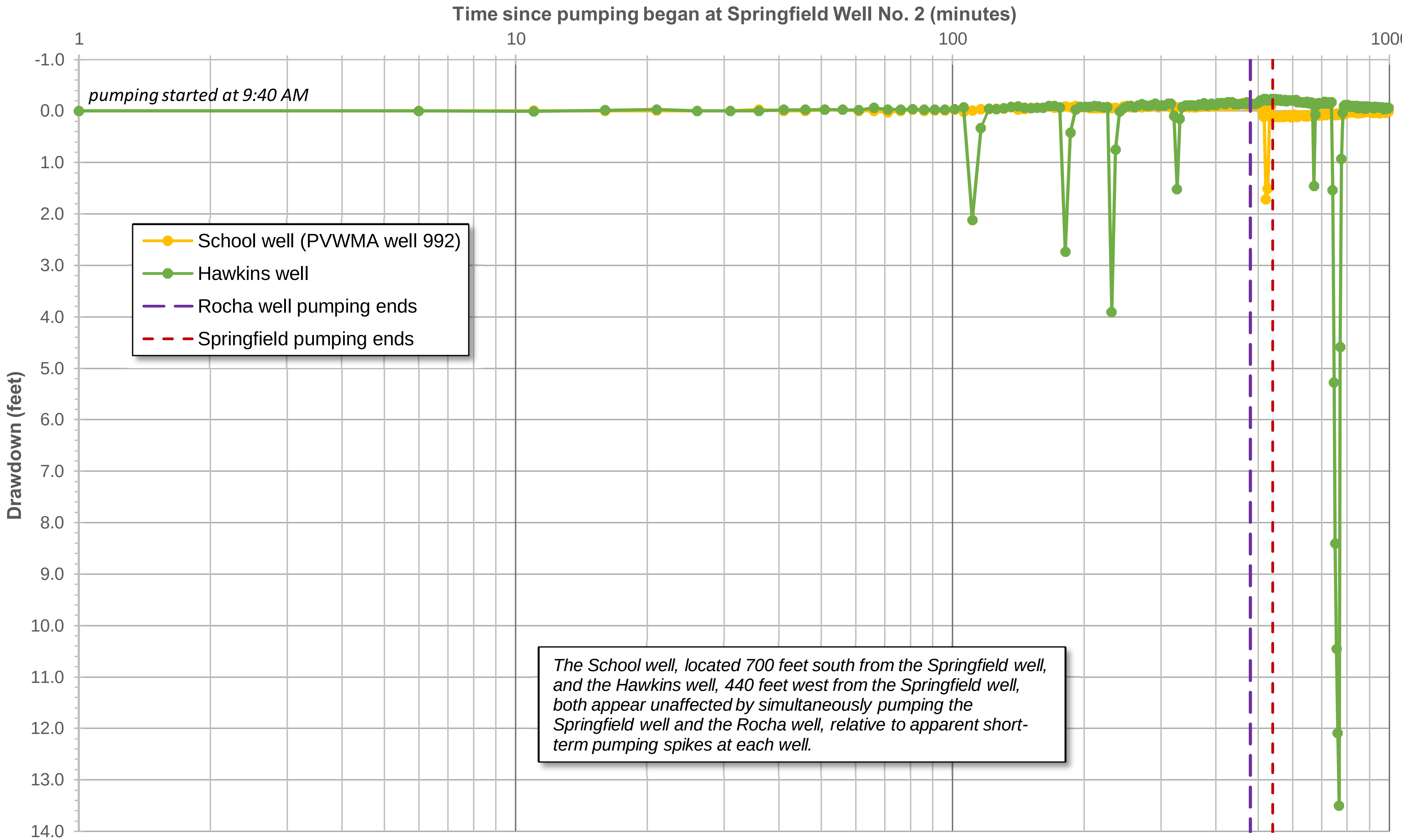

Figure 20. Time-drawdown graph for observation wells during 9-hour pumping test at Springfield Well No. 2, February 21-22, 2018, Pajaro / Sunny Mesa Community Services District, Monterey County, CA

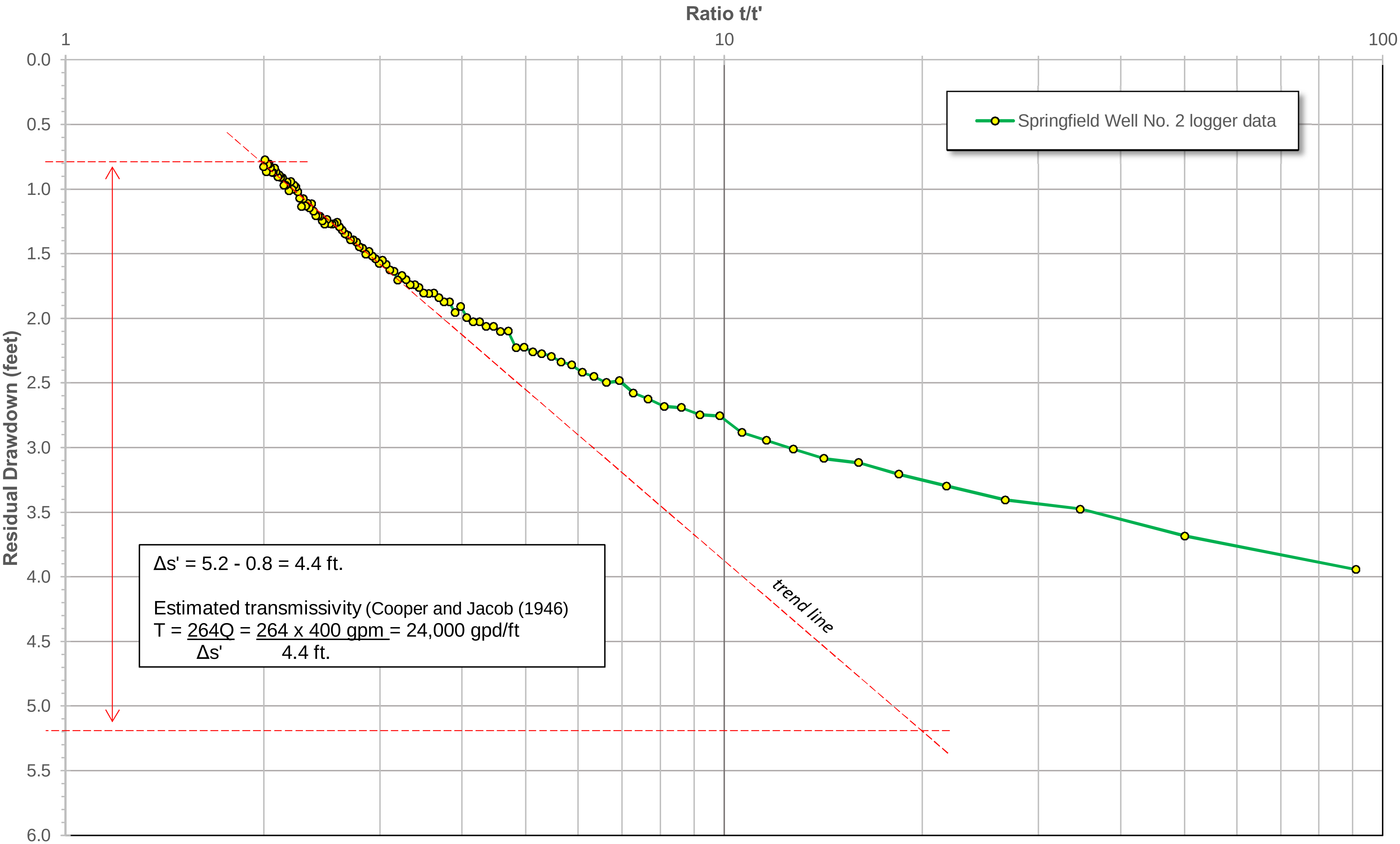

Figure 21. Residual-drawdown graph for recovery test at Springfield Well No. 2, February 21-22, 2018, Pajaro / Sunny Mesa Community Services District, Monterey County, CA

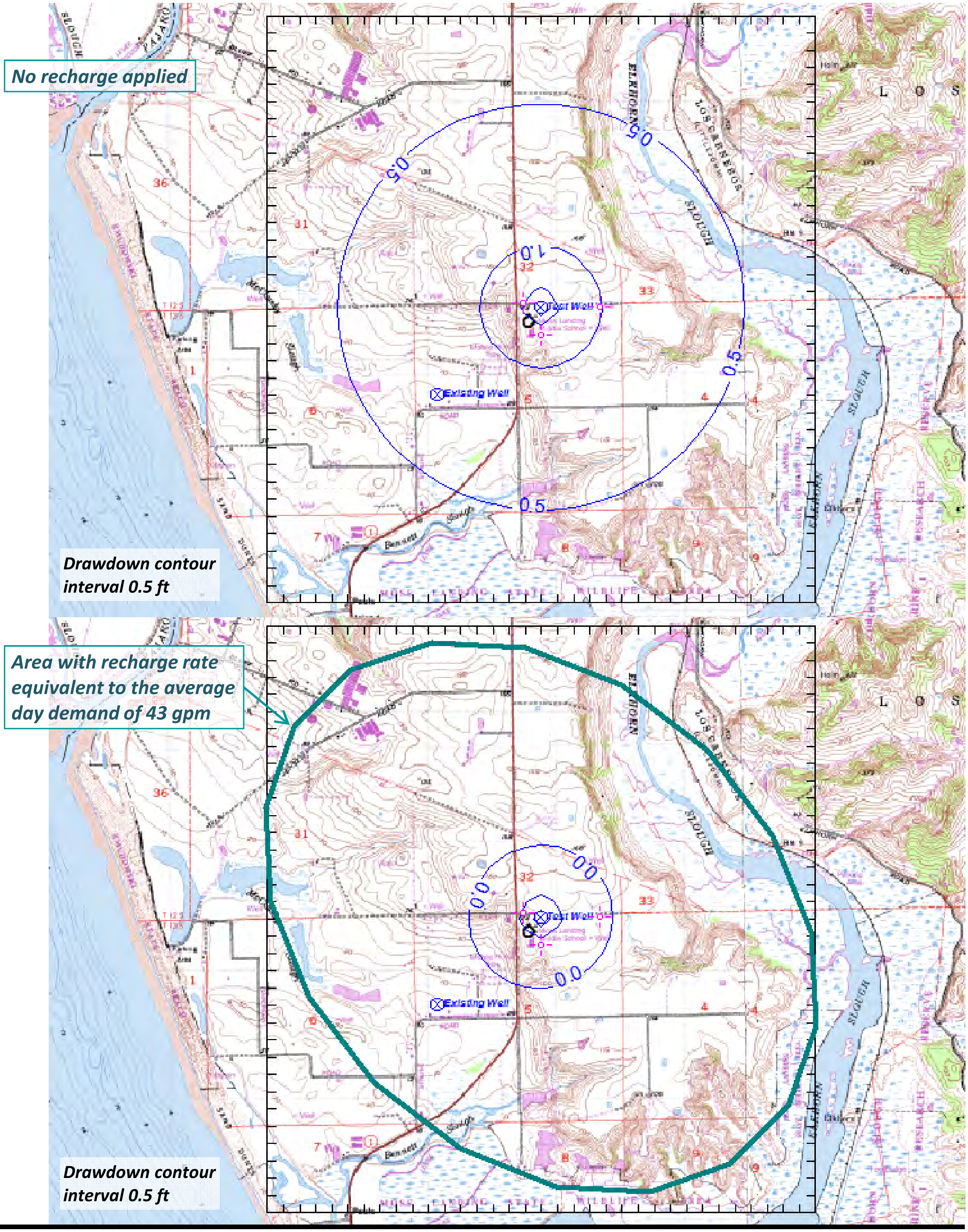

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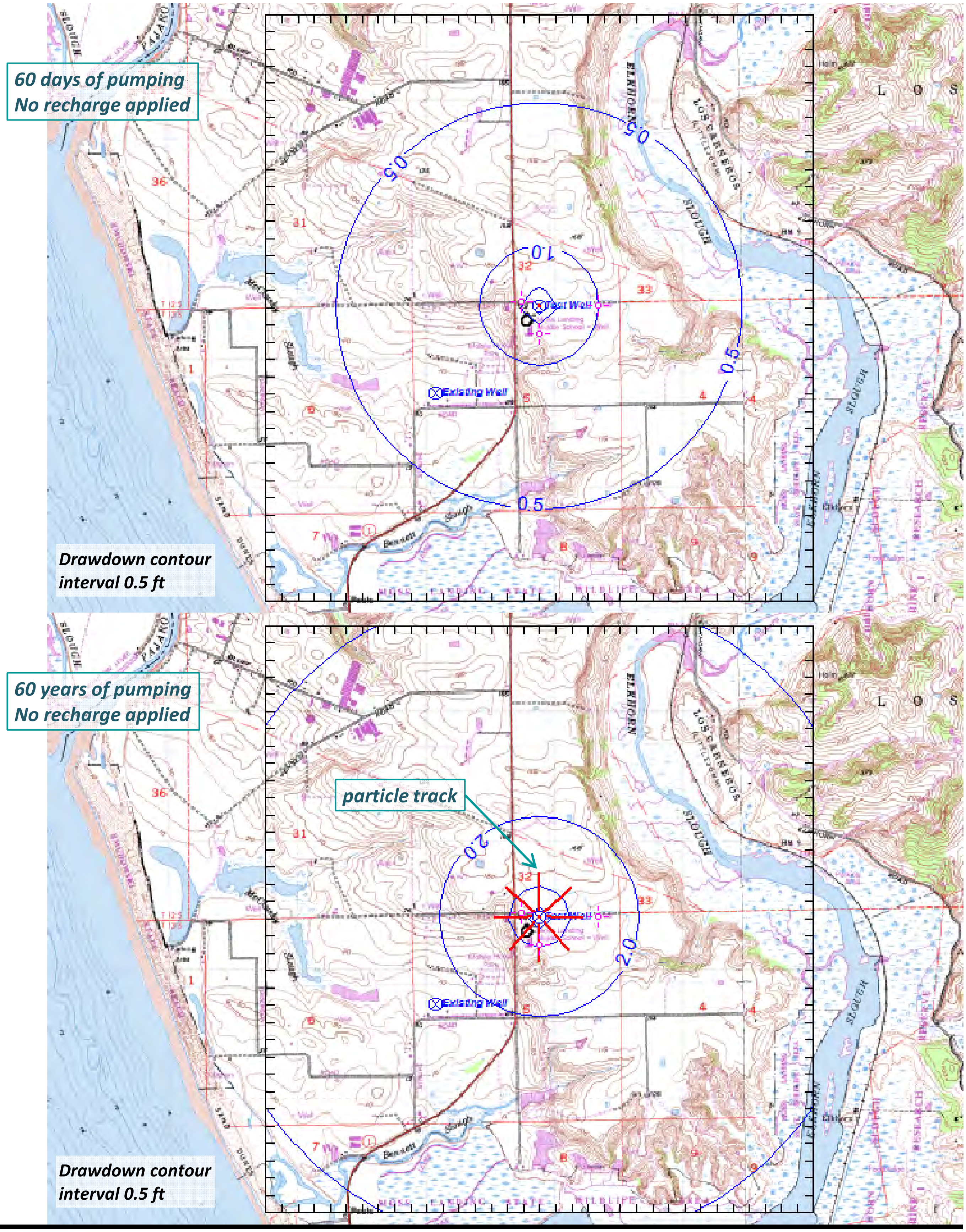
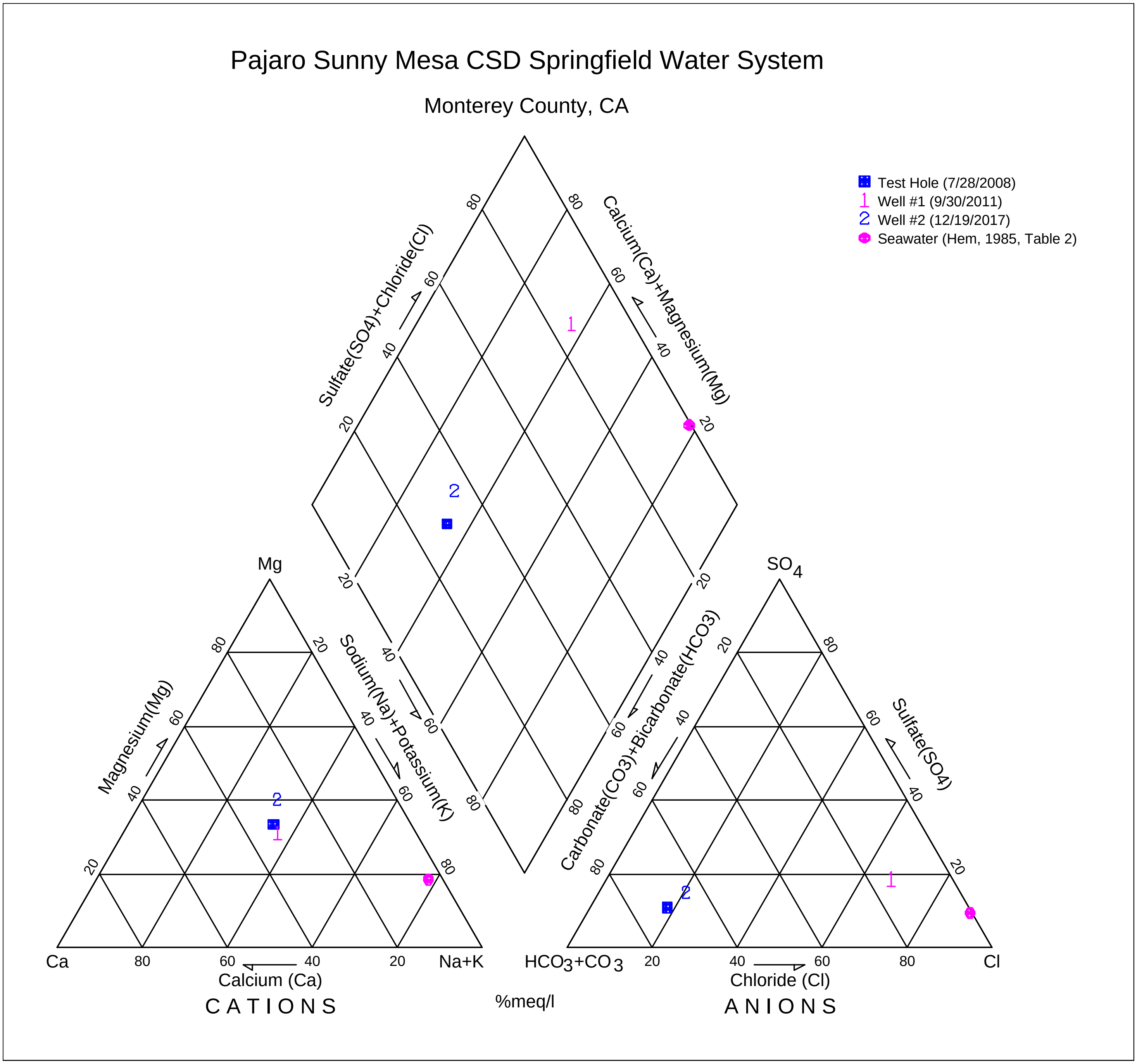
Figure 22. Results of two-dimensional steady-state analytical groundwater model for Springfield Well No. 2 pumping at 43 gpm, Pajaro / Sunny Mesa CSD, Monterey County, CA. The 1-ft drawdown contour is commonly used to estimate a theoretical area of influence. Refer to text for parameters and assumptions of the calculations.



Balance Hydrologics, Inc.®

Figure 23. Results of two-dimensional transient analytical groundwater model for Springfield Well No. 2 pumping 43 gpm, Pajaro / Sunny Mesa CSD, Monterey County, CA. Drawdown at 60 days resembles the steady-state model results. The red particle traces identify the aquifer volume equivalent to the total volume of water pumped. Refer to text for parameters and assumptions of the calculations.



This diagram shows cations in the ternary graph on the left and anions on the right graph. The diamond graph in the center illustrates both cations and anions. Hardness dominated (calcium and magnesium) water plots to the left and top of the diamond graph, soft monovalent-salt dominated (primarily sodium) water to the right, and soft alkaline water towards the bottom.

Balance Hydrologics, Inc.®

Figure 24. Piper diagram illustrating ionic signatures of water samples collected from the Springfield water system existing Well 1 and from the test hole and Well 2, Monterey County, California. The two waters are differentiated by their anion composition.

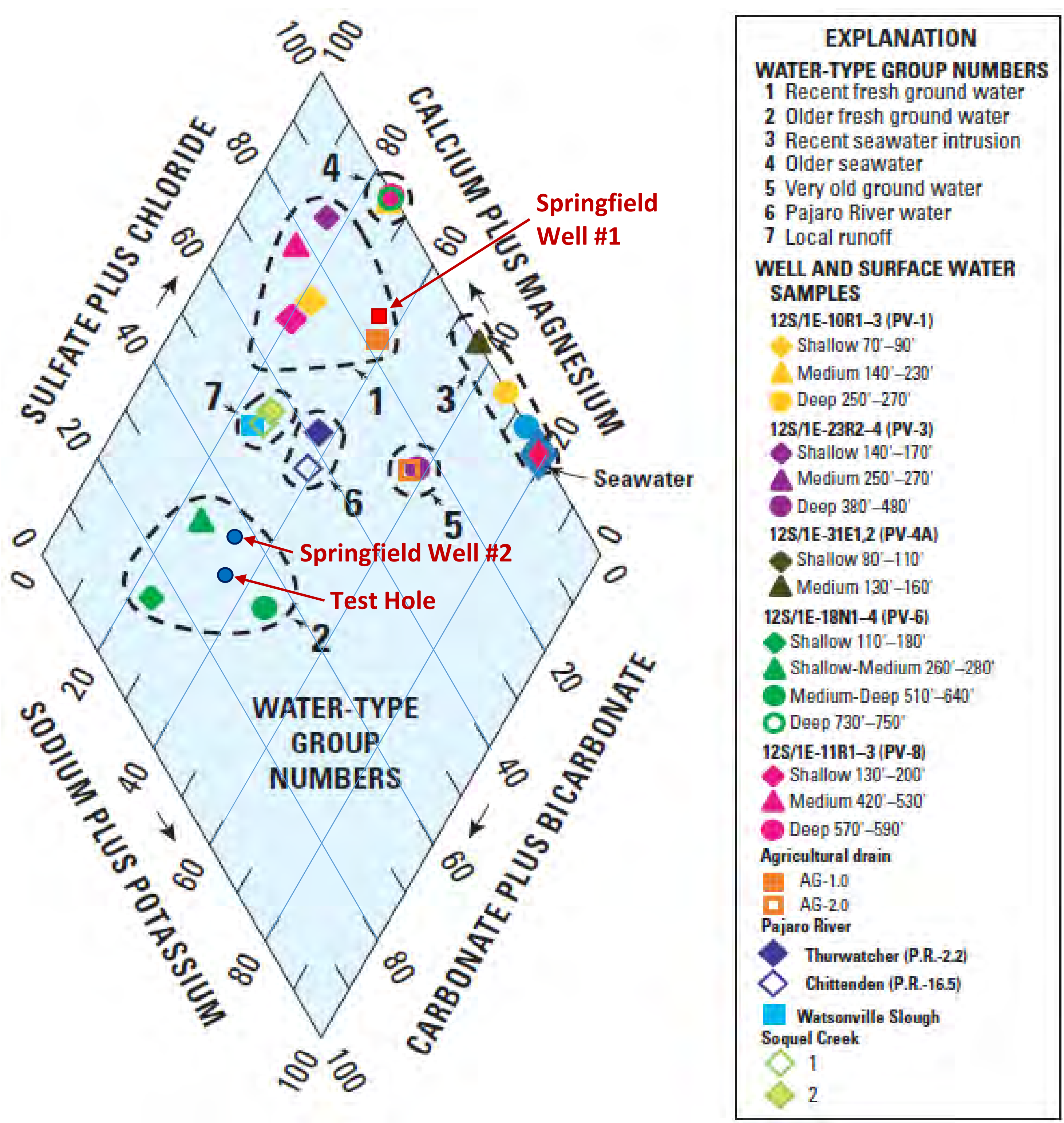
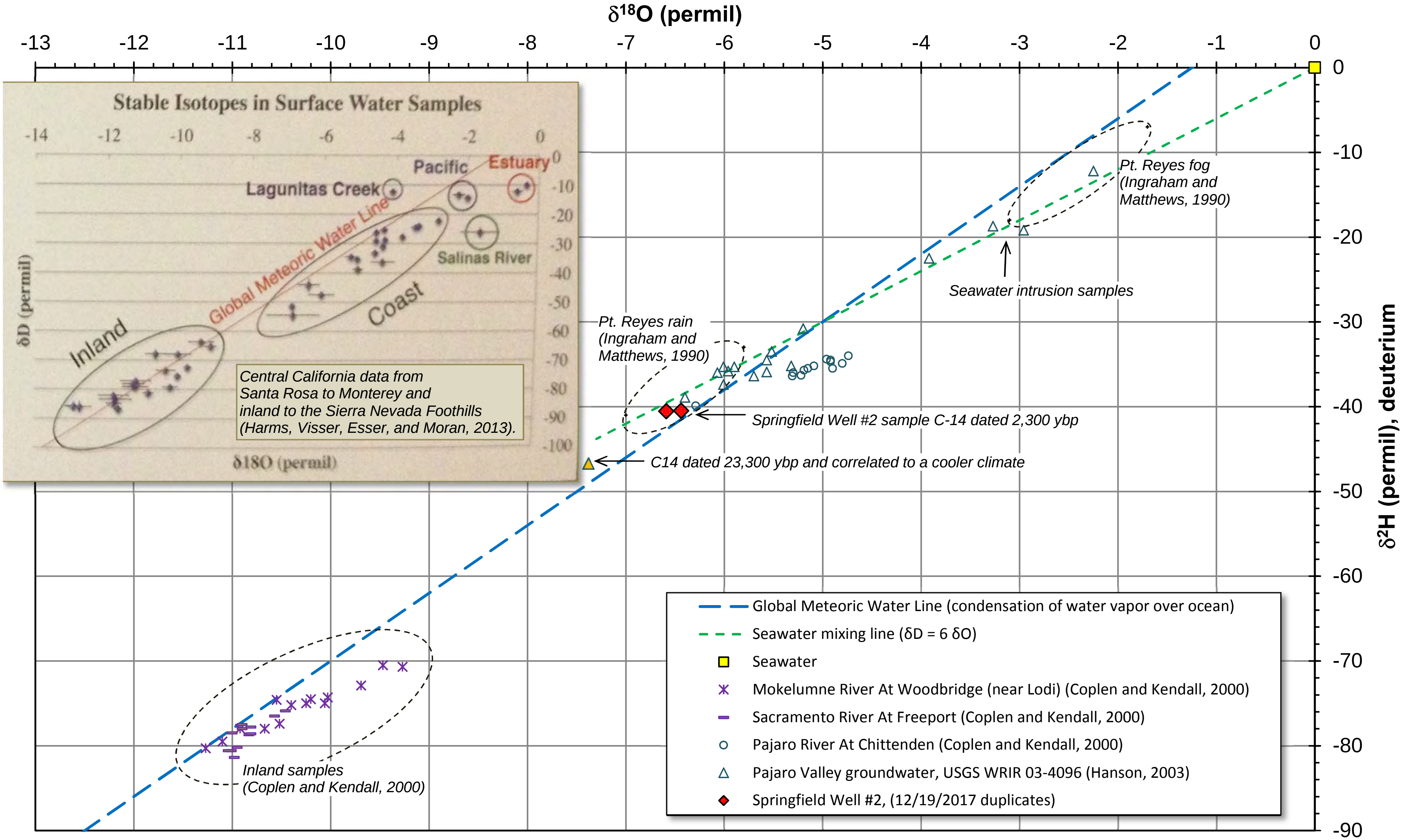


Figure 25. Piper diagram in USGS Fact Sheet 044-03 with data added from the Springfield water system Wells 1 and 2, Monterey County, California.

Well 1 sample is grouped with samples from shallow wells and agricultural drain water, characterized as Recent Fresh Groundwater. The test hole and Well 2 samples are grouped with samples from nested wells (PV-6), located at the corner of W. Beach St. and San Andreas Rd, a similar distance from the coast as the Springfield Well No. 2 site. Up to a depth of 640 ft at PV-6, samples were characterized as Older Fresh Groundwater; below this depth, groundwater was characterized as Old Seawater, indicating seawater intrusion related to the difference in specific gravities between fresh and saline water.



Balance Hydrologics, Inc.®

Figure 26. Stable isotopes of oxygen and hydrogen in groundwater from the Springfield Well #2 relative to published results from coastal and inland waters. Water with a higher deuterium content is generally found near the coast, at low elevations, in warm rains, and in water which has undergone partial evaporation. The variation of oxygen-18 content generally follow those of deuterium. Results from the Springfield Well #2 plot within the range of coast waters and other Pajaro Valley samples. Additional differences between coastal and inland waters are shown on the inset chart.

APPENDIX A

Springfield Well No. 1 Drillers Report and Water-Quality Reports

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 076746

State Well No. 13/02-5

Other Well No.

Notice of Intent No. 190633

Local Permit No. or Date 4-6-82

(1) OWNER: Name Springfield Mutual Water Co

Address 18 Struve Road

City Watsonville, CA Zip 95076

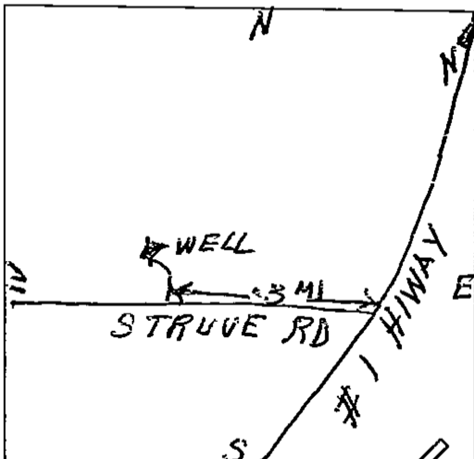
(2) LOCATION OF WELL (See instructions):

County Monterey Owner's Well Number

Well address if different from above

Township Range Section

Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size 8-12
Diameter of bore 20
Packed from 50 to 172 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	122	8	160	122	172	3/64 x 4

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.

Were strata sealed against pollution? Yes ☒ No ☐ Interval solid ft.

Method of sealing concrete poured through pipe

(10) WATER LEVELS:

Depth of first water, if known 20 ft.

Standing level after well completion 20 ft.

(11) WELL TESTS:

Was well test made? Yes ☒ No ☐ If yes, by whom? Self

Type of test Pump ☒ Bailer ☐ Air lift ☐

Depth to water at start of test 20 ft. At end of test 21 ft

Discharge 40 gal/min after 6 hours Water temperature cool

Chemical analysis made? Yes ☐ No ☒ If yes, by whom?

Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 188 ft. Depth of completed well 172 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	3	Top soil
3	17	Grey clay & sand
17	25	White sand
25	31	Grey clay
31	76	Grey to white sand with streaks of clay
76	186	Red Aromas sand
186	188	Grey clay with large gravel embeded.

Work started 4-6- 19 82 Completed 4-7-82 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED James I. Ash (Well Driller)

James I. Ash

NAME FRED ASH & SONS, INC.
(Person, firm, or corporation) (Typed or printed)

Address 1225 Castroville Blvd.

City Salinas Zip 93907

License No. 391942 Date of this report 4-8-82

Pajaro Sunny Mesa Svc District
Donald Rosa
136 San Juan Road
Watsonville, CA 95076-5237

MBAS
MONTEREY BAY ANALYTICAL SERVICES

4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS
montereybayanalytical@usa.net

ELAP Certification Number: 2385

Thursday, May 10, 2012

Lab Number: AA85967

Collection Date/Time:	3/21/2012	8:40	Sample Collector:	EVANS, M
Submittal Date/Time:	3/21/2012	15:15	Sample ID	2700771-001

Sample Description: Springfield - Well #1

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Nitrate as NO3	EPA300.0	mg/L	293		1	45	3/21/2012

Sample Comments:

Lab Number: AA85968

Collection Date/Time:	3/21/2012	8:40	Sample Collector:	EVANS, M
Submittal Date/Time:	3/21/2012	15:15	Sample ID	2700771-001

Sample Description: Springfield - Well #1

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Gross Alpha	EPA900.0	pCi/L	6.06 ± 1.51	E		15	4/25/2012

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

ME

mg/L: Milligrams per liter   ug/L : Micrograms per liter   PQL : Practical Quantitation Limit   MCL : Maximum Contamination Level
H = Analyzed ouside of hold time   E = Analysis performed by External Laboratory; See External Laboratory Report attachments.

Pajaro Sunny Mesa Svc District
Donald Rosa
136 San Juan Road
Watsonville, CA 95076-5237

MBAS
MONTEREY BAY ANALYTICAL SERVICES
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS
montereybayanalytical@usa.net
ELAP Certification Number: 2385

Tuesday, July 17, 2012

Lab Number: AA89214

Collection Date/Time:	6/21/2012	13:30	Sample Collector:	EVANS, M
Submittal Date/Time:	6/21/2012	15:20	Sample ID	2700771-001

Sample Description: Springfield System - Well #1

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Nitrate as NO3	EPA300.0	mg/L	289		1	45	6/22/2012

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

ME

mg/L: Milligrams per liter   ug/L : Micrograms per liter   PQL : Practical Quantitation Limit   MCL: Maximum Contamination Level
H = Analyzed ouside of hold time   E = Analysis performed by External Laboratory; See External Laboratory Report attachments.

MBAS
MONTEREY BAY ANALYTICAL SERVICES

Pajaro Sunny Mesa Svc District
Donald Rosa
136 San Juan Road
Watsonville, CA 95076-5237

4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS
montereybayanalytical@usa.net

ELAP Certification Number: 2385

Thursday, September 20, 2012

Lab Number: AA91980

Collection Date/Time:	9/12/2012	8:44	Sample Collector:	EVANS M	
Submittal Date/Time:	9/12/2012	15:16	Sample ID	2700771-001	Coliform Designation:

Sample Description: Springfield System, Well #1

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Nitrate as NO3	EPA300.0	mg/L	286		1	45	9/13/2012

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

ME

mg/L: Milligrams per liter ug/L : Micrograms per liter PQL : Practical Quantitation Limit MCL: Maximum Contamination Level
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See External Laboratory Report attachments.

Pajaro Sunny Mesa Svc District
Donald Rosa
136 San Juan Road
Watsonville, CA 95076-5237

MBAS
MONTEREY BAY ANALYTICAL SERVICES
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS
montereybayanalytical@usa.net

ELAP Certification Number: 2385

Friday, November 30, 2012

Lab Number: AA55018

Collection Date/Time:	11/28/2012 8:30	Sample Collector:	EVANS, M	
Submittal Date/Time:	11/28/2012 13:40	Sample ID	2700771-001	Coliform Designation:

Sample Description: Springfield System, Well #1

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Nitrate as NO3	EPA300.0	mg/L	272		1	45	11/29/2012

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

ME

mg/L: Milligrams per liter ug/L : Micrograms per liter PQL : Practical Quantitation Limit MCL: Maximum Contamination Level
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See External Laboratory Report attachments.

J-1.

MBAS
MONTEREY BAY ANALYTICAL SERVICES

4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS
montereybayanalytical@usa.net
ELAP Certification Number: 2385

Pajaro Sunny Mesa Svc District
Donald Rosa
136 San Juan Road
Watsonville, CA 95076-5237

Friday, September 30, 2011

Lab Number: AA80211

Collection Date/Time:	9/15/2011	9:10	Sample Collector:	VAZQUEZ-VAREL
Submittal Date/Time:	9/15/2011	13:05	Sample ID	2700771-001

Sample Description: Springfield, Well

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Alkalinity, Total (as CaCO3)	2320B	mg/L	280		2		9/20/2011
Aluminum, Total	EPA200.8	ug/L	Not Detected		10	1000	9/16/2011
Antimony, Total	EPA200.8	ug/L	Not Detected		1	6	9/16/2011
Arsenic, Total	EPA200.8	ug/L	3		1	10	9/16/2011
Barium, Total	EPA200.8	ug/L	68		10	1000	9/16/2011
Beryllium, Total	EPA200.8	ug/L	Not Detected		1	4	9/16/2011
Bicarbonate (as HCO3-)	2320B	mg/L	342		10		9/22/2011
Bromide	EPA300.0	mg/L	0.56		0.05		9/15/2011
Cadmium, Total	EPA200.8	ug/L	Not Detected		0.5	5	9/16/2011
Calcium	EPA200.7	mg/L	281		0.5		9/22/2011
Carbonate as CaCO3	2320B	mg/L	Not Detected		10		9/15/2011
Chloride	EPA300.0	mg/L	822		1	250	9/15/2011
Chromium, Total	EPA200.8	ug/L	12		2	50	9/16/2011
Color, Apparent (Unfiltered)	2120B	Color Units	Not Detected		3	15	9/15/2011
Copper, Total	EPA200.8	ug/L	Not Detected		4	1300	9/16/2011
Cyanide	QuikChem 10-20	ug/L	Not Detected		10	200	9/19/2011
Fluoride	EPA300.0	mg/L	Not Detected		0.10	2.0	9/15/2011
Hardness (as CaCO3)	2340B	mg/L	1451		10		9/23/2011
Hydroxide	2320B	mg/L	Not Detected		5		9/15/2011
Iron	EPA 200.7	ug/L	Not Detected		10		9/22/2011
Langlier Index (15 deg. C)	2330B		0.67				9/23/2011
Langlier Index (60 deg. C)	2330B		1.24				9/23/2011
Lead, Total	EPA200.8	ug/L	Not Detected		5	15	9/16/2011
Magnesium	EPA200.7	mg/L	182		0.5		9/22/2011
Manganese, Total	EPA 200.7	ug/L	Not Detected		10	50	9/22/2011
MBAS (Surfactants)	5540C	mg/L	Not Detected		0.05	0.50	9/21/2011
Mercury, Total	EPA200.8	ug/L	Not Detected		0.5	2	9/16/2011
Nickel, Total	EPA200.8	ug/L	10		10	100	9/16/2011
Nitrate as NO3	EPA300.0	mg/L	194		1	45	9/15/2011
Nitrite as NO2-N	EPA300.0	mg/L	0.18		0.05	1.00	9/15/2011
Odor Threshold at 60 C	2150B	TON	1		1	3	9/15/2011
o-Phosphate-P	EPA300.0	mg/L	Not Detected		0.05		9/15/2011
Perchlorate	314	ug/L	Not Detected	E	4.0	6	9/21/2011
pH (Laboratory)	4500-H+B	STD. Units	7.6				9/15/2011

mg/L: Milligrams per liter ug/L: Micrograms per liter PQL: Practical Quantitation Limit MCL: Maximum Contamination Level
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See External Laboratory Report attachments.

July 1 2014

10

Lab Number: AA80211

Collection Date/Time:	9/15/2011	9:10	Sample Collector:	VAZQUEZ-VAREL
Submittal Date/Time:	9/15/2011	13:05	Sample ID	2700771-001

Sample Description: Springfield, Well

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Potassium	EPA200.7	mg/L	6.2		0.1		9/22/2011
QC Anion Sum x 100	Calculation	%	101%				9/23/2011
QC Anion-Cation Balance	Calculation	%	3				9/23/2011
QC Cation Sum x 100	Calculation	%	106%				9/23/2011
QC Ratio TDS/SEC	Calculation		0.70				9/27/2011
Selenium, Total	EPA200.8	ug/L	12		2	50	9/16/2011
Silver, Total	EPA200.8	ug/L	Not Detected		10	100	9/16/2011
Sodium	EPA200.7	mg/L	356		0.5		9/22/2011
Specific Conductance (E.C)	2510B	umhos/cm	4140		1	900	9/16/2011
Sulfate	EPA300.0	mg/L	349		1	250	9/15/2011
Synthetic Organic Compounds		ug/L	Attached	E			9/20/2011
Thallium, Total	EPA200.8	ug/L	Not Detected		1	2	9/16/2011
Total Diss. Solids	2540C	mg/L	2900		10	500	9/16/2011
Turbidity	180.1	NTU	Not Detected	H	0.05	5.0	9/20/2011
Volatile Org. Compounds (524)	EPA524	ug/L	Attached	E			9/21/2011
Zinc, Total	EPA200.8	ug/L	44		10	5000	9/16/2011

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

mg/L: Milligrams per liter ug/L : Micrograms per liter PQL : Practical Quantitation Limit MCL: Maximum Contamination Level

H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See External Laboratory Report attachments.

Tel: 408 724-5422
FAX: 408 724-3188

SOIL CONTROL LAB

A Division of Control Laboratories Inc.

In any reference, please quote Certified Analysis Number appearing hereon.

123391-1-74

Christopher & Associates
P.O. Box 161
Capitola CA 95010

NOV 1997

CERTIFIED ANALYTICAL REPORT

MATERIAL:	Water sample received 04 November 1997	PUBLIC HEALTH DRINKING WATER LIMITS[1]
IDENTIFICATION:	Springfield MWC, 11/4/97, 10:20	
REPORT:	Quantitative chemical analysis is as follows expressed as milligrams per liter (parts per million):	

Nitrate	(as NO_3)	175	45

[1] California Administrative Code Title 22

The undersigned certifies that the above is a true and accurate report of the findings of this Laboratory.

Analyst

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY

Tel: 831 724-5422
FAX: 831 724-3188

√

195489-1-2200

Springfield MWC c/o Pajaro Sunny Mesa
136 San Juan Road
Watsonville CA 95076

29 JUL 05

Attn: Struve Road Water System #1

MATERIAL:	Water sample received 27 July 2005	PUBLIC HEALTH DRINKING WATER LIMITS[1]
IDENTIFICATION:	System #2700771, Well, 7/27/05, 1610	
REPORT:	Quantitative chemical analysis is as follows expressed as milligrams per liter (parts per million):	

Nitrate	(as NO_3)	290	45

[1] California Administrative Code
Title 22

cc: MCHD

SOIL CONTROL LAB

Tel: 408 724-5422
FAX: 408 724-3188

In any reference, please quote Certified Analysis Number appearing hereon.

120099-1-74

A Division of Control Laboratories Inc.

Christopher & Associates
P.O. Box 161
Capitola CA 95010

[illegible] MAY 97

CERTIFIED ANALYTICAL REPORT

MATERIAL: Water sample received 13 May 1997
IDENTIFICATION: Springfield Mutual Water, 5/13/97, 10:00
REPORT: Quantitative chemical analysis is as follows expressed as milligrams per liter (parts per million):

			PUBLIC HEALTH DRINKING WATER LIMITS[1]
Nitrate	(as NO_3)	190	45

[1] California Administrative Code Title 22

The undersigned certifies that the above is a true and accurate report of the findings of this Laboratory.

Analyst

Springfield Mutual WS Nitrate Results

Nitrate MCL = 45 ppm

Date	Result
3/10/2010	283 ppm
6/9/2010	280 ppm
9/23/2010	226 ppm
12/15/2010	280 ppm
3/10/2011	285 ppm
6/8/2011	306 ppm
9/15/2011	194 ppm
12/8/2011	309 ppm
3/21/2012	293 ppm
6/21/2012	269 ppm
9/12/2012	255 ppm
11/28/2012	272 ppm
3/20/2013	253 ppm

APPENDIX B

Test Hole Drillers Report, Geophysical Log, and Water-Quality Report

DWR

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. **e0119536**

DWR Use Only – Do Not Fill In
1 3 S / 0 2 E - 0 5
State Well Number/Site Number
Latitude N / Longitude W
APN/TRS/Other

Page 1 of 1

Owner's Well Number 71081-1

Date Work Began 07/22/2008 Date Work Ended 7/25/2008

Local Permit Agency Monterey County Division of Environmental Health

Permit Number 07-11219 Permit Date 10/18/07

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Mud Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Red sand with clay
30	50	White clay
50	70	Gravel and sand
70	90	Red sand
90	110	Sand and Brown silty clay
110	295	Red sand
295	335	Blue clay and sand
335	360	Blue clay
360	450	Red sand
450	470	Red sand and clay
470	630	Red sand

Total Depth of Boring 630 Feet

Total Depth of Completed Well 630 Feet

Well Owner

Name Pajaro Sunny Mesa CSD

Mailing Address 136 San Juan Road

City Royal Oaks State CA Zip 95076

Well Location

Address 1815 Highway 1

City Moss Landing County Monterey

Latitude ___ ___ ___ N Longitude ___ ___ ___ W (Deg. Min. Sec.)

Datum ____ Decimal Lat. ____ Decimal Long. ____

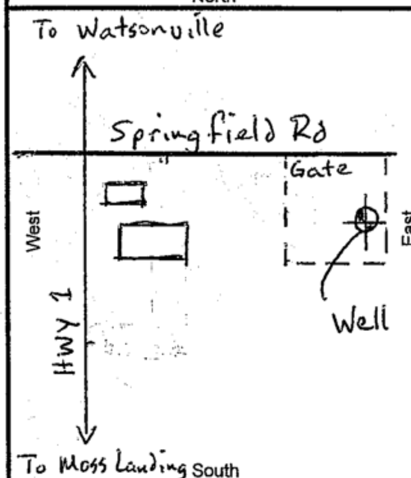
APN Book 413 Page 014 Parcel 001

Township ____ Range ____ Section ____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
⦿ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water ____ (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Maggiora Bros. Drilling, Inc.
Person, Firm or Corporation

595 Airport Blvd. Watsonville CA 95076
Address City State Zip

Signed [signature] 10-27-10 249957
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

NEWMAN WELL SURVEYS

ELECTRIC LOG

Job No. 70856	Company	MAGGIORA BROTHERS		
	Well	PAJARO SUNNY MESA		
	Field	SPRINGFIELD		
File No. 710811	County	MONTEREY	State	CALIFORNIA

Location: 30 YARDS SOUTH OF EAST END OF SPRINGFIELD RD.	Other Services: NONE
Sec. 5 Twp. 13S Rge. 5E	

			Elevation
Permanent Datum	GROUND LEVEL	Elevation above perm. datum	K.B.
Log Measured From	GROUND LEVEL		D.F.
Drilling Measured From	GROUND LEVEL		G.L.

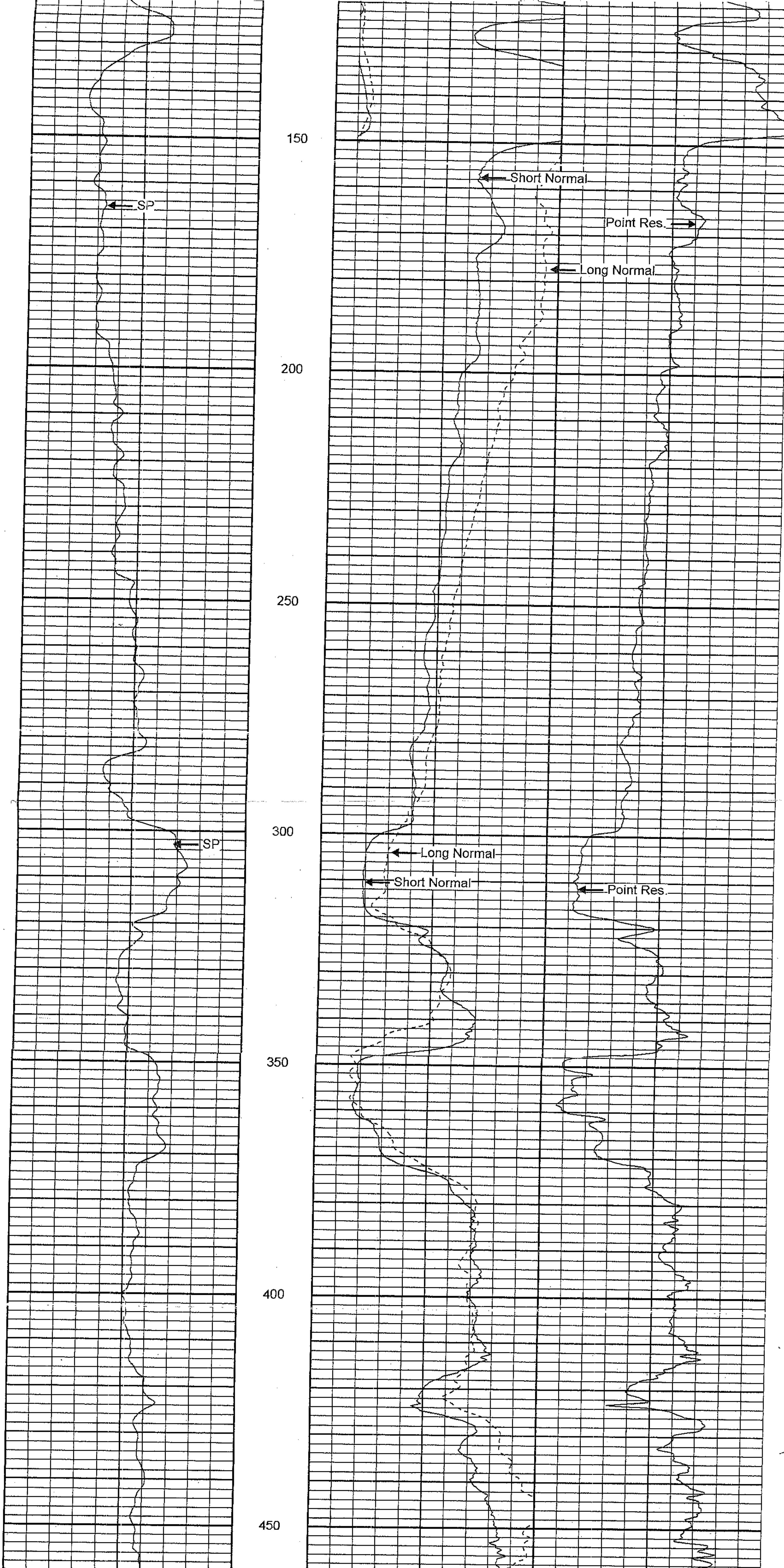
Date	7/24/2008		
Run Number	ONE		
Depth Driller	634'		
Depth Logger	634'		
Bottom Logged Interval	634'		
Top Log Interval	30'		
Casing Driller	NONE		
Casing Logger	NONE		
Bit Size	8 3/4"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	CIRC.		
Rm @ Meas. Temp	12.1 @ 72.8 F		
Rmf @ Meas. Temp	10.0 @ 73.2 F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS.		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	-		
Max. Recorded Temperature	N/A		
Equipment Number	LV-1		
Location	SNS		
Recorded By	C.NEWMAN		
Witnessed By	V.RODRIQUEZ		

<<< Fold Here >>>

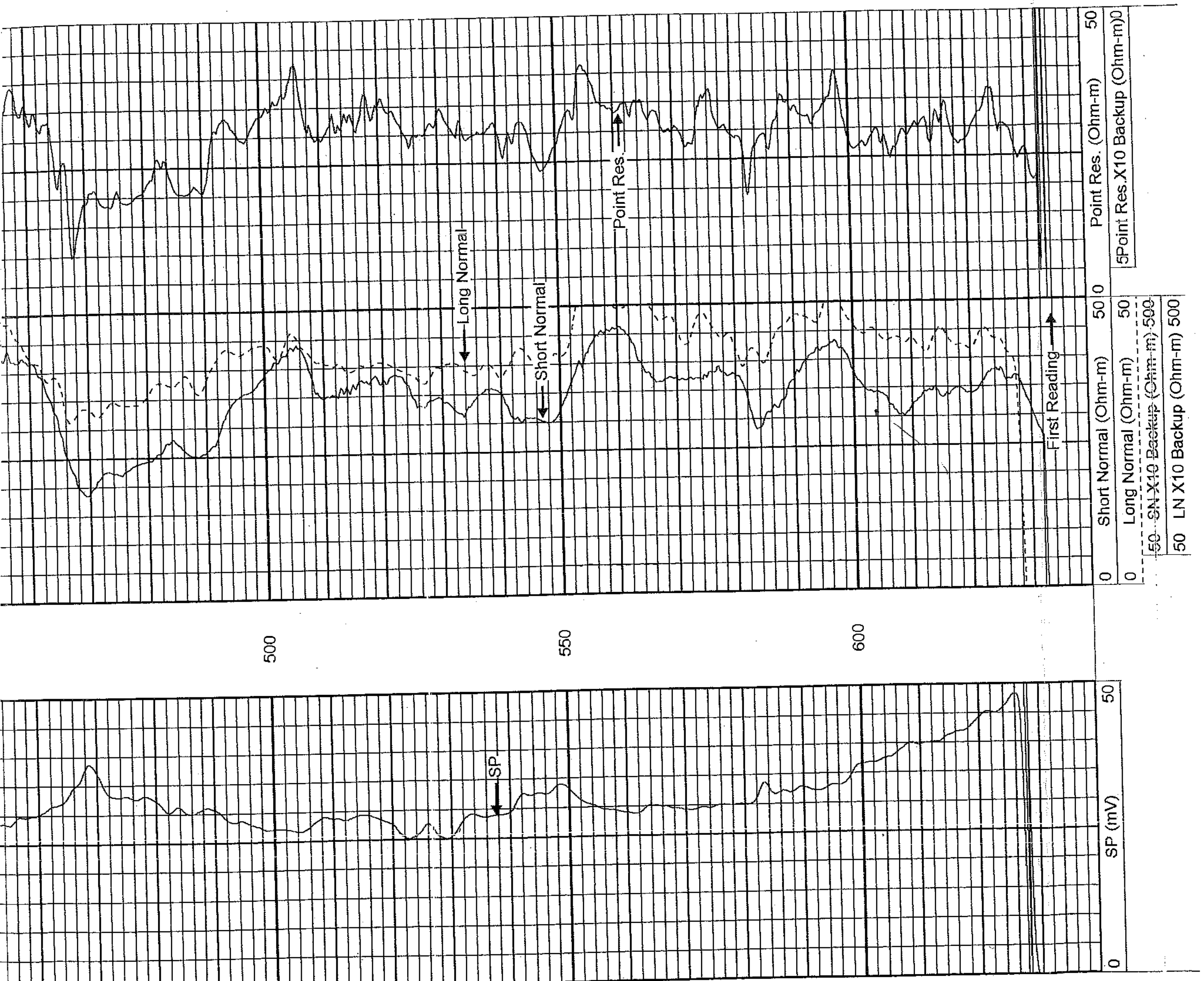
Comments

Database File: 70856.db
Dataset Pathname: pass2.1
Presentation Format: elog2
Dataset Creation: Thu Jul 24 18:53:16 2008 by Calc Warrior Version 6.6
Charted by: Depth in Feet scaled 1:240

0	SP (mV)	50
0	Short Normal (Ohm-m)	50
0	Long Normal (Ohm-m)	50
50	SN X10 Backup (Ohm-m)	500
50	LN X10 Backup (Ohm-m)	500
0	Point Res. (Ohm-m)	50
5	Point Res.X10 Backup (Ohm-m)	50



SP
SP
150
200
250
300
350
400
450
Short Normal
Point Res.
Long Normal
Long Normal
Short Normal
Point Res.



Water Quality Analy

Rmf @ Temp: 10 Temp: 73.2
Corrected Rmf @ 75 degree F: 9.78
Rm @ Temp: 12.8 @ 72.8 F

Depth	S.P. mV	Rwe ohm-m	Rw NaCl ohm-m	Rw NaHCO3 ohm-m	EC NaCl
150 ft to 280 ft	-5.00	8.3	11.1	13.0	901.9
282 ft to 300 ft	-13.00	6.4	8.1	9.5	1241.7
318 ft to 348 ft	-9.00	7.3	9.4	11 1	1058.3
370 ft to 632 ft	-7.00	7.8	10.2	12.0	977.0

Class I : Less than *700* ppm (mg/l) Excellent to Good Quality
Class II : *700* to *2000* ppm (mg/l) Good to Injurious Quality
Class III: More than *2000* ppm (mg/l) Injurious to Unsatisfactory

This interpretation represents our best judgement based on given values. Since all interpr
electrical and other measurements, we can not and do not guarantee the accurancy or co
any cost, damages or expenses that may be incurred from this or any other interpretation

50 LN X10 Backup (Ohm-m) 500

Water Quality Analysis

Rmf @ Temp: 10 **Temp:** 73.2
Corrected Rmf @ 75 degree F: 9.78
Rm @ Temp: 12.8 @ 72.8 F

Depth	S.P. mV	Rwe ohm-m	Rw *NaCl* ohm-m	Rw *NaHCO3* ohm-m	EC umhos *NaCl*	EC umhos *NaHCO3*	T.D.S. *ppm* NaCl	T.D.S. *ppm* NaHCO3	Remarks
150 ft to 280 ft	-5.00	8.3	11.1	13.0	901.9	766.7	478.0	766.7	CLASS I
282 ft to 300 ft	-13.00	6.4	8.1	9.5	1241.7	1055.5	658.1	1055.5	CLASS I
318 ft to 348 ft	-9.00	7.3	9.4	11.1	1058.3	899.5	560.9	899.5	CLASS I
370 ft to 632 ft	-7.00	7.8	10.2	12.0	977.0	830.4	517.8	830.4	CLASS I

Class I : Less than *700* ppm (mg/l) Excellent to Good Quality
Class II : *700* to *2000* ppm (mg/l) Good to Injurious Quality
Class III: More than *2000* ppm (mg/l) Injurious to Unsatisfactory

This interpretation represents our best judgement based on given values. Since all interpretations are opinions based solely on inference from electrical and other measurements, we can not and do not guarantee the accurancy or correctness of this interpretation and shall not be liable for any cost, damages or expenses that may be incurred from this or any other interpretation.

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

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SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

Springfield MWC c/o Pajaro Sunny Mesa
136 San Juan Road
Royal Oaks, CA 95076
Attn: Joe Rosa

Work Order #: 8070803
Reporting Date: August 6, 2008

TEST HOLE

Date Received: July 28, 2008
Project # / Name: None / None
Water System #: 2700771 SPRINGFIELD MWC
Sample Identification: Springfield Test, sampled 7/28/2008 11:45:00AM
Sampler Name / Co.: Rodney Schmidt / Pajaro Sunny Mesa
Matrix: Water
Laboratory #: 8070803-01

	Results	Units	RL	State Drinking Water Limits 1	Analysis Method	Date Analyzed	Flags
General Mineral							
pH	8.2	pH Units	0.1	-	EPA 150.1	07/29/08	
Specific Conductance (EC)	570	uS/cm	1.0	1600	EPA 120.1	07/29/08	
Hydroxide as OH	ND	mg/L	2.5	-	EPA 310.1	07/29/08	
Carbonate as CO3	ND	mg/L	2.5	-	EPA 310.1	07/29/08	
Bicarbonate as HCO3	270	mg/L	2.5	-	EPA 310.1	07/29/08	
Total Alkalinity as CaCO3	220	mg/L	2.5	-	EPA 310.1	07/29/08	
Hardness	220	mg/L	5.0	-	SM 2340 B	07/30/08	
Total Dissolved Solids	370	mg/L	10	1000	EPA 160.1	07/30/08	
Nitrate as NO3	4.9	mg/L	1.0	45	EPA 300.0	07/29/08	
Chloride	40	mg/L	1.0	500	EPA 300.0	07/29/08	
Sulfate as SO4	33	mg/L	1.0	500	EPA 300.0	07/29/08	
Fluoride	0.14	mg/L	0.10	2	EPA 300.0	07/29/08	
Calcium	43	mg/L	0.50	-	EPA 200.7	07/30/08	
Magnesium	27	mg/L	0.50	-	EPA 200.7	07/30/08	
Potassium	2.5	mg/L	0.50	-	EPA 200.7	07/30/08	
Sodium	51	mg/L	0.50	-	EPA 200.7	07/30/08	
* Iron	7900	ug/L	50	300	EPA 200.7	07/30/08	
* Manganese	180	ug/L	20	50	EPA 200.7	07/30/08	
Copper	ND	ug/L	50	1000	EPA 200.7	07/30/08	
Zinc	130	ug/L	50	5000	EPA 200.7	07/30/08	
Inorganics							
Arsenic	ND	ug/L	2.0	10	EPA 200.8	07/31/08	
Barium	ND	ug/L	100	1000	EPA 200.7	07/30/08	
Boron	170	ug/L	100	-	EPA 200.7	07/30/08	

RL - are levels down to which we can quantify with reliability, a result below this level is reported as "ND" for Not Detected.
State Drinking Water Limits1 - as listed by California Administrative Code, Title 22.
* - a * in the left hand margin of the report means that particular constituent is above the California Drinking Water Limits.

Mike Galloway

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Springfield MWC c/o Pajaro Sunny Mesa
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Attn: Joe Rosa

Work Order #: 8070803
Reporting Date: August 6, 2008

Date Received:	July 28, 2008
Project # / Name:	None / None
Water System #:	2700771 SPRINGFIELD MWC
Sample Identification:	Springfield Test, sampled 7/28/2008 11:45:00AM
Sampler Name / Co.:	Rodney Schmidt / Pajaro Sunny Mesa
Matrix:	Water
Laboratory #:	8070803-01

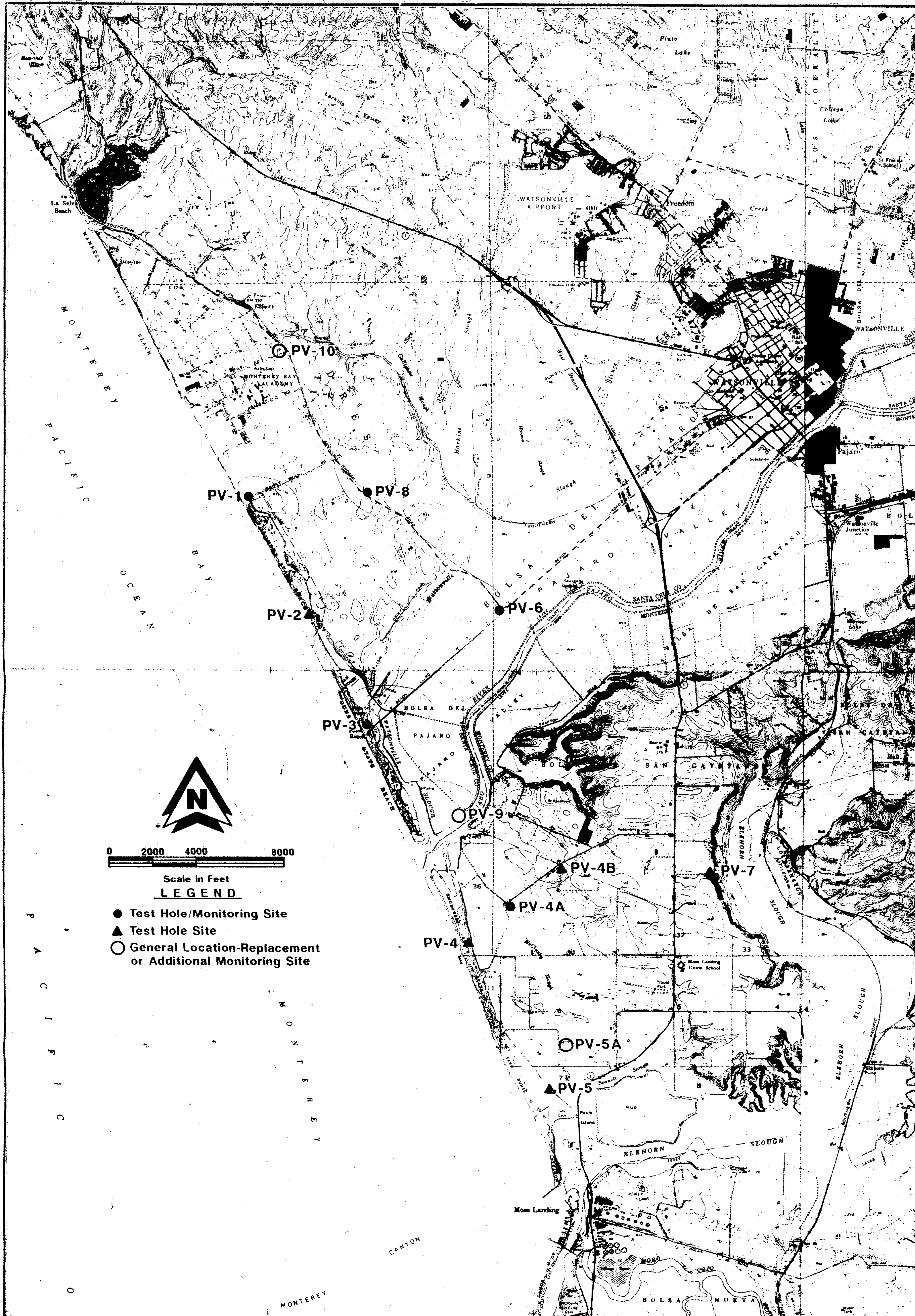
	Results	Units	RL	State Drinking Water Limits 1	Analysis Method	Date Analyzed	Flags
Inorganics							
Cadmium	ND	ug/L	1.0	5	EPA 200.8	07/31/08	
Chromium	16	ug/L	1.0	50	EPA 200.8	07/31/08	
Cyanide (total)	ND	ug/L	100	200	SM 4500-CN F	08/04/08	
Lead	ND	ug/L	5.0	-	EPA 200.8	07/31/08	
Mercury	ND	ug/L	1.0	2	EPA 245.1	07/30/08	
Selenium	ND	ug/L	5.0	50	EPA 200.8	07/31/08	
Silver	ND	ug/L	10	100	EPA 200.7	07/30/08	
MBAS (Surfactants)	ND	mg/L	0.025	0.5	EPA 425.1	07/29/08	
* Aluminum	4600	ug/L	50	1000	EPA 200.7	07/30/08	
Antimony	ND	ug/L	6.0	6	EPA 200.8	07/31/08	
Beryllium	ND	ug/L	1.0	4	EPA 200.7	07/30/08	
Nickel	13	ug/L	10	100	EPA 200.7	07/30/08	
Thallium	ND	ug/L	1.0	2	EPA 200.8	07/31/08	
Nitrite as N	ND	mg/L	0.10	1	EPA 300.0	07/29/08	
General Physical							
Color	12	Color Units	3.0	-	EPA 110.2	07/29/08	
Threshold Odor No.	ND	T.O.N.	1.0	-	EPA 140.1	07/29/08	
Turbidity	94	NTU	0.10	-	EPA 180.1	07/29/08	
Nitrate/Nitrite as N	1.1	mg/L	0.10	10	EPA 300.0	07/29/08	

RL - are levels down to which we can quantify with reliability, a result below this level is reported as "ND" for Not Detected.
State Drinking Water Limits1 - as listed by California Administrative Code, Title 22.
* - a * in the left hand margin of the report means that particular constituent is above the California Drinking Water Limits.

Mike Galloway

APPENDIX C

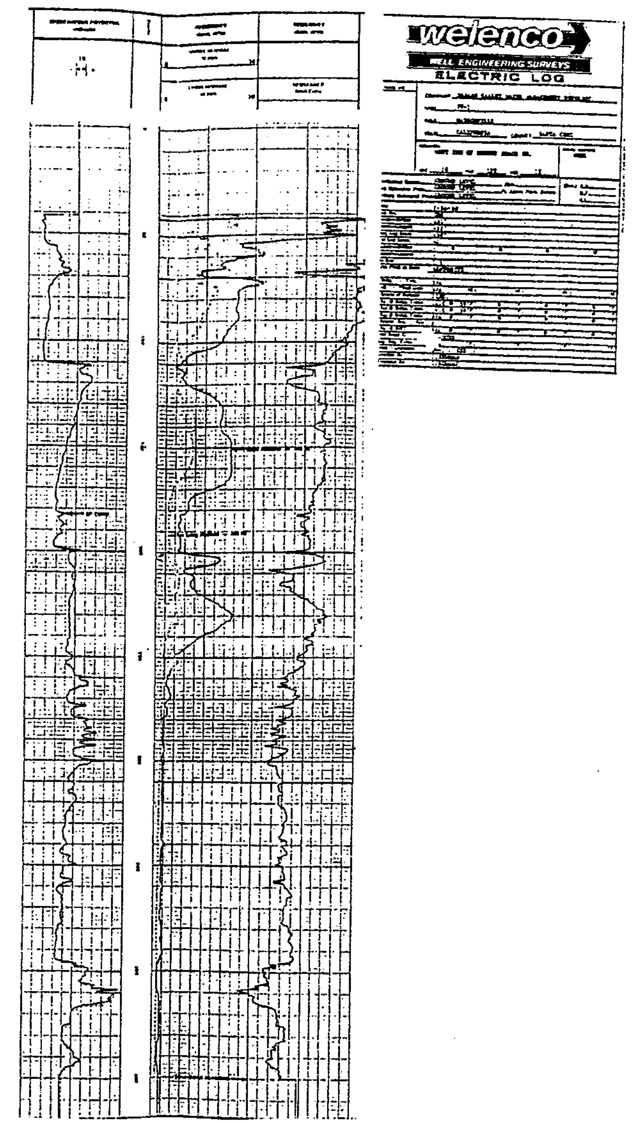
E-logs from Pajaro Valley Groundwater Investigation (Luhdorff and Scalmanini Consulting Engineers, November 1988)



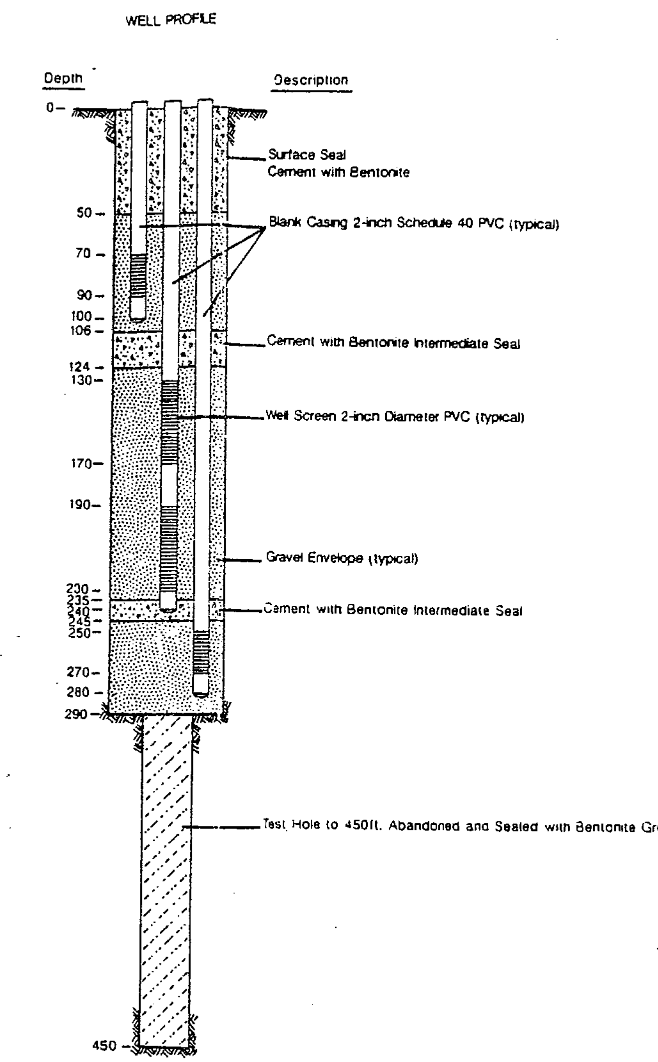
LUHDORFF & SCALMANINI Consulting Engineers Woodland, California 95695	SHEET TITLE Location Map Test Holes and Monitoring Well Sites	PROJECT Pajaro Valley Ground-Water Monitoring	PROJ. NO. 87-1-068 DATE FIGURE 1

LITHOLOGY

Depth	Description
0–39	Sand, medium-coase, reddish brown, moderately sorted, subanglar- subrounded, quartz, lithics, feldsoars, trace mica, some clay in upper 10' from soil forming process
39–54	Gravelly Sand, medium-very coarse, poorly sorted, subangular-subrounded, some fine gravel
54–76 (66)	Gravelly Sand to Gravel w/Sand, medium-very coarse sand, poorly sorted, subangular-suorounded, lithics dominate, thin silty clay interbeds, olive brown at 54ft. & 66ft., medium plastic
76–106	Sand, fine-medium, reddish brown,moderately sorted, subangular-subrounded,quartz, lithcs, feldspars, black & golden mica, some layers of coarse sand
106–122	Clayey Sand, reddish brown, fine-medium,subangular, clay <30%
122–200 (150)	Sand, fine-medium, well sorted, subangular-subrounded, quartz, lithics, feldspars, mica, thin silt(stone), olive gray, low plastic at 150ft., slightly coarser in lower 10ft.
200–220	Sand, medium-coarse, dark gray brown, well sorted, sbangular-subrounded, quartz, lithics
220–250	Sand, medium-coarse, dark brown to yellowish brown, subangular-subrounded, moderately sorted, quartz lithics, trace mica, some thin siltstone layers, unit tends to be slightly coarser grained in lower half
250–300	Sand, medium-coarse, reddish brown, subangular-suorounded, well sorted, quartz, lithics, trace mica, unit tends to be slightly coarser in lower 10ft.
300–350	Sand, medium-coarse, dark reddish brown, moderately sorted, subangular-subrounded, quartz, lithics,trace mica, some thin grayish siltstone layers in upper 10ft., unit tends to be slightly coarser in lower 20ft.
350–396	Sand, medium-coarse, dark brown-dark reddish brown, moderately sorted, subangular-subrounded, some thin grayisn siltstone layers, unit tends to be slightly coarser in lower 20ft., some thin cemented sand layers
396–416 (402)	Clayey Sand-Sandy Clay, reddish brown clayey medium sand, yellowisn to olive brown sandy clay, and thin organic rich (peaty) claystone at 402-404ft.
416–450	Sand, medium-coarse grayish brown, moderately sorted, subangular-subrounded, quartz, lithics, some thin poorly cemented sand layers



WELL PROFILE



Vertical Scale 1" = 40'

MONITORING WELL PROFILE PV-1	87-1-068
	Shown
	5/88
PAJARO VALLEY	mls
GROUND-WATER MONITORING	jcs
	eel

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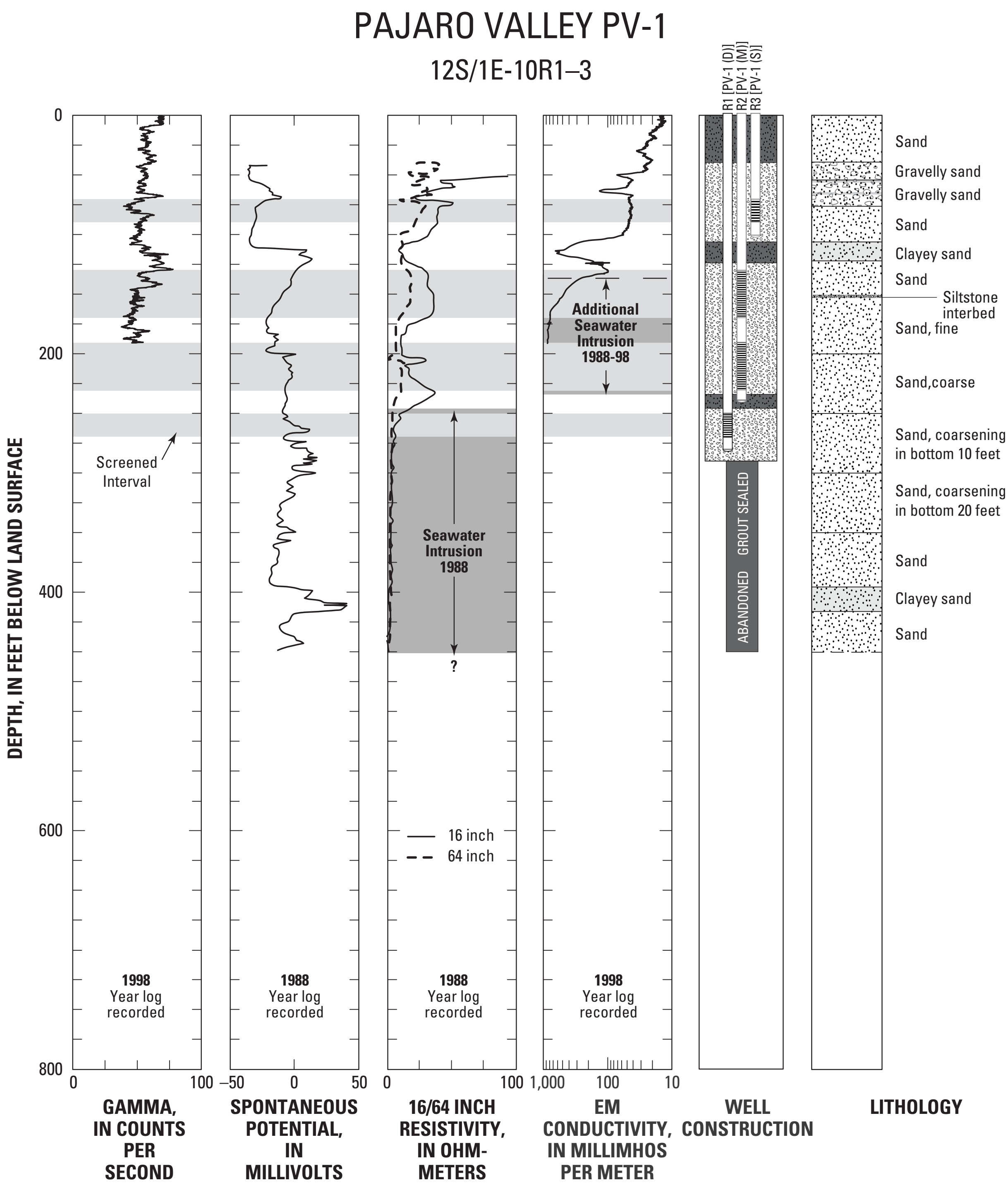
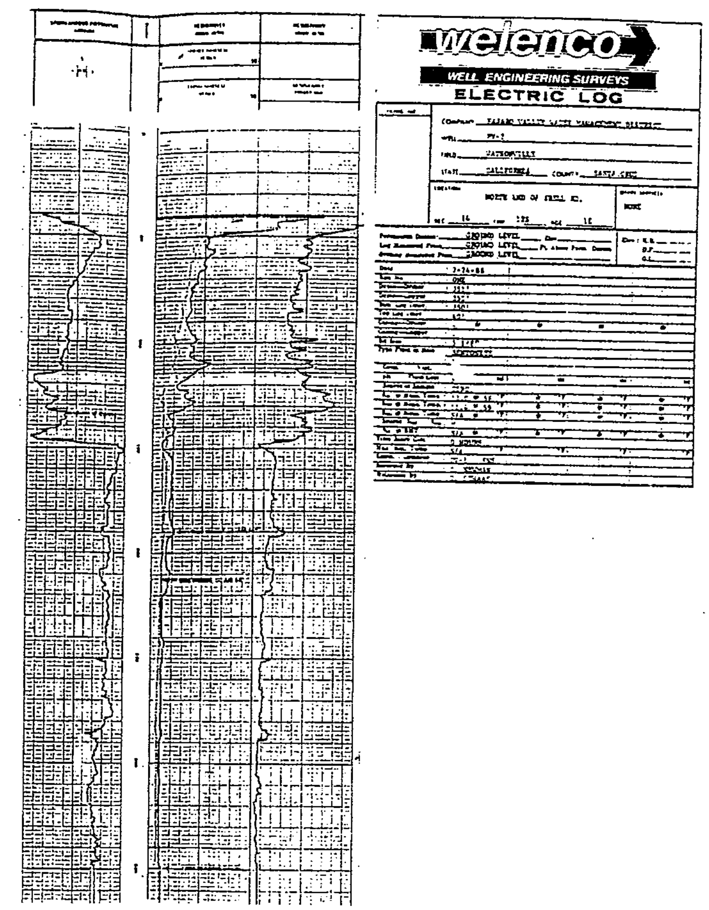


Figure A1.1. Geophysical logs and well construction for selected monitoring wells and test holes in the Pajaro Valley, Santa Cruz County, California.

LITHOLOGY

Depth	Description
0	Sand, fine-medium, dark brown, well sorted, subrounded; lithic (volcanic, metamorphic, sedimentary), quartz, feldspars, trace micas
12	Silty Clay, reddish brown, low plastic, trace fine sand
14	Sand, medium-coarse w/fine gravel, medium brown, poorly sorted, subrounded-subangular, quartz, lithics, feldspars, trace micas
24	Clayey Sand, medium w/coarse, medium brown, poorly sorted, subrounded-subangular
26	Silty Clay, brown to gray, low plastic
28	Gravelly Sand to Gravel, medium-very coarse sand, subangular, poorly sorted, gravel to 1/2", subrounded, lithics, upper 4' has some thin clay interbeds, middle 8' gravelly sand, lower 10' gravel
50	Silty Clay, yellowish brown, low plastic, trace fine-medium sand
54	Sandy Silty Clay, very dark gray (bluish), low-medium plastic, stiff, fine-medium sand <20%; some thin sandier stringers
86	Silty Clay w/Sand, very dark gray, medium plastic, soft
98	Sandy Silty clay w/thin interbeds of Sand, very dark gray, low plastic, soft, sand beds very fine-fine
108	Sand, medium w/coarse-very coarse, subangular; coarser, well rounded, some shell fragments
112	Sandy Silty Clay, very dark gray, low plastic, fine-,medium sand 30-50%
122	Sand, fine-coarse, poorly sorted, subrounded, abundant shell fragments
132	Sand, medium-very coarse w/some fine gravel, subrounded-well rounded, quartz, lithics; abundant shell fragments and intact small gastrod (snail) shells, thin 2'thick clay bed at top
147	Silty Clay w/fine Sand, dark gray, low-medium plastic, sand <15% micaceous
160	Silty Clay, dark gray, medium plastic
170	Silty Clay w/trace fine Sand, dark gray, medium-high plastic, stiff
240	Silty Clay w/trace fine Sand, dark gray, medium plastic, soft
250	Silty Clay w/trace fine Sand, dark gray, medium-high plastic, stiff
300	Silty Clay w/trace fine Sand, greenish gray, medium plastic, stiff
350	

Vertical Scale 1"=40'



NO	DATE	REVISION	BY

Test Hole Lithology PV-2

Pajaro Valley Ground-Water Monitoring

87-1-068
Shown
8/88
mls
eel
jcs

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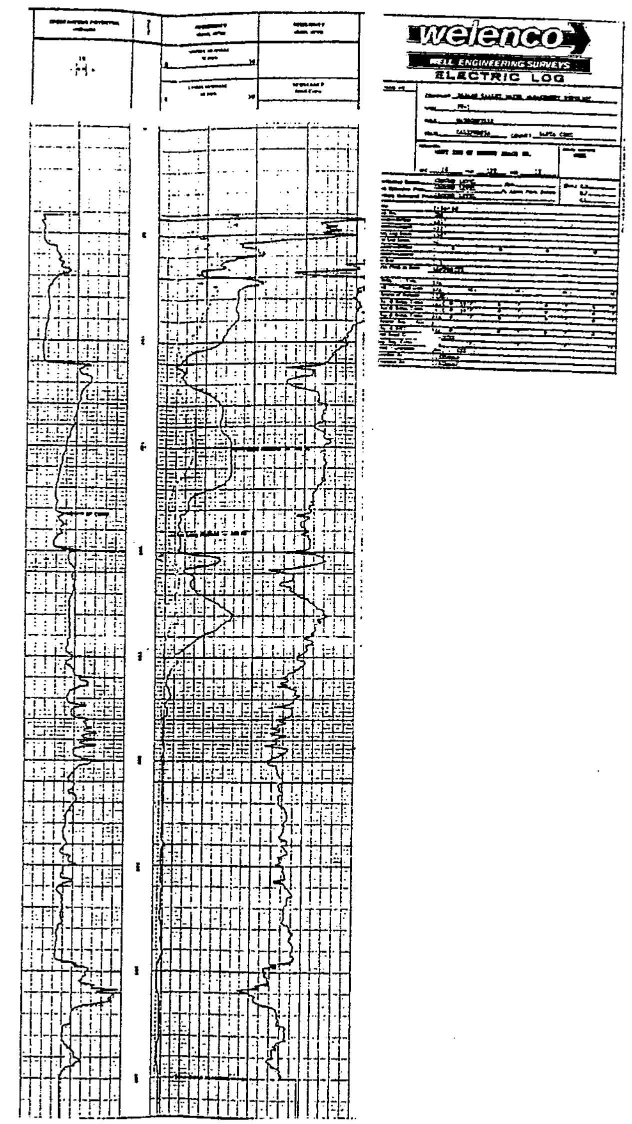
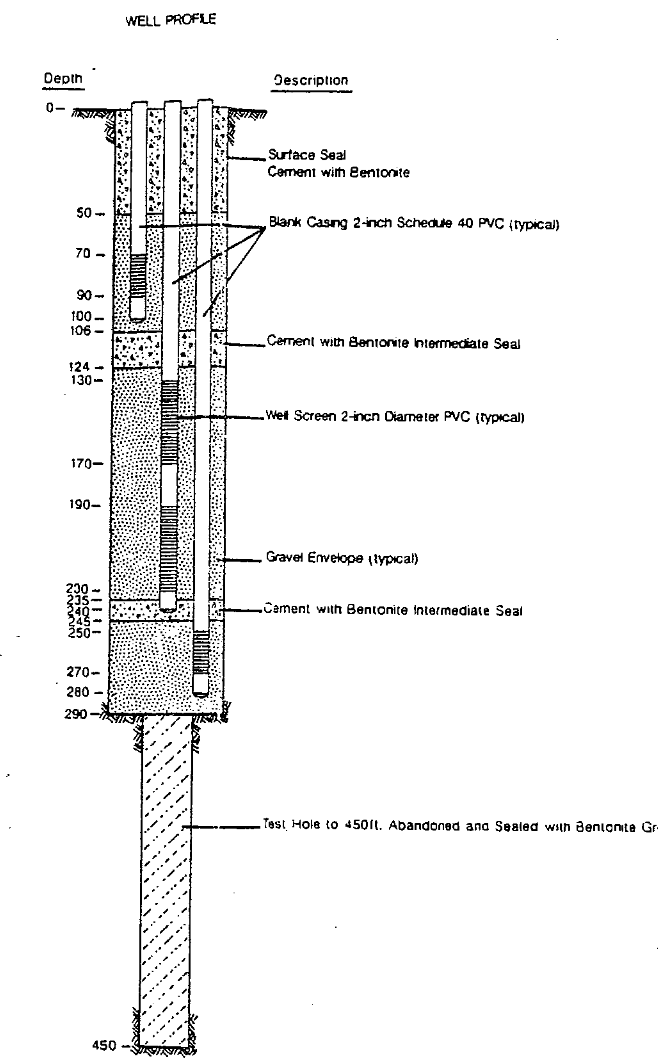
___ OF ___ SHTS

LITHOLOGY

Depth	Description
0–39	Sand, medium-coase, reddish brown, moderately sorted, subanglar- subrounded, quartz, lithics, feldsoars, trace mica, some clay in upper 10' from soil forming process
39–54	Gravelly Sand, medium-very coarse, poorly sorted, subangular-subrounded, some fine gravel
54–76 (66)	Gravelly Sand to Gravel w/Sand, medium-very coarse sand, poorly sorted, subangular-suorounded, lithics dominate, thin silty clay interbeds, olive brown at 54ft. & 66ft., medium plastic
76–106	Sand, fine-medium, reddish brown,moderately sorted, subangular-subrounded,quartz, lithcs, feldspars, black & golden mica, some layers of coarse sand
106–122	Clayey Sand, reddish brown, fine-medium,subangular, clay <30%
122–200 (150)	Sand, fine-medium, well sorted, subangular-subrounded, quartz, lithics, feldspars, mica, thin silt(stone), olive gray, low plastic at 150ft., slightly coarser in lower 10ft.
200–220	Sand, medium-coarse, dark gray brown, well sorted, sbangular-subrounded, quartz, lithics
220–250	Sand, medium-coarse, dark brown to yellowish brown, subangular-subrounded, moderately sorted, quartz lithics, trace mica, some thin siltstone layers, unit tends to be slightly coarser grained in lower half
250–300	Sand, medium-coarse, reddish brown, subangular-suorounded, well sorted, quartz, lithics, trace mica, unit tends to be slightly coarser in lower 10ft.
300–350	Sand, medium-coarse, dark reddish brown, moderately sorted, subangular-subrounded, quartz, lithics,trace mica, some thin grayish siltstone layers in upper 10ft., unit tends to be slightly coarser in lower 20ft.
350–396	Sand, medium-coarse, dark brown-dark reddish brown, moderately sorted, subangular-subrounded, some thin grayisn siltstone layers, unit tends to be slightly coarser in lower 20ft., some thin cemented sand layers
396–416 (402)	Clayey Sand-Sandy Clay, reddish brown clayey medium sand, yellowisn to olive brown sandy clay, and thin organic rich (peaty) claystone at 402-404ft.
416–450	Sand, medium-coarse grayish brown, moderately sorted, subangular-subrounded, quartz, lithics, some thin poorly cemented sand layers



WELL PROFILE



Vertical Scale 1" = 40'

MONITORING WELL PROFILE PV-1	87-1-068
	Shown
	5/88
PAJARO VALLEY	mls
GROUND-WATER MONITORING	jcs
	eel

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Woodland, California 95695

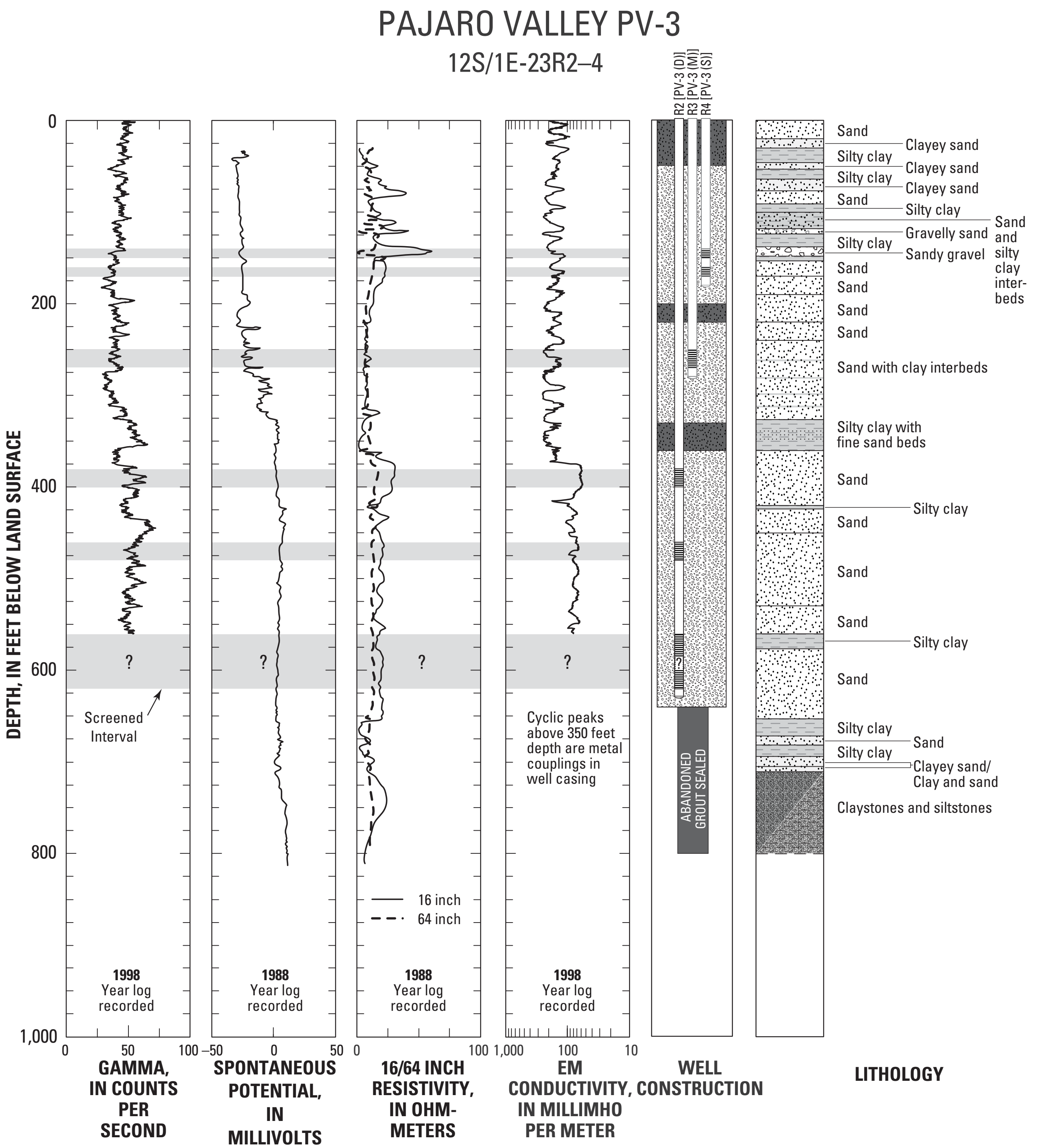
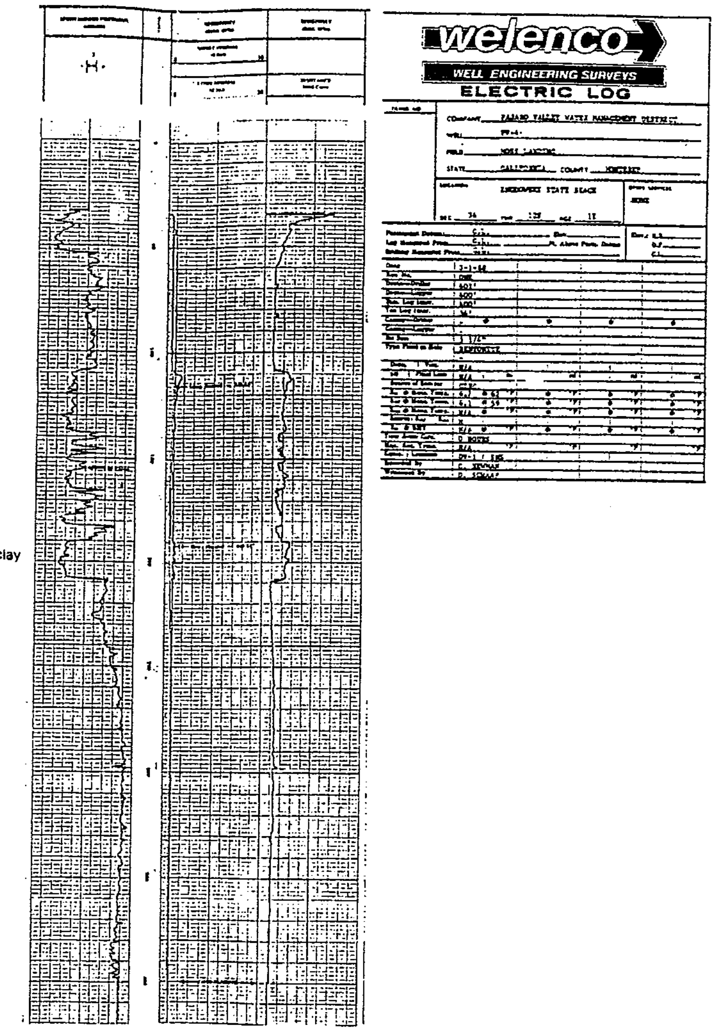


Figure A1.2. Geophysical logs and well construction for selected monitoring wells and test holes in the Pajaro Valley, Santa Cruz County, California.

LITHOLOGY

Depth	Description
0–	Sand and Clay, interbedded, fine-medium sand, silty, subangular-subrounded, clay-dark gray, sandy, low plastic
12–	Sand w/Clay stringers, medium, dark gray brown, subangular-subrounded, quartz, feldspars, lithic, some shell fragments
21–	Sand, medium, dark gray brown, moderately sorted, subangular-subrounded; shell fragments; slightly coarser in lower 10'
50–	Gravelly Sand, medium-very coarse sand, fine gravels, subangular-well rounded, shell fragments, some thin dark gray clay interbeds
60–	Silty Clay, dark gray, soft, medium-high plastic, abundant shell fragments; thin stringers of dark brown peaty material and fine gravels, well rounded
80–	Silty Clay, dark gray, stiff, medium-high plastic; some thin laminate of peaty material, abundant shell fragments above 100'
108–	Sand and Gravel, medium-very coarse sand and fine gravel, subrounded-well rounded, quartz, feldspars, lithics, esp. volcanic clasts; thin stringers of dark gray clay, some shell fragments
160–	Sand and Gravel, coarse-very coarse sand and fine gravel, some thin stringers of silty clay, minor shell fragments
170–	Sand, medium, gray, subrounded-rounded, trace fine gravels; quartz, feldspars, lithics
183–	Silty Clay w/Sand, gray?, low-medium plastic
189–	Sand and Gravel, medium-very coarse sand, fine 2" gravels, poorly sorted, subrounded-well rounded, some thin interbeds of dark brown silty clay gravels dominated by dark lithics; quartz, feldspars and minor sandstone clasts
209–	Silty Clay, dark gray (bluish), soft, medium plastic, trace fine mica sand, some shell fragments
290–	Silty Clay, dark gray (bluish), stiff, slightly compacted, trace fine mica sand, no shells
350–	Silty Clay, dark gray (bluish), soft, low-medium plastic, no shell fragments
370–	Silty Clay, dark gray (bluish), dense, hard, some olive streaks, low-medium plastic
400–	

Vertical Scale 1"=40'



NO	DATE	REVISION	BY

Test Hole Lithology PV-4

Pajaro Valley Ground-Water Monitoring

Project No.	87-1-068
Scale	Shown
Date	6/88
Drawn by	mfs
Checked by	eel
	jcs

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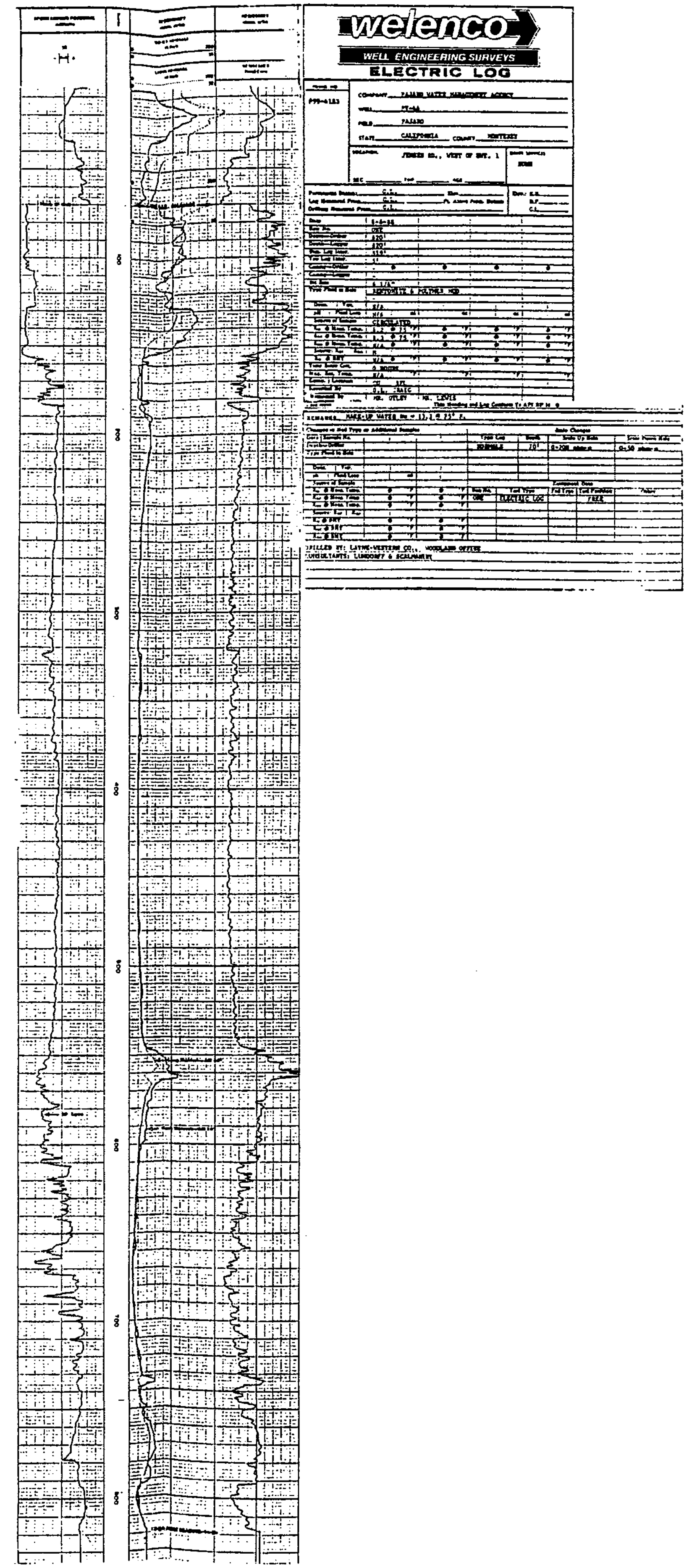
Woodland, California 95695

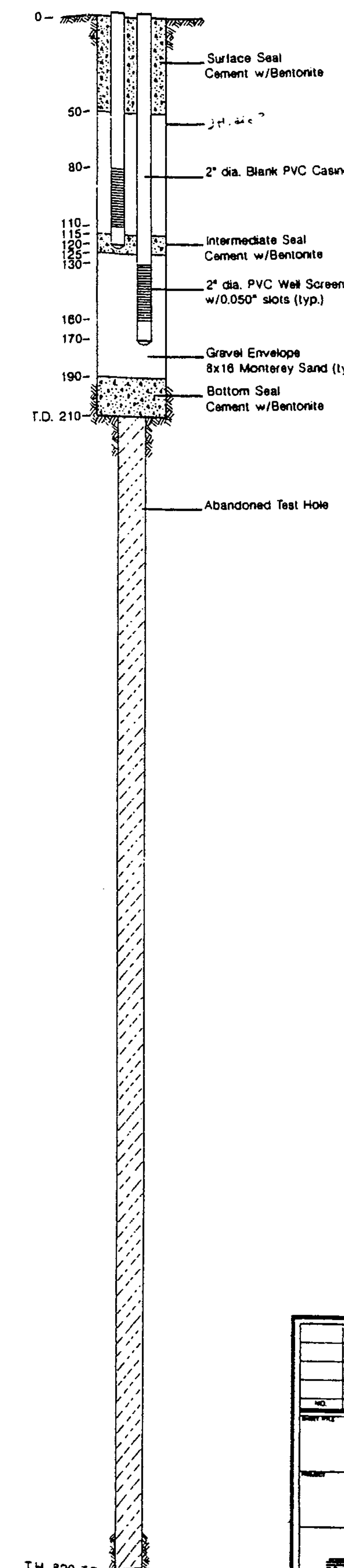
___ OF ___ SHTS

LITHOLOGY

Depth	Description
0–	Clayey Sand, reddish brown-strong brown, medium-medium coarse, moderately sorted, subrounded; quartz, lithics; topsoil in upper part
15–	Sand, pale brown, coarse-medium, moderately sorted, subangular-subrounded
26–	Gravelly Sand, medium-very coarse w/fine gravel, well sorted, subrounded, clots of bluish silty clay
34–	Silty Clay, light olive brown, medium plastic, some bluish gray clayier zones, small clots of orangish clay, rare shell fragments
74–	Silty Sand-Sand, pale olive, fine-medium, moderately sorted, matrix of mud; quartz, lithics, trace of mica
106–	Clay and Sandy Clay, dark greenish gray, soft, low plastic
126–	Sand, light yellowish brown, fine-medium, well sorted, subrounded; quartz, lithics, trace mica, some coarse-very coarse at base
154–	Gravelly Sand, medium-very coarse w/fine gravel to 3/4", poorly sorted, subrounded to rounded; quartz, lithics; some shell fragments
192–	Silty Clay-Clay, greenish-bluish gray, soft to stiff, medium-high plastic, some thin zones of fine sandy clay, massive to thinnly bedded in lower half
322–	Silty Clay w/Sand, bluish-greenish gray, medium plastic, soft to stiff, fine-very fine sand, trace of coarse to very coarse sand in thin zones
384–	Clay-Silty Clay, bluish gray, medium-high olastic, stiff, trace fine-very fine sand
546–	Clayey Sand-Sand, fine-medium, subangular-subrounded, poorly sorted, grades downward into sand, coarse-very coarse, w/shell fragments
575–	Sand-Gravelly Sand, medium-very coarse w/fine gravel, poorly sorted, subangular-subrounded; lithics, quartz; abundant shell fragments
610–, 618–, 640–, 654–	Sand and Clays, interbedded (as shown from E-Log interpretation), sands medium to coarse thinnly bedded, bluish gray-greenish gray mudstones interfingered w/sands; thicker mudstones at top (610) and middle (640)
674–, 683–, 686–, 693–, 697–, 706–, 710–, 732–, 738–, 746–, 750–, 756–, 792–, 820–	Mudstones and Silty Sandstones, interbedded (as shown from E-Log interpretation), sandstones-fine-very fine, weakly cemented, mudstones-greenish gray, moderately compacted and cemented

Vertical Scale 1"=40'





Vertical Scale 1"=40'

NO.	DATE	REVISION	BY

Monitoring Well Profile-PV-4A

Pajaro Valley
Ground-Water Monitoring

	87-1-068
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	8/88
	mls
	eel
	jca

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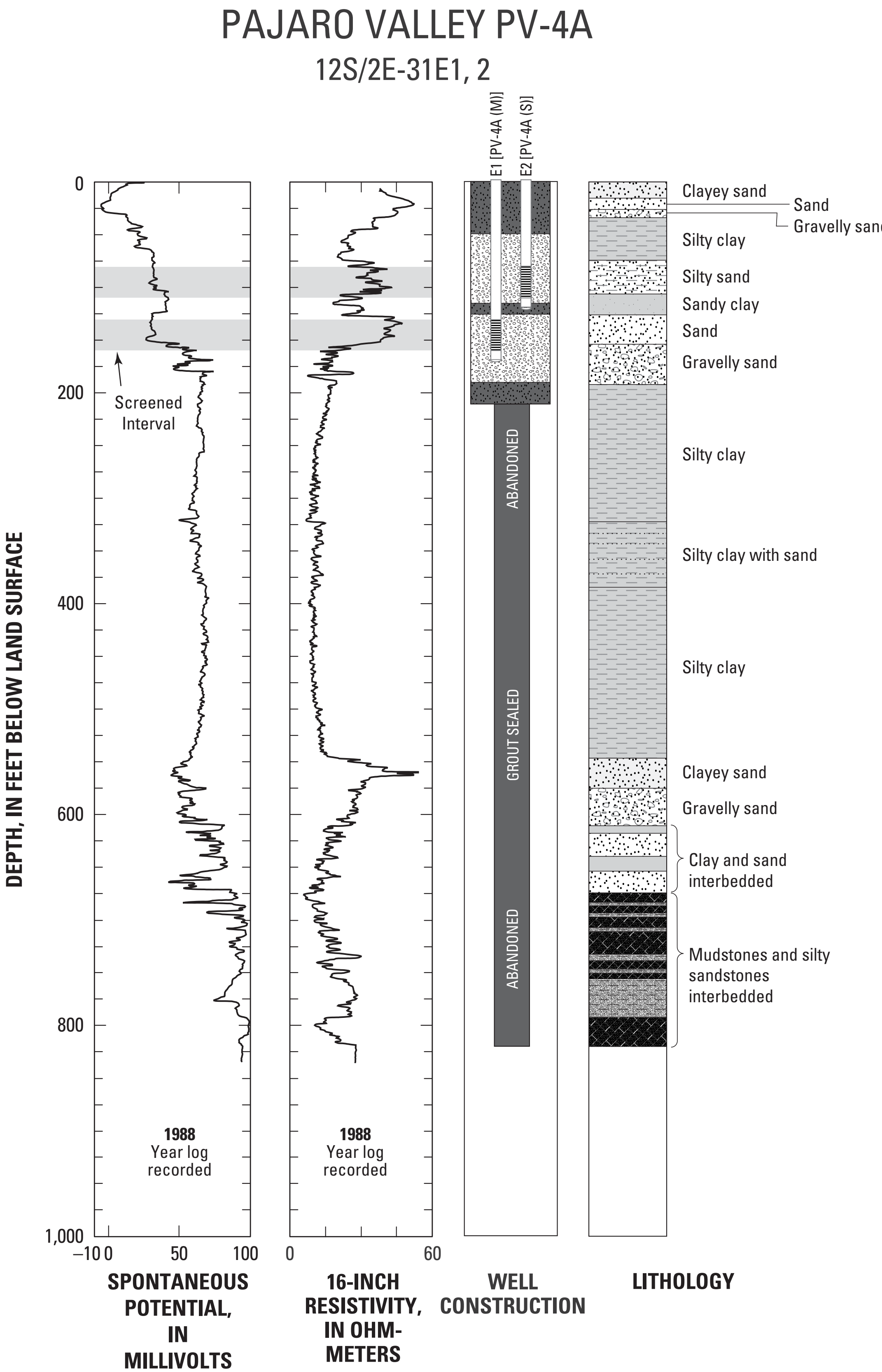
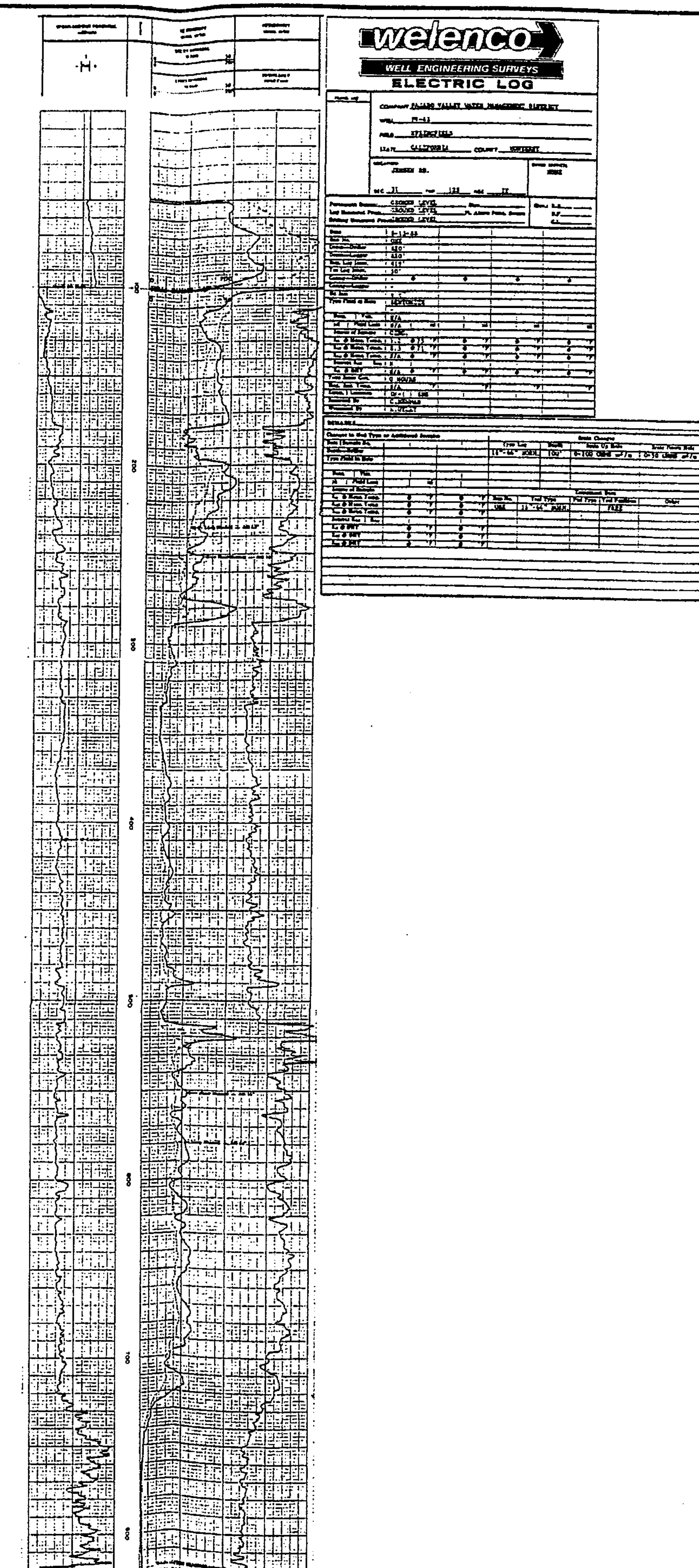


Figure A1.3. Geophysical logs and well construction for selected monitoring wells and test holes in the Pajaro Valley, Monterey County, California.

LITHOLOGY

Depth	Description
0–	Clayey Sand, strong brown, medium-coarse, subangular-subrounded, poorly sorted; quartz, lithics; topsoil in upper part
15–	Sand, dark yellow brown, medium, subrounded-subangular, moderately sorted; quartz, lithics; trace of silt; slightly coarser
64–	Gravelly Sand-Sand and Gravel, grayish brown, medium-very coarse sand, fine gravel to 1/4"; subrounded-subanglar, poorly sorted; lithics, quartz, abundant golden mica
112–	Sandy Clay, light yellowish brown, low plasticity; fine-very fine sand, some thin sand lenses
129–	Sand w/Gravel, grayish brown, medium-very coarse, fine gravel, poorly sorted, subrounded-subangular; quartz, lithics; slightly coarser to gravelly sand at bottom; sharp basal contact
178–	Sandy Silty Clay, tannish to grayish, low plasticity, some orangish weathering mottles; thin sandier layers
196–	Gravelly Sand, grayish brown, coarse-very coarse, fine gravel, poorly sorted, subrounded-subangular; lithics, quartz; gravel to 1/2"; finer grained in lower half
232–	Gravelly Sand and Sandy Silty Clay, interbedded, grayish brownish, medium-very coarse, fine gravel, poorly sorted; clay, medium-low plastic w/fine sand
278–	Gravelly Sand, grayish brown, coarse-very coarse, fine gravel, poorly sorted, sharp base
290–	Silty Clay-Sandy Silty Clay, bluish gray, low-medium plasticity, fine-very fine sand, some thin fine-very fine sandy layers, thinnly bedded
334–	Silty Clay, bluish gray, medium plastic, trace fine-very fine sand, some whitish-grayish mudstones, thickly bedded
380–	Silty Clay-Sandy Silty Clay, bluish gray, medium-low plastic, fine-very fine sand, thin interbeds of sandier layers
446–	Clayey Silty Sand, bluish grayish, fine-very fine
455–	Silty Clay, bluish gray, medium plastic, trace fine-very fine sand, some sandier zones
482–	Clayey Silty Sand, grayish, fine-very fine
493–	Silty Clay, bluish gray, medium plastic, trace fine-very fine sand
512–	Sand w/Gravel and Shells, grayish, medium-very coarse, fine gravel; poorly sorted; subrounded, lithic dominated; abundant shell fragments, slightly finer grained in lower half
540–	Sand w/thin interbeds Clay and Sand, reddish brown-yellowish brown, fine-medium, moderately sorted, subrounded-subangular, quartz, lithics; thin interbeds of reddish brown clay and sand, some tannish-grayish mudstones
666–	Sand, yellowish brown, medium-coarse, sbangular-subrounded, poorly sorted
696–	Clayey Sand-Clay and Sand, reddish orangish brown, fine-medium
708–	Sand, reddish-yellowish brown, fine-medium, moderately sorted, subrounded, quartz, lithics
748–	Clayey Sand and Sandy Mudstone, thinnly interbedded, reddish-yellowish brown sands, subrounded, quartz, lithics, low plastic mudstones, thicker mudstones as shown, see E-Log for details
820–	

Vertical Scale 1"=40'



NO.	DATE	REVISION	BY

Test Hole Lithology
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Ground-Water Monitoring

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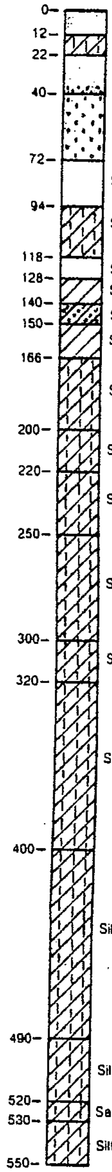
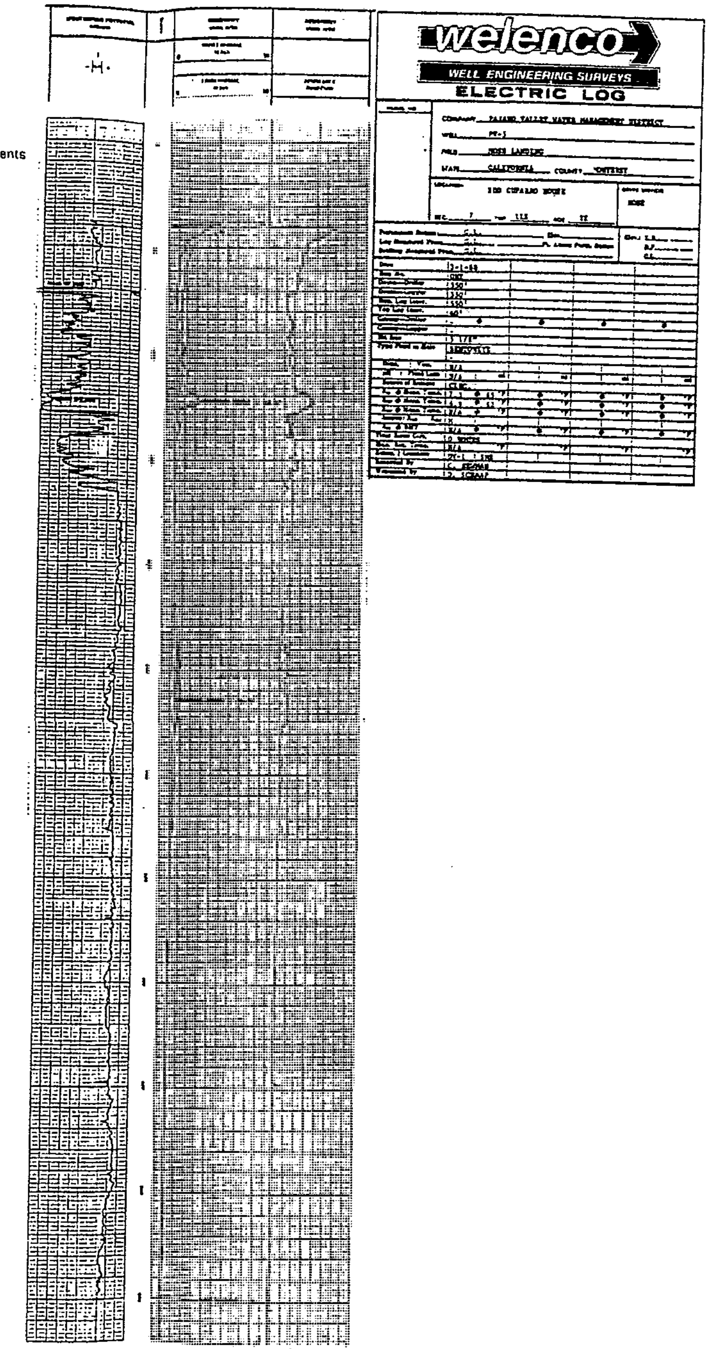
LITHOLOGY



Depth	Description
0–	Sand, medium, well sorted, subrounded-rounded, yellowish brown, quartz and feldspar; topsoil w/silt and clay in upper 2' w/large shell fragments
12–	Silty Clay, pale brown w/tan streaks, soft, low plastic, some thin peaty beds
22–	Sand, medium-coarse, pale brown, well sorted, subrounded-rounded, some coarse sand and fine gravel stringers in lower 4'
40–	Sand, medium-coarse w/some fine gravel, well sorted, subrounded-rounded, yellowish brown
72–	Sand w/yellowish brown Silty Clay stringers, medium-coarse sand and fine gravel, subangular-subrounded
94–	Sandy Silty Clay w/coarse sand stringers, coarse, rounded sands, gray brown sandy clays, stiff, medium-low plastic
118–	Sand, medium-coarse w/fine gravel, subangular-subrounded, light brown
128–	Sandy Clay, pale brown, low plastic
140–	Sand w/Clay, yellowish brown, medium-coarse sand, some fine gravels
150–	Sand and Clay, interbedded, medium-coarse sand w/fine gravel, clay dark gray (bluish), stiff, medium plastic
166–	Sandy Silty Clay, bluish gray, medium plastic, fine-medium sand <20%
200–	Silty Clay, bluish gray, medium-high plastic, trace fine mica sand, trace coarse sand and fine gravel
220–	Sandy Silty Clay, bluish gray, low-medium plastic, fine mica sand <30%; some dark organic material and shell fragments
250–	Silty Clay w/Sand, bluish gray, medium-high plastic, fine mica sand <10%
300–	Sandy Silty Clay, bluish gray, low-medium plastic, fine mica sand <20%, some shell fragments
320–	Silty Clay w/Sand, bluish gray, medium plastic, fine mica sand <10%, some shell fragments
400–	Silty Clay w/Sand, dark bluish gray, medium-high plastic, trace fine mica sand <10%, some shell fragments
490–	Silty Clay, dark bluish gray, high plastic, trace fine mica sand, no shell fragments
520–	Sandy Silty Clay, bluish gray, low-medium plastic, fine mica sand, some shell fragments
530–	Silty Clay w/trace fine Sand, dark bluish gray, medium-high plastic, no shell fragments
550–	

Vertical Scale 1"=40'



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Test Hole Lithology PV-5

Pajaro Valley Ground-Water Monitoring

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Woodland, California 95695

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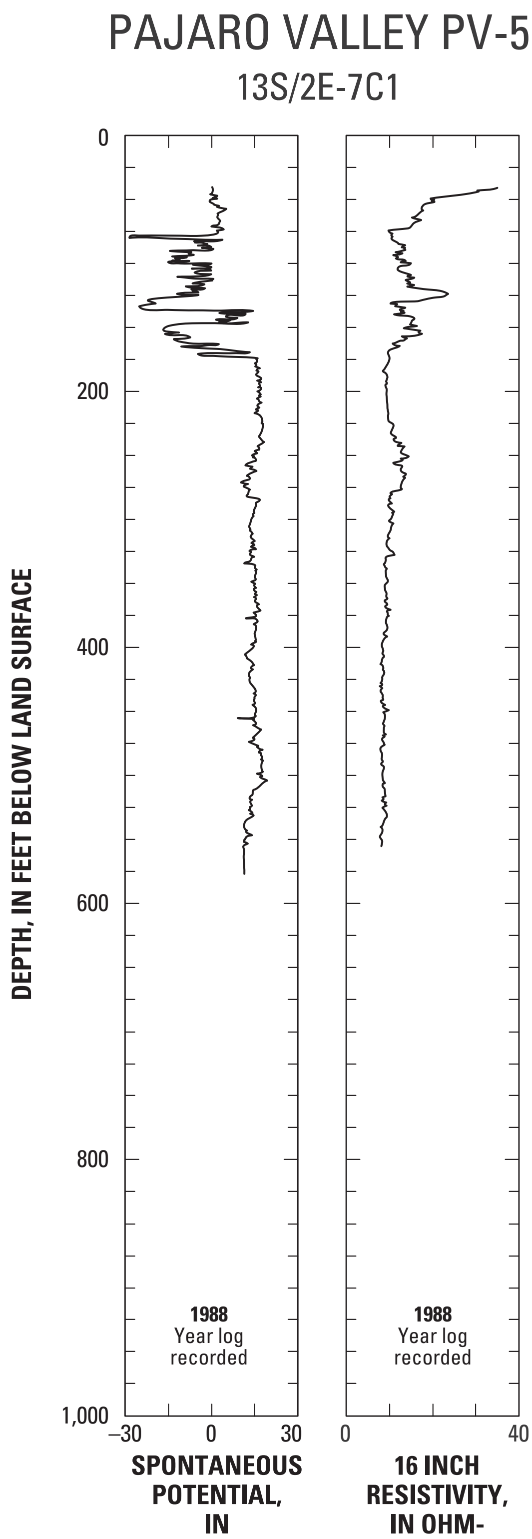
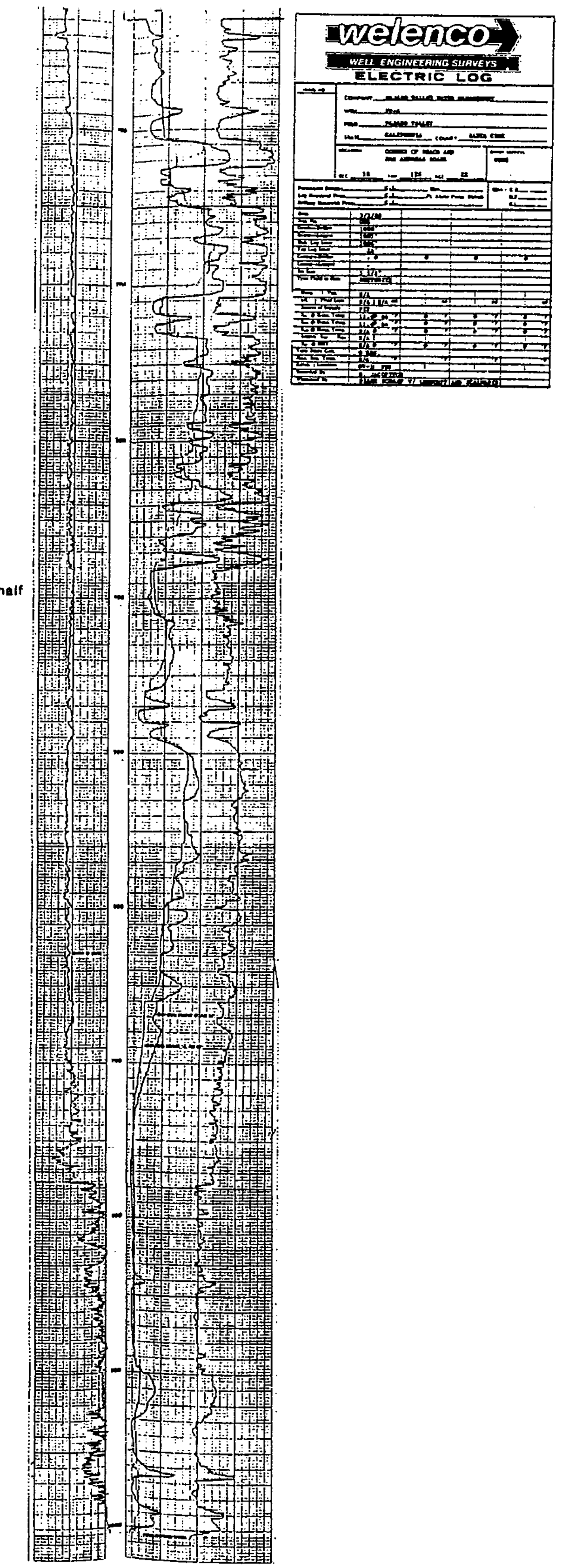


Figure A1.4. Geophysical logs for selected monitoring wells and test holes in the Pajaro Valley, Monterey County, California.

LITHOLOGY

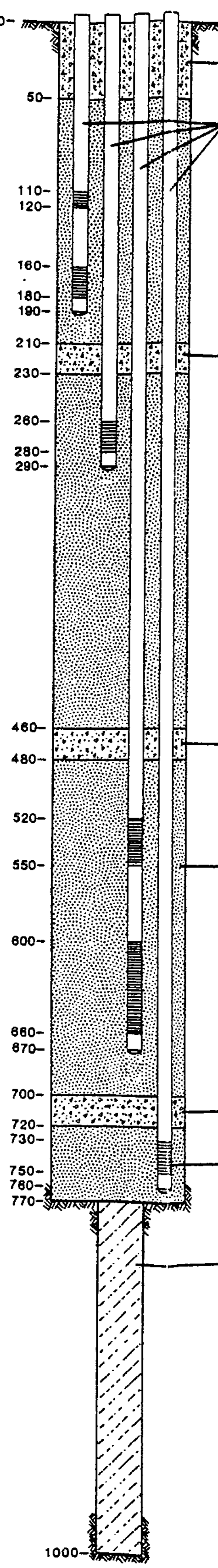
Depth	Description
0–12	Sandy & Silty Clays, dark brown to dark gray, medium plastic
12–28	Silty Clay w/Sand, dark gray (bluish), soft, medium-high plastic, fine sand, some layers dark brown peaty material
28–32	Silty Sand, medium, subrounded-rounded, quartz, lithics, some shell fragments
32–70	Sandy Silty Clay, dark greenish gray, stiff, medium plastic, zones of sandier clay interbedded, thin, medium-coarse sand layers 60-70ft.
70–86	Silty Clay, dark greenish bluish gray, soft, medium-high plastic
86–92	Sand, medium-coarse, well sorted, quartz, lithics, subrounded-well rounded
92–106	Silty Clay w/trace fine Sand, dark bluish gray, medium plastic
106–124	Sand-Gravelly Sand, medium, very coarse sand and fine gravel, subangular-well rounded, quartz, lithics, feldspars
124–150	Silty Clay & coarse Sand, interbedded, dark gray, clay-medium plastic, medium-coarse sand w/fine gravels
150–208	Sand & Gravel, medium-very coarse sand, fine gravel, subrounded-rounded, quartz, lithics, well sorted, some thin dark gray clay layers, thickest at 169ft.
208–232	Silty Clay w/Sand, brown-gray, medium plastic, fine-very fine sand, thin fine sand w/gravel 219-224ft.
232–382	Sand-Gravelly Sand, medium-very coarse, subangular-subrounded, quartz, feldspars, lithics, gravels fine-pebble, well rounded, lithics dominate, thin interbedded dark gray-brown silty clay & sandy clay at 289-300-314-340-344 & 359ft.
382–410	Silty-Sandy Clay, bluish gray, medium-high plastic, trace fine sand, some thin layers fine-medium sand especially in lower half
410–460	Sand, medium-coarse, well sorted, gray brown, subrounded-rounded, feldspars, lithics, mica
460–492	Silty Clay w/Sand, interbedded, clays-tan, medium plastic, sand fine-medium w/some coarse & fine gravel, subrounded-rounded
492–530	Sand, fine-medium, brown, well sorted, subrounded-rounded, quartz, feldspars, lithics, some thin interbedded dark gray silty clay beds
530–594	Sand, medium, reddish brown, well sorted, subrounded-rounded, slightly silty in places
594–600	Sandy Clay-Sand & Clay?, gray brown, low plastic?
600–630	Sand, medium, brown, well sorted, sub-well rounded, quartz, feldspars, lithics, slightly silty to finer grained lower 10ft.
630–640	Clayey Sand, reddish brown, medium, subrounded-rounded, quartz, feldspars, lithics
640–700	Sand, fine-medium, reddish brown, well sorted, subrounded-rounded, quartz, feldspars, lithics, thin stringer of light beown-dark gray, silty-clayey 660-674ft.
700–776	Sand-Silty Sand, grayish brown, yellowish brown, fine-medium sand, poorly sorted, fines increase, thin interbeds of yellowish brown & grayish siltstones &claystones, sands-quartz,feldspars, lithics
776–838	Siltstones & Claystones w/interbedded thin Sandy Siltstone-Silty Sandstones, grayish brown-dark gray, medium-high plastic, dark gray, massive, evenly bedded subunits decribed below
844–	Silty Sandstone-Sandy Siltstone, grayish brown, fine-medium sand
–900	Silt & Sandstone?, grayish brown, low plastic, fine sand
900–930	Sandy Siltstone-Silty Sandstone?, grayish brown, fine-medium sands
930, 956, 977, 984, 992, 1000	Sandy Siltstone-Silty Sandstone, grayish brown, fine-medium sand



Vertical Scale 1" = 50'

WELL PROFILE

Depth	Description
0–50	Cement with Bentonite Surface Seal
110, 120, 160, 180, 190	Blank Casing 2-inch dia. Sch. 40 PVC (typ.)
210–230	Cement with Bentonite Intermediate Seal
460–480	Cement with Bentonite Intermediate Seal
520, 550, 600, 660, 670	Gravel Envelope (typ.)
700–720	Cement with Bentonite Intermediate Seal
730, 750, 760, 770	Well Screen 2-inch dia. PVC (typ.)
770–1000	Test Hole to 1000' Abandoned and Sealed with Bentonite Grout



NO.	DATE	REVISION	BY

MONITORING WELL PROFILE PV-6

PAJARO VALLEY
GROUND-WATER MONITORING

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Consulting Engineers
Woodland, California 95695

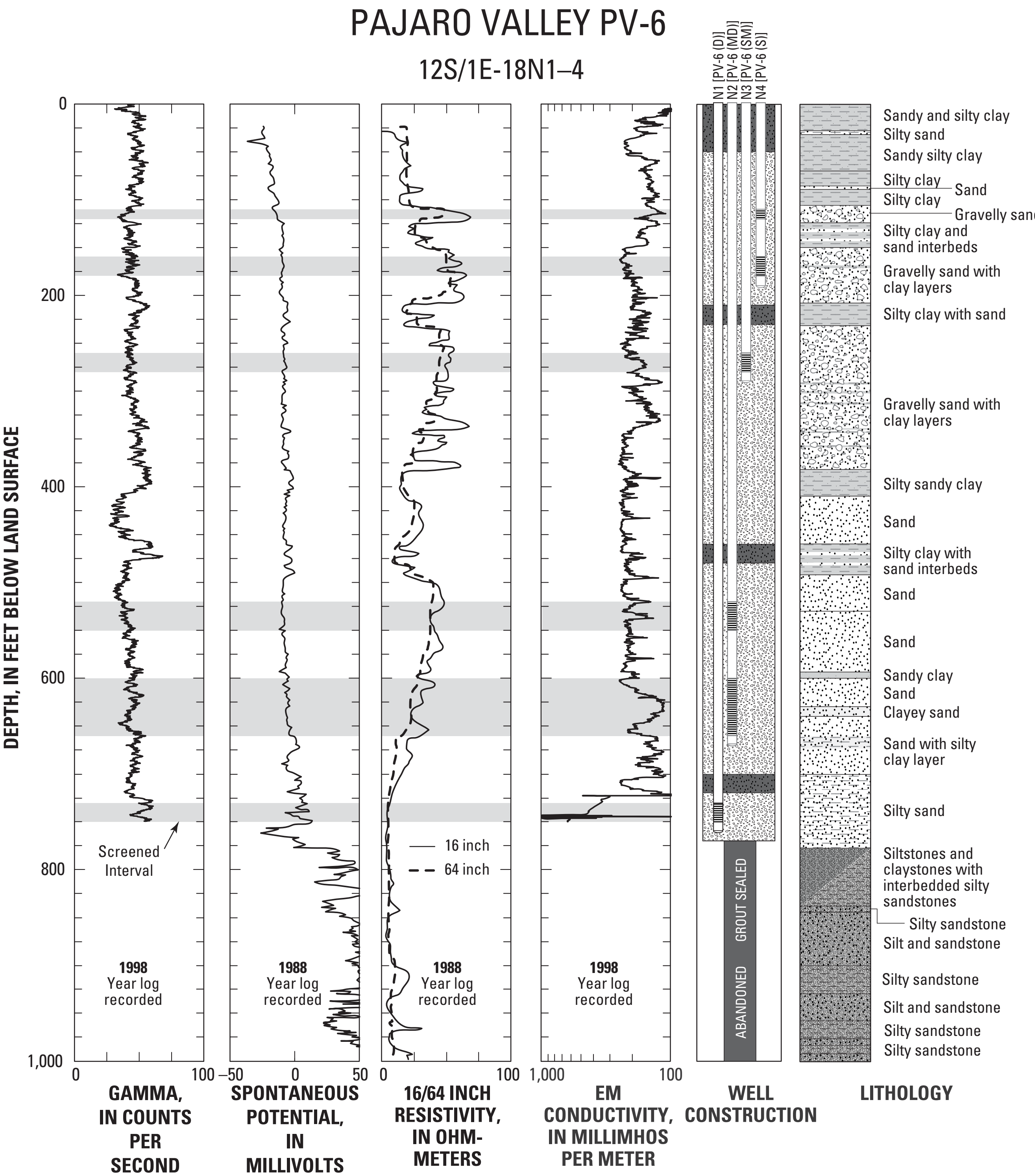
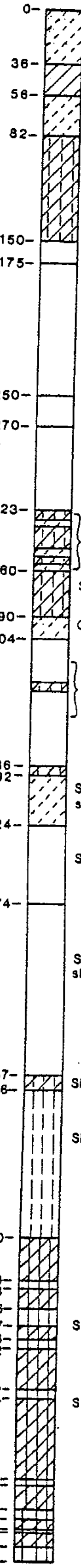
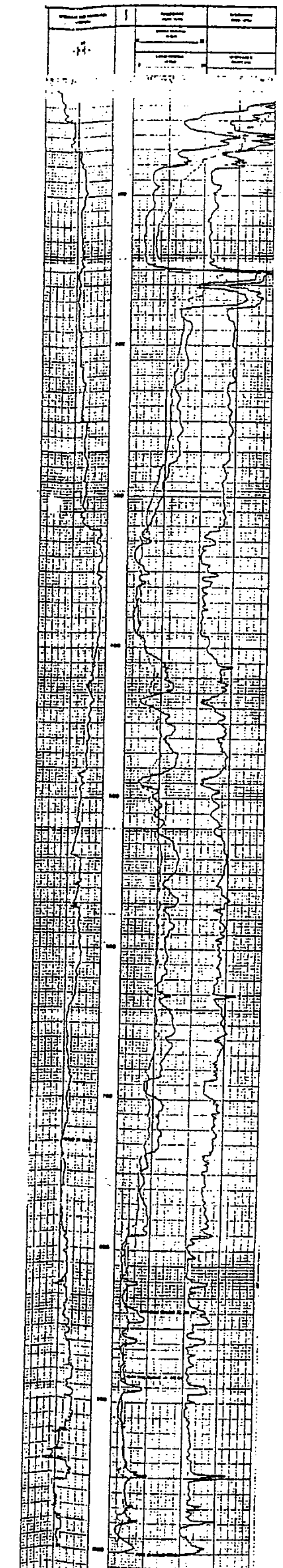


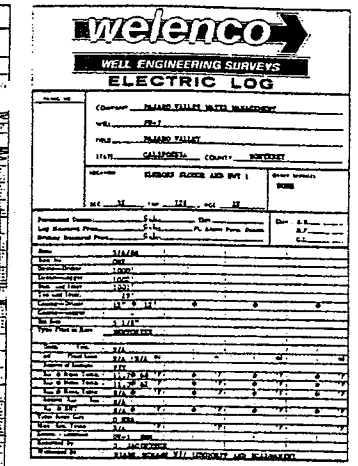
Figure A1.5. Geophysical logs and well construction for selected monitoring wells and test holes in the Pajaro Valley, Santa Cruz County, California.

LITHOLOGY



Depth	Description
0–	Clayey Sand, reddish brown, fine-medium, subrounded-rounded, some thin, dark brown organic clay layers
36–	Sandy Clay, reddish brown, soft, low plastic, fine-medium sand, stringers of gray brown clays
58–	Clayey Sand, fine-medium, olive brown & organish, quartz, lithics, mica, thin interbeds of sandy silty clays
82–	Silty Clay w/trace fine mica sand, bluish gray, medium-high plastic, some thin stringers of medium-coarse sand, shell fragments in upper 30ft.
150– 175–	Sand, medium-coarse, subangular, moderately sorted, quartz, feldspars, lithics, trace micas, tends to be coarser downward w/fine gravel in lower 15ft.
	Sand, fine-medium w/coarse, well sorted, subrounded-rounded, quartz, lithics, mica, light brown-gray brown, some thin interbeds of dark gray, plastic clays, some thin layers of coarse sand and fine gravel
250–	Sand, medium-coarse, reddish brown, moderately sorted, subrounded-rounded, quartz, lithics
270–	Sand, fine-medium, well sorted, subrounded-rounded, quartz, lithics, mica
323–	Silty Clay, dark gray-olive/bluish gray, medium plastic, trace fine mica sand, stiff, compact, thin interbeds of sand-clayey sand at 328-346 & 356ft.
360–	Silty Clay, olive brown-bluish gray, stiff, medium-high plastic, some thin sand stringers
390– 404–	Clayey Sand, orangish brown, fine-medium sand, subrounded
	Sand, fine-medium, well sorted, subrounded-rounded, quartz, lithics, brown-reddish brown, thin interbedded clay(stone), dark gray-olive gray, 432-438 & 486-492ft.
486– 492–	Sand-Clayey Sand, fine-medium, subrounded-rounded, well sorted, some interbeds olive gray silt(stone)-clay(stone), low-medium plastic
524–	Sand w/Silt & Clay, fine-medium, subrounded-rounded, quartz, feldspars, lithics
574–	Sand, fine-medium, subrounded-rounded, quartz, lithics, feldspars, some thin grayish siltstone layers, sands locally weakly cemented, shell fragments 630-640ft., thin layers reddish brown clayey sand
687– 696–	Silty Clay, greenish gray, medium plastic
	Silty Sand, fine-medium, subrounded-rounded, grayish brown, no-low plastic, some thin interbeds of sandy clays
790– 818– 823– 836– 847– 856– 862–	Silty Claystone-Siltstones, dark gray, stiff, compacted, low-medium plastic, decomposed shell fragments 840-920 & 960-980ft.
888– 894– 946– 950– 966– 972– 978– 980– 990– 1000–	Silty Sandstones-Sandy Siltstones, interbedded, dark gray, fine sand, quartz, lithics, subangular-subrounded





Vertical Scale 1" = 50'

NO.	DATE	REVISION	BY

Test Hole Lithology
PV-7

PAJARO VALLEY
GROUND-WATER MONITORING

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Woodland, California 95695

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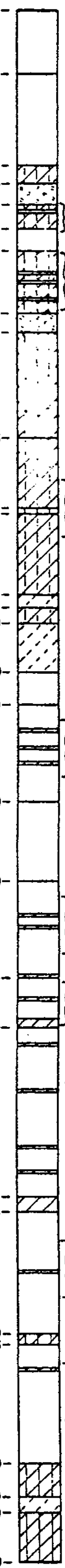
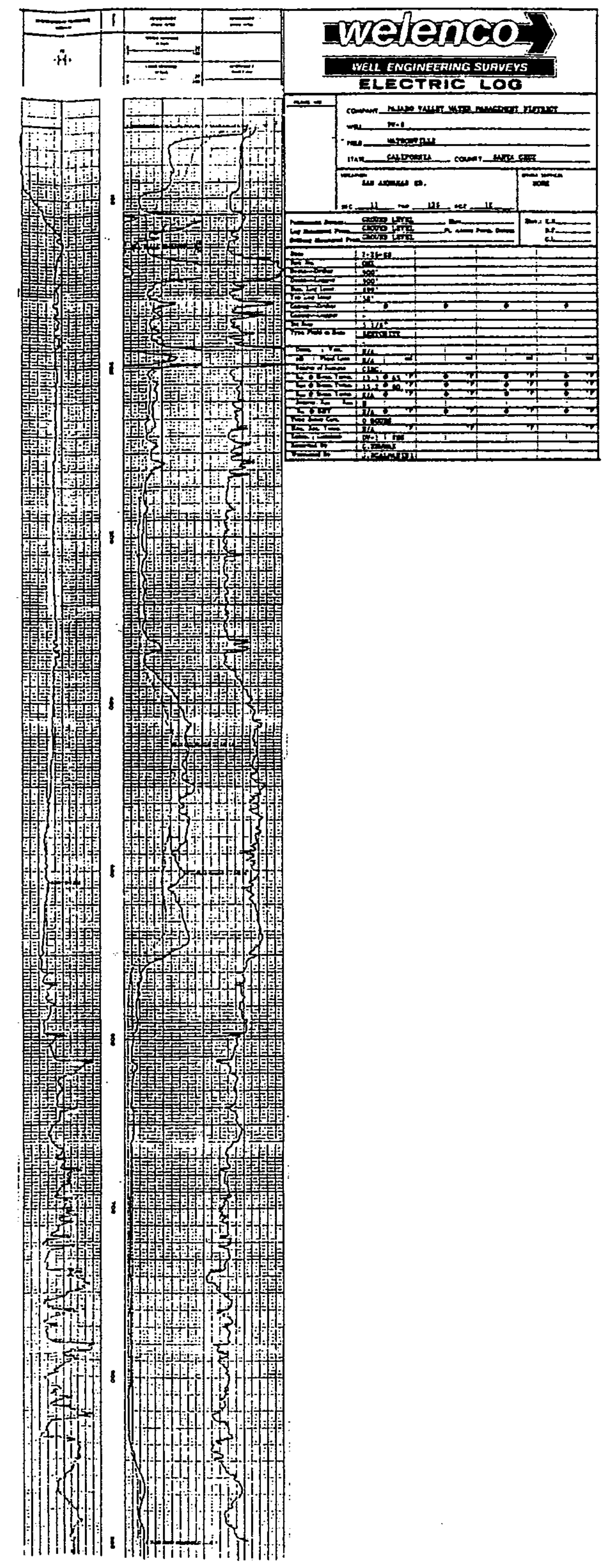
LITHOLOGY

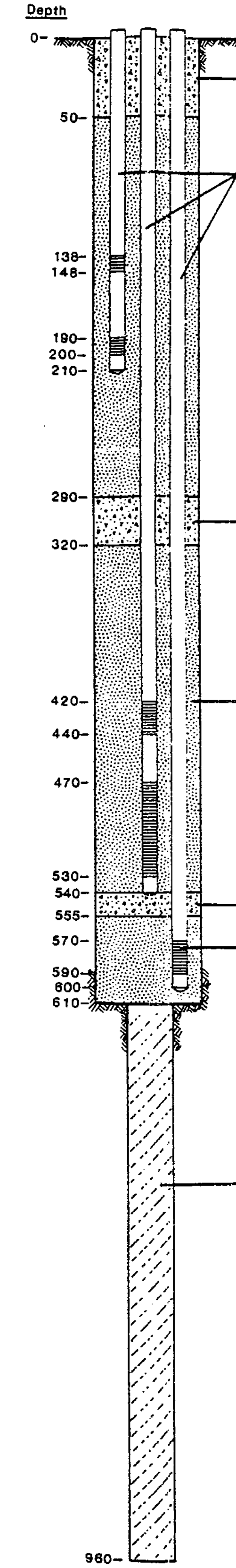


Depth	Description
0–	Sand, fine-medium, w/coarse, reddish brown, moderately sorted, subangular-subrounded, quartz, lithics, topsoil in upper 10ft. w/silt & clay, coarser at base w/fine gravel
40–	Sand, medium-coarse, dark brown-reddish brown, well sorted, subangular-subrounded, quartz, lithics, mica
97–	Silty Clay, w/trace fine Sand, dark gray, medium plastic
108–	Sand-Gravelly Sand, medium-very coarse & fine gravel, moderately sorted, subangular-subrounded, quartz, lithics, some shells
121–	Silty Clay, tannish beown, medium plastic, thin medium-coarse sand at 124ft.
136–	Sand, medium-coarse, well sorted, subangular-subrounded
150–	Silty Clay, bluish gray, medium-high plastic, trace fine mica sends, thin intwrbeds of fine silty sand at 162-168-178ft., and sand-clayey sand at 362-370ft.
188–	Gravelly Sand, medium-very coarse & fine gravels, well sorted, subrounded, quartz, lithics
200–	Silty Clay w/thin interbeds of Silty Sands, greenish bluish gray, medium plastic, thin, fine-very fine sand layers especially in lower 20ft.
265–	
308– 312–	Silty Clay w/trace fine mica Sand, olive greenish gray, medium plastic, thin silty sands
362– 370–	Sand-Clayey Sands, medium-fine, dark gray
380–	Clayey Sand, fine-medium, ver ddark gray, subrounded-rounded, clay <30%
410–	Sand w/Clay, fine-medium, dark grayish brown
430–	Sand, medium, well sorted, subrounded- rounded, quartz, feldspars, lithics weakly cemented, some thin dark clay interbeds at 445-456-& 465-489ft.
490–	Sand, fine-medium, brown, well sorted, subrounded-rounded, thin interbeds of grayish claystones
540–	Sand, medium, brown, well sorted, subrounded-rounded, quartz, feldspars, lithics, thin interbeds of gray claystones at 561-568-598 & 612ft.
598–	Sand, medium, grayish-olive brown, well sorted, subrounded-rounded, quartz, feldspars, lithics
630–	Sand, medium, dark brown, well sorted, subrounded-rounded, quartz, feldspars, lithics, thin interbeds of dark gray claystones at 640-688-704-718 & 722
735– 744–	Sandy Claystone, light olive-black, stiff, compact, peaty in part
	Sand, medium, dark brown,well sorted, subrounded-rounded, some thin interbeds of dark gray claystones
820– 826–	Siltstone-Claystone, grayish, medium plastic
	Sand, medium-coarse, dark brown, well sorted, subangular-subrounded, quartz, lithics, slightly silty-clayey, some thin interbeds of dark gray claystones
900–	Claystone-Siltstone, dark brown-bluish gray, stiff, medium plastic, trace fine mica sand
920–	Clayey Sand, grayish brown, fine-medium
930–	Claystone-Siltstone, dark brown-bluish gray, stiff, medium plastic, trace fine mica sand
960–	



Vertical Scale 1" = 50'

WELL PROFILE



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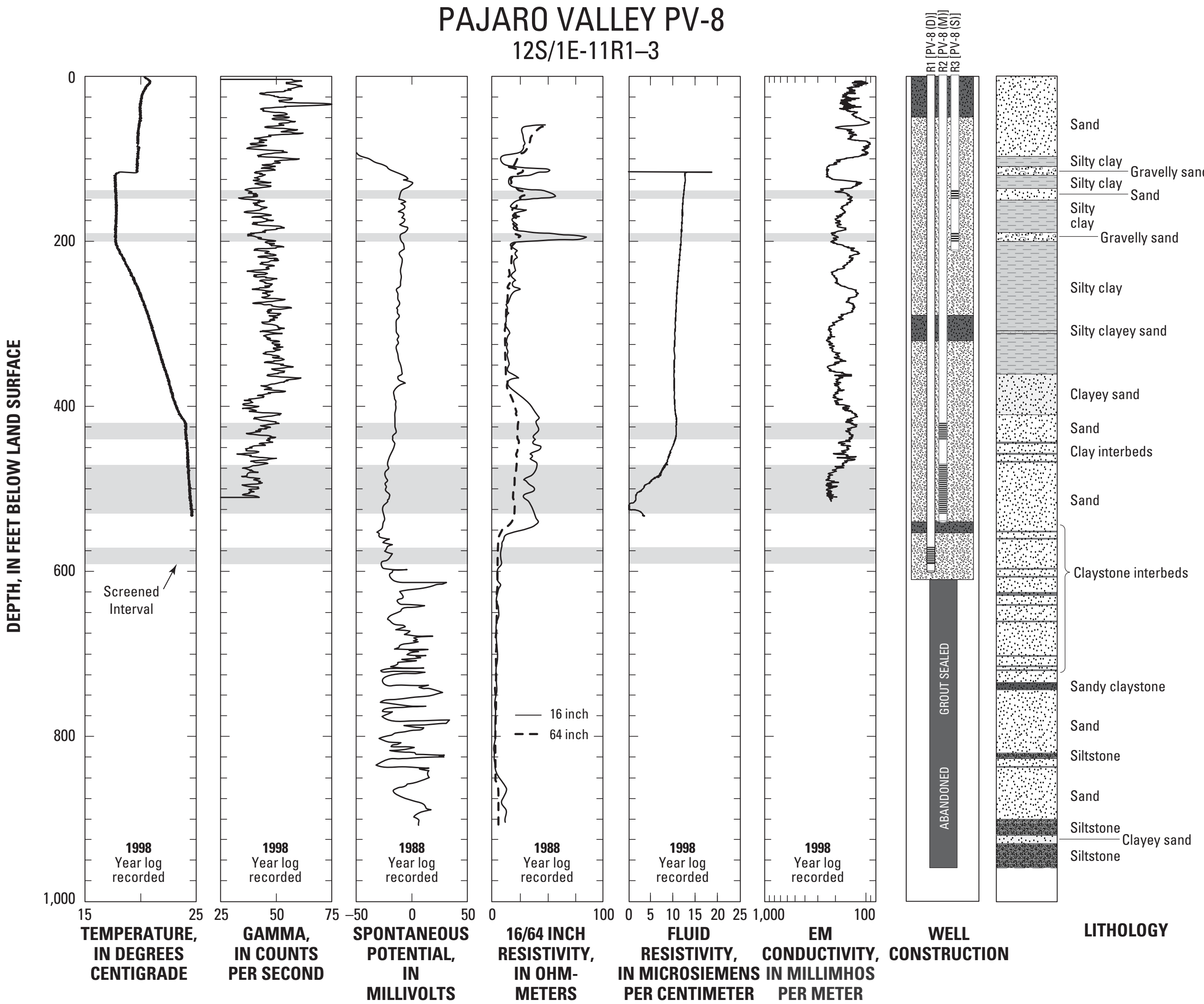
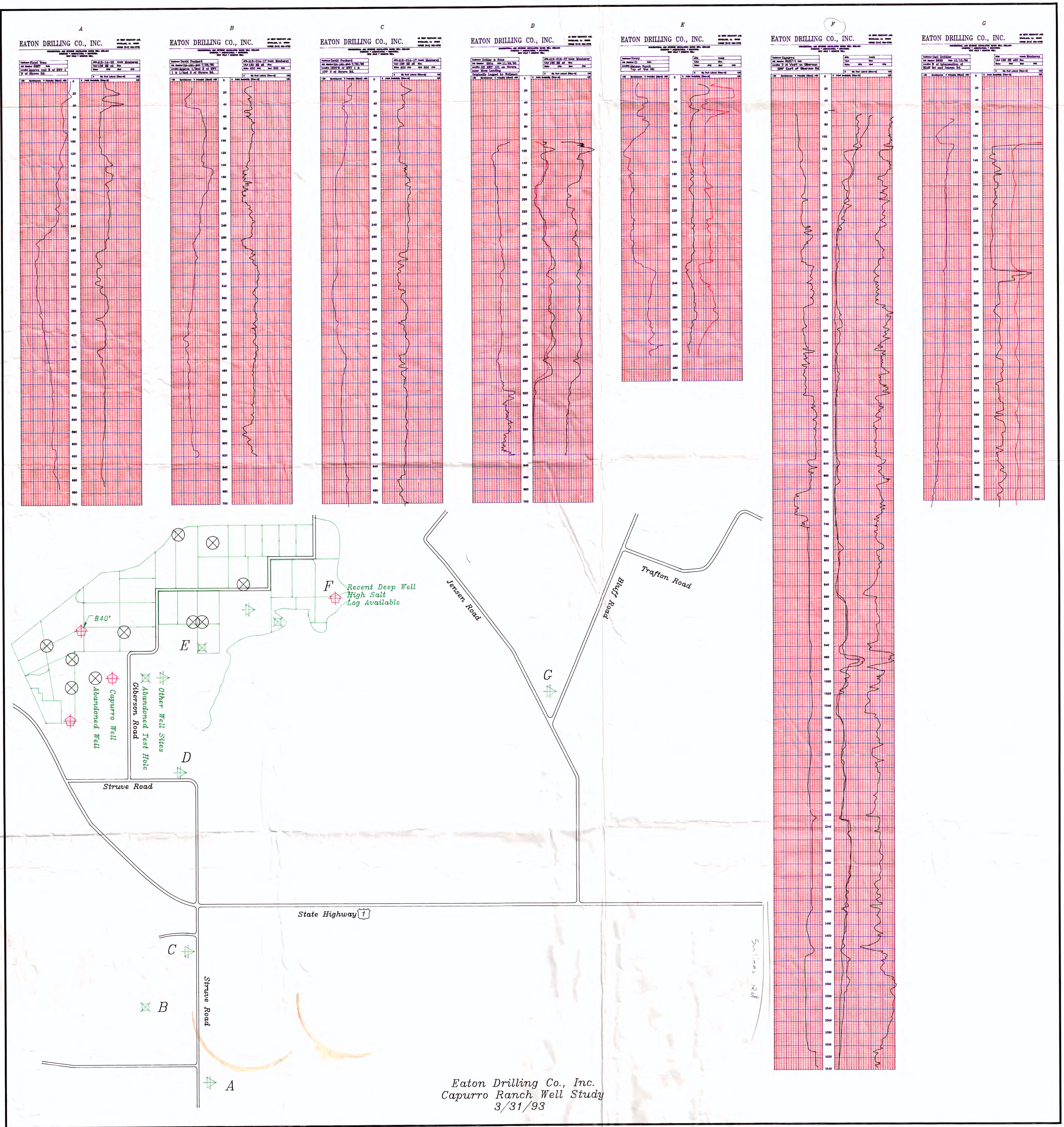


Figure A1.6. Geophysical logs and well construction for selected monitoring wells and test holes in the Pajaro Valley, Santa Cruz County, California.

APPENDIX D

E-logs from the Capurro Ranch well study, Eaton Drilling Co., Inc., March 1993


A
EATON DRILLING CO., INC.
B
EATON DRILLING CO., INC.
C
EATON DRILLING CO., INC.
D
EATON DRILLING CO., INC.
E
EATON DRILLING CO., INC.
F
EATON DRILLING CO., INC.
G
EATON DRILLING CO., INC.
F
Recent Deep Well
High Salt
Log Available
840'
E
Capurro Well
Abandoned Well
Abandoned Test Hole
Other Well Sites
Giberson Road
D
Struve Road
Jensen Road
Bluff Road
Trafton Road
G
State Highway 1
C
B
Struve Road
A
Salinas Rd
Eaton Drilling Co., Inc.
Capurro Ranch Well Study
3/31/93

APPENDIX E

Springfield Well No. 2 Drilling and Testing Activities Log

Appendix A. Log of drilling and testing activities of Springfield Well #2
Pajaro / Sunny Mesa Community Services District, Monterey County, California

Date	Activity
Monday, November 06, 2017	Drilling at 12:00 noon with 8 3/4-inch bit. Hydraulic system in drilling rig breaks down; stopped drilling after 86 feet (0 to 86 feet)
Tuesday, November 07, 2017	Continued drilling. Stopped for the day at 330 ft. below ground surface (bgs). Driller removed drill pipe from borehole at end of day ("tripped out") (86 to 330feet)
Wednesday, November 08, 2017	Started day by replacing drill pipe back in borehole ("tripping back in"), cleaned out mud shakers as they were getting filled with sand. Continued drilling and stopped at total depth of 615 feet bgs. Tripped out at end of day. Borehole was E-logged by Newman (330 to 615 feet)
Thursday, November 09, 2017	Removed fine sand from system in preparation to ream borehole next week. Balance staff not present.
Friday, November 10, 2017	Removed fine sand from system in preparation to ream borehole next week. Balance staff not present.
Saturday, November 11, 2017	
Sunday, November 12, 2017	
Monday, November 13, 2017	Reamed borehole to 16 inches diameter. Balance staff was not present.
Tuesday, November 14, 2017	Continued reaming borehole. Balance staff was not present.
Wednesday, November 15, 2017	Continued reaming borehole. Balance staff was not present.
Thursday, November 16, 2017	Casing installed in borehole. Drill pipe placed inside casing. Heavy rain intermittently throughout day. Water was circulated through system until mud viscosity was significantly reduced. Attempted placement of sand in annulus was unsuccessful. Truck was not able to reach borehole site due to muddy conditions. Balance staff present.
Friday, November 17, 2017	8/16" gravel pack material was placed in annulus. 14:00 Monterey County inspector observed placement of cement sanitary seal in well. Balance staff present.
Saturday, November 18, 2017	
Sunday, November 19, 2017	
Monday, November 20, 2017	
Tuesday, November 21, 2017	
Wednesday, November 22, 2017	
Thursday, November 23, 2017	Thanksgiving
Friday, November 24, 2017	Holiday
Saturday, November 25, 2017	
Sunday, November 26, 2017	
Monday, November 27, 2017	
Tuesday, November 28, 2017	
Wednesday, November 29, 2017	
Thursday, November 30, 2017	
Friday, December 01, 2017	
Saturday, December 02, 2017	
Sunday, December 03, 2017	
Monday, December 04, 2017	
Tuesday, December 05, 2017	
Wednesday, December 06, 2017	
Thursday, December 07, 2017	
Friday, December 08, 2017	Install dataloggers in Springfield Well No. 2, Hawkins well, and School well (PVWMA 992)
Saturday, December 09, 2017	
Sunday, December 10, 2017	
Monday, December 11, 2017	
Tuesday, December 12, 2017	
Wednesday, December 13, 2017	
Thursday, December 14, 2017	
Friday, December 15, 2017	
Saturday, December 16, 2017	
Sunday, December 17, 2017	
Monday, December 18, 2017	
Tuesday, December 19, 2017	Step test starts at 10:35; Pumping rate is 327 gpm; at 13:45 pumping rate is increased to 425 gpm; water quality samples collected at 18:00; Pumping ends at 18:15; removed all dataloggers
Wednesday, December 20, 2017	
Thursday, December 21, 2017	
Friday, December 22, 2017	

Appendix A. Log of drilling and testing activities of Springfield Well #2
Pajaro / Sunny Mesa Community Services District, Monterey County, California

Date	Activity
Monday, February 12, 2018	
Tuesday, February 13, 2018	
Wednesday, February 14, 2018	
Thursday, February 15, 2018	Re-installed dataloggers in Springfield Well No. 2, Hawkins well, and School well (PVWMA 992), and Rocha's irrigation well
Friday, February 16, 2018	
Saturday, February 17, 2018	
Sunday, February 18, 2018	
Monday, February 19, 2018	
Tuesday, February 20, 2018	Springfield Well No. 2 pumped for 1 hour
Wednesday, February 21, 2018	9-hour constant-rate pumping test starts at 9:40; Pumping rate is 410 gpm; Pumping ends at 18:40
Thursday, February 22, 2018	Recovery ends ast 3:40; equipment demobbed at 9am
Friday, February 23, 2018	

APPENDIX F

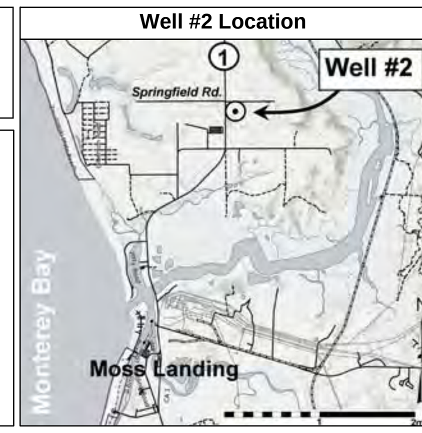
Springfield Well No. 2 Geologic and Geophysical Logs

Preliminary Data Subject To Revision

Balance Hydrologics, Inc.

Geologic log for test well #2, Pajaro/Sunny Mesa Community Services District, Monterey County, CA

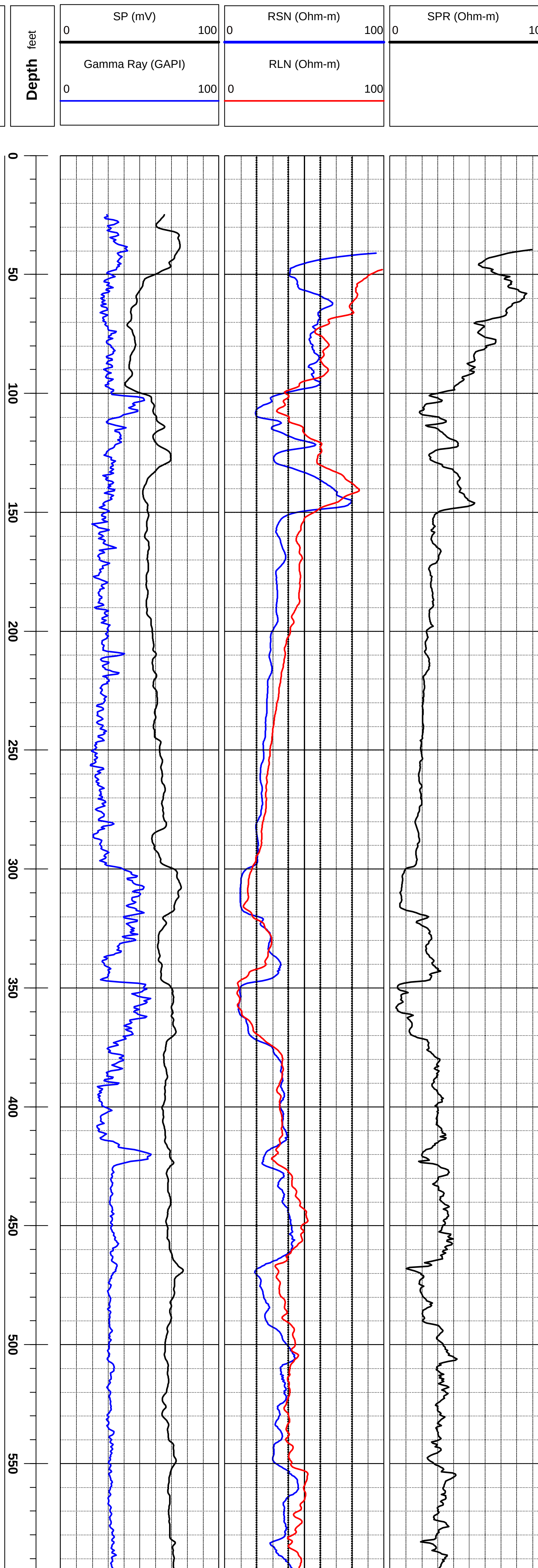
Well #2 Location



Owner:	**Pajaro/Sunny Mesa Community Services District**	Drilling company:	**Maggiora Bros. Drilling Co.**
Well location:	**1812 Springfield Road, Moss Landing CA 95039**	Driller:	**Victor Rodriguez**
APN:	**413-014-001**	Drilling rig:	**Ingersoll Rand TH60**
Latitude, Longitude:	**N 36° 50' 16.59"; W 121° 46' 7.19"**	Driling bits:	**8 ¾ inches, then reamed to 16 inches**
Ground surface elevation:	**142 feet WGS84**	Depth of borehole:	**600 feet**
Start drilling date:	**November 6, 2017**	Depth of casing:	**600 feet**
Well completion date:	**November 17, 2017**	Diameter of casing:	**8-inch PVC**
Borehole geologist:	**Gustavo Porras**	Geophysical log:	**Craig Newman**

Depth (feet)	Lithology	Remarks
0	RED SAND WITH CLAY: Brown (7.5YR 4/2) to reddish brown (5YR 4/4) fine to medium, subangular to subrounded, well sorted loamy, clayey sand	0 to 600 ft.: drilled pilot hole with 8 ¾ -inch bit; cuttings samples were collected as lithology changed; reamed with 16-inch bit.
	WHITE/YELLOW CLAY: Grayish brown (2.5YR 5/2) to (10YR 5/2) silty clay	0 to 490 ft.: 8-inch blank SDR-17 well casing
50	Gravel and Sand: Yellowish brown (10YR 5/4) to brown (10YR 5/3) fine to coarse, subangular to subrounded, poorly sorted sand and small gravels of mixed lithology	0 to 470 ft.: Sanitary seal tremmied with cement slurry
	Thin clay lens	
100	RED SAND: (Gradual change to) reddish brown (5YR 4/3) medium to coarse, rounded to subrounded, predominantly quartz grains, well sorted sand	
150		Static water level = 145 feet bgs on 12/8/17
200	Slightly larger sand grains	
250		
300	BLUE/GREY CLAY: Light brownish gray (10YR 6/2) to gray (10YR 5/1) clay	
	BLUE/GREY CLAY AND SAND: Gray (10YR 5/1) to grayish brown (10YR 5/2) fine to coarse, subangular to subrounded, well sorted sand with clay	
350	RED SAND: Yellowish brown (10YR 5/4) fine to medium, subangular to subrounded, medium sorted sand	
	BLUE/GREY CLAY: Light brownish gray (10YR 6/2) clay	
	Gravel and Sand: Dark yellowish brown (10YR 4/4) to dark gray (10YR 4/1)medium to coarse, angular to subrounded, well sorted, with some shale fragments and diverse lithology, sand	
400	Harder layer with shale fragments	
450	Dark to light grey-green shale pieces interbedded with sand.	
	RED SAND: Yellowish brown (10YR 5/4) fine to medium, subangular to subrounded, medium sorted sand	470 to 600 ft.: Sand pack: 8/16"
500		490 to 590 ft.: 8-inch screened 0.032 inch slot SDR-21 well casing
550	Shale fragments	
600		590 to 600 ft.: 5-inch blank SDR-17 well casing Bottom of well capped

Well Construction



ELECTRIC LOG
GAMMA-RAY LOG

Job No. 74380

File No. D00313

Company	MAGGIORA BROS. DRILLING
Well	1815 SPRINGFIELD RD.
Field	SPRINGFIELD TERRACE
County	SANTA CRUZ
State	CALIFORNIA

Location:

lat 36.837935o lon -121.768630o
1815 SPRINGFIELD RD.

Sec. - Twp. - Rge. -

Other Services:

NONE

Permanent Datum	GROUND LEVEL	Elevation 142'	
Log Measured From	GROUND LEVEL	above perm. datum	
Drilling Measured From	GROUND LEVEL		

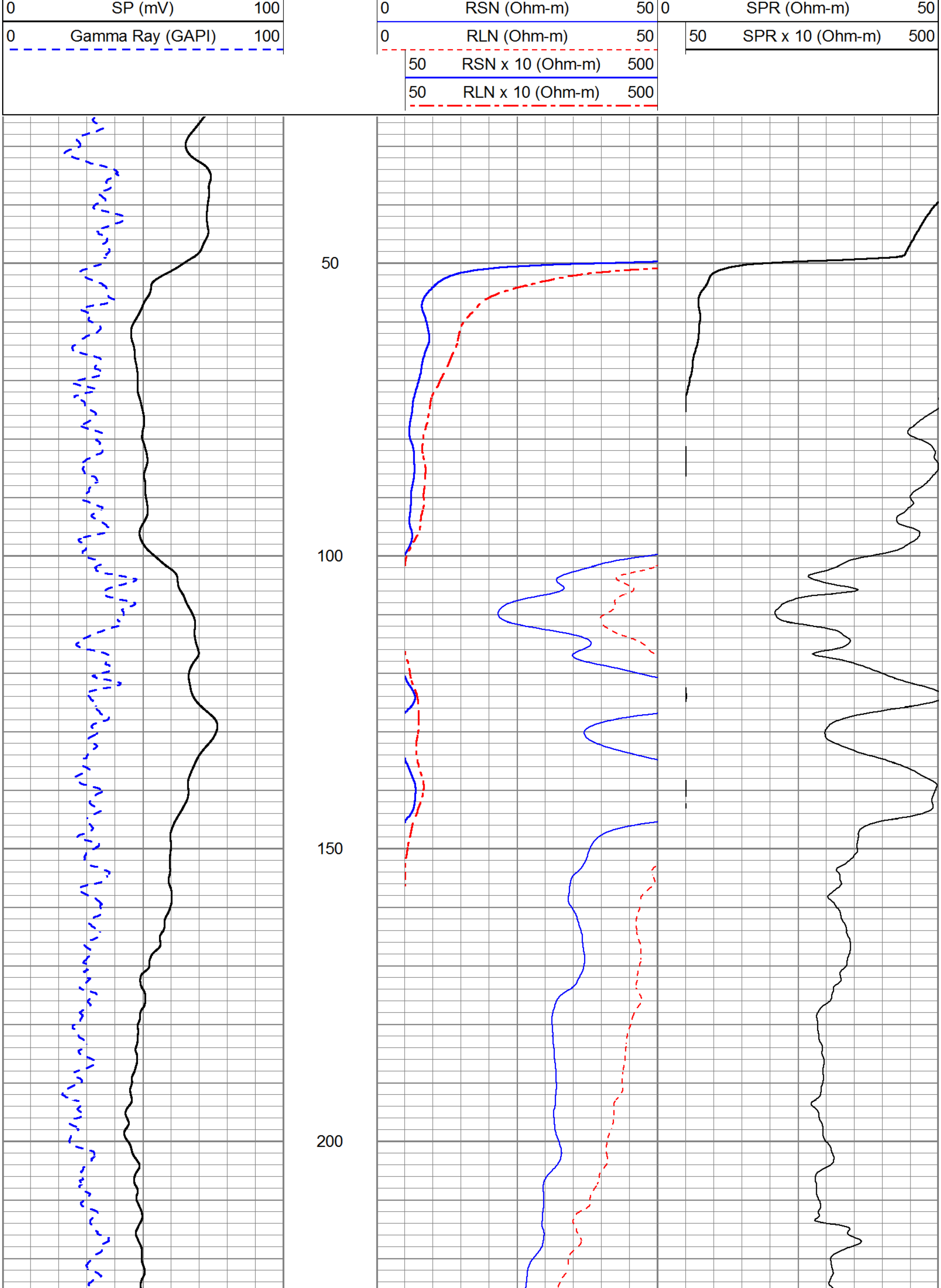
Elevation
K.B.
D.F.
G.L.

Date	11/8/2017		
Run Number	ONE		
Depth Driller	611'		
Depth Logger	611'		
Bottom Logged Interval	611'		
Top Log Interval	20'		
Casing Driller	NONE		
Casing Logger	NONE		
Bit Size	8 3/4"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	8.0 @ 74.3 F		
Rmf @ Meas. Temp	8.6 @ 75.5 F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS.		
Rm @ BHT	N/A		
Time Circulation Stopped	1 HOUR		
Time Logger on Bottom	N/A		
Max. Recorded Temperature	-		
Equipment Number	LV-2		
Location	SNS		
Recorded By	M. NEWMAN		
Witnessed By	V. RODRIQUEZ		

<<< Fold Here >>>

Comments

Database File	74380.db
Dataset Pathname	pass2.1
Presentation Format	elog
Dataset Creation	Thu Nov 09 08:18:22 2017
Charted by	Depth in Feet scaled 1:240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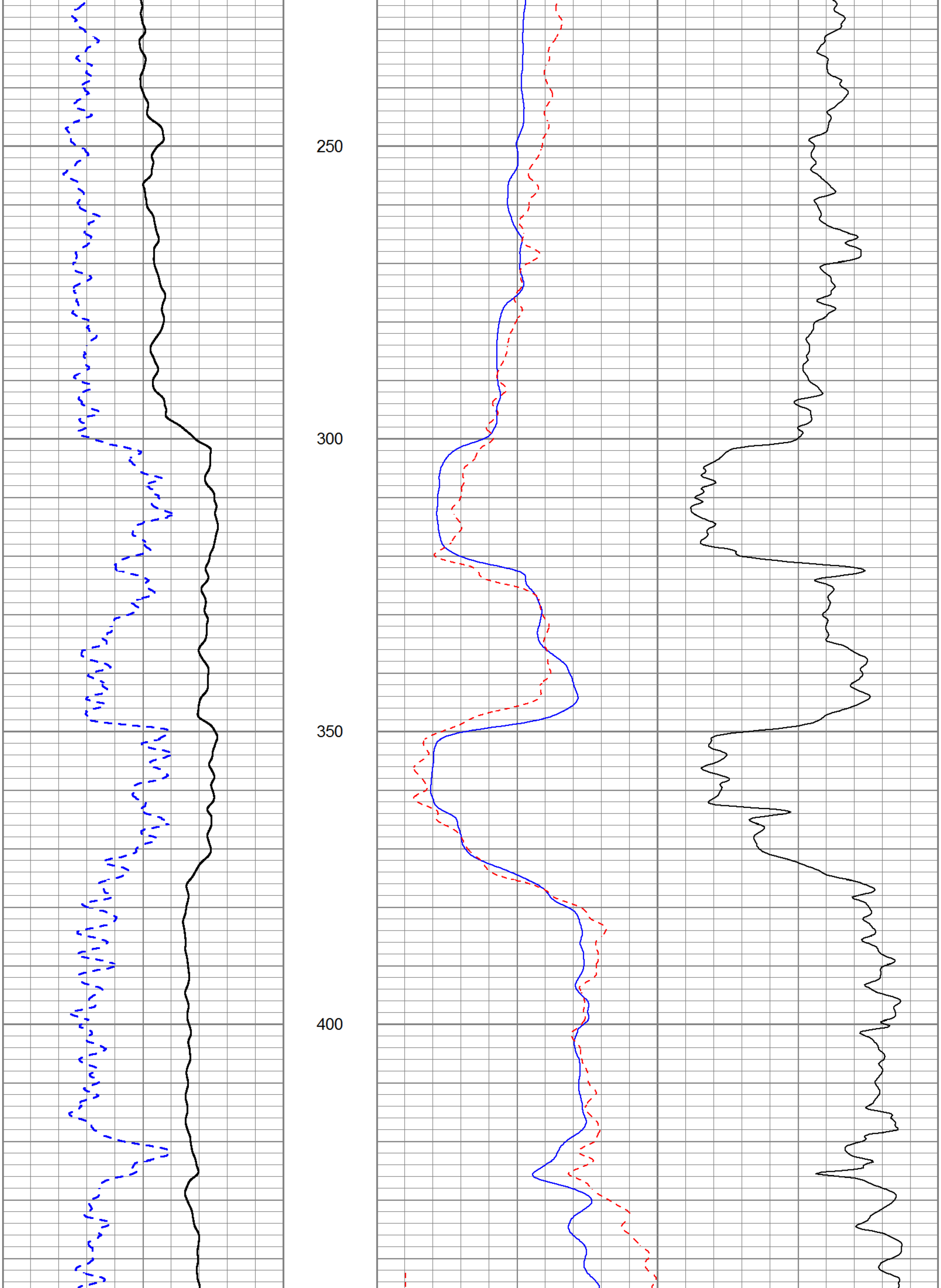
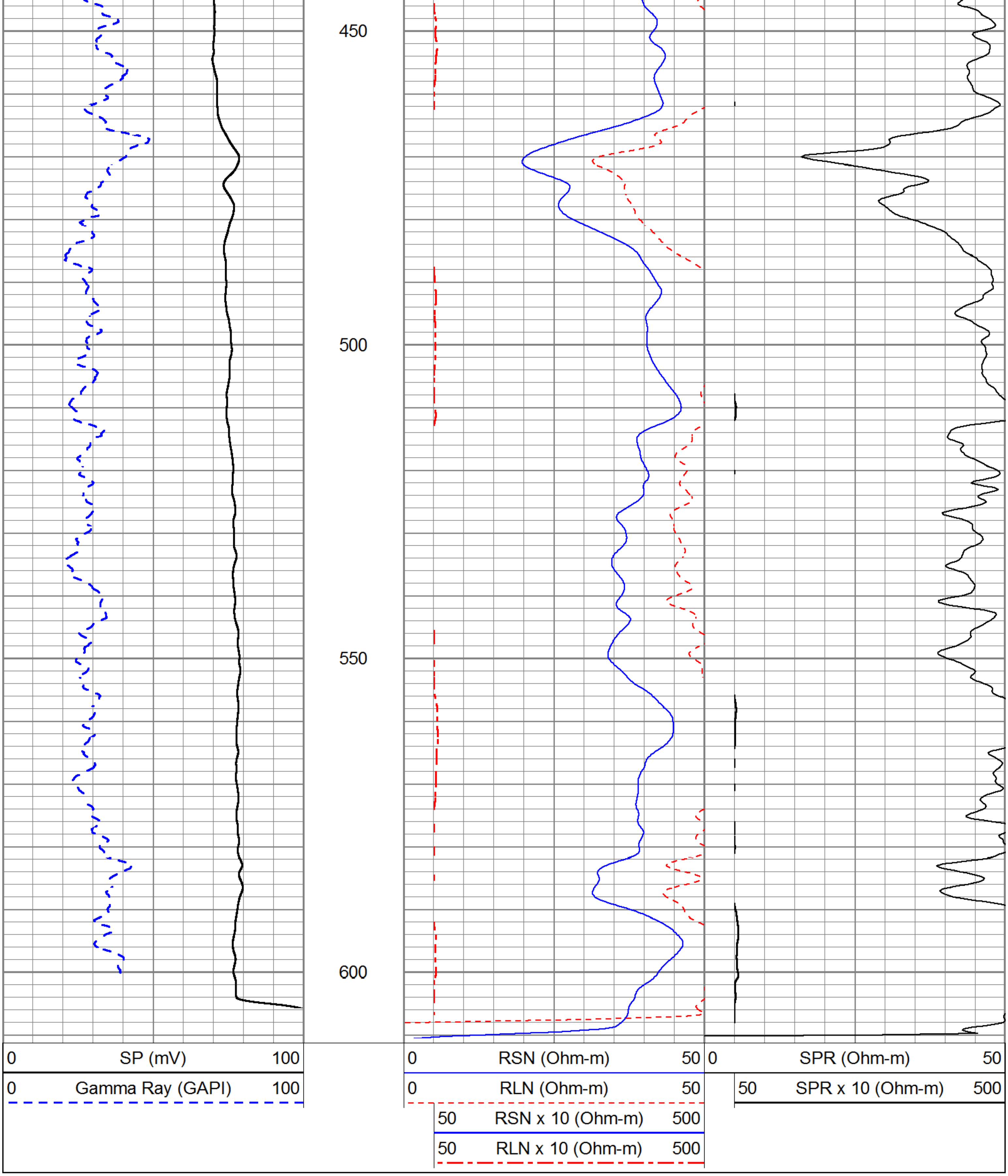
0 Gamma Ray (GAPI) 100
0 RSN (Ohm-m) 50
0 RLN (Ohm-m) 50
50 RSN x 10 (Ohm-m) 500
50 RLN x 10 (Ohm-m) 500
0 SPR (Ohm-m) 50
50 SPR x 10 (Ohm-m) 500
50
100
150
200


250
300
350
400



450
500
550
600
0 SP (mV) 100
0 Gamma Ray (GAPI) 100
0 RSN (Ohm-m) 50
0 RLN (Ohm-m) 50
50 RSN x 10 (Ohm-m) 500
50 RLN x 10 (Ohm-m) 500
0 SPR (Ohm-m) 50
50 SPR x 10 (Ohm-m) 500

Newman Well Surveys

a full service geophysical well logging company

Water Quality Analysis

Company:	Maggiora Bros. Drilling	**Date:**	8-Nov-17
Well:	1815 Springfield Rd.	**Run:**	One
Field:	Springfield Terrace	**Job Ticket:**	74380
State:	California	**Total Depth:**	611 ft

Rmf @ Temp: 8.8 **Temp:** 75.5

Corrected Rmf @ 75 degree F: 8.85

Rm @ Temp: 8.0 @ 74.3 F

Depth		S.P. mV	Rwe ohm-m	Rw *NaCl* ohm-m	Rw *NaHCO3* ohm-m	EC umhos *NaCl*	EC umhos *NaHCO3*	T.D.S *ppm* NaCl	T.D.S *ppm* $NaHCO_3$	Remarks
145 ft to	302 ft	-5.00	7.5	9.8	11.5	1019.0	866.2	540.1	866.2	Class I
320 ft to	350 ft	-5.00	7.5	9.8	11.5	1019.0	866.2	540.1	866.2	Class I
370 ft to	470 ft	-4.00	7.8	10.2	12.0	979.1	832.3	518.9	832.3	Class I
480 ft to	611 ft	-2.00	8.3	11.1	13.0	903.9	768.3	479.1	768.3	Class I

Class I : Less than *700* ppm (mg/l) Excellent to Good Quality
Class II : *700* to *2000* ppm (mg/l) Good to Injurious Quality
Class III: More than *2000* ppm (mg/l) Injurious to Unsatisfactory

APPENDIX G

Springfield Well No. 2 Water-Quality Reports

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188

Balance Hydrologics Inc.
800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Mark Woyshner

Work Order #: 7120730
Reporting Date: January 9, 2018

Date Received:	December 20, 2017
Project # / Name:	215021 / Pajaro Sunny Mesa CSD
Water System #:	NA
Sample Identification:	Springfield Well #2, sampled 12/19/2017 5:00:00PM
Sampler Name / Co.:	Gustavo Porras / Balance Hydrologics
Matrix:	Water
Laboratory #:	7120730-01

	Results	Units	RL	State Drinking Water Limits [1]	Analysis Method	Date Analyzed	Flags
General Mineral							
pH	7.8	pH Units	0.1	-	SM4500-H+ B	12/20/17	
Specific Conductance (EC)	700	uS/cm	1.0	1600	SM2510B	12/20/17	
Hydroxide as OH	ND	mg/L	2.0	-	SM 2320B	12/20/17	
Carbonate as CO3	ND	mg/L	2.0	-	SM 2320B	12/20/17	
Bicarbonate as HCO3	300	mg/L	2.0	-	SM 2320B	12/20/17	
Total Alkalinity as CaCO3	240	mg/L	2.0	-	SM 2320B	12/20/17	
Hardness	250	mg/L	5.0	-	SM 2340 B	12/22/17	
Total Dissolved Solids	410	mg/L	10	1000	SM2540C	12/20/17	
Chloride	55	mg/L	1.0	500	EPA 300.0	12/22/17	
Sulfate as SO4	54	mg/L	1.0	500	EPA 300.0	12/22/17	
Fluoride	0.15	mg/L	0.10	2	EPA 300.0	12/22/17	
Calcium	41	mg/L	0.50	-	EPA 200.7	12/22/17	
Magnesium	35	mg/L	0.50	-	EPA 200.7	12/22/17	
Potassium	2.5	mg/L	0.50	-	EPA 200.7	12/22/17	
Sodium	51	mg/L	0.50	-	EPA 200.7	12/22/17	
Iron	ND	ug/L	50	300	EPA 200.7	12/22/17	
Manganese	ND	ug/L	20	50	EPA 200.7	12/22/17	
Copper	ND	ug/L	50	1000	EPA 200.7	12/22/17	
Zinc	ND	ug/L	50	5000	EPA 200.7	12/22/17	
Inorganics							
Nitrate+Nitrite as N	0.12	mg/L	0.10	10	EPA 300.0	12/22/17	
Arsenic	ND	ug/L	2.0	10	EPA 200.8	01/04/18	
Barium	ND	ug/L	100	1000	EPA 200.7	12/22/17	
Boron	270	ug/L	100	-	EPA 200.7	12/22/17	

RL - are levels down to which we can quantify with reliability, a result below this level is reported as "ND" for Not Detected.
State Drinking Water Limits[1] - as listed by California Administrative Code, Title 22.
* - a * in the left hand margin of the report means that particular constituent is above the California Drinking Water Limits.

Mike Galloway

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
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USA

TEL: 831-724-5422
FAX: 831-724-3188

Balance Hydrologics Inc.
800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Mark Woyshner

Work Order #: 7120730
Reporting Date: January 9, 2018

Date Received:	December 20, 2017
Project # / Name:	215021 / Pajaro Sunny Mesa CSD
Water System #:	NA
Sample Identification:	Springfield Well #2, sampled 12/19/2017 5:00:00PM
Sampler Name / Co.:	Gustavo Porras / Balance Hydrologics
Matrix:	Water
Laboratory #:	7120730-01

	Results	Units	RL	State Drinking Water Limits 1	Analysis Method	Date Analyzed	Flags
Inorganics							
Cadmium	ND	ug/L	1.0	5	EPA 200.8	01/04/18	
Chromium	7.3	ug/L	1.0	50	EPA 200.8	01/04/18	
Cyanide (total)	ND	ug/L	100	200	SM 4500-CN F	12/20/17	
Lead	ND	ug/L	5.0	15	EPA 200.8	01/04/18	
Mercury	ND	ug/L	1.0	2	EPA 245.1	01/04/18	
Selenium	ND	ug/L	5.0	50	EPA 200.8	01/04/18	
Silver	ND	ug/L	10	100	EPA 200.8	01/04/18	
MBAS (Surfactants)	ND	mg/L	0.025	0.5	SM5540C	12/20/17	
Aluminum	ND	ug/L	50	1000	EPA 200.7	12/22/17	
Antimony	ND	ug/L	6.0	6	EPA 200.8	01/04/18	
Beryllium	ND	ug/L	1.0	4	EPA 200.7	12/22/17	
Nickel	ND	ug/L	10	100	EPA 200.7	12/22/17	
Thallium	ND	ug/L	1.0	2	EPA 200.8	01/04/18	
Nitrite as N	ND	mg/L	0.10	1	EPA 300.0	12/22/17	
General Physical							
Color	ND	Color Units	3.0	-	SM 2120B	12/20/17	
Threshold Odor No.	ND	T.O.N.	1.0	-	SM 2150B	12/20/17	
Turbidity	0.10	NTU	0.10	-	SM 2130B	12/20/17	
Nitrate as N	0.12	mg/L	0.10	10	EPA 300.0	12/22/17	

RL - are levels down to which we can quantify with reliability, a result below this level is reported as "ND" for Not Detected.
State Drinking Water Limits1 - as listed by California Administrative Code, Title 22.
* - a * in the left hand margin of the report means that particular constituent is above the California Drinking Water Limits.

Mike Galloway

BSK Associates Laboratory Fresno
1414 Stanislaus St
Fresno, CA 93706
559-497-2888 (Main)
559-485-6935 (FAX)

A7L2428
1/23/2018
Invoice: A732318

Mark Woyshner
Balance Hydrologics, Inc.
800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227

RE: Report for A7L2428 General Chemistry

Dear Mark Woyshner,

Thank you for using BSK Associates for your analytical testing needs. In the following pages, you will find the test results for the samples submitted to our laboratory on 12/21/2017. The results have been approved for release by our Laboratory Director as indicated by the authorizing signature below.

The samples were analyzed for the test(s) indicated on the Chain of Custody (see attached) and the results relate only to the samples analyzed. BSK certifies that the testing was performed in accordance with the quality system requirements specified in the 2009 TNI Standard. Any deviations from this standard or from the method requirements for each test procedure performed will be annotated alongside the analytical result or noted in the Case Narrative. Unless otherwise noted, the sample results are reported on an "as received" basis.

If additional clarification of any information is required, please contact your Project Manager, True Lee , at 559-497-2888.

Thanks again for using BSK Associates. We value your business and appreciate your loyalty.

Sincerely,

True Lee, Project Manager

Accredited in Accordance with NELAP
ORELAP #4021

BSK ASSOCIATES

Case Narrative

Project and Report Details		Invoice Details	
Client:	Balance Hydrologics, Inc.	**Invoice To:**	Balance Hydrologics, Inc.
Report To:	Mark Woyshner	**Invoice Attn:**	Rachel Boitano
Project #:	Springfield New Well	**Project PO#:**	-
Received:	12/21/2017 - 11:58		
Report Due:	1/23/2018		

Sample Receipt Conditions

Cooler: Default Cooler
Temperature on Receipt °C: 3.5

Containers Intact
COC/Labels Agree
Received On Blue Ice
Packing Material - Bubble Wrap
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Detailed Narrative

Chain of Custody Notes

Date: 12/22/2017
Initials: TRL
Note: Received empty bottle for EPA 531. Notified Mark and EPA 531 cancelled.

Data Qualifiers

The following qualifiers have been applied to one or more analytical results:

BS	Blank spike recoveries did not meet acceptance limits.
BS1.0	Blank spike recovery for this analyte was biased high; no material impact on reported result as sample is ND for this parameter.
CV0.0	CCV recovery was above method acceptance limits; no material impact on reported result as sample is ND for this parameter.
MS1.0	Matrix spike recoveries exceed control limits.

Report Distribution

Recipient(s)	Report Format	CC:
Gustavo Porras	FINAL.RPT	
Jason Parke	FINAL.RPT	
Mark Woyshner	FINAL.RPT	

Certificate of Analysis

Sample ID: A7L2428-01
Sampled By: Client
Sample Description: Springfield New Well #2

Sample Date - Time: 12/19/17 - 16:25
Matrix: Water
Sample Type: Grab

BSK Associates Laboratory Fresno

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Conductivity @ 25C	SM 2510B	**690**	1.0	umhos/cm	1	A716714	12/22/17	12/22/17	
Hexavalent Chromium	EPA 218.7	**6.6**	0.050	ug/L	1	A716766	12/26/17	12/26/17	
Perchlorate	EPA 314.0	ND	2.0	ug/L	1	A716909	12/29/17	12/29/17	

Radiological

Analyte	Method	Result	Units	Batch	Prepared	Analyzed	Qual
Gross Alpha	SM 7110C	**2.52**	pCi/L	A800004	01/02/18	01/03/18	
Gross Alpha 1.65 Sigma Uncertainty	SM 7110C	**0.291**	pCi/L	A800004	01/02/18	01/03/18	
Gross Alpha MDA95	SM 7110C	**1.06**	pCi/L	A800004	01/02/18	01/03/18	

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.4	ND	1.0	ug/L	1	A716839	12/27/17	01/03/18	
2,4,5-TP (Silvex)	EPA 515.4	ND	1.0	ug/L	1	A716839	12/27/17	01/03/18	
2,4-D	EPA 515.4	ND	10	ug/L	1	A716839	12/27/17	01/03/18	
Bentazon	EPA 515.4	ND	2.0	ug/L	1	A716839	12/27/17	01/03/18	
Dalapon	EPA 515.4	ND	10	ug/L	1	A716839	12/27/17	01/03/18	
Dicamba	EPA 515.4	ND	1.5	ug/L	1	A716839	12/27/17	01/03/18	
Dinoseb	EPA 515.4	ND	2.0	ug/L	1	A716839	12/27/17	01/03/18	
Pentachlorophenol	EPA 515.4	ND	0.20	ug/L	1	A716839	12/27/17	01/03/18	
Picloram	EPA 515.4	ND	1.0	ug/L	1	A716839	12/27/17	01/03/18	
Surrogate: DCPAA	EPA 515.4	94 %	*Acceptable range:*	*70-130 %*					
Volatile Organics by GC-MS									
1,1,1,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,1,1-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,1,2,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 524.2	ND	10	ug/L	1	A716740	12/22/17	12/22/17	
1,1,2-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,1-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,1-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,1-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,2,3-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,2,4-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,2,4-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,2-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,2-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,3,5-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,3-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	

Certificate of Analysis

Sample ID: A7L2428-01
Sampled By: Client
Sample Description: Springfield New Well #2

Sample Date - Time: 12/19/17 - 16:25
Matrix: Water
Sample Type: Grab

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
1,3-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
1,4-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
2,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
2-Butanone	EPA 524.2	ND	5.0	ug/L	1	A716740	12/22/17	12/22/17	
2-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
2-Hexanone	EPA 524.2	ND	10	ug/L	1	A716740	12/22/17	12/22/17	
4-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
4-Methyl-2-pentanone	EPA 524.2	ND	5.0	ug/L	1	A716740	12/22/17	12/22/17	
Acetone	EPA 524.2	ND	10	ug/L	1	A716740	12/22/17	12/22/17	
Benzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Bromobenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Bromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Bromodichloromethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Bromoform	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Bromomethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Carbon Tetrachloride	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Chlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Chloroethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Chloromethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
cis-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
cis-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Dibromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Dibromomethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Dichlorodifluoromethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Dichloromethane	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Di-isopropyl ether (DIPE)	EPA 524.2	ND	3.0	ug/L	1	A716740	12/22/17	12/22/17	
Ethyl tert-Butyl Ether (ETBE)	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Ethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Hexachlorobutadiene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Isopropylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
m,p-Xylenes	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Methyl-t-butyl ether	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Naphthalene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
n-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
n-Propylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
o-Xylene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
p-Isopropyltoluene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
sec-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Styrene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
tert-Amyl Methyl Ether (TAME)	EPA 524.2	ND	3.0	ug/L	1	A716740	12/22/17	12/22/17	
tert-Butyl alcohol (TBA)	EPA 524.2	ND	2.0	ug/L	1	A716740	12/22/17	12/22/17	
tert-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Tetrachloroethene (PCE)	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	

Certificate of Analysis

Sample ID: A7L2428-01
Sampled By: Client
Sample Description: Springfield New Well #2

Sample Date - Time: 12/19/17 - 16:25
Matrix: Water
Sample Type: Grab

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
Toluene	EPA 524.2	**0.63**	0.50	ug/L	1	A716740	12/22/17	12/22/17	
trans-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
trans-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Trichloroethene (TCE)	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	
Trichlorofluoromethane	EPA 524.2	ND	5.0	ug/L	1	A716740	12/22/17	12/22/17	
Vinyl Chloride	EPA 524.2	ND	0.50	ug/L	1	A716740	12/22/17	12/22/17	BS1.0
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.2	104 %	*Acceptable range:*	*70-130 %*					
Surrogate: Bromofluorobenzene	EPA 524.2	105 %	*Acceptable range:*	*70-130 %*					
Total 1,3-Dichloropropene		ND	0.50	ug/L					
Total Trihalomethanes		ND	0.50	ug/L					
Total Xylenes, EPA 524.2		ND	0.50	ug/L					
Semi-Volatile Organics by GC-MS									
Alachlor	EPA 525.3	ND	1.0	ug/L	1	A716710	12/21/17	12/27/17	
Atrazine	EPA 525.3	ND	0.50	ug/L	1	A716710	12/21/17	12/27/17	
Benzo(a)pyrene	EPA 525.3	ND	0.10	ug/L	1	A716710	12/21/17	12/27/17	
Bis(2-ethylhexyl) adipate	EPA 525.3	ND	3.0	ug/L	1	A716710	12/21/17	12/27/17	
Bis(2-ethylhexyl) phthalate	EPA 525.3	ND	3.0	ug/L	1	A716710	12/21/17	12/27/17	
Bromacil	EPA 525.3	ND	10	ug/L	1	A716710	12/21/17	12/27/17	
Butachlor	EPA 525.3	ND	0.38	ug/L	1	A716710	12/21/17	12/27/17	
Diazinon	EPA 525.3	ND	0.25	ug/L	1	A716710	12/21/17	12/27/17	
Dimethoate	EPA 525.3	ND	10	ug/L	1	A716710	12/21/17	12/27/17	
Metolachlor	EPA 525.3	ND	0.50	ug/L	1	A716710	12/21/17	12/27/17	
Metribuzin	EPA 525.3	ND	0.50	ug/L	1	A716710	12/21/17	12/27/17	
Molinate	EPA 525.3	ND	2.0	ug/L	1	A716710	12/21/17	12/27/17	
Propachlor	EPA 525.3	ND	0.50	ug/L	1	A716710	12/21/17	12/27/17	
Simazine	EPA 525.3	ND	1.0	ug/L	1	A716710	12/21/17	12/27/17	
Thiobencarb	EPA 525.3	ND	1.0	ug/L	1	A716710	12/21/17	12/27/17	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	EPA 525.3	108 %	*Acceptable range:*	*70-130 %*					
Surrogate: Benzo(a)pyrene-d12	EPA 525.3	123 %	*Acceptable range:*	*70-130 %*					
Surrogate: Triphenyl Phosphate	EPA 525.3	100 %	*Acceptable range:*	*70-130 %*					
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	A716758	12/22/17	12/29/17	CV0.0

BSK Associates Laboratory Fresno

General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
EPA 218.7 - Quality Control											
Batch: A716766										Prepared: 12/26/2017	
Prep Method: Method Specific Preparation										Analyst: CEG	
Blank (A716766-BLK1)											
Hexavalent Chromium	ND	0.050	ug/L							12/26/17	
Blank Spike (A716766-BS1)											
Hexavalent Chromium	0.035	0.050	ug/L	0.050		70	50-150			12/26/17	
Matrix Spike (A716766-MS1), Source: A7L2496-08											
Hexavalent Chromium	6.4	0.050	ug/L	2.0	4.6	90	85-115			12/26/17	
Matrix Spike Dup (A716766-MSD1), Source: A7L2496-08											
Hexavalent Chromium	6.4	0.050	ug/L	2.0	4.6	88	85-115	1	15	12/26/17	
EPA 314.0 - Quality Control											
Batch: A716909										Prepared: 12/28/2017	
Prep Method: Method Specific Preparation										Analyst: RES	
Blank (A716909-BLK1)											
Perchlorate	ND	2.0	ug/L							12/28/17	
Blank Spike (A716909-BS1)											
Perchlorate	16	2.0	ug/L	15		104	85-115			12/28/17	
Matrix Spike (A716909-MS1), Source: A7L2015-01RE1											
Perchlorate	6.6	2.0	ug/L	5.0	ND	99	80-120			12/28/17	
Matrix Spike Dup (A716909-MSD1), Source: A7L2015-01RE1											
Perchlorate	6.7	2.0	ug/L	5.0	ND	101	80-120	2	15	12/28/17	
SM 2510B - Quality Control											
Batch: A716714										Prepared: 12/22/2017	
Prep Method: Method Specific Preparation										Analyst: CEG	
Blank Spike (A716714-BS1)											
Conductivity @ 25C	1400	1.0	umhos/cm	1400		99	90-110			12/22/17	
Blank Spike Dup (A716714-BSD1)											
Conductivity @ 25C	1400	1.0	umhos/cm	1400		99	90-110	0	20	12/22/17	
Duplicate (A716714-DUP1), Source: A7L2456-01											
Conductivity @ 25C	590	1.0	umhos/cm		590			1	20	12/22/17	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 515.4 - Quality Control

Batch: A716839 Prepared: 12/27/2017

Prep Method: EPA 515.4 Analyst: YNV

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (A716839-BLK1)											
2,4,5-T	ND	1.0	ug/L							01/03/18	
2,4,5-TP (Silvex)	ND	1.0	ug/L							01/03/18	
2,4-D	ND	10	ug/L							01/03/18	
Bentazon	ND	2.0	ug/L							01/03/18	
Dalapon	ND	10	ug/L							01/03/18	
Dicamba	ND	1.5	ug/L							01/03/18	
Dinoseb	ND	2.0	ug/L							01/03/18	
Pentachlorophenol	ND	0.20	ug/L							01/03/18	
Picloram	ND	1.0	ug/L							01/03/18	
Surrogate: DCPAA	*35*			*36*		*97*	*70-130*			01/03/18	
Blank Spike (A716839-BS1)											
2,4,5-T	3.9	1.0	ug/L	4.0		98	70-130			01/03/18	
2,4,5-TP (Silvex)	0.83	1.0	ug/L	0.80		104	70-130			01/03/18	
2,4-D	0.41	10	ug/L	0.40		102	70-130			01/03/18	
Bentazon	7.8	2.0	ug/L	8.0		98	70-130			01/03/18	
Dalapon	4.0	10	ug/L	4.0		101	70-130			01/03/18	
Dicamba	0.79	1.5	ug/L	0.80		99	70-130			01/03/18	
Dinoseb	0.80	2.0	ug/L	0.80		100	70-130			01/03/18	
Pentachlorophenol	0.16	0.20	ug/L	0.16		100	70-130			01/03/18	
Picloram	0.37	1.0	ug/L	0.40		93	70-130			01/03/18	
Surrogate: DCPAA	*36*			*36*		*99*	*70-130*			01/03/18	
Blank Spike Dup (A716839-BSD1)											
2,4,5-T	4.0	1.0	ug/L	4.0		100	70-130	2	20	01/03/18	
2,4,5-TP (Silvex)	0.85	1.0	ug/L	0.80		106	70-130	2	20	01/03/18	
2,4-D	0.40	10	ug/L	0.40		99	70-130	3	20	01/03/18	
Bentazon	7.8	2.0	ug/L	8.0		98	70-130	0	20	01/03/18	
Dalapon	4.1	10	ug/L	4.0		103	70-130	2	20	01/03/18	
Dicamba	0.81	1.5	ug/L	0.80		101	70-130	2	20	01/03/18	
Dinoseb	0.82	2.0	ug/L	0.80		102	70-130	2	20	01/03/18	
Pentachlorophenol	0.16	0.20	ug/L	0.16		102	70-130	1	20	01/03/18	
Picloram	0.39	1.0	ug/L	0.40		98	70-130	6	20	01/03/18	
Surrogate: DCPAA	*35*			*36*		*98*	*70-130*			01/03/18	
Matrix Spike (A716839-MS1), Source: A7L2122-01											
2,4,5-T	3.4	1.0	ug/L	4.0	ND	85	70-130			01/03/18	
2,4,5-TP (Silvex)	0.69	1.0	ug/L	0.80	ND	87	70-130			01/03/18	
2,4-D	0.30	10	ug/L	0.40	ND	76	70-130			01/03/18	
Bentazon	ND	2.0	ug/L	8.0	ND	0	70-130			01/03/18	MS1.0 ***Low***
Dalapon	4.0	10	ug/L	4.0	ND	101	70-130			01/03/18	
Dicamba	0.76	1.5	ug/L	0.80	ND	95	70-130			01/03/18	
Dinoseb	0.70	2.0	ug/L	0.80	ND	87	70-130			01/03/18	
Pentachlorophenol	ND	0.20	ug/L	0.16	ND	0	70-130			01/03/18	MS1.0 ***Low***
Picloram	0.37	1.0	ug/L	0.40	ND	93	70-130			01/03/18	
Surrogate: DCPAA	*33*			*36*		*92*	*70-130*			01/03/18	

BSK Associates Laboratory Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

EPA 515.4 - Quality Control

Batch: A716839 Prepared: 12/27/2017

Prep Method: EPA 515.4 Analyst: YNV

Matrix Spike Dup (A716839-MSD1), Source: A7L2122-01

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
2,4,5-T	3.4	1.0	ug/L	4.0	ND	84	70-130	1	30	01/03/18	
2,4,5-TP (Silvex)	0.67	1.0	ug/L	0.80	ND	84	70-130	3	30	01/03/18	
2,4-D	0.29	10	ug/L	0.40	ND	72	70-130	5	30	01/03/18	
Bentazon	ND	2.0	ug/L	8.0	ND	0	70-130		30	01/03/18	MS1.0 ***Low***
Dalapon	4.0	10	ug/L	4.0	ND	100	70-130	1	30	01/03/18	
Dicamba	0.75	1.5	ug/L	0.80	ND	93	70-130	2	30	01/03/18	
Dinoseb	0.69	2.0	ug/L	0.80	ND	86	70-130	2	30	01/03/18	
Pentachlorophenol	ND	0.20	ug/L	0.16	ND	0	70-130		30	01/03/18	MS1.0 ***Low***
Picloram	0.38	1.0	ug/L	0.40	ND	96	70-130	3	30	01/03/18	
Surrogate: DCPAA	*33*			*36*		*91*	*70-130*			01/03/18	

EPA 524.2 - Quality Control

Batch: A716740 Prepared: 12/22/2017

Prep Method: EPA 524.2 Analyst: ANM

Blank (A716740-BLK1)

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
1,1,1,2-Tetrachloroethane	ND	0.50	ug/L							12/22/17	
1,1,1-Trichloroethane	ND	0.50	ug/L							12/22/17	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							12/22/17	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	10	ug/L							12/22/17	
1,1,2-Trichloroethane	ND	0.50	ug/L							12/22/17	
1,1-Dichloroethane	ND	0.50	ug/L							12/22/17	
1,1-Dichloroethene	ND	0.50	ug/L							12/22/17	
1,1-Dichloropropene	ND	0.50	ug/L							12/22/17	
1,2,3-Trichlorobenzene	ND	0.50	ug/L							12/22/17	
1,2,4-Trichlorobenzene	ND	0.50	ug/L							12/22/17	
1,2,4-Trimethylbenzene	ND	0.50	ug/L							12/22/17	
1,2-Dichlorobenzene	ND	0.50	ug/L							12/22/17	
1,2-Dichloroethane	ND	0.50	ug/L							12/22/17	
1,2-Dichloropropane	ND	0.50	ug/L							12/22/17	
1,3,5-Trimethylbenzene	ND	0.50	ug/L							12/22/17	
1,3-Dichlorobenzene	ND	0.50	ug/L							12/22/17	
1,3-Dichloropropane	ND	0.50	ug/L							12/22/17	
1,4-Dichlorobenzene	ND	0.50	ug/L							12/22/17	
2,2-Dichloropropane	ND	0.50	ug/L							12/22/17	
2-Butanone	ND	5.0	ug/L							12/22/17	
2-Chlorotoluene	ND	0.50	ug/L							12/22/17	
2-Hexanone	ND	10	ug/L							12/22/17	
4-Chlorotoluene	ND	0.50	ug/L							12/22/17	
4-Methyl-2-pentanone	ND	5.0	ug/L							12/22/17	
Acetone	ND	10	ug/L							12/22/17	
Benzene	ND	0.50	ug/L							12/22/17	
Bromobenzene	ND	0.50	ug/L							12/22/17	
Bromochloromethane	ND	0.50	ug/L							12/22/17	
Bromodichloromethane	ND	0.50	ug/L							12/22/17	
Bromoform	ND	0.50	ug/L							12/22/17	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 524.2 - Quality Control

Batch: A716740 Prepared: 12/22/2017

Prep Method: EPA 524.2 Analyst: ANM

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (A716740-BLK1)											
Bromomethane	ND	0.50	ug/L							12/22/17	
Carbon Tetrachloride	ND	0.50	ug/L							12/22/17	
Chlorobenzene	ND	0.50	ug/L							12/22/17	
Chloroethane	ND	0.50	ug/L							12/22/17	
Chloroform	ND	0.50	ug/L							12/22/17	
Chloromethane	ND	0.50	ug/L							12/22/17	
cis-1,2-Dichloroethene	ND	0.50	ug/L							12/22/17	
cis-1,3-Dichloropropene	ND	0.50	ug/L							12/22/17	
Dibromochloromethane	ND	0.50	ug/L							12/22/17	
Dibromomethane	ND	0.50	ug/L							12/22/17	
Dichlorodifluoromethane	ND	0.50	ug/L							12/22/17	
Dichloromethane	ND	0.50	ug/L							12/22/17	
Di-isopropyl ether (DIPE)	ND	3.0	ug/L							12/22/17	
Ethyl tert-Butyl Ether (ETBE)	ND	0.50	ug/L							12/22/17	
Ethylbenzene	ND	0.50	ug/L							12/22/17	
Hexachlorobutadiene	ND	0.50	ug/L							12/22/17	
Isopropylbenzene	ND	0.50	ug/L							12/22/17	
m,p-Xylenes	ND	0.50	ug/L							12/22/17	
Methyl-t-butyl ether	ND	0.50	ug/L							12/22/17	
Naphthalene	ND	0.50	ug/L							12/22/17	
n-Butylbenzene	ND	0.50	ug/L							12/22/17	
n-Propylbenzene	ND	0.50	ug/L							12/22/17	
o-Xylene	ND	0.50	ug/L							12/22/17	
p-Isopropyltoluene	ND	0.50	ug/L							12/22/17	
sec-Butylbenzene	ND	0.50	ug/L							12/22/17	
Styrene	ND	0.50	ug/L							12/22/17	
tert-Amyl Methyl Ether (TAME)	ND	3.0	ug/L							12/22/17	
tert-Butyl alcohol (TBA)	ND	2.0	ug/L							12/22/17	
tert-Butylbenzene	ND	0.50	ug/L							12/22/17	
Tetrachloroethene (PCE)	ND	0.50	ug/L							12/22/17	
Toluene	ND	0.50	ug/L							12/22/17	
trans-1,2-Dichloroethene	ND	0.50	ug/L							12/22/17	
trans-1,3-Dichloropropene	ND	0.50	ug/L							12/22/17	
Trichloroethene (TCE)	ND	0.50	ug/L							12/22/17	
Trichlorofluoromethane	ND	5.0	ug/L							12/22/17	
Vinyl Chloride	ND	0.50	ug/L							12/22/17	
Surrogate: 1,2-Dichlorobenzene-d4	*49*			*50*		*98*	*70-130*			12/22/17	
Surrogate: Bromofluorobenzene	*50*			*50*		*100*	*70-130*			12/22/17	
Blank Spike (A716740-BS1)											
1,1,1,2-Tetrachloroethane	11	0.50	ug/L	10		109	70-130			12/22/17	
1,1,1-Trichloroethane	11	0.50	ug/L	10		112	70-130			12/22/17	
1,1,2,2-Tetrachloroethane	11	0.50	ug/L	10		109	70-130			12/22/17	
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10		112	70-130			12/22/17	
1,1,2-Trichloroethane	11	0.50	ug/L	10		110	70-130			12/22/17	
1,1-Dichloroethane	11	0.50	ug/L	10		110	70-130			12/22/17	

BSK Associates Laboratory Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

EPA 524.2 - Quality Control

Batch: A716740 Prepared: 12/22/2017

Prep Method: EPA 524.2 Analyst: ANM

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank Spike (A716740-BS1)											
1,1-Dichloroethene	11	0.50	ug/L	10		111	70-130			12/22/17	
1,1-Dichloropropene	11	0.50	ug/L	10		110	70-130			12/22/17	
1,2,3-Trichlorobenzene	10	0.50	ug/L	10		101	70-130			12/22/17	
1,2,4-Trichlorobenzene	9.9	0.50	ug/L	10		99	70-130			12/22/17	
1,2,4-Trimethylbenzene	11	0.50	ug/L	10		107	70-130			12/22/17	
1,2-Dichlorobenzene	11	0.50	ug/L	10		110	70-130			12/22/17	
1,2-Dichloroethane	11	0.50	ug/L	10		108	70-130			12/22/17	
1,2-Dichloropropane	11	0.50	ug/L	10		108	70-130			12/22/17	
1,3,5-Trimethylbenzene	11	0.50	ug/L	10		108	70-130			12/22/17	
1,3-Dichlorobenzene	11	0.50	ug/L	10		109	70-130			12/22/17	
1,3-Dichloropropane	11	0.50	ug/L	10		108	70-130			12/22/17	
1,4-Dichlorobenzene	11	0.50	ug/L	10		111	70-130			12/22/17	
2,2-Dichloropropane	12	0.50	ug/L	10		119	70-130			12/22/17	
2-Butanone	11	5.0	ug/L	10		106	70-130			12/22/17	
2-Chlorotoluene	11	0.50	ug/L	10		106	70-130			12/22/17	
2-Hexanone	11	10	ug/L	10		107	70-130			12/22/17	
4-Chlorotoluene	11	0.50	ug/L	10		108	70-130			12/22/17	
4-Methyl-2-pentanone	10	5.0	ug/L	10		104	70-130			12/22/17	
Acetone	11	10	ug/L	10		106	70-130			12/22/17	
Benzene	11	0.50	ug/L	10		109	70-130			12/22/17	
Bromobenzene	11	0.50	ug/L	10		108	70-130			12/22/17	
Bromochloromethane	11	0.50	ug/L	10		107	70-130			12/22/17	
Bromodichloromethane	11	0.50	ug/L	10		109	70-130			12/22/17	
Bromoform	11	0.50	ug/L	10		109	70-130			12/22/17	
Bromomethane	11	0.50	ug/L	10		111	70-130			12/22/17	
Carbon disulfide	12	10	ug/L	10		115	70-130			12/22/17	
Carbon Tetrachloride	11	0.50	ug/L	10		114	70-130			12/22/17	
Chlorobenzene	11	0.50	ug/L	10		109	70-130			12/22/17	
Chloroethane	11	0.50	ug/L	10		109	70-130			12/22/17	
Chloroform	11	0.50	ug/L	10		110	70-130			12/22/17	
Chloromethane	11	0.50	ug/L	10		106	70-130			12/22/17	
cis-1,2-Dichloroethene	11	0.50	ug/L	10		109	70-130			12/22/17	
cis-1,3-Dichloropropene	11	0.50	ug/L	10		107	70-130			12/22/17	
Dibromochloromethane	11	0.50	ug/L	10		110	70-130			12/22/17	
Dibromomethane	11	0.50	ug/L	10		109	70-130			12/22/17	
Dichlorodifluoromethane	11	0.50	ug/L	10		113	70-130			12/22/17	
Dichloromethane	11	0.50	ug/L	10		113	70-130			12/22/17	
Di-isopropyl ether (DIPE)	10	3.0	ug/L	10		100	70-130			12/22/17	
Ethyl tert-Butyl Ether (ETBE)	9.7	0.50	ug/L	10		97	70-130			12/22/17	
Ethylbenzene	11	0.50	ug/L	10		108	70-130			12/22/17	
Hexachlorobutadiene	11	0.50	ug/L	10		111	70-130			12/22/17	
Isopropylbenzene	11	0.50	ug/L	10		109	70-130			12/22/17	
m,p-Xylenes	22	0.50	ug/L	20		110	70-130			12/22/17	
Methyl-t-butyl ether	21	0.50	ug/L	20		104	70-130			12/22/17	
Naphthalene	9.4	0.50	ug/L	10		94	70-130			12/22/17	
n-Butylbenzene	11	0.50	ug/L	10		108	70-130			12/22/17	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 524.2 - Quality Control

Batch: A716740 Prepared: 12/22/2017

Prep Method: EPA 524.2 Analyst: ANM

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual	
Blank Spike (A716740-BS1)												
n-Propylbenzene	11	0.50	ug/L	10		110	70-130			12/22/17		
o-Xylene	11	0.50	ug/L	10		114	70-130			12/22/17		
p-Isopropyltoluene	11	0.50	ug/L	10		109	70-130			12/22/17		
sec-Butylbenzene	11	0.50	ug/L	10		109	70-130			12/22/17		
Styrene	11	0.50	ug/L	10		107	70-130			12/22/17		
tert-Amyl Methyl Ether (TAME)	10	3.0	ug/L	10		101	70-130			12/22/17		
tert-Butyl alcohol (TBA)	10	2.0	ug/L	10		103	70-130			12/22/17		
tert-Butylbenzene	11	0.50	ug/L	10		109	70-130			12/22/17		
Tetrachloroethene (PCE)	11	0.50	ug/L	10		112	70-130			12/22/17		
Toluene	11	0.50	ug/L	10		108	70-130			12/22/17		
trans-1,2-Dichloroethene	11	0.50	ug/L	10		110	70-130			12/22/17		
trans-1,3-Dichloropropene	11	0.50	ug/L	10		106	70-130			12/22/17		
Trichloroethene (TCE)	11	0.50	ug/L	10		113	70-130			12/22/17		
Trichlorofluoromethane	11	5.0	ug/L	10		109	70-130			12/22/17		
Vinyl Chloride	14	0.50	ug/L	10		135	70-130			12/22/17	BS	***High***
Surrogate: 1,2-Dichlorobenzene-d4	*51*			*50*		*102*	*70-130*			12/22/17		
Surrogate: Bromofluorobenzene	*51*			*50*		*101*	*70-130*			12/22/17		
Blank Spike Dup (A716740-BSD1)												
1,1,1,2-Tetrachloroethane	11	0.50	ug/L	10		108	70-130	1	30	12/22/17		
1,1,1-Trichloroethane	11	0.50	ug/L	10		110	70-130	1	30	12/22/17		
1,1,2,2-Tetrachloroethane	11	0.50	ug/L	10		111	70-130	2	30	12/22/17		
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10		110	70-130	2	30	12/22/17		
1,1,2-Trichloroethane	11	0.50	ug/L	10		110	70-130	1	30	12/22/17		
1,1-Dichloroethane	11	0.50	ug/L	10		109	70-130	1	30	12/22/17		
1,1-Dichloroethene	11	0.50	ug/L	10		109	70-130	1	30	12/22/17		
1,1-Dichloropropene	11	0.50	ug/L	10		108	70-130	2	30	12/22/17		
1,2,3-Trichlorobenzene	10	0.50	ug/L	10		102	70-130	2	30	12/22/17		
1,2,4-Trichlorobenzene	10	0.50	ug/L	10		104	70-130	5	30	12/22/17		
1,2,4-Trimethylbenzene	11	0.50	ug/L	10		106	70-130	1	30	12/22/17		
1,2-Dichlorobenzene	11	0.50	ug/L	10		110	70-130	0	30	12/22/17		
1,2-Dichloroethane	11	0.50	ug/L	10		108	70-130	0	30	12/22/17		
1,2-Dichloropropane	11	0.50	ug/L	10		109	70-130	0	30	12/22/17		
1,3,5-Trimethylbenzene	11	0.50	ug/L	10		108	70-130	1	30	12/22/17		
1,3-Dichlorobenzene	11	0.50	ug/L	10		109	70-130	1	30	12/22/17		
1,3-Dichloropropane	11	0.50	ug/L	10		110	70-130	2	30	12/22/17		
1,4-Dichlorobenzene	11	0.50	ug/L	10		110	70-130	1	30	12/22/17		
2,2-Dichloropropane	12	0.50	ug/L	10		116	70-130	2	30	12/22/17		
2-Butanone	11	5.0	ug/L	10		106	70-130	0	30	12/22/17		
2-Chlorotoluene	11	0.50	ug/L	10		108	70-130	1	30	12/22/17		
2-Hexanone	11	10	ug/L	10		111	70-130	4	30	12/22/17		
4-Chlorotoluene	11	0.50	ug/L	10		108	70-130	0	30	12/22/17		
4-Methyl-2-pentanone	11	5.0	ug/L	10		107	70-130	3	30	12/22/17		
Acetone	11	10	ug/L	10		107	70-130	1	30	12/22/17		
Benzene	11	0.50	ug/L	10		109	70-130	0	30	12/22/17		
Bromobenzene	11	0.50	ug/L	10		109	70-130	1	30	12/22/17		

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 524.2 - Quality Control

Batch: A716740 Prepared: 12/22/2017

Prep Method: EPA 524.2 Analyst: ANM

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank Spike Dup (A716740-BSD1)											
Bromochloromethane	10	0.50	ug/L	10		102	70-130	4	30	12/22/17	
Bromodichloromethane	11	0.50	ug/L	10		109	70-130	1	30	12/22/17	
Bromoform	11	0.50	ug/L	10		109	70-130	1	30	12/22/17	
Bromomethane	11	0.50	ug/L	10		113	70-130	2	30	12/22/17	
Carbon disulfide	11	10	ug/L	10		112	70-130	2	30	12/22/17	
Carbon Tetrachloride	11	0.50	ug/L	10		112	70-130	2	30	12/22/17	
Chlorobenzene	11	0.50	ug/L	10		109	70-130	0	30	12/22/17	
Chloroethane	11	0.50	ug/L	10		108	70-130	1	30	12/22/17	
Chloroform	11	0.50	ug/L	10		109	70-130	1	30	12/22/17	
Chloromethane	11	0.50	ug/L	10		106	70-130	0	30	12/22/17	
cis-1,2-Dichloroethene	11	0.50	ug/L	10		108	70-130	1	30	12/22/17	
cis-1,3-Dichloropropene	11	0.50	ug/L	10		106	70-130	1	30	12/22/17	
Dibromochloromethane	11	0.50	ug/L	10		108	70-130	1	30	12/22/17	
Dibromomethane	11	0.50	ug/L	10		110	70-130	1	30	12/22/17	
Dichlorodifluoromethane	11	0.50	ug/L	10		111	70-130	2	30	12/22/17	
Dichloromethane	11	0.50	ug/L	10		111	70-130	2	30	12/22/17	
Di-isopropyl ether (DIPE)	9.9	3.0	ug/L	10		99	70-130	1	30	12/22/17	
Ethyl tert-Butyl Ether (ETBE)	9.9	0.50	ug/L	10		99	70-130	3	30	12/22/17	
Ethylbenzene	11	0.50	ug/L	10		107	70-130	1	30	12/22/17	
Hexachlorobutadiene	11	0.50	ug/L	10		112	70-130	1	30	12/22/17	
Isopropylbenzene	11	0.50	ug/L	10		107	70-130	2	30	12/22/17	
m,p-Xylenes	22	0.50	ug/L	20		109	70-130	1	30	12/22/17	
Methyl-t-butyl ether	21	0.50	ug/L	20		104	70-130	0	30	12/22/17	
Naphthalene	10	0.50	ug/L	10		100	70-130	6	30	12/22/17	
n-Butylbenzene	11	0.50	ug/L	10		108	70-130	0	30	12/22/17	
n-Propylbenzene	11	0.50	ug/L	10		108	70-130	2	30	12/22/17	
o-Xylene	11	0.50	ug/L	10		113	70-130	1	30	12/22/17	
p-Isopropyltoluene	11	0.50	ug/L	10		106	70-130	3	30	12/22/17	
sec-Butylbenzene	11	0.50	ug/L	10		106	70-130	2	30	12/22/17	
Styrene	11	0.50	ug/L	10		107	70-130	0	30	12/22/17	
tert-Amyl Methyl Ether (TAME)	10	3.0	ug/L	10		102	70-130	1	30	12/22/17	
tert-Butyl alcohol (TBA)	10	2.0	ug/L	10		103	70-130	0	30	12/22/17	
tert-Butylbenzene	10	0.50	ug/L	10		103	70-130	6	30	12/22/17	
Tetrachloroethene (PCE)	11	0.50	ug/L	10		110	70-130	2	30	12/22/17	
Toluene	11	0.50	ug/L	10		107	70-130	1	30	12/22/17	
trans-1,2-Dichloroethene	11	0.50	ug/L	10		109	70-130	2	30	12/22/17	
trans-1,3-Dichloropropene	11	0.50	ug/L	10		107	70-130	1	30	12/22/17	
Trichloroethene (TCE)	11	0.50	ug/L	10		115	70-130	2	30	12/22/17	
Trichlorofluoromethane	11	5.0	ug/L	10		107	70-130	1	30	12/22/17	
Vinyl Chloride	11	0.50	ug/L	10		111	70-130	20	30	12/22/17	
Surrogate: 1,2-Dichlorobenzene-d4	*51*			*50*		*102*	*70-130*			12/22/17	
Surrogate: Bromofluorobenzene	*51*			*50*		*103*	*70-130*			12/22/17	
Matrix Spike (A716740-MS1), Source: A7L2423-01											
1,1,1,2-Tetrachloroethane	10	0.50	ug/L	10	ND	103	41-156			12/23/17	
1,1,1-Trichloroethane	12	0.50	ug/L	10	ND	117	48-160			12/23/17	

ASSOCIATES

BSK Associates Laboratory Fresno
Organics Quality Control Report

EPA 524.2 - Quality Control

Batch: A716740 Prepared: 12/22/2017
Prep Method: EPA 524.2 Analyst: ANM

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Matrix Spike (A716740-MS1), Source: A7L2423-01											
1,1,2,2-Tetrachloroethane	11	0.50	ug/L	10	ND	106	42-151			12/23/17	
1,1,2-Trichloro-1,2,2-trifluoroethane	15	10	ug/L	10	ND	146	47-164			12/23/17	
1,1,2-Trichloroethane	11	0.50	ug/L	10	ND	107	45-152			12/23/17	
1,1-Dichloroethane	11	0.50	ug/L	10	ND	112	48-157			12/23/17	
1,1-Dichloroethene	12	0.50	ug/L	10	ND	125	51-158			12/23/17	
1,1-Dichloropropene	12	0.50	ug/L	10	ND	123	46-162			12/23/17	
1,2,3-Trichlorobenzene	9.6	0.50	ug/L	10	ND	96	37-145			12/23/17	
1,2,4-Trichlorobenzene	9.8	0.50	ug/L	10	ND	98	33-149			12/23/17	
1,2,4-Trimethylbenzene	11	0.50	ug/L	10	ND	107	44-146			12/23/17	
1,2-Dichlorobenzene	11	0.50	ug/L	10	ND	107	44-146			12/23/17	
1,2-Dichloroethane	11	0.50	ug/L	10	ND	106	47-151			12/23/17	
1,2-Dichloropropane	11	0.50	ug/L	10	ND	108	47-155			12/23/17	
1,3,5-Trimethylbenzene	11	0.50	ug/L	10	ND	110	45-154			12/23/17	
1,3-Dichlorobenzene	11	0.50	ug/L	10	ND	108	44-146			12/23/17	
1,3-Dichloropropane	11	0.50	ug/L	10	ND	106	45-151			12/23/17	
1,4-Dichlorobenzene	11	0.50	ug/L	10	ND	109	43-146			12/23/17	
2,2-Dichloropropane	9.6	0.50	ug/L	10	ND	96	24-182			12/23/17	
2-Butanone	9.9	5.0	ug/L	10	ND	99	55-144			12/23/17	
2-Chlorotoluene	11	0.50	ug/L	10	ND	110	48-150			12/23/17	
2-Hexanone	10	10	ug/L	10	ND	103	40-159			12/23/17	
4-Chlorotoluene	11	0.50	ug/L	10	ND	111	43-150			12/23/17	
4-Methyl-2-pentanone	9.8	5.0	ug/L	10	ND	98	30-171			12/23/17	
Acetone	9.9	10	ug/L	10	ND	99	27-181			12/23/17	
Benzene	11	0.50	ug/L	10	ND	113	48-155			12/23/17	
Bromobenzene	11	0.50	ug/L	10	ND	110	43-151			12/23/17	
Bromochloromethane	9.3	0.50	ug/L	10	ND	93	48-161			12/23/17	
Bromodichloromethane	11	0.50	ug/L	10	ND	105	47-151			12/23/17	
Bromoform	9.9	0.50	ug/L	10	ND	99	29-162			12/23/17	
Bromomethane	12	0.50	ug/L	10	ND	116	10-200			12/23/17	
Carbon disulfide	13	10	ug/L	10	ND	126	57-161			12/23/17	
Carbon Tetrachloride	12	0.50	ug/L	10	ND	124	47-163			12/23/17	
Chlorobenzene	11	0.50	ug/L	10	ND	109	46-152			12/23/17	
Chloroethane	12	0.50	ug/L	10	ND	121	28-189			12/23/17	
Chloroform	11	0.50	ug/L	10	ND	113	52-148			12/23/17	
Chloromethane	11	0.50	ug/L	10	ND	115	53-159			12/23/17	
cis-1,2-Dichloroethene	11	0.50	ug/L	10	ND	111	50-152			12/23/17	
cis-1,3-Dichloropropene	9.7	0.50	ug/L	10	ND	97	34-156			12/23/17	
Dibromochloromethane	10	0.50	ug/L	10	ND	101	44-149			12/23/17	
Dibromomethane	11	0.50	ug/L	10	ND	108	46-150			12/23/17	
Dichlorodifluoromethane	15	0.50	ug/L	10	ND	149	33-170			12/23/17	
Dichloromethane	12	0.50	ug/L	10	ND	117	47-156			12/23/17	
Di-isopropyl ether (DIPE)	9.6	3.0	ug/L	10	ND	96	41-159			12/23/17	
Ethyl tert-Butyl Ether (ETBE)	9.1	0.50	ug/L	10	ND	91	32-160			12/23/17	
Ethylbenzene	11	0.50	ug/L	10	ND	112	40-157			12/23/17	
Hexachlorobutadiene	12	0.50	ug/L	10	ND	116	38-151			12/23/17	
Isopropylbenzene	11	0.50	ug/L	10	ND	114	41-156			12/23/17	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 524.2 - Quality Control

Batch: A716740 Prepared: 12/22/2017

Prep Method: EPA 524.2 Analyst: ANM

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Matrix Spike (A716740-MS1), Source: A7L2423-01											
m,p-Xylenes	23	0.50	ug/L	20	ND	113	49-154			12/23/17	
Methyl-t-butyl ether	19	0.50	ug/L	20	ND	96	41-156			12/23/17	
Naphthalene	9.0	0.50	ug/L	10	ND	90	35-154			12/23/17	
n-Butylbenzene	11	0.50	ug/L	10	ND	114	31-153			12/23/17	
n-Propylbenzene	11	0.50	ug/L	10	ND	115	39-156			12/23/17	
o-Xylene	12	0.50	ug/L	10	ND	116	27-164			12/23/17	
p-Isopropyltoluene	11	0.50	ug/L	10	ND	115	26-161			12/23/17	
sec-Butylbenzene	12	0.50	ug/L	10	ND	116	39-154			12/23/17	
Styrene	11	0.50	ug/L	10	ND	114	10-200			12/23/17	
tert-Amyl Methyl Ether (TAME)	10	3.0	ug/L	10	ND	100	24-161			12/23/17	
tert-Butyl alcohol (TBA)	8.3	2.0	ug/L	10	ND	83	22-174			12/23/17	
tert-Butylbenzene	11	0.50	ug/L	10	ND	110	40-153			12/23/17	
Tetrachloroethene (PCE)	12	0.50	ug/L	10	ND	120	48-155			12/23/17	
Toluene	11	0.50	ug/L	10	ND	110	40-159			12/23/17	
trans-1,2-Dichloroethene	12	0.50	ug/L	10	ND	116	52-157			12/23/17	
trans-1,3-Dichloropropene	9.4	0.50	ug/L	10	ND	94	28-160			12/23/17	
Trichloroethene (TCE)	11	0.50	ug/L	10	ND	114	49-155			12/23/17	
Trichlorofluoromethane	13	5.0	ug/L	10	ND	135	47-169			12/23/17	
Vinyl Chloride	15	0.50	ug/L	10	ND	154	21-183			12/23/17	
Surrogate: 1,2-Dichlorobenzene-d4	*51*			*50*		*102*	*70-130*			12/23/17	
Surrogate: Bromofluorobenzene	*51*			*50*		*101*	*70-130*			12/23/17	

EPA 525.3 - Quality Control

Batch: A716710 Prepared: 12/21/2017

Prep Method: EPA 525.3 Analyst: JKH

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (A716710-BLK1)											
Alachlor	ND	1.0	ug/L							12/26/17	
Atrazine	ND	0.50	ug/L							12/26/17	
Benzo(a)pyrene	ND	0.10	ug/L							12/26/17	
Bis(2-ethylhexyl) adipate	ND	3.0	ug/L							12/26/17	
Bis(2-ethylhexyl) phthalate	ND	3.0	ug/L							12/26/17	
Bromacil	ND	10	ug/L							12/26/17	
Butachlor	ND	0.38	ug/L							12/26/17	
Diazinon	ND	0.25	ug/L							12/26/17	
Dimethoate	ND	10	ug/L							12/26/17	
Metolachlor	ND	0.50	ug/L							12/26/17	
Metribuzin	ND	0.50	ug/L							12/26/17	
Molinate	ND	2.0	ug/L							12/26/17	
Propachlor	ND	0.50	ug/L							12/26/17	
Simazine	ND	1.0	ug/L							12/26/17	
Thiobencarb	ND	1.0	ug/L							12/26/17	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*1.0*			*1.0*		*104*	*70-130*			12/26/17	
Surrogate: Benzo(a)pyrene-d12	*1.2*			*1.0*		*117*	*70-130*			12/26/17	
Surrogate: Triphenyl Phosphate	*1.1*			*1.0*		*110*	*70-130*			12/26/17	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 525.3 - Quality Control

Batch: A716710 Prepared: 12/21/2017

Prep Method: EPA 525.3 Analyst: JKH

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank Spike (A716710-BS1)											
Alachlor	0.98	1.0	ug/L	1.0		98	70-130			12/26/17	
Atrazine	0.52	0.50	ug/L	0.50		103	70-130			12/26/17	
Benzo(a)pyrene	0.11	0.10	ug/L	0.10		113	70-130			12/26/17	
Bis(2-ethylhexyl) adipate	1.9	3.0	ug/L	2.0		97	70-130			12/26/17	
Bis(2-ethylhexyl) phthalate	2.9	3.0	ug/L	3.0		96	70-130			12/26/17	
Bromacil	1.2	10	ug/L	1.0		116	70-130			12/26/17	
Butachlor	1.1	0.38	ug/L	1.0		108	70-130			12/26/17	
Diazinon	1.3	0.25	ug/L	1.3		103	70-130			12/26/17	
Dimethoate	1.8	10	ug/L	2.0		90	70-130			12/26/17	
Metolachlor	1.3	0.50	ug/L	1.3		106	70-130			12/26/17	
Metribuzin	1.0	0.50	ug/L	1.0		101	70-130			12/26/17	
Molinate	2.0	2.0	ug/L	2.0		102	70-130			12/26/17	
Propachlor	0.51	0.50	ug/L	0.50		101	70-130			12/26/17	
Simazine	0.38	1.0	ug/L	0.35		107	70-130			12/26/17	
Thiobencarb	0.97	1.0	ug/L	1.0		97	70-130			12/26/17	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*1.0*			*1.0*		*102*	*70-130*			12/26/17	
Surrogate: Benzo(a)pyrene-d12	*1.2*			*1.0*		*120*	*70-130*			12/26/17	
Surrogate: Triphenyl Phosphate	*1.0*			*1.0*		*103*	*70-130*			12/26/17	
Blank Spike Dup (A716710-BSD1)											
Alachlor	0.98	1.0	ug/L	1.0		98	70-130	1	30	12/26/17	
Atrazine	0.48	0.50	ug/L	0.50		96	70-130	7	30	12/26/17	
Benzo(a)pyrene	0.12	0.10	ug/L	0.10		119	70-130	5	30	12/26/17	
Bis(2-ethylhexyl) adipate	2.1	3.0	ug/L	2.0		105	70-130	8	30	12/26/17	
Bis(2-ethylhexyl) phthalate	3.3	3.0	ug/L	3.0		111	70-130	14	30	12/26/17	
Bromacil	1.1	10	ug/L	1.0		111	70-130	5	30	12/26/17	
Butachlor	1.0	0.38	ug/L	1.0		104	70-130	4	30	12/26/17	
Diazinon	1.3	0.25	ug/L	1.3		102	70-130	1	30	12/26/17	
Dimethoate	1.9	10	ug/L	2.0		94	70-130	4	30	12/26/17	
Metolachlor	1.3	0.50	ug/L	1.3		104	70-130	1	30	12/26/17	
Metribuzin	0.98	0.50	ug/L	1.0		98	70-130	3	30	12/26/17	
Molinate	2.2	2.0	ug/L	2.0		112	70-130	9	30	12/26/17	
Propachlor	0.52	0.50	ug/L	0.50		105	70-130	3	30	12/26/17	
Simazine	0.33	1.0	ug/L	0.35		94	70-130	13	30	12/26/17	
Thiobencarb	0.97	1.0	ug/L	1.0		97	70-130	1	30	12/26/17	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*1.1*			*1.0*		*110*	*70-130*			12/26/17	
Surrogate: Benzo(a)pyrene-d12	*1.3*			*1.0*		*129*	*70-130*			12/26/17	
Surrogate: Triphenyl Phosphate	*1.2*			*1.0*		*123*	*70-130*			12/26/17	
Matrix Spike (A716710-MS1), Source: A7L2241-01											
Alachlor	1.3	1.0	ug/L	1.3	ND	101	70-130			12/26/17	
Atrazine	0.66	0.50	ug/L	0.66	ND	101	70-130			12/26/17	
Benzo(a)pyrene	0.14	0.10	ug/L	0.13	ND	103	70-130			12/26/17	
Bis(2-ethylhexyl) adipate	2.3	3.0	ug/L	2.6	ND	88	70-130			12/26/17	
Bis(2-ethylhexyl) phthalate	3.6	3.0	ug/L	3.9	ND	93	70-130			12/26/17	
Bromacil	1.4	10	ug/L	1.3	ND	110	70-130			12/26/17	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 525.3 - Quality Control

Batch: A716710 Prepared: 12/21/2017

Prep Method: EPA 525.3 Analyst: JKH

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Matrix Spike (A716710-MS1), Source: A7L2241-01											
Butachlor	1.4	0.38	ug/L	1.3	ND	104	70-130			12/26/17	
Diazinon	1.6	0.25	ug/L	1.6	ND	98	70-130			12/26/17	
Dimethoate	2.3	10	ug/L	2.6	ND	86	70-130			12/26/17	
Metolachlor	1.7	0.50	ug/L	1.6	ND	102	70-130			12/26/17	
Metribuzin	1.3	0.50	ug/L	1.3	ND	97	70-130			12/26/17	
Molinate	2.7	2.0	ug/L	2.6	ND	101	70-130			12/26/17	
Propachlor	0.67	0.50	ug/L	0.66	ND	102	70-130			12/26/17	
Simazine	0.42	1.0	ug/L	0.46	ND	91	70-130			12/26/17	
Thiobencarb	1.3	1.0	ug/L	1.3	ND	96	70-130			12/26/17	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*0.88*			*0.94*		*94*	*70-130*			12/26/17	
Surrogate: Benzo(a)pyrene-d12	*1.1*			*0.94*		*120*	*70-130*			12/26/17	
Surrogate: Triphenyl Phosphate	*0.91*			*0.94*		*97*	*70-130*			12/26/17	

EPA 549.2 - Quality Control

Batch: A716758 Prepared: 12/22/2017

Prep Method: EPA 549.2 Analyst: ANM

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (A716758-BLK1)											
Diquat	ND	4.0	ug/L							12/29/17	
Blank Spike (A716758-BS1)											
Diquat	4.0	4.0	ug/L	4.0		101	70-130			12/29/17	
Blank Spike Dup (A716758-BSD1)											
Diquat	4.4	4.0	ug/L	4.0		111	70-130	9	30	12/29/17	
Matrix Spike (A716758-MS1), Source: A7L2241-01											
Diquat	4.6	4.0	ug/L	4.0	ND	115	70-130			12/29/17	
Matrix Spike (A716758-MS2), Source: A7L2254-01											
Diquat	4.4	4.0	ug/L	4.0	ND	110	70-130			12/29/17	

BSK Associates Laboratory Fresno
Radiological Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

SM 7110C - Quality Control

Batch: A800004 Prepared: 1/2/2018
Prep Method: EPA 00-02 Analyst: SAB

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (A800004-BLK1)											
Gross Alpha	ND	3	pCi/L							01/03/18	
Gross Alpha 1.65 Sigma Uncertainty	ND	0.00	pCi/L							01/03/18	
Gross Alpha MDA95	ND	0.00	pCi/L							01/03/18	
Blank Spike (A800004-BS1)											
Gross Alpha	27.7	3	pCi/L	30		92	73-127			01/03/18	
Blank Spike Dup (A800004-BSD1)											
Gross Alpha	24.2	3	pCi/L	30		81	73-127	14	50	01/03/18	
Matrix Spike (A800004-MS1), Source: A7L2300-01											
Gross Alpha	104	3	pCi/L	120	ND	86	70-130			01/03/18	
Matrix Spike Dup (A800004-MSD1), Source: A7L2300-01											
Gross Alpha	106	3	pCi/L	120	ND	88	70-130	2	50	01/03/18	

Certificate of Analysis

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected at RL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	Picocuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit		

Please see the individual Subcontract Lab's report for applicable certifications.

BSK is not accredited under the NELAP program for the following parameters:

Chlorothalonil   Trifluralin

Certifications: **Please refer to our website for a copy of our Accredited Fields of Testing under each certification.**

Fresno			
State of California - ELAP	1180	State of Hawaii	4021
State of Nevada	CA000792018-1	State of Oregon - NELAP	4021-009
EPA - UCMR4	CA00079	State of Washington	C997-17B
State of New York	12073		
Sacramento			
State of California - ELAP	2435		
San Bernardino			
State of California - ELAP	2993	State of Oregon - NELAP	4119-002
Vancouver			
State of Oregon - NELAP	WA100008-010	State of Washington	C824-17

A7L2428

12212017

Balan1000

Turnaround: Standard
Due Date: 1/8/2018

Balance Hydrologics, Inc.

Printed: 12/21/2017 2:51:20PM
Page 1 of 1

BSK ASSOCIATES

1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
☒ Standard - 10 business days
☐ Rush (Surcharge may apply)
Date needed:

A7L2428 12/21/2017
Balan1000 10
Y

*Required Fields Temp: 3.5° #45

Company/Client Name*: Balance Hyrdologics, Inc.	Report Attention*: Mark Woyshner Additional cc's: see project	Invoice To*: Rachel Boitano PO#:	Phone*: 510-704-1000 Fax: E-mail*: mwoyshner@balancehydro.com
Address*: 800 Bancroft Way Suite 101	City*: Berkeley	State*: CA Zip*: 94710-2227	
Project: Springfield New Well	Project #:	How would you like to receive your completed results?* ☒ E-Mail ☐ Fax ☐ Mail	
Reporting Options: ☐ Trace (J-Flag) ☐ Swamp ☐ EDD Type: ______	Regulatory Carbon Copies ☐ SWRCB (Drinking Water) ☐ Merced Co ☐ Fresno Co ☐ Madera Co ☐ Tulare Co ☐ Other:	Regulatory Compliance ☐ EDT to California SWRCB (Drinking Water) System Number*: ______ ☐ Geotracker #: ______	
Sampler Name (Printed/Signature)*:			

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX	Perchlorate Package, Hexavalent Chromium (Cr6)	Gross Alpha	EPA 515.4, 524.2, 525.3, 531, 549	Uranium Decision		EXT - Radium 228	Hold Analysis: Rad 226		
	Springfield New Well #2	12/19/17	16:25	WATER		X	X	X	X		X	X		
	12-21-17 SL													
	Project created - trl 11/27/17													

Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
GUSTAVO PORRAS	BALANCE HYDRO	12/20/17	13:30	12/21/17 SL	
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name)		Date	Time	Payment Received at Delivery: Check / Cash	
Steven Lytam		12-21-17	11:58	Date: Amount: PIA#: Init.	

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: ______ Custody Seal Y N
Cooling Method: Wet Blue None Chilling Process Begun: Y N B/W

Payment for services rendered as noted herein are due in full within 30 days from the date invoiced. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in BSK's current Standard Terms and Conditions for Laboratory Services. The person signing for the Client/Company acknowledges that they are either the Client or an authorized agent to the Client, that the Client agrees to be responsible for payment for the services on this Chain of Custody, and agrees to BSK's terms and conditions for laboratory services unless contractually bound otherwise. BSK's current terms and conditions can be found at www.bskassociates.com/BSKLabTermsConditions.pdf

SR-FL-0012-07

3.5° #TS

A7L2428 12/21/2017
Balan1000 10

BSK Associates SR-FL-0002-18

Sample Integrity

BSK Bottles: Yes No Page 1 of 1

COC Info

Was temperature within range? Chemistry **≤ 6°C** Micro **< 8°C**	Yes No NA	Were correct containers and preservatives received for the tests requested?	Yes No NA
If samples were taken today, is there evidence that chilling has begun?	Yes No NA	Were there bubbles in the VOA vials? **(Volatiles Only)**	Yes No NA
Did all bottles arrive unbroken and intact?	Yes No	Was a sufficient amount of sample received?	Yes No
Did all bottle labels agree with COC?	Yes No	Do samples have a hold time <72 hours?	Yes No
Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes No NA	Was PM notified of discrepancies? PM: Adam By/Time: Steve 12:15	Yes No NA

Bottles Received

"—" means preservation/chlorine checks are either N/A or are performed in the lab

250ml(A) 500ml(B) 1Liter(C) 40ml VOA(V)	Checks	Passed?	1				
Bacti $Na_2S_2O_3$	—	—					
None (P) White Cap	—	—	1B				
Cr6 (P) Lt. Green Label/Blue Cap $NH_4OH(NH_4)_2SO_4$ DW	Cl, pH > 8	Y N	1A				
Cr6 (P) Pink Label/Blue Cap $NH_4OH(NH_4)_2SO_4$ WW	pH 9.3-9.7	Y N	~~1A~~ SL				
Cr6 (P) Black Label/Blue Cap $NH_4OH(NH_4)_2SO_4$ 7199 ***24 HOUR HOLD TIME***	pH 9.0-9.5	Y N					
HNO_3 (P) Red Cap or HCl (P) Purple Cap/Lt. Blue Label	—	—	4C, 1B				
H_2SO_4 (P) or (AG) Yellow Cap/Label	pH < 2	Y N		12/21/17			
NaOH (P) Green Cap	Cl, pH >10	Y N					
NaOH + ZnAc (P)	pH > 9	Y N			SL		
Dissolved Oxygen 300ml (g)	—	—					
None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	—	—					
HCl (AG) Lt. Blue Label O&G, Diesel	—	—					
Ascorbic, EDTA, KH_2Ct (AG) Pink Label 525	—	—	2C				
Na_2SO_3 250mL (AG) Neon Green Label 515	—	—	1A				
$Na_2S_2O_3$ 1 Liter (Brown P) 549	—	—	1C				
$Na_2S_2O_3$ (AG) Blue Label 548, THM, 524	—	—					
$Na_2S_2O_3$ (CG) Blue Label 504, 505, 547	—	—					
$Na_2S_2O_3$ + MCAA (CG) Orange Label 531	pH < 3	Y N	~~1V~~ SL				
NH_4Cl (AG) Purple Label 552	—	—					
EDA (AG) Brown Label DBPs	—	—					
HCL (CG) 524.2, BTEX, Gas, MTBE, 8260/624	—	—	3V				
Buffer pH 4 (CG)	—	—					
H_3PO_4 (CG) Salmon Label	—	—					
Other:							
Asbestos 1Liter Plastic w/ Foil	—	—					
Low Level Hg / Metals Double Baggie	—	—					
Bottled Water	—	—					
Clear Glass 250mL / 500mL / 1 Liter	—	—					
Soil Tube Brass / Steel / Plastic	—	—					
Tedlar Bag / Plastic Bag	—	—					

Split

	Container	Preservative	Date/Time/Initials		Container	Preservative	Date/Time/Initials
S P				S P			
S P				S P			

Comments

531 bottle V received empty

* Cancel EPA 531 vial due to no volume. Mark Woysher notified and will resample. MM 12-21-17

Labeled by: MM @ 1312 Labels checked by: MP @ 1337 RUSH Paged by:________@________

External

A7L2428

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

January 22, 2018

True Lee
BSK Associates
1414 Stanislaus Street
Fresno, CA 93706

RE: Project: A7L2428
Pace Project No.: 30240447

Dear True Lee:

Enclosed are the analytical results for sample(s) received by the laboratory on January 09, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Revision 1: This report replaces the January 10, 2018 report. Report reissued January 21, 2018 to reflect the correction of the WO and Sample ID.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jacquelyn Collins
jacquelyn.collins@pacelabs.com
(724)850-5612
Project Manager

Enclosures

cc: Ms. Brittney Cornejo, BSK Associates

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: A7L2428
Pace Project No.: 30240447

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
L-A-B DOD-ELAP Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH-0694
Delaware Certification
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana DHH/TNI Certification #: LA140008
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: PA00091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nebraska Certification #: NE-05-29-14
Nevada Certification #: PA014572015-1
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188-14-8
Utah/TNI Certification #: PA014572015-5
USDA Soil Permit #: P330-14-00213
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Certification
Wyoming Certification #: 8TMS-L

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: A7L2428
Pace Project No.: 30240447

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30240447001	**A7L2428-01**	Drinking Water	12/19/17 16:25	01/09/18 10:45

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: A7L2428
Pace Project No.: 30240447

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30240447001	**A7L2428-01**	EPA 904.0	JLW	1	PASI-PA

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Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: A7L2428
Pace Project No.: 30240447

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: BSK Associates
Date: January 22, 2018

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2 3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: A7L2428
Pace Project No.: 30240447

Sample: A7L2428-01 **Lab ID: 30240447001** Collected: 12/19/17 16:25 Received: 01/09/18 10:45 Matrix: Drinking Water
PWS: Site ID: Sample Type:

Comments: • The sampler's name and signature were not listed on the COC.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-228	EPA 904.0	**0.549 ± 0.322 (0.616)** **C:81% T:82%**	pCi/L	01/17/18 11:55	15262-20-1	

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL - RADIOCHEMISTRY

Project: A7L2428
Pace Project No.: 30240447

QC Batch: 284604 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 30240447001

METHOD BLANK: 1396192 Matrix: Water
Associated Lab Samples: 30240447001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.107 ± 0.296 (0.663) C:80% T:86%	pCi/L	01/17/18 11:54	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: A7L2428
Pace Project No.: 30240447

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval). Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

WO#:30240447

SUBCONTRACT ORDER

A7L2428

30240447

ASSOCIATES

SENDING LABORATORY:

BSK Associates Laboratory Fresno
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: True Lee
E-mail: tlee@bskassociates.com

RECEIVING LABORATORY:

Pace Analytical-Radiochem
1638 Roseytown Rd Ste 2,3,4
Greensburg, PA 15601
Phone :(724) 850-5600
Fax: (724) 722-5208
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc	Comments	Sample Date
A7L2428-01	Springfield New Well #2	Client Matrix Water	12/19/2017 16:25 001
Lab Matrix:	Water		
	Analysis: (2) 1 L P HNO3		
	EXT-Radium 226-DW Matrix	Please HOLD RAD 226 until further notice.	
	EXT-Radium 228-DW Matrix		

Analyze Radium 228 only.
* Please Contact True with Preliminary results.
* Hold for Radium 226. —True 12/22/17

Released By	Date	Received By	Date
[signature]	1-2-18	Michael L	1-9-18 1045
Released By	Date	Received By	Date

Page 1 of 1

Pittsburgh Lab Sample Condition Upon Receipt

Pace Analytical

Client Name: BSK

Project # 3024044 7

Courier: ☐ Fed Ex ☒ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #: 1Z 93X 921 037049 1548

Label	7u
LIMS Login	BLM

Custody Seal on Cooler/Box Present: ☐ yes ☒ no   Seals intact: ☐ yes ☐ no

Thermometer Used 6   Type of Ice: Wet Blue None

Cooler Temperature   Observed Temp 1.6 °C   Correction Factor: 0.0 °C   Final Temp: 1.6 °C

Temp should be above freezing to 6°C

Date and Initials of person examining contents: MC 1-9-18

Comments:	Yes	No	N/A	
Chain of Custody Present:	X			1.
Chain of Custody Filled Out:	X			2.
Chain of Custody Relinquished:	X			3
Sampler Name & Signature on COC:		X		4
Sample Labels match COC:	X			5.
-Includes date/time/ID Matrix: WT				
Samples Arrived within Hold Time:	X			6.
Short Hold Time Analysis (<72hr remaining):		X		7.
Rush Turn Around Time Requested:		X		8.
Sufficient Volume:	X			9.
Correct Containers Used:	X			10.
-Pace Containers Used:	X			
Containers Intact:	X			11.
Orthophosphate field filtered			X	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			X	13.
Organic Samples checked for dechlorination:			X	14.
Filtered volume received for Dissolved tests			X	15.
All containers have been checked for preservation.	X			16. pH < 2
All containers needing preservation are found to be in compliance with EPA recommendation.	X			
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed MC · Date/time of preservation · Lot # of added preservative
Headspace in VOA Vials (>6mm):			X	17.
Trip Blank Present:		X		18.
Trip Blank Custody Seals Present			X	
Rad Aqueous Samples Screened > 0.5 mrem/hr		X		Initial when completed: MC · Date: 1-9-18

Client Notification/ Resolution:

Person Contacted: ______ Date/Time: ______ Contacted By: ______

Comments/ Resolution: ______

☐ A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen

BSK Associates Laboratory Fresno
1414 Stanislaus St
Fresno, CA 93706
559-497-2888 (Main)
559-485-6935 (FAX)

A8B2807
3/12/2018
Invoice: A805351

Mark Woyshner
Balance Hydrologics, Inc.
800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227

RE: Report for A8B2807 General Chemistry

Dear Mark Woyshner,

Thank you for using BSK Associates for your analytical testing needs. In the following pages, you will find the test results for the samples submitted to our laboratory on 2/26/2018. The results have been approved for release by our Laboratory Director as indicated by the authorizing signature below.

The samples were analyzed for the test(s) indicated on the Chain of Custody (see attached) and the results relate only to the samples analyzed. BSK certifies that the testing was performed in accordance with the quality system requirements specified in the 2009 TNI Standard. Any deviations from this standard or from the method requirements for each test procedure performed will be annotated alongside the analytical result or noted in the Case Narrative. Unless otherwise noted, the sample results are reported on an “as received” basis.

If additional clarification of any information is required, please contact your Project Manager, True Lee , at 559-497-2888.

Thank you again for using BSK Associates. We value your business and appreciate your loyalty.

Sincerely,

True Lee, Project Manager

Accredited in Accordance with NELAP
ORELAP #4021-009

BSK ASSOCIATES

Case Narrative

Project and Report Details		Invoice Details	
Client:	Balance Hydrologics, Inc.	**Invoice To:**	Balance Hydrologics, Inc.
Report To:	Mark Woyshner	**Invoice Attn:**	Rachel Boitano
Project #:	Springfield New Well - #215021	**Project PO#:**	-
Received:	2/26/2018 - 13:02		
Report Due:	3/12/2018		

Sample Receipt Conditions

Cooler: Default Cooler

Temperature on Receipt °C: 5.8

Containers Intact
COC/Labels Agree
Preservation Confirmed
Received On Blue Ice
Packing Material - Other
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Data Qualifiers

The following qualifiers have been applied to one or more analytical results:

None applied

Report Distribution

Recipient(s)	Report Format	CC:
Gustavo Porras	FINAL.RPT	
Jason Parke	FINAL.RPT	
Mark Woyshner	FINAL.RPT	

Certificate of Analysis

Sample ID: A8B2807-01
Sampled By: Gustavo Porras
Sample Description: Springfield New Well

Sample Date - Time: 02/21/18 - 18:37
Matrix: Ground Water
Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	A802824	03/01/18	03/02/18	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	A802824	03/01/18	03/02/18	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	A802824	03/01/18	03/02/18	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	A802824	03/01/18	03/02/18	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	A802824	03/01/18	03/02/18	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	A802824	03/01/18	03/02/18	
Methomyl	EPA 531.1	ND	2.0	ug/L	1	A802824	03/01/18	03/02/18	
Oxamyl	EPA 531.1	ND	20	ug/L	1	A802824	03/01/18	03/02/18	

BSK Associates Laboratory Fresno
Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

EPA 531.1 - Quality Control

Batch: A802824 — Prepared: 3/1/2018

Prep Method: EPA 531.1 — Analyst: PNN

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (A802824-BLK1)											
3-Hydroxycarbofuran	ND	3.0	ug/L							03/02/18	
Aldicarb	ND	3.0	ug/L							03/02/18	
Aldicarb Sulfone	ND	2.0	ug/L							03/02/18	
Aldicarb Sulfoxide	ND	3.0	ug/L							03/02/18	
Carbaryl	ND	5.0	ug/L							03/02/18	
Carbofuran	ND	5.0	ug/L							03/02/18	
Methomyl	ND	2.0	ug/L							03/02/18	
Oxamyl	ND	20	ug/L							03/02/18	
Blank Spike (A802824-BS1)											
3-Hydroxycarbofuran	4.3	3.0	ug/L	4.3		99	80-120			03/02/18	
Aldicarb	4.7	3.0	ug/L	4.3		107	80-120			03/02/18	
Aldicarb Sulfone	4.2	2.0	ug/L	4.3		97	80-120			03/02/18	
Aldicarb Sulfoxide	4.3	3.0	ug/L	4.3		98	80-120			03/02/18	
Carbaryl	4.4	5.0	ug/L	4.3		101	80-120			03/02/18	
Carbofuran	4.4	5.0	ug/L	4.3		100	80-120			03/02/18	
Methomyl	4.2	2.0	ug/L	4.3		97	80-120			03/02/18	
Oxamyl	4.2	20	ug/L	4.3		98	80-120			03/02/18	
Blank Spike Dup (A802824-BSD1)											
3-Hydroxycarbofuran	4.5	3.0	ug/L	4.3		104	80-120	5	20	03/02/18	
Aldicarb	4.6	3.0	ug/L	4.3		106	80-120	1	20	03/02/18	
Aldicarb Sulfone	4.4	2.0	ug/L	4.3		102	80-120	5	20	03/02/18	
Aldicarb Sulfoxide	4.5	3.0	ug/L	4.3		102	80-120	5	20	03/02/18	
Carbaryl	4.4	5.0	ug/L	4.3		101	80-120	0	20	03/02/18	
Carbofuran	4.4	5.0	ug/L	4.3		102	80-120	1	20	03/02/18	
Methomyl	4.4	2.0	ug/L	4.3		101	80-120	4	20	03/02/18	
Oxamyl	4.4	20	ug/L	4.3		101	80-120	3	20	03/02/18	
Matrix Spike (A802824-MS1), Source: A8B2577-08											
3-Hydroxycarbofuran	4.3	3.0	ug/L	4.3	ND	99	65-135			03/02/18	
Aldicarb	4.3	3.0	ug/L	4.3	ND	100	65-135			03/02/18	
Aldicarb Sulfone	4.4	2.0	ug/L	4.3	ND	101	65-135			03/02/18	
Aldicarb Sulfoxide	4.4	3.0	ug/L	4.3	ND	101	65-135			03/02/18	
Carbaryl	4.3	5.0	ug/L	4.3	ND	99	65-135			03/02/18	
Carbofuran	4.4	5.0	ug/L	4.3	ND	101	65-135			03/02/18	
Methomyl	4.2	2.0	ug/L	4.3	ND	96	65-135			03/02/18	
Oxamyl	4.4	20	ug/L	4.3	ND	101	65-135			03/02/18	

Certificate of Analysis

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected at RL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	PicoCuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit		

Please see the individual Subcontract Lab's report for applicable certifications.

BSK is not accredited under the NELAP program for the following parameters: **NA**

Certifications: **Please refer to our website for a copy of our Accredited Fields of Testing under each certification.**

Fresno

EPA - UCMR4	CA00079	NELAP certified	4021-010	State of California - ELAP	1180
State of Hawaii	4021	State of Nevada	CA000792018-1	State of New York	12073
State of Oregon - NELAP	4021-010	State of Washington	C997-17b		

Sacramento

State of California - ELAP	2435

San Bernardino

NELAP certified	4119-002	State of California - ELAP	2993	State of Oregon - NELAP	4119-002

Vancouver

NELAP certified	WA100008-010	State of Oregon - NELAP	WA100008-010	State of Washington	C824-17

A8B2807

02262018

Balan1000

Turnaround: Standard
Due Date: 3/12/2018

Balance Hydrologics, Inc.

BSK ASSOCIATES

1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
- ☒ Standard - 10 business days
- ☐ Rush (Surcharge may apply)
- Date needed:

02/26/2018
Balan1000 10

*Required Fields

Temp: 5.8°#4

Company/Client Name*: Balance Hydrologics, Inc.

Report Attention*: Mark Woyshner
Additional cc's: see project

Invoice To*: Rachel Boitano
PO#:

Phone*: (510) 704-1000 x 209
Fax:
E-mail*: mwoyshner@balancehydro.com

Address*: 800 Bancroft Way, Suite 101
City*: Berkeley
State*: CA
Zip*: 94710-2227

Project: Springfield New Well
Project #: 215021

How would you like to receive your completed results?* ☒ E-Mail ☐ Fax ☐ Mail

Reporting Options: ☐ Trace (J-Flag) ☐ Swamp ☐ EDD Type: ________

Regulatory Carbon Copies: ☐ SWRCB (Drinking Water) ☐ Merced Co ☐ Fresno Co ☐ Madera Co ☐ Tulare Co ☐ Other: ________

Regulatory Compliance: ☐ EDT to California SWRCB (Drinking Water) System Number*: ________ ☐ Geotracker #: ________

Sampler Name (Printed/Signature)*: Gustavo Porras

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX	EPA 531
1	Springfield New Well	2/21/18	18:37	GW		X

2/26/18
SC

Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Gustavo Porras	Balance Hydrologics	2/23/18	12:00	2/26/18	SC

Received for Lab by: (Signature and Printed Name) Date: 2/26/18 Time: 13:02

Payment Received at Delivery: Check / Cash
Date: Amount: PIA#: Init.

Shipping Method: ONTRAC UPS GSO WALK-IN **FED EX** Courier: ________

Custody Seal: Y / (N)

Cooling Method: Wet **Blue** None

Chilling Process Begun: (Y) / N

BSK Associates SR-FL-0002-18

Sample Integrity

BSK Bottles: Yes No Page 1 of 1

COC Info	Was temperature within range? Chemistry ≤ 6°C Micro < 8°C	Yes No NA	Were correct containers and preservatives received for the tests requested?	Yes No NA
	If samples were taken today, is there evidence that chilling has begun?	Yes No NA	Were there bubbles in the VOA vials? (Volatiles Only)	Yes No NA
	Did all bottles arrive unbroken and intact?	Yes No	Was a sufficient amount of sample received?	Yes No
	Did all bottle labels agree with COC?	Yes No	Do samples have a hold time <72 hours?	Yes No
	Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes No NA	Was PM notified of discrepancies? PM: By/Time:	Yes No NA

Bottles Received — "–" means preservation/chlorine checks are either N/A or are performed in the lab

250ml(A) 500ml(B) 1Liter(C) 40ml VOA(V)	Checks	Passed?	1				
Bacti $Na_2S_2O_3$	—	—					
None (P) White Cap	—	—					
Cr6 (P) Lt. Green Label/Blue Cap NH4OH(NH4)2SO4 DW	Cl, pH > 8	Y N					
Cr6 (P) Pink Label/Blue Cap NH4OH(NH4)2SO4 WW	pH 9.3-9.7	Y N					
Cr6 (P) Black Label/Blue Cap NH4OH(NH4)2SO4 7199 ***24 HOUR HOLD TIME***	pH 9.0-9.5	Y N					
HNO_3 (P) Red Cap or HCl (P) Purple Cap/Lt. Blue Label	—	—					
H_2SO_4 (P) or (AG) Yellow Cap/Label	pH < 2	Y N					
NaOH (P) Green Cap	Cl, pH >10	Y N					
NaOH + ZnAc (P)	pH > 9	Y N					
Dissolved Oxygen 300ml (g)	—	—					
None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	—	—					
HCl (AG) Lt. Blue Label O&G, Diesel	—	—					
Ascorbic, EDTA, KH_2Ct (AG) Pink Label 525	—	—					
Na_2SO_3 250mL (AG) Neon Green Label 515	—	—					
$Na_2S_2O_3$ 1 Liter (Brown P) 549	—	—					
$Na_2S_2O_3$ (AG) Blue Label 548, THM, 524	—	—					
$Na_2S_2O_3$ (CG) Blue Label 504, 505, 547	—	—					
$Na_2S_2O_3$ + MCAA (CG) Orange Label 531	pH < 3	Y N	1V		2/26/18 SC		
NH_4Cl (AG) Purple Label 552	—	—					
EDA (AG) Brown Label DBPs	—	—					
HCL (CG) 524.2,BTEX,Gas, MTBE, 8260/624	—	—					
Buffer pH 4 (CG)	—	—					
H_3PO_4 (CG) Salmon Label	—	—					
Other:							
Asbestos 1Liter Plastic w/ Foil	—	—					
Low Level Hg / Metals Double Baggie	—	—					
Bottled Water	—	—					
Clear Glass 250mL / 500mL / 1 Liter	—	—					
Soil Tube Brass / Steel / Plastic	—	—					
Tedlar Bag / Plastic Bag	—	—					

Split

	Container	Preservative	Date/Time/Initials		Container	Preservative	Date/Time/Initials
S P				S P			
S P				S P			

Comments

Labeled by: SC @ 1410 Labels checked by: [illegible] @ 1513 RUSH Paged by:_______@_______

APPENDIX H

Observers' Log

Appendix H. Groundwater monitoring observations, Springfield Well No. 2, Pajaro / Sunny Mesa CSD, Monterey County, CA

Site Conditions			Water Level		Water Quality Observations				Remarks
Time Zone (PST/PDT)	Date/Time (2004-4)	Observer(s) (see notes)	Depth to Water (feet)	WSE (ft amsl)	Water Temperature (°C)	Specific Conductance at field temp. (µmhos/cm)	Specific Conductance at 25C (at 25 °C)	Samples (see notes)	

Springfield Well No. 2

Reference point elevation (ft amsl) = 143.80
Stickup (feet) = 1.80
Ground surface elevation (ft amsl) = 142.00
Depth of well from ground surface (feet) = 600.00

Latitude (WGS84) = N 36°50'16.59"
Longitude (WGS84) = W 121°46'7.19"
Depth to 60HP pump (feet) = 380

PST	11/6/17 12:00	gp							Drilling of Springfield well No. 2 begins with mud-rotary rig.
PST	11/8/17 16:00	gp							Total depth of well is reached. Borehole was E-logged by Newman (330 to 615 feet)
PST	11/16/17 12:00	gp							Casing installed in borehole.
PST	11/17/18 14:00	gp							Monterey County inspector observed placement of cement sanitary seal in well.
PST	12/8/17 10:42	mw	146.60	-2.80					Diver 100m BSN 3019 installed at a depth of 400 ft
PST	12/8/17 11:05	mw	146.90	-3.10					
PST	12/19/17 9:00	gp	148.20	-4.40					
PST	12/19/17 10:24	gp	146.30	-2.50					Static water level
PST	12/19/17 10:35	gp	146.30	-2.50					Pumping begins
PST	12/19/17 10:35	gp	182.00	-38.20					
PST	12/19/17 10:36	gp	187.95	-44.15					Flow rate: 430 gpm
PST	12/19/17 10:37	gp	184.20	-40.40					
PST	12/19/17 10:39	gp	180.75	-36.95					Flow rate: 350 gpm
PST	12/19/17 10:42	gp	178.87	-35.07					Flow rate: 330 gpm
PST	12/19/17 10:45	gp	179.00	-35.20					Flow rate: 328.5 gpm
PST	12/19/17 10:55	gp	179.32	-35.52					Flow rate: 328 gpm
PST	12/19/17 11:03	gp	179.45	-35.65					Flow rate: 328 gpm
PST	12/19/17 11:19	gp	179.61	-35.81					Flow rate: 328 gpm
PST	12/19/17 11:35	gp	179.76	-35.96					Flow rate: 328.3 gpm
PST	12/19/17 11:44	gp	179.92	-36.12					
PST	12/19/17 12:15	gp	180.20	-36.40					Flow rate: 327 gpm
PST	12/19/17 12:45	gp	180.41	-36.61					
PST	12/19/17 13:44	gp	181.02	-37.22					
PST	12/19/17 13:45	gp	181.02	-37.22					
PST	12/19/17 13:45	gp	191.70	-47.90					
PST	12/19/17 13:46	gp	192.46	-48.66					Flow rate: 425 gpm
PST	12/19/17 13:47	gp	192.63	-48.83					
PST	12/19/17 13:49	gp	192.86	-49.06					Flow rate: 426.3 gpm
PST	12/19/17 13:53	gp	192.96	-49.16					Flow rate: 426.6 gpm

PST	12/19/17 14:00	gp	193.72	-49.92						Flow rate: 425.5 gpm
PST	12/19/17 14:50	gp	194.18	-50.38						
PST	12/19/17 15:11	gp	194.45	-50.65						Flow rate: 425.4 gpm
PST	12/19/17 15:35	gp	194.75	-50.95	22.0	657	695			Flow rate: 423.9 gpm
PST	12/19/17 16:00	gp	194.96	-51.16						Flow rate: 424.7 gpm
PST	12/19/17 16:35	gp	195.19	-51.39						Flow rate: 425.2 gpm
PST	12/19/17 18:00	gp							yes	Water quality/age dating samples collected
PST	12/19/17 18:15	gp								Pumping stops
PST	12/20/17 10:40	gp	145.50	-1.70						Diver logger demobed
PST	2/15/18 19:48	gp	144.67	-0.87						Diver logger re-installed
PST	2/20/18 16:07	gp	144.52	-0.72						
PST	2/20/18 16:48	gp	144.52	-0.72						Start pumping
PST	2/20/18 17:50	gp	179.45	-35.65						Pumping ends
PST	2/21/18 9:33	gp	143.33	0.47						Static WL
PST	2/21/18 9:40	gp	143.33	0.47						Static WL. Pumping starts. Flow meter 95571800 gal
PST	2/21/18 9:40	gp	156.10	-12.30						
PST	2/21/18 9:41	gp	181.10	-37.30						
PST	2/21/18 9:42	gp	181.54	-37.74						
PST	2/21/18 9:44	gp	182.00	-38.20						
PST	2/21/18 9:52	gp	182.60	-38.80						
PST	2/21/18 9:56	gp	182.85	-39.05						
PST	2/21/18 10:10	gp	183.20	-39.40						
PST	2/21/18 10:40	gp	183.68	-39.88						
PST	2/21/18 11:47	gp	184.56	-40.76	22.3	651	688			
PST	2/21/18 12:40	gp	185.19	-41.39	22.5	659	693			
PST	2/21/18 13:40	gp	185.62	-41.82	22.5	659	691			
PST	2/21/18 14:40	gp	186.11	-42.31						
PST	2/21/18 15:40	gp	186.39	-42.59						
PST	2/21/18 17:13	gp	186.68	-42.88						
PST	2/21/18 18:30	gp	186.57	-42.77	22.1	648	686			WQ sample taken at 18:37
PST	2/21/18 18:40	gp	186.50	-42.70						Pumping stops; Recovery begins; Flow meter 95784700 gal
PST	2/21/18 18:40	gp	143.18	0.62						
PST	2/21/18 18:41	gp	147.68	-3.88						
PST	2/21/18 18:42	gp	147.52	-3.72						
PST	2/21/18 18:44	gp	147.12	-3.32						
PST	2/21/18 18:48	gp	146.70	-2.90						
PST	2/21/18 19:00	gp	146.35	-2.55						
PST	2/21/18 19:10	gp	146.18	-2.38						
PST	2/22/18 8:44	gp	143.69	0.11						Diver logger demobed

School Well (PVWMA 992)

Reference point elevation (ft amsl) = 137.00
Stickup (feet) = 1.00
Ground surface elevation (ft amsl) = 136.00
Depth of well from ground surface (feet) =

Latitude (WGS84) = N 36°50'9.63"
Longitude (WGS84) = W 121°46'6.68"

PST	12/8/17 8:40	mw	136.55	0.45					Diver 50m BSN 3123 installed
PST	12/8/17 11:20	mw	136.50	0.50					
PST	12/19/17 10:10	gp	136.40	0.60					Diver logger demobed
PST	2/15/18 17:48	gp	134.19	2.81					Diver logger re-installed
PST	2/20/18 16:20	gp	134.21	2.79					
PST	2/21/18 18:10	gp	134.05	2.95					
PST	2/22/18 11:35	gp	134.18	2.82					Diver logger demobed

Hawkins Well

Reference point elevation (ft amsl) = 137.69
Stickup (feet) = 0.69
Ground surface elevation (ft amsl) = 137.00
Depth of well from ground surface (feet) =

Latitude (WGS84) = N 36° 50' 18.18"
Longitude (WGS84) = W 121° 46' 12.26"

PST	12/19/17 9:39	gp	140.00	-2.31					Diver logger installed and demobed at the end of the day
PST	2/15/18 16:25	gp	137.80	-0.11					Diver logger installed
PST	2/20/18 16:33	gp	137.75	-0.06					
PST	2/21/18 9:16	gp	137.71	-0.02					
PST	2/21/18 17:56	gp	137.45	0.24					
PST	2/22/18 12:17	gp	137.76	-0.07					Diver logger demobed

Rocha Well ("Mini Joto" well)

Reference point elevation (ft amsl) = 125.00
Stickup (feet) = 0.00
Ground surface elevation (ft amsl) = 125.00
Depth of well from ground surface (feet) = unknown
Depth to Diver from RP (feet) = 300.00

Latitude (WGS84) = N 36° 50' 17.5"
Longitude (WGS84) = W 121° 45' 48.7"

PST	2/15/18 15:42	gp	208.30	-83.30					Diver logger installed
PST	2/20/18 16:42	gp	128.00	-3.00					
PST	2/21/18 8:51	gp	125.05	-0.05					
PST	2/21/18 8:55	gp							Rocha well starts pumping; Q~900 gpm
PST	2/21/18 17:37	gp	210.77	-85.77					
PST	2/21/18 17:40	gp							
PST	2/22/18 9:10	gp	125.41	-0.41					Rocha well stops pumping; Diver logger demobed

Notes:
1) gp = Gustavo Porras, mw = Mark Woyshner
2) NR is not recorded
3) NA or "-" is not applicable
4) Abbreviations: SCT = specific conductance and temperature; DL = datalogger; PT = pressure transducer;

APPENDIX I

Groundwater Contours
(Fugro, 1995, Hanson and Others, 2014, and Feeney, 2016)

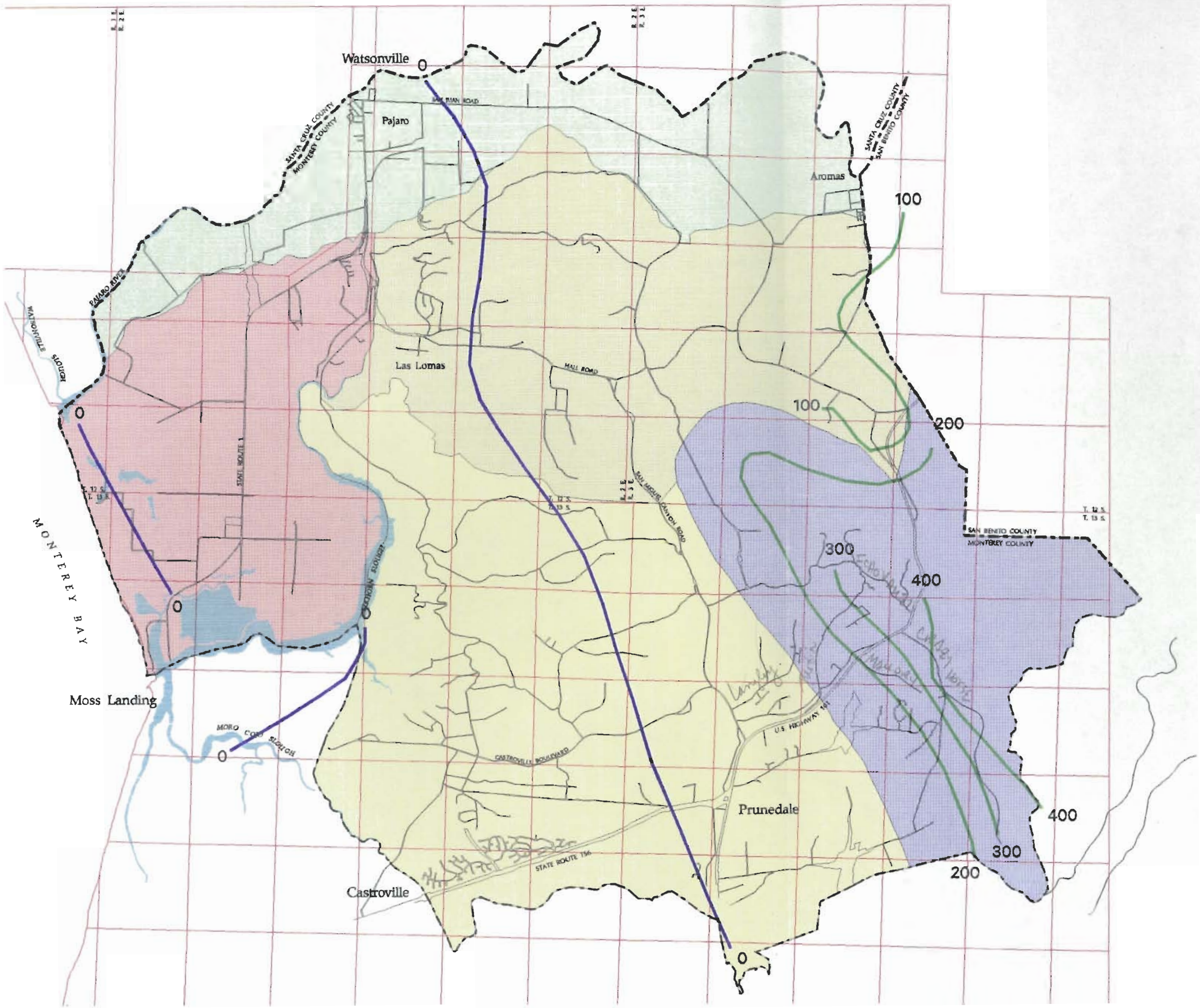


Figure 13

1979 WATER LEVELS

- Pajaro
- Springfield Terrace
- Granite Ridge
- Highlands North
- Highlands South
- Water Surface - Below Sea Level
- Water Surface - Sea Level
- Water Surface - Above Sea Level
- Study Area Boundary
- County Line
- Township and Range Grid

MILES

0 1.25 2.5

Source: USGS

North Monterey County Hydrogeologic Study

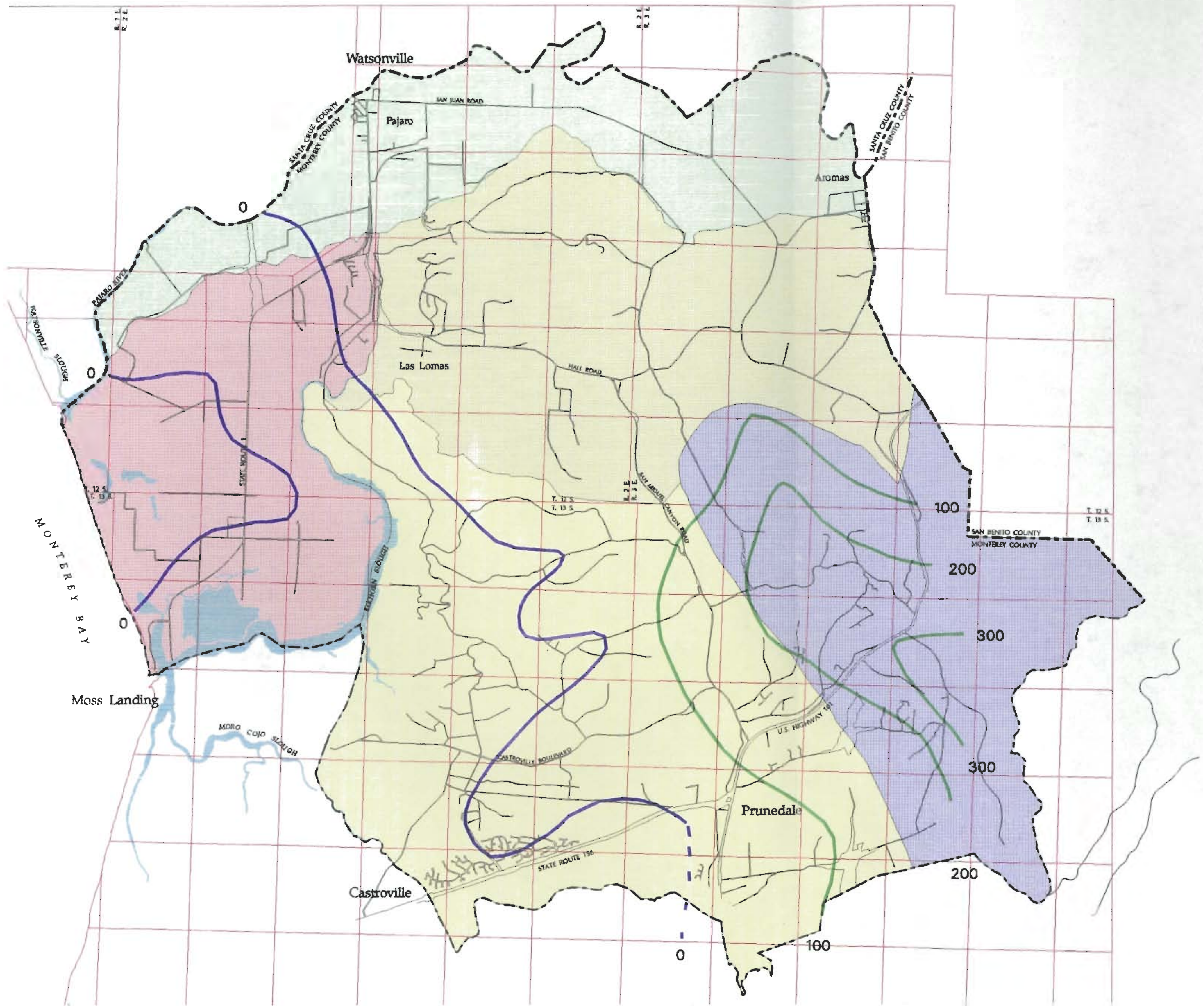


Figure 11

1983 WATER LEVELS

Sources: MCWRA, PVMVA, and Fugro

North Monterey County Hydrogeologic Study

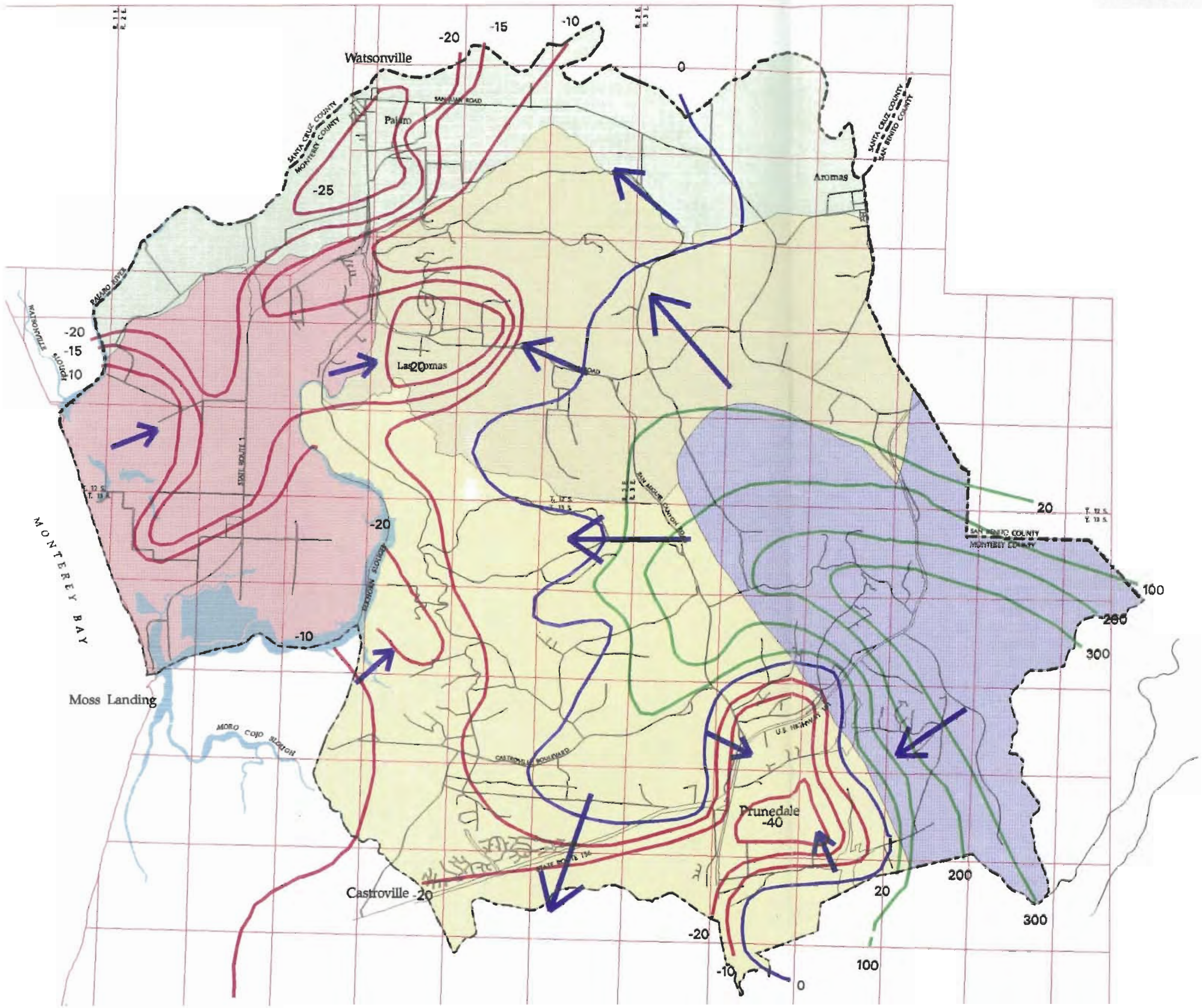


Figure 12

1994 WATER LEVELS

- Pajaro
- Springfield Terrace
- Granite Ridge
- Highlands North
- Highlands South
- Water Surface - Below Sea Level
- Water Surface - Sea Level
- Water Surface - Above Sea Level
- Study Area Boundary
- County Line
- Township and Range Grid

Note: Arrows indicate direction of ground water movement

MILES

0 1.25 2.5

Sources: MCWRA, PVMVA, and Fugro

North Monterey County Hydrogeologic Study

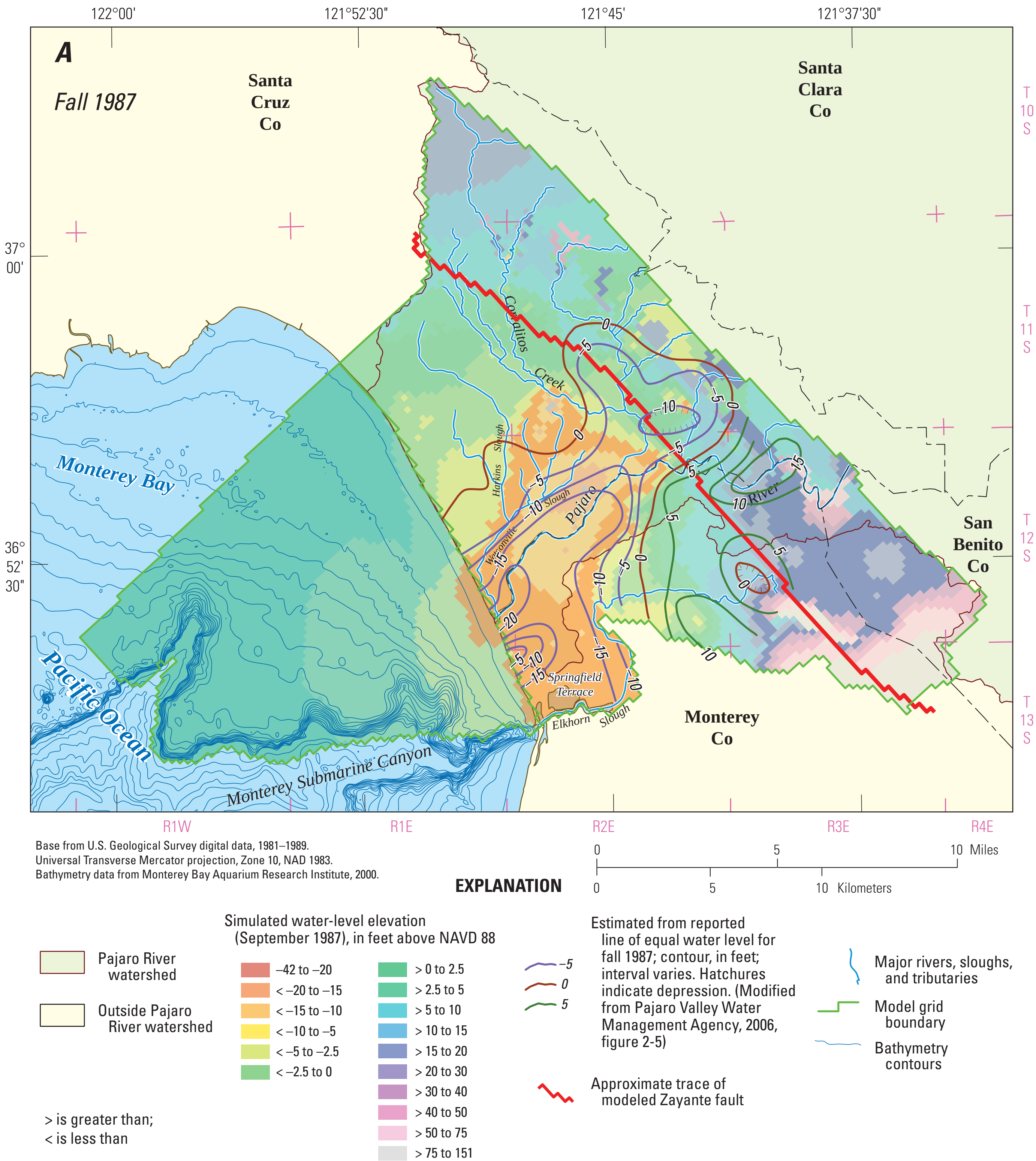


Figure 33. Comparison of the contoured measured with simulated water levels *A*, in 1987; *B*, in 1992; *C*, in 1998; and *D*, in September 2006 for the calibrated hydrologic flow model, Pajaro Valley, California.

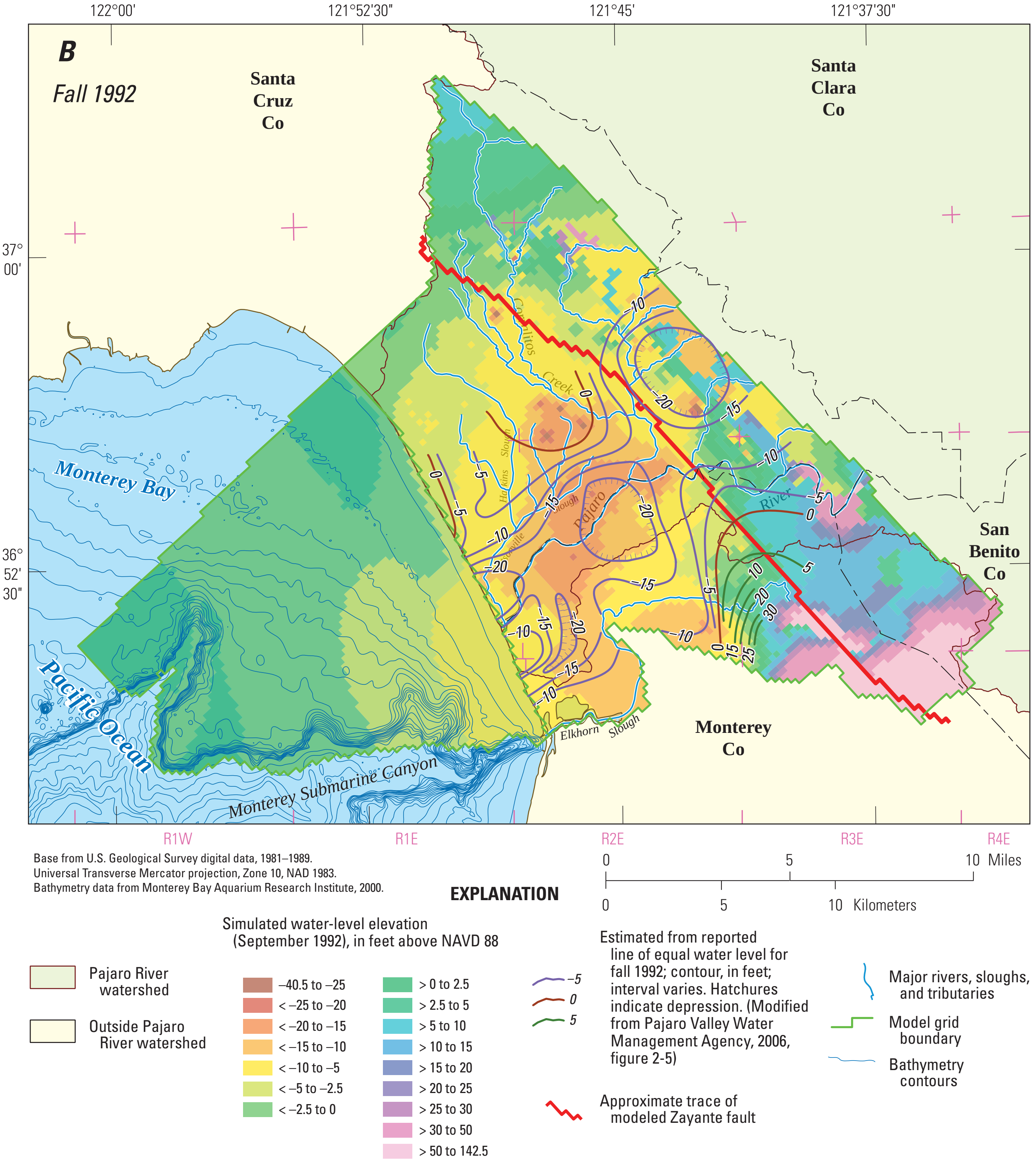


Figure 33. —Continued

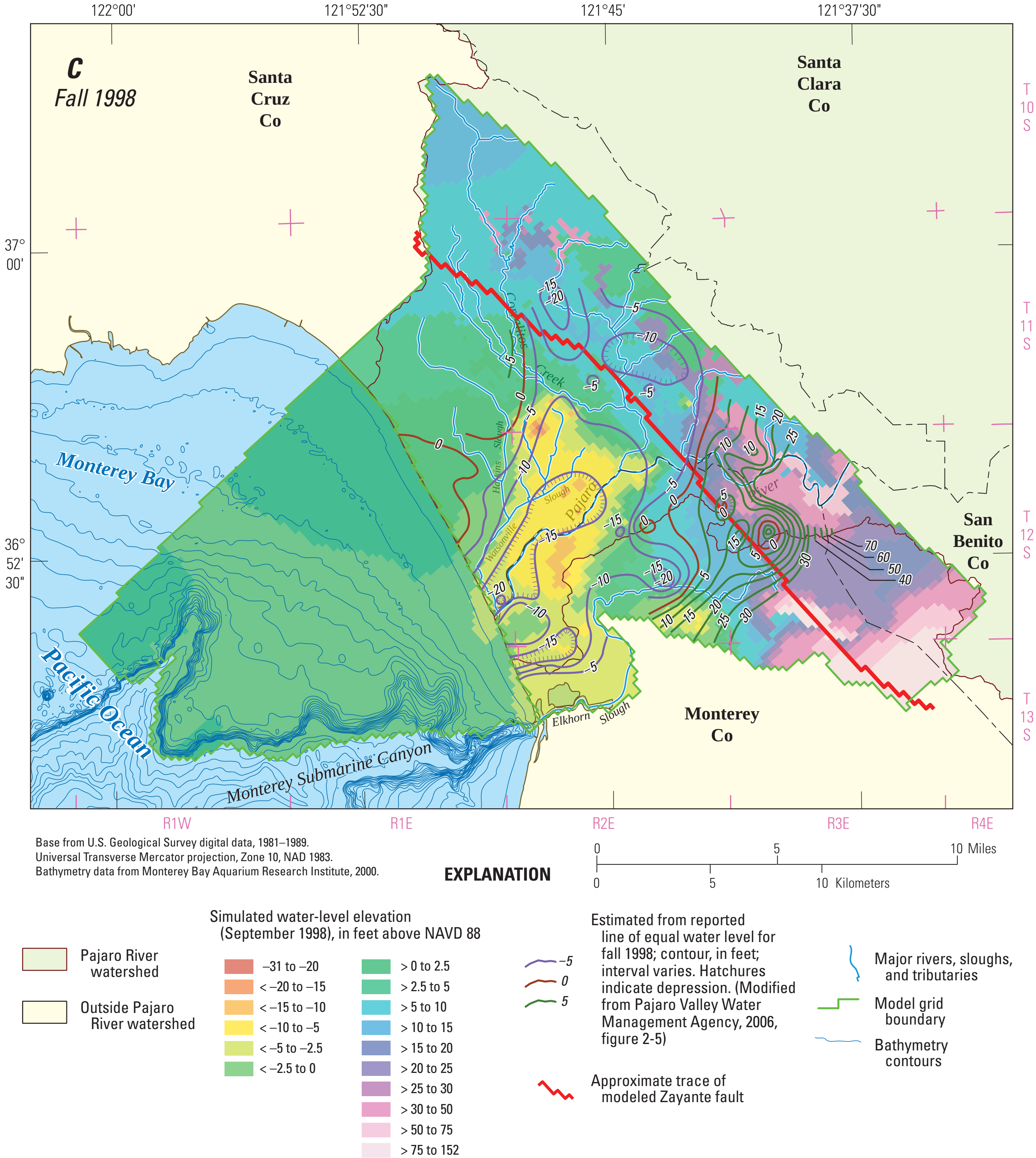
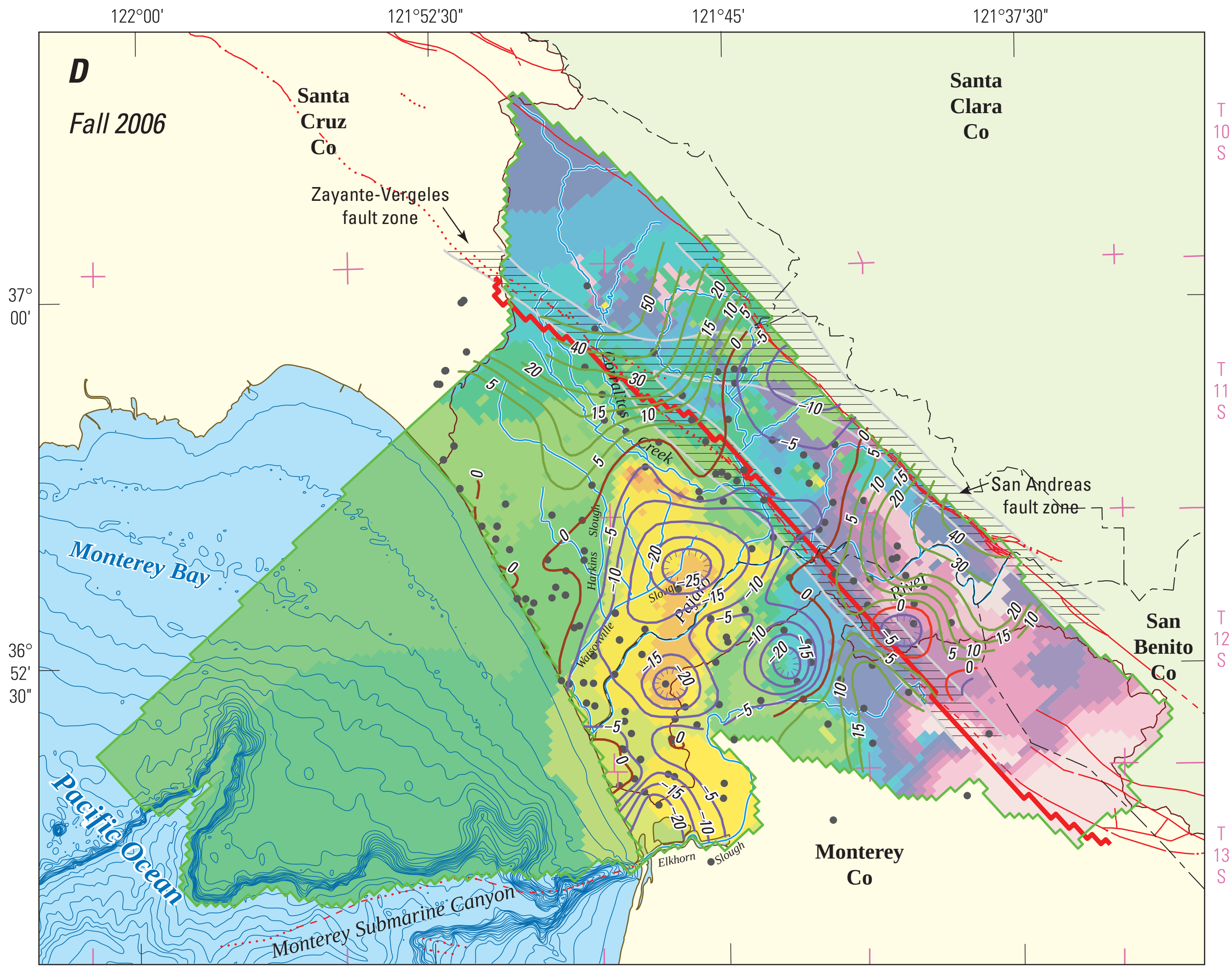


Figure 33. —Continued



Base from U.S. Geological Survey digital data, 1981–1989.
Universal Transverse Mercator projection, Zone 10, NAD 1983.
Bathymetry data from Monterey Bay Aquarium Research Institute, 2000.

0 5 10 Miles
0 5 10 Kilometers

EXPLANATION

Pajaro River watershed

Outside Pajaro River watershed

Simulated water-level elevation (September 2006), in feet above NAVD 88

- –36.9 to –25
- < –25 to –20
- < –20 to –15
- < –15 to –10
- < –10 to –5
- < –5 to –2.5
- < –2.5 to 0
- > 0 to 2.5
- > 2.5 to 5
- > 5 to 7.5
- > 7.5 to 10
- > 10 to 15
- > 15 to 20
- > 20 to 25
- > 25 to 30
- > 30 to 50
- > 50 to 155

–5
0
5

Estimated from reported line of equal water level for fall 2006; contour, in feet; interval varies. Hatchures indicate depression. (Modified from Pajaro Valley Water Management Agency, 2006, figure 2-5)

Major rivers, sloughs, and tributaries

Model grid boundary

Bathymetry contours

Faults—
From USGS (Brabb and others, 1997), and CDMG (Wagner and others, 2000)

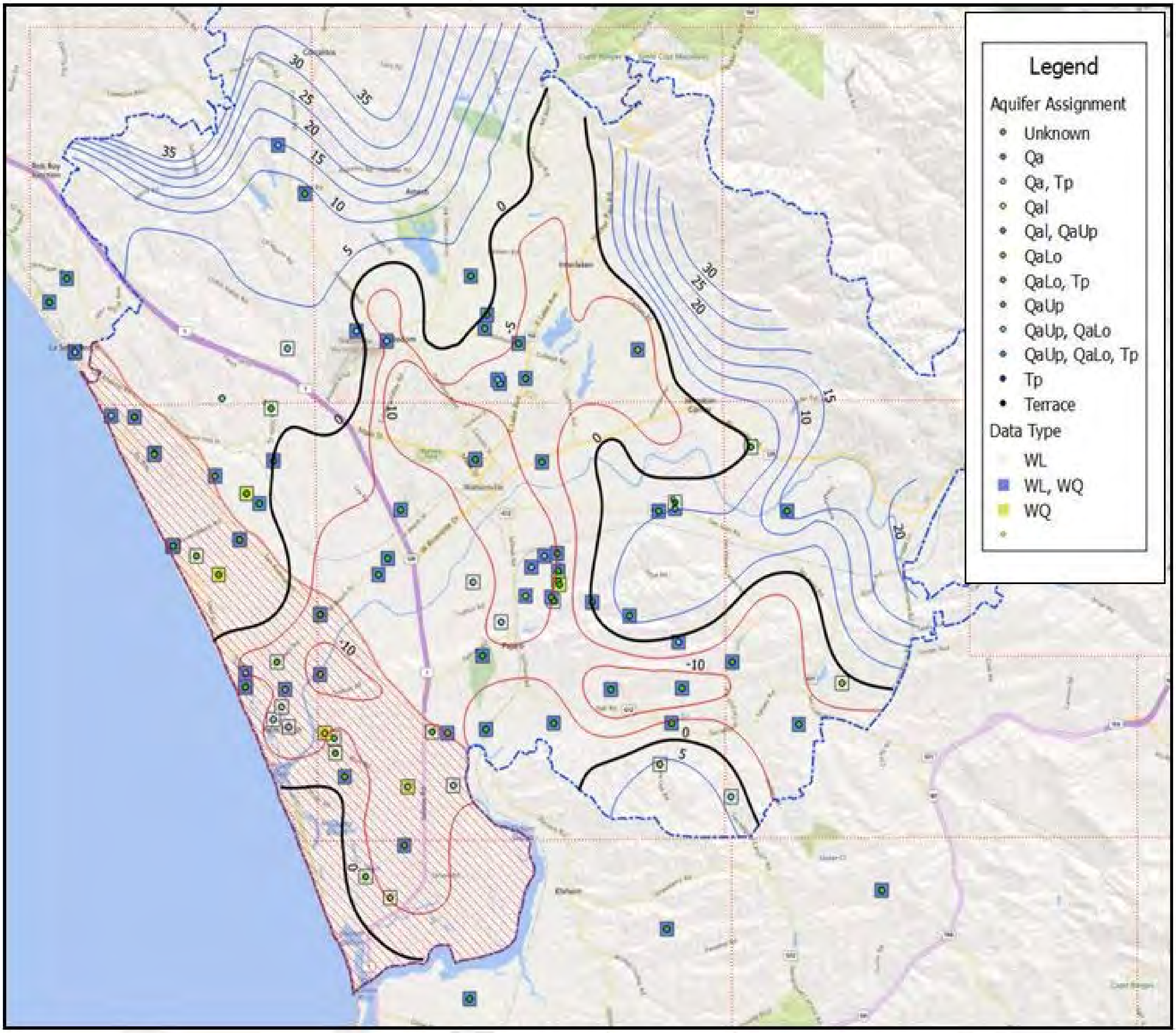
- Known
- Concealed
- Inferred

Approximate trace of modeled Zayante fault

Data points used to generate water-level contours

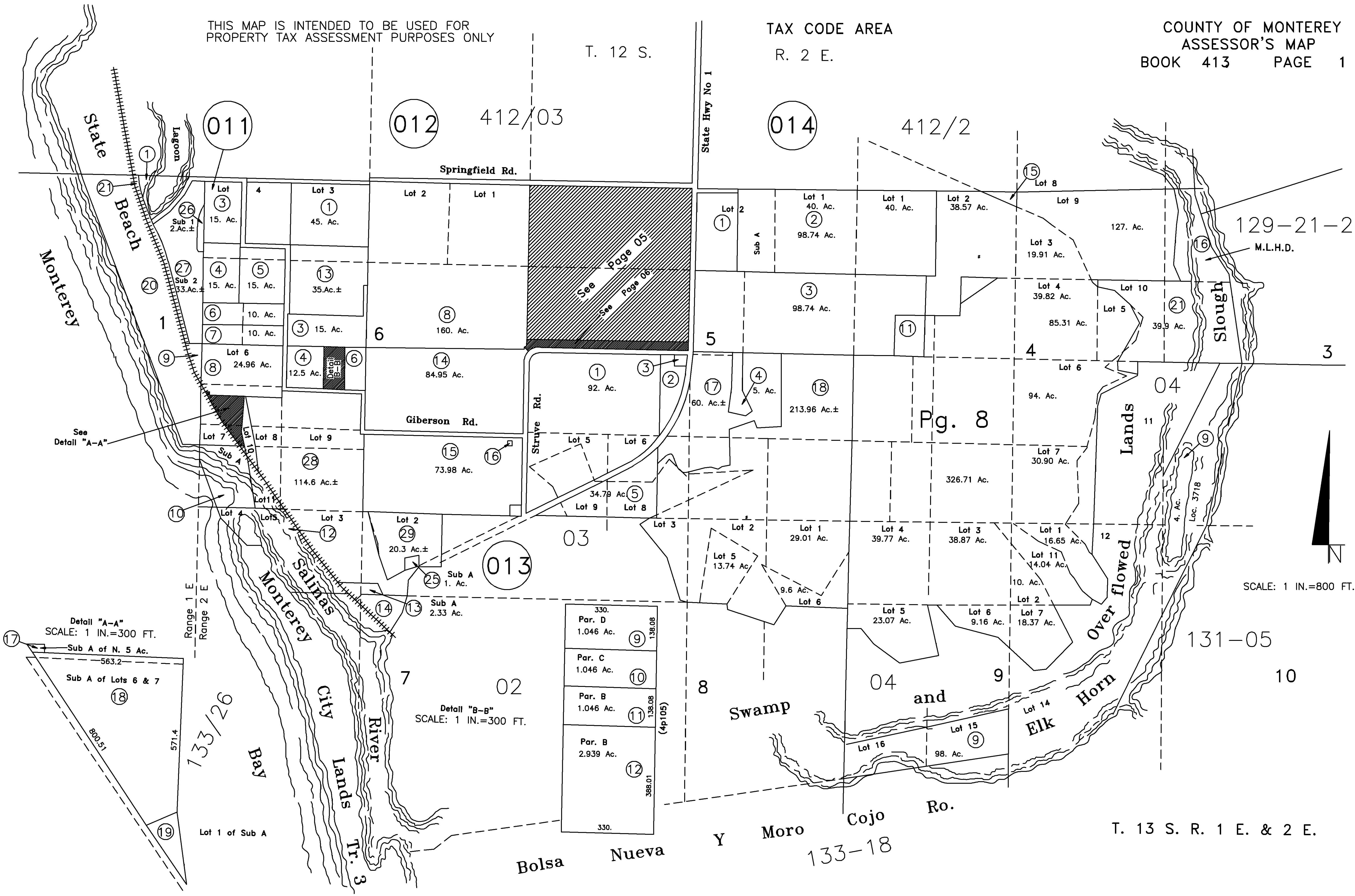
Figure 33. —Continued

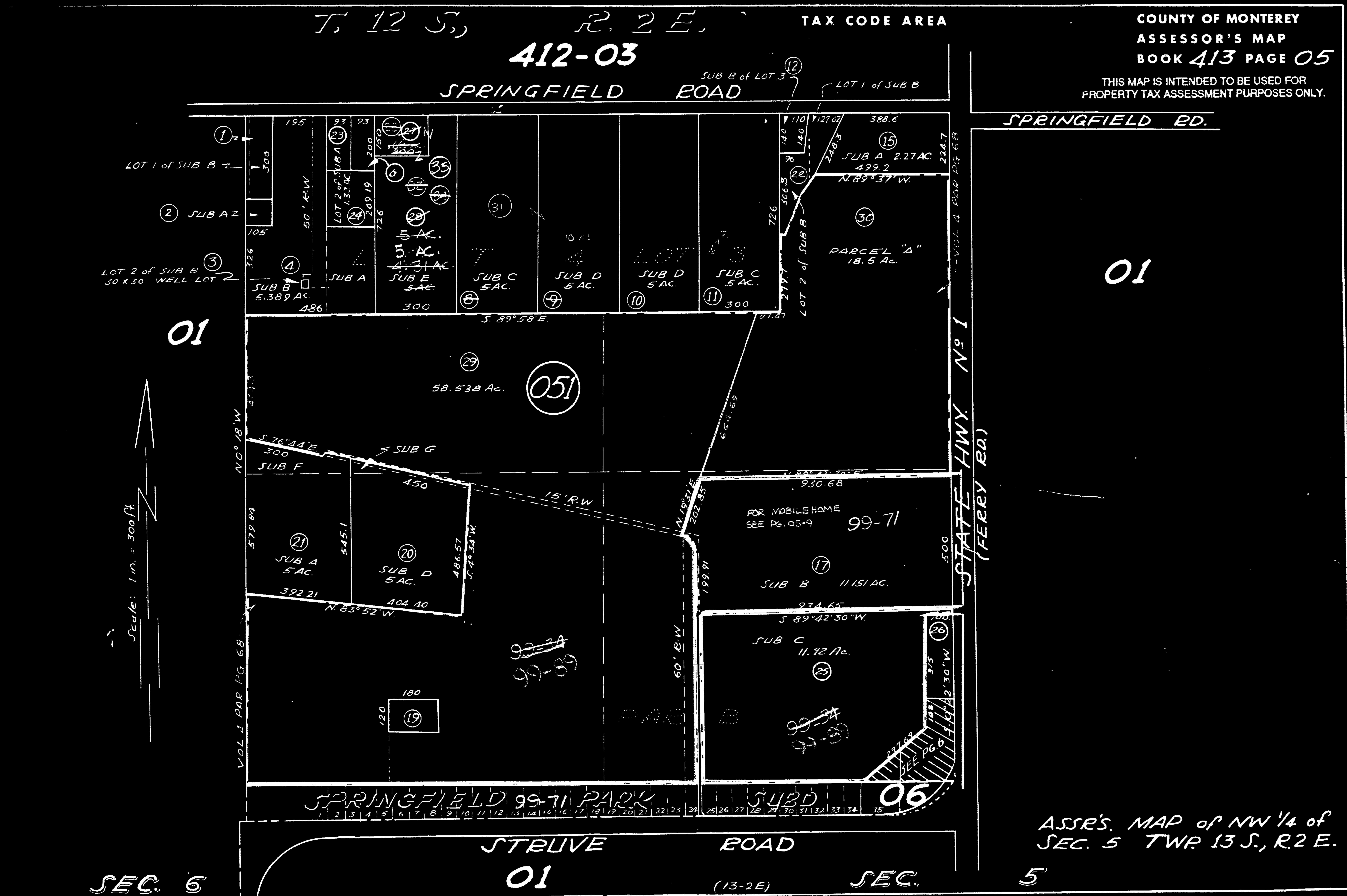
Network Wells Perforated in Upper and Lower Aromas



Feeney, M., 2016, Groundwater monitoring network review, modifictions, and recommended improvements: Technical memorandum to Pajaro Valley Water Management Agency (PVWMA), May 8, 2016

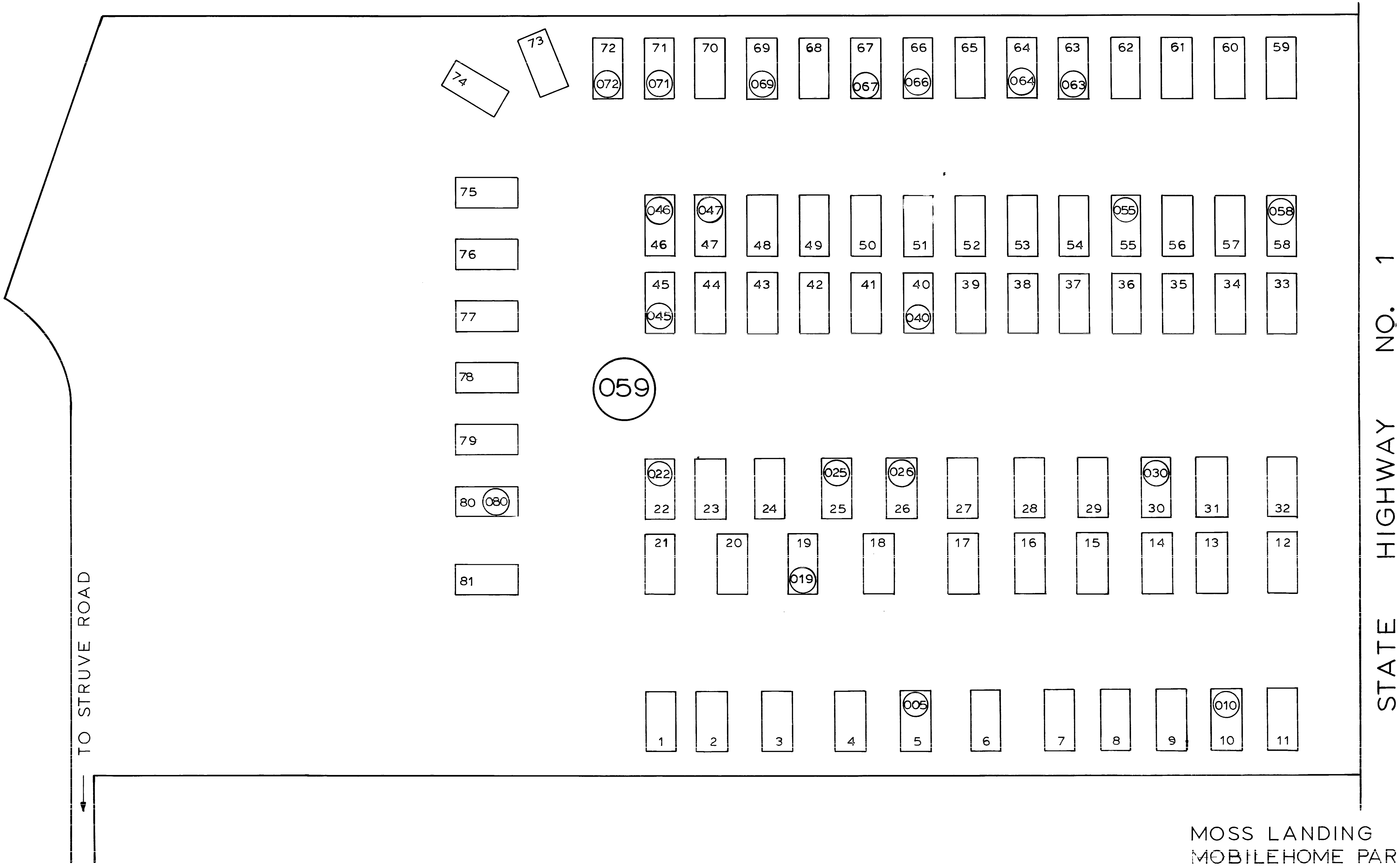
Appendix E – Parcel Maps


THIS MAP IS INTENDED TO BE USED FOR
PROPERTY TAX ASSESSMENT PURPOSES ONLY
TAX CODE AREA
COUNTY OF MONTEREY
ASSESSOR'S MAP
BOOK 413 PAGE 1
T. 12 S.
R. 2 E.
011
012
014
013
412/03
412/2
129-21-2
131-05
133/26
133-18
Springfield Rd.
Giberson Rd.
Struve Rd.
State Hwy No 1
See Page 05
See Page 06
Pg. 8
Monterey State Beach
Lagoon
Monterey Bay
Salinas River
Monterey City Lands Tr. 3
Bolsa Nueva Y Moro Cojo Ro.
Swamp and Overflowed Lands
Elk Horn Slough
M.L.H.D.
See Detail "A-A"
Detail "A-A"
SCALE: 1 IN.=300 FT.
Sub A of N. 5 Ac.
Sub A of Lots 6 & 7
Lot 1 of Sub A
Detail "B-B"
SCALE: 1 IN.=300 FT.
Range 1 E
Range 2 E
SCALE: 1 IN.=800 FT.
T. 13 S. R. 1 E. & 2 E.
N


COUNTY OF MONTEREY
ASSESSOR'S MAP
BOOK 413 PAGE 05
THIS MAP IS INTENDED TO BE USED FOR
PROPERTY TAX ASSESSMENT PURPOSES ONLY.
TAX CODE AREA
T. 12 S., R. 2 E.
412-03
SPRINGFIELD ROAD
SPRINGFIELD RD.
STATE HWY. No 1
(FERRY RD.)
STRUVE ROAD
SPRINGFIELD 99-71 PARK SUBD
051
01
06
SEC. 6
SEC. 5
(13-2E)
PARCEL "A" 18.5 Ac.
58.538 Ac.
FOR MOBILE HOME SEE PG. 05-9
99-71
SUB B 11.151 AC.
SUB C 11.92 Ac.
SEE PG. 6
Scale: 1 in. = 300 ft.
ASSR'S. MAP of NW 1/4 of SEC. 5 TWP. 13 S., R. 2 E.

TAX RATE AREA

COUNTY OF MONTEREY
ASSESSOR'S MAP
BOOK 413 PAGE 05-9



MOSS LANDING
MOBILEHOME PARK
LOCATED ON
413-051-17

Appendix F – Construction Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST

MNS ENGINEERS INC

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Prepared By: NEP
Date Prepared: 11/21/2019

Building, Area: Moss Landing Middle School Well Site

MNS Proj. No. PSMCS.150024

Estimate Type:
☐ Conceptual
☑ Preliminary (w/o plans)
☐ Design Development @ ____ % complete
☐ Construction
☐ Change Order

Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials		Installation		Sub-Contractor		Total
				$/Unit	Total	$/Unit	Total	$/Unit	Total	
1	Mobilization	1	LS	$5,000.00	$5,000.00	$50,000.00	$50,000.00			$55,000.00
2	Site Clearing and Grubbing	1	LS	$1,000.00	$1,000.00	$5,000.00	$5,000.00			$6,000.00
3	8' High Chain Link Fence	440	LF	$15.00	$6,600.00	$15.00	$6,600.00			$13,200.00
4	20' Wide Double Swing Manual Gate	1	LS	$1,500.00	$1,500.00	$1,500.00	$1,500.00			$3,000.00
5	40,000-Gal Infiltration Basin w/ Two Pre-Cast Catch Basins	1	LS	$7,500.00	$7,500.00	$12,500.00	$12,500.00			$20,000.00
6	Site Grading	1	LS	$1,000.00	$1,000.00	$5,000.00	$5,000.00			$6,000.00
7	Gravel Surfacing	1	LS	$10,000.00	$10,000.00	$5,000.00	$5,000.00			$15,000.00
8	Miscellaneous Site Improvements	1	LS	$10,000.00	$10,000.00	$15,000.00	$15,000.00			$25,000.00
9	PG&E Service and Transformer	1	LS					$50,000.00	$50,000.00	$50,000.00
10	Generator	1	LS	$50,000.00	$50,000.00	$15,000.00	$15,000.00			$65,000.00
11	Well Pump	1	LS	$3,000.00	$3,000.00	$5,000.00	$5,000.00			$8,000.00
12	Wellhead Slab and Pedestal	1	LS	$2,500.00	$2,500.00	$2,500.00	$2,500.00			$5,000.00
13	1" Air release Valve	1	EA	$1,500.00	$1,500.00	$500.00	$500.00			$2,000.00
14	4" Gate Valve	5	EA	$1,000.00	$5,000.00	$250.00	$1,250.00			$6,250.00
15	4" Check Valve	1	EA	$1,000.00	$1,000.00	$250.00	$250.00			$1,250.00
16	4" Flow Meter	1	EA	$2,500.00	$2,500.00	$500.00	$500.00			$3,000.00
17	4" D.I. Fitting	7	EA	$250.00	$1,750.00	$150.00	$1,050.00			$2,800.00
18	4" D.I. Piping	30	LF	$40.00	$1,200.00	$40.00	$1,200.00			$2,400.00
19	4" Back Pressure Sustaining Valve	1	EA	$5,000.00	$5,000.00	$1,000.00	$1,000.00			$6,000.00
20	Back Pressure Sustaining Valve/Bypass Vault	1	LS	$5,000.00	$5,000.00	$2,500.00	$2,500.00			$7,500.00
21	Pipe and Valve Coatings	1	LS	$3,500.00	$3,500.00	$5,000.00	$5,000.00			$8,500.00
22	Tank Ringwall Foundation	2	EA	$20,000.00	$40,000.00	$20,000.00	$40,000.00			$80,000.00
23	110,000-Gal 32'-4" Bolted Steel Water Storage Tank and Appurtenances	2	EA	$55,000.00	$110,000.00	$55,000.00	$110,000.00			$220,000.00
24	Internal Tank Mixing System	2	EA	$10,000.00	$20,000.00	$2,500.00	$5,000.00			$25,000.00
25	8" Flexible Expansion Joint	2	EA	$5,000.00	$10,000.00	$750.00	$1,500.00			$11,500.00
26	8" Gate Valve	15	EA	$2,500.00	$37,500.00	$500.00	$7,500.00			$45,000.00
27	8" Check Valve	4	EA	$2,500.00	$10,000.00	$500.00	$2,000.00			$12,000.00
28	8" D.I. Fitting	29	EA	$500.00	$14,500.00	$250.00	$7,250.00			$21,750.00
29	8" PVC Piping	150	LF	$50.00	$7,500.00	$50.00	$7,500.00			$15,000.00
30	200-GPM Duty Pump	2	EA	$58,000.00	$116,000.00	$10,000.00	$20,000.00			$136,000.00
31	1,150-GPM Fire Pump	2	EA	$72,000.00	$144,000.00	$20,000.00	$40,000.00			$184,000.00
32	3,000-Gal Hydropneumatic Tank and Surge System	1	LS	$100,000.00	$100,000.00	$40,000.00	$40,000.00			$140,000.00
33	12' x 35' Electrical/Chlorination FRP Building	420	SF	$100.00	$42,000.00	$50.00	$21,000.00			$63,000.00
34	Electrical Equipment and Controls	1	LS	$75,000.00	$75,000.00	$50,000.00	$50,000.00			$125,000.00
35	Site Lighting Improvements	1	LS	$5,000.00	$5,000.00	$5,000.00	$5,000.00			$10,000.00

36	Chlorine Pump, Piping, Injection Quill, Storage Tank	1	LS	$5,000.00	$5,000.00	$2,500.00	$2,500.00			$7,500.00
37	Site Cleanup/Punchlist	1	LS	$2,500.00	$2,500.00	$2,500.00	$2,500.00			$5,000.00
	Subtotals				$863,550.00		$498,100.00		$50,000.00	$1,411,650.00
	Division 1 Costs	@	2.00%		$17,271.00		$9,962.00		$1,000.00	$28,233.00
	Subtotals				$880,821.00		$508,062.00		$51,000.00	$1,439,883.00
	Taxes - Materials Costs	@	7.75%		$68,263.63					$68,263.63
	Subtotals				$949,084.63		$508,062.00		$51,000.00	$1,508,146.63
	Contractor Markup for Sub	@	12.00%						$6,120.00	$6,120.00
	Subtotals				$949,084.63		$508,062.00		$57,120.00	$1,514,266.63
	Contractor OH&P	@	15.00%		$142,362.69		$76,209.30		$8,568.00	$227,139.99
	Subtotals				$1,091,447.32		$584,271.30		$65,688.00	$1,741,406.62
	Estimate Contingency	@	20.00%		$218,289.46		$116,854.26		$13,137.60	$348,281.32
	Subtotals				$1,309,736.79		$701,125.56		$78,825.60	$2,089,687.95
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$163,538.97		$87,545.34		$9,842.48	$260,926.80
	Estimated Bid Cost				$1,473,275.76		$788,670.90		$88,668.08	$2,350,614.74
	Total Estimate									**$2,350,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

MNS ENGINEERS INC

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Prepared By: NEP
Date Prepared: 11/21/2019

Building, Area: Water Distribution System - Option D

MNS Proj. No. PSMCS.150024

Estimate Type:
- ☐ Conceptual
- ☑ Preliminary (w/o plans)
- ☐ Design Development @ ____ % complete
- ☐ Construction
- ☐ Change Order

Months to Midpoint of Construction 36

				Materials		Installation		Sub-Contractor		
Item No.	**Description**	**Qty.**	**Units**	**$/Unit**	**Total**	**$/Unit**	**Total**	**$/Unit**	**Total**	**Total**
1	Mobilization	1	LS	$5,000.00	$5,000.00	$50,000.00	$50,000.00			$55,000.00
2	6" PVC C900, Paved Road (Struve Road)	2250	LF	$60.00	$135,000.00	$60.00	$135,000.00			$270,000.00
3	6" PVC C900, Paved Road (Struve Road to MH Park)	880	LF	$60.00	$52,800.00	$60.00	$52,800.00			$105,600.00
4	8" PVC C900, Unpaved Road (Springfield Road to MH Park)	1430	LF	$50.00	$71,500.00	$50.00	$71,500.00			$143,000.00
5	8" PVC C900, Paved Road (Springfield Road to MH Park)	1620	LF	$70.00	$113,400.00	$70.00	$113,400.00			$226,800.00
6	6" PVC C900, Mobile Home Park	2950	LF	$60.00	$177,000.00	$60.00	$177,000.00			$354,000.00
7	8" PVC C900, Paved Road (Springfield Road)	3280	LF	$70.00	$229,600.00	$70.00	$229,600.00			$459,200.00
8	8" PVC C900 in Steel Casing by Jack and Bore (Highway 1 Crossing)	100	LF	$300.00	$30,000.00	$500.00	$50,000.00			$80,000.00
9	6" D.I. Fitting	10	EA	$350.00	$3,500.00	$200.00	$2,000.00			$5,500.00
10	8" D.I. Fitting	10	EA	$500.00	$5,000.00	$250.00	$2,500.00			$7,500.00
11	6" In-Line Gate Valve	7	EA	$1,500.00	$10,500.00	$500.00	$3,500.00			$14,000.00
12	8" In-Line Gate Valve	9	EA	$2,500.00	$22,500.00	$750.00	$6,750.00			$29,250.00
13	Fire Hydrant, Bury, Lateral, and Gate Valve	19	EA	$7,500.00	$142,500.00	$2,500.00	$47,500.00			$190,000.00
14	Water Sampling Station	2	EA	$5,000.00	$10,000.00	$2,500.00	$5,000.00			$15,000.00
15	Water Service Connection and Meter	163	EA	$2,000.00	$326,000.00	$1,500.00	$244,500.00			$570,500.00
16	Blowoff Valve	3	EA	$3,000.00	$9,000.00	$2,000.00	$6,000.00			$15,000.00
17	Air Release Valve	4	EA	$3,000.00	$12,000.00	$2,000.00	$8,000.00			$20,000.00
18	Road Repair	1	LS	$100,000.00	$100,000.00	$150,000.00	$150,000.00			$250,000.00
	Subtotals				$1,455,300.00		$1,355,050.00			$2,810,350.00
	Division 1 Costs	@	2.00%		$29,106.00		$27,101.00			$56,207.00
	Subtotals				$1,484,406.00		$1,382,151.00			$2,866,557.00
	Taxes - Materials Costs	@	7.75%		$115,041.47					$115,041.47
	Subtotals				$1,599,447.47		$1,382,151.00			$2,981,598.47
	Contractor OH&P	@	15.00%		$239,917.12		$207,322.65			$447,239.77
	Subtotals				$1,839,364.58		$1,589,473.65			$3,428,838.23
	Estimate Contingency	@	20.00%							$685,767.65
	Subtotals									$4,114,605.88
	Escalate to Midpoint of Construct	@	12.5%							$513,766.15
	Estimated Bid Cost									$4,628,372.03
	Total Estimate									**$4,630,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

MNS ENGINEERS INC

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Prepared By: NEP
Date Prepared: 11/21/2019
MNS Proj. No. PSMCS.150024

Building, Area: Existing Springfield Well Site

Estimate Type:

- ☐ Conceptual
- ☑ Preliminary (w/o plans)
- ☐ Design Development @ ____ % complete
- ☐ Construction
- ☐ Change Order

Months to Midpoint of Construction: 36

Item No.	Description	Qty.	Units	Materials		Installation		Sub-Contractor		Total
				$/Unit	Total	$/Unit	Total	$/Unit	Total	
1	Mobilization	1	LS	$5,000.00	$5,000.00	$25,000.00	$25,000.00			$30,000.00
2	Demolition of Existing Structure and Facilities	1	LS	$5,000.00	$5,000.00	$10,000.00	$10,000.00			$15,000.00
3	Site Clearing and Grubbing	1	LS	$1,000.00	$1,000.00	$1,000.00	$1,000.00			$2,000.00
4	12' Wide Gravel Access Road	550	LF	$50.00	$27,500.00	$100.00	$55,000.00			$82,500.00
5	8' High Chain Link Fence	264	LF	$15.00	$3,960.00	$15.00	$3,960.00			$7,920.00
6	16' Wide Double Swing Manual Gate	1	LS	$1,500.00	$1,500.00	$1,500.00	$1,500.00			$3,000.00
7	20,000-Gal Infiltration Basin	1	LS	$5,000.00	$5,000.00	$7,500.00	$7,500.00			$12,500.00
8	Site Grading	1	LS	$500.00	$500.00	$2,500.00	$2,500.00			$3,000.00
9	Gravel Surfacing	1	LS	$5,000.00	$5,000.00	$2,500.00	$2,500.00			$7,500.00
10	Miscellaneous Site Improvements	1	LS	$10,000.00	$10,000.00	$10,000.00	$10,000.00			$20,000.00
11	Well	1	LS					$100,000.00	$100,000.00	$100,000.00
12	Well Pump	1	LS	$3,000.00	$3,000.00	$5,000.00	$5,000.00			$8,000.00
13	Wellhead Pad and Pedestal	1	LS	$2,500.00	$2,500.00	$2,500.00	$2,500.00			$5,000.00
14	1" Air Release Valve	1	EA	$1,500.00	$1,500.00	$500.00	$500.00			$2,000.00
15	4" Gate Valve	2	EA	$1,000.00	$2,000.00	$250.00	$500.00			$2,500.00
16	4" Check Valve	1	EA	$1,000.00	$1,000.00	$250.00	$250.00			$1,250.00
17	4" Flow Meter	1	EA	$2,500.00	$2,500.00	$500.00	$500.00			$3,000.00
18	4" D.I. Fitting	4	EA	$250.00	$1,000.00	$150.00	$600.00			$1,600.00
19	4" D.I. Piping	10	LF	$40.00	$400.00	$40.00	$400.00			$800.00
20	4" PVC Piping	60	LF	$30.00	$1,800.00	$30.00	$1,800.00			$3,600.00
21	10' x 18' Electrical/Chlorination FRP Building	180	SF	$120.00	$21,600.00	$60.00	$10,800.00			$32,400.00
22	Electrical Equipment and Controls	1	LS	$40,000.00	$40,000.00	$20,000.00	$20,000.00			$60,000.00
23	Site Lighting Improvements	2	LS	$2,500.00	$5,000.00	$2,500.00	$5,000.00			$10,000.00
24	Chlorine Pump, Piping, Injection Quill, Storage Tank	1	LS	$5,000.00	$5,000.00	$2,500.00	$2,500.00			$7,500.00
25	Existing Well Destruction	1	LS					$20,000.00	$20,000.00	$20,000.00
26	Site Cleanup/Punchlist	1	LS	$2,500.00	$2,500.00	$2,500.00	$2,500.00			$5,000.00
	Subtotals				$154,260.00		$171,810.00		$120,000.00	$446,070.00
	Division 1 Costs	@	2.00%		$3,085.20		$3,436.20		$2,400.00	$8,921.40
	Subtotals				$157,345.20		$175,246.20		$122,400.00	$454,991.40
	Taxes - Materials Costs	@	7.75%		$12,194.25					$12,194.25
	Subtotals				$169,539.45		$175,246.20		$122,400.00	$467,185.65
	Contractor Markup for Sub	@	12.00%						$14,688.00	$14,688.00
	Subtotals				$169,539.45		$175,246.20		$137,088.00	$481,873.65
	Contractor OH&P	@	15.00%		$25,430.92		$26,286.93		$20,563.20	$72,281.05
	Subtotals				$194,970.37		$201,533.13		$157,651.20	$554,154.70

	Estimate Contingency	@	20.00%				$110,830.94
	Subtotals						$664,985.64
	Escalate to Midpoint of Construct	@	12.5%				$83,032.77
	Estimated Bid Cost						$748,018.41
	Total Estimate						**$750,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

ENGINEERS INC

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Prepared By: NEP
Date Prepared: 11/21/2019
MNS Proj. No. PSMCS.150024

Building, Area: Water Distribution System - Option D

Estimate Type:
- [ ] Conceptual
- [x] Preliminary (w/o plans)
- [ ] Design Development @ ______ % complete
- [ ] Construction
- [ ] Change Order

Months to Midpoint of Construction: 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00	$50,000.00	$50,000.00			$55,000.00
2	4" PVC C900 (SW-3 to Struve Road)	600	LF	$30.00	$18,000.00	$30.00	$18,000.00			$36,000.00
3	6" PVC C900, Unpaved Road	2000	LF	$40.00	$80,000.00	$30.00	$60,000.00			$140,000.00
4	6" PVC C900, Crossing Under McClusky Slough	300	LF	$41.00	$12,300.00	$31.00	$9,300.00			$21,600.00
5	6" PVC C900, Paved Road	10100	LF	$40.00	$404,000.00	$40.00	$404,000.00			$808,000.00
6	4" D.I. Fitting	3	EA	$250.00	$750.00	$150.00	$450.00			$1,200.00
7	6" D.I. Fitting	8	EA	$350.00	$2,800.00	$200.00	$1,600.00			$4,400.00
8	6" In-Line Gate Valve	17	EA	$1,500.00	$25,500.00	$500.00	$8,500.00			$34,000.00
9	Fire Hydrant, Bury, Lateral, and Gate Valve	6	EA	$7,500.00	$45,000.00	$2,500.00	$15,000.00			$60,000.00
10	Water Sampling Station	2	EA	$5,000.00	$10,000.00	$2,500.00	$5,000.00			$15,000.00
11	Water Service Connection and Meter	163	EA	$2,000.00	$326,000.00	$1,500.00	$244,500.00			$570,500.00
12	Air Release Valve	4	EA	$3,000.00	$12,000.00	$2,000.00	$8,000.00			$20,000.00
13	Road Repair	1	LS	$100,000.00	$100,000.00	$150,000.00	$150,000.00			$250,000.00
	Subtotals				$1,041,350.00		$974,350.00			$2,015,700.00
	Division 1 Costs	@	2.00%		$20,827.00		$19,487.00			$40,314.00
	Subtotals				$1,062,177.00		$993,837.00			$2,056,014.00
	Taxes - Materials Costs	@	7.75%		$82,318.72					$82,318.72
	Subtotals				$1,144,495.72		$993,837.00			$2,138,332.72
	Contractor OH&P	@	15.00%		$171,674.36		$149,075.55			$320,749.91
	Subtotals				$1,316,170.08		$1,142,912.55			$2,459,082.63
	Estimate Contingency	@	20.00%		$263,234.02		$228,582.51			$491,816.53
	Subtotals				$1,579,404.09		$1,371,495.06			$2,950,899.15
	Escalate to Midpoint of Construct	@	12.5%		$197,210.71		$171,250.36			$368,461.07
	Estimated Bid Cost				$1,776,614.80		$1,542,745.42			$3,319,360.22
	Total Estimate									**$3,320,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

Project: Springfield Water Supply Improvements, Pajaro Sunny Mesa Community Services District

Prepared By: NEP
Date Prepared: 11/21/2019
MNS Proj. No. PSMCS.150024

Building, Area: Moss Landing Middle School Well Site

Estimate Type:
- ☐ Conceptual
- ☑ Preliminary (w/o plans)
- ☐ Design Development @ ____ % complete
- ☐ Construction
- ☐ Change Order

Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00					$5,000.00
2	Communications and Controls Improvements	1	LS	$25,000.00	$25,000.00	$25,000.00	$25,000.00			$50,000.00
3	Backpressure Sustaining Valve	1	LS	$6,000.00	$6,000.00	$1,000.00	$1,000.00			$7,000.00
	Subtotals				$36,000.00		$26,000.00			$62,000.00
	Division 1 Costs	@	2.00%		$720.00		$520.00			$1,240.00
	Subtotals				$36,720.00		$26,520.00			$63,240.00
	Taxes - Materials Costs	@	7.75%		$2,845.80					$2,845.80
	Subtotals				$39,565.80		$26,520.00			$66,085.80
	Contractor Markup for Sub	@	12.00%							
	Subtotals				$39,565.80		$26,520.00			$66,085.80
	Contractor OH&P	@	15.00%		$5,934.87		$3,978.00			$9,912.87
	Subtotals				$45,500.67		$30,498.00			$75,998.67
	Estimate Contingency	@	20.00%							$15,199.73
	Subtotals									$91,198.40
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%							$11,387.40
	Estimated Bid Cost									$102,585.80
	Total Estimate									**$100,000.00**

11.1.4. Feasibility Study for Long-Term Drinking Water Solutions for the Unincorporated Area North of Moss Landing

Corona Environmental Consulting, LLC, November 18, 2021

Final Report - Executive Summary

Feasibility Study for Long-Term Drinking Water Solutions for the Unincorporated Area North of Moss Landing

Final

November 18, 2021

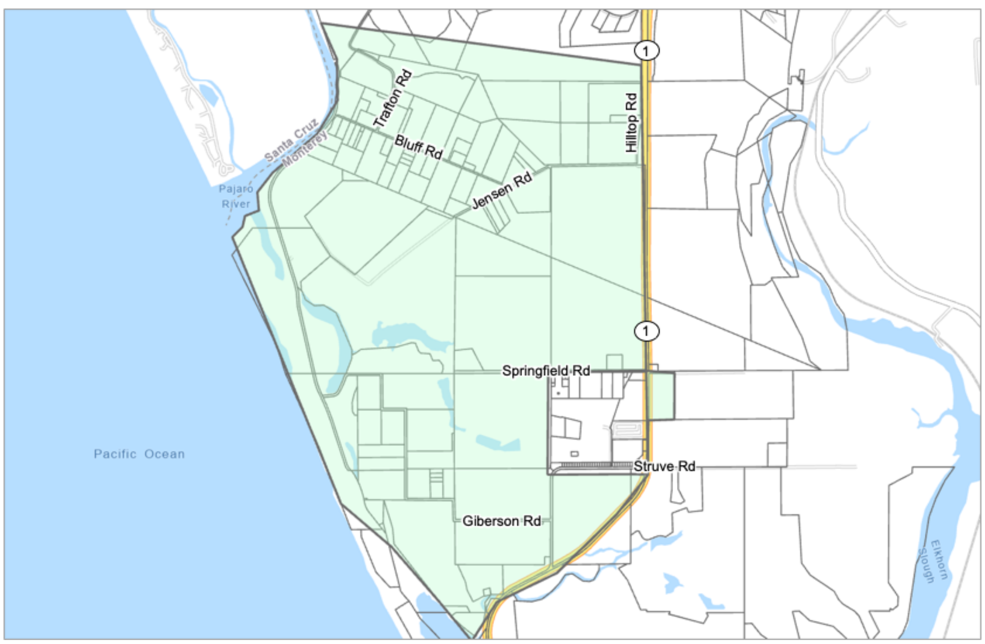
Corona Environmental Consulting, LLC and
KYLE Groundwater, Inc.
in conjunction with Community Water Center

Executive Summary

Background

The Community Water Center (CWC), with funding from the State Water Resources Control Board (SWRCB), provides assistance to communities to develop long-term drinking water solutions to improve both water quality and water supply. One of the communities CWC is currently assisting is the agricultural, low-income area of unincorporated Monterey County north of Moss Landing. The project area is shown in green in the map below (Figure ES-1). This community of approximately 88 households is in need of a long-term drinking water solution as residents are currently receiving drinking water from private and shared wells that have very high levels of chloride (indicating seawater intrusion), total dissolved solids (TDS), nitrate and 1,2,3-Trichloropropane (123-TCP). The following executive summary provides an overview of the study conducted to identify suitable long-term drinking water solutions that could provide safe and affordable drinking water to the community.

Figure ES-1. Project area map. Project area shaded in green. The white square area within the green project area is intended to be served by the Springfield Water System Consolidation Project (Springfield Project) and thus is excluded from the area being considered for this project.



The goals of the study include:

- Conducting an alternatives analysis to evaluate long-term options for supplying safe and affordable drinking water to the community
- Engaging community members and other stakeholders in the evaluation of options
- Supporting community members to make an informed decision and collectively arrive at a preferred drinking water solution
- Selecting a preferred alternative and seeking state grant funding to cover the costs to implement the selected alternative

As part of this project, CWC has engaged with residents and property owners in the project area via virtual community meetings, mailers, phone calls, and one-on-one conversations and surveys to solicit their questions about the project and their feedback on the alternatives being considered. In this Draft Report, Corona Environmental Consulting, with support from CWC, has addressed many questions received from community members. Community feedback is also summarized in detail in Appendix F. CWC and Corona Environmental Consulting have also convened meetings and received feedback from other project stakeholders. Stakeholders for this project whose feedback has informed this Draft Report include nearby water providers (Pajaro Sunny Mesa Community Services District (CSD)), Monterey County Environmental Health Bureau, Monterey County LAFCO, Pajaro Valley Water Management Agency, and the SWRCB.

Alternatives and costs

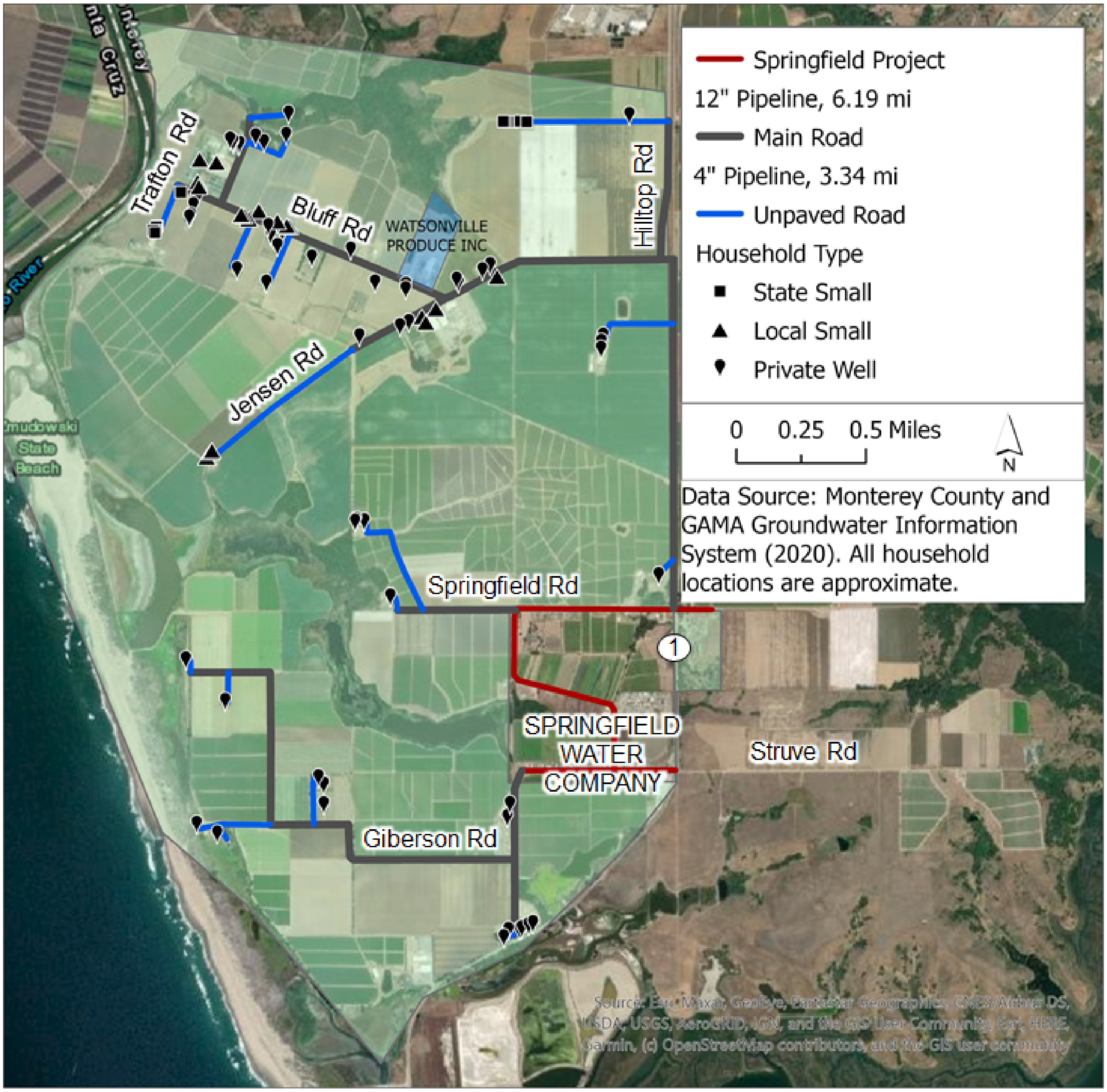
This study evaluated the technical practicality and associated initial costs (sometimes referred to as capital costs) as well as operation and maintenance (O&M) costs of potential long-term drinking water solutions summarized in Table ES-1, taking into consideration water quality and other local constraints. For the first two alternatives (physical consolidation and new community water system), households would be supplied with water from a piped community water system, which people sometimes call "city water". A pipeline would be installed in the street in front of each property and households would become customers of Pajaro Sunny Mesa Community Services District or a new entity and pay a monthly water bill. Two different ways to connect households to city water (or in other words Physical consolidation) were considered. Both scenarios involved connecting to the Springfield Water System, with Scenario A involving the development of a new well and Scenario B connecting to the Sunny Mesa and Pajaro Systems to provide a second water source.

For the other three alternatives (replace existing domestic wells, wellhead treatment, and point-of-use/point-of-entry [POU/POE] treatment), households would continue to receive water from domestic wells, which are smaller wells on their property or small wells that are shared with other households through state or local small water systems.

Table ES-1. Summary of alternatives considered.

Name	Description	Water Supply
Physical Consolidation	*Connect to the Springfield Project operated by the Pajaro Sunny Mesa Community Services District (CSD)*. The Pajaro Sunny Mesa CSD would be responsible for operating and maintaining the water system. In addition to the Springfield Project well, an additional water source would also be needed for backup or emergency purposes. The new water source could be a new backup well (Scenario A) constructed at a location with potentially good water quality near or within the project area or water from the Pajaro Water System (Scenario B) if the Pajaro Water System is connected to the Sunny Mesa Water System and the Sunny Mesa Water System is connected to the project area. Households could either destroy their wells or keep their wells for non-potable use and install and maintain backflow preventers on them to prevent contaminated water from the wells from entering the water system. A map showing how the project area could be consolidated with the Springfield Water System is shown in Figure ES-2.	Community Piped Water System
New Community Water System	*Develop a new community water system that could be owned and operated by an existing system*. Locations for two new wells would need to be identified in an area with potentially good water quality. For this option, piping would be installed in the street. A new entity or an existing entity, such as Pajaro Sunny Mesa CSD, would be responsible for operating and maintaining the water system.	Community Piped Water System
Replace Existing Domestic Well(s)	*Replace existing wells with new, better constructed wells likely to produce better water quality*. The property owner would be responsible for ongoing operation and maintenance of the new well.	Domestic Well
Wellhead Treatment	*Install treatment systems that remove contaminants to safe levels and that treat all water produced from a well for one or more households.* This option would use water treatment equipment including filters to remove the contaminants so that the water would satisfy drinking water standards.	Domestic Well
Point of Use/Point of Entry Treatment	*Install treatment systems that remove contaminants to safe levels that treat water at the location of consumption (normally the kitchen sink) and/or just prior to entering homes.*	Domestic Well

Figure ES-2. Map of potential physical consolidation with the Springfield Project.



Benefits and disadvantages or challenges for each alternative are summarized in Table ES-2. It is important to note that POU/POE treatment is not certified by the State of California to treat well water with extremely high nitrate concentrations, and therefore it will not be an adequate solution for the majority of households. Also, replacing private wells may not address water quality issues because it is possible that a new well could also be subject to contamination and/or seawater intrusion.

Cost estimates per household have been developed for each alternative and are shown in both Table ES-2 and Table ES-3. Table ES-3 shows total costs over a 20-year period that account for both initial and long-term O&M costs in present-day dollars. By combining initial capital costs and O&M costs, total costs across alternatives can be compared.

Table ES-3 O&M costs assume water used for indoor and outdoor purposes is treated, except for the POU/POE alternative where only water used indoors is treated. Based on quotes from two treatment equipment vendors (A and B), wellhead treatment was estimated to be the most expensive alternative. Physical consolidation with an existing water system and development of a new community water system appear to be the most cost competitive, especially when considering that POU/POE treatment only treats water used for indoor consumption whereas these options provide water for indoor and outdoor use.

The different alternatives are not expected to have the same level of grant funding from the state, which is another important consideration related to cost. Table ES-2, which summarizes initial capital costs and O&M costs on a household basis, has been color coded to reflect anticipated grant funding.

Table ES-2. Summary of the benefits, challenges, and costs per household for each alternative.

(green)	Costs anticipated to be grant funded for the community.
(yellow)	Costs anticipated to be grant funded for households that qualify based on ability to pay.[1]
(pink)	It is uncertain which O&M costs may be eligible for state funding.

Alternative	Benefits	Disadvantages and Challenges	System type[2]	Annual O&M per house ($/yr)[3]	Monthly O&M per house ($/month)[3]	Capital Costs per house ($)
Physical consolidation (Connect to Springfield Project)	•Operated by an experienced utility, which will likely improve long-term sustainability. •Storage, booster pumps and one well would be shared with an existing system. •Low estimated O&M costs •Scenario B would regionally consolidate the project area with two additional systems, increasing the reliability of each system. •Scenario B would be more reliable in the long term, because it would rely on more inland wells less vulnerable to seawater intrusion.	•High initial construction costs •Capital cost uncertainties associated with pipelines crossing highways, private land, and protected habitat. •Scenario A would rely only on wells near the coast that could have water quality degrade in the future from seawater intrusion. •Scenario B is dependent on the completion of a consolidation project between Sunny Mesa and Pajaro Water Systems that is without a start date.	CWS	Based on PSMCSD Water Rates[4] (See Table ES-4 for examples)		Scenario A: 154,000; Scenario B: 149,000[6] (Community Infrastructure) Lateral Pipe Installation & Well Destruction: 21,000 Lateral Pipe Installation & Well Isolation: 10,000 + premise plumbing modifications [7]
New CWS	•Another experienced water utility may be able to operate the system, which would likely improve long-term sustainability. •Water quality monitored and reported to the state •Low to moderate estimated O&M costs	•High initial construction costs •Likely only eligible for state funding if physical consolidation is not feasible •If another experienced water utility is not able to operate the system, it would likely be difficult and time consuming to develop a new and sustainable utility. •Requires the development of a new permit or modifying an existing permit that may delay implementation	CWS	Based on PSMCSD Water Rates[4] (See Table ES-4 for examples)		233,000[6] (Community Infrastructure) Lateral Pipe Installation & Well Destruction: 21,000 Lateral Pipe Installation & Well Isolation: 10,000 + premise plumbing modifications[7]
Replace private wells	•Does not require new community-level water infrastructure •Low estimated O&M costs	• Each well owner will be responsible for maintaining their well and water system •Water quality in replacement wells could degrade in the future •Replacement wells with good water quality will likely be infeasible in some portions of the project area	PW	692	58	166,000
			LSWS	294	25	63,000
			SSWS	154	13	37,000
Wellhead treatment	•Can treat other contaminants that may reach wells in the future	•High estimated O&M costs •Requires frequent disposal of waste from treatment systems •Could be difficult to maintain many individual decentralized treatment systems that require substantial O&M costs and support	PW[5]	86,200	7,180	165,000
			LSWS[5]	39,700	3,310	142,000
			SSWS[5]	37,100	3,090	78,900
			PW[5]	13,300	1,110	707,000
			LSWS[5]	12,400	1,030	307,000
			SSWS[5]	10,200	850	165,000

POU/POE	•Low capital costs	•Not an allowable option for compliance ofSSWS and LSWS in Monterey County •Infeasible for 12 of 15 households that need treatment due to high nitrate •Could be difficult to maintain many individual decentralized treatment systems that require substantial O&M costs and support •Growth of microorganisms in granular activated carbon (GAC) filters is a potential concern	PW	9,210 indoor only	770 indoor only	70,500[8]

[1] The State Water Board Division of Financial Assistance (DFA) is in the process of updating their funding policy for work on private property and has provided preliminary guidance with implications for this project (Email Correspondence from the Assistant Deputy Director, DFA, on 10/14/2021). In the updated funding policy, funding eligibility for work on private property will normally be determined on a community basis meaning that most households in this project would be eligible since the area is classified as a disadvantaged community (DAC). There may be some exceptions, such as very costly work on private property or in cases where block group income data is not representative of individual households in the project area. In these cases, funding eligibility would be based on the property owner's ability to pay. DFA is working to formalize this guidance into a written policy and CWC is seeking confirmation whether this policy applies to all costs on private property (lateral, well destruction and backflow preventer, and what the criteria may be identifying exceptions where ability-to-pay information is required).

[2]Community Water System (CWS), Private Well (PW), Local Small Water System (LSWS), State Small Water System (SSWS). For cost estimation, it is assumed that each PW, LSWS and SSWS serve an average of 1.3, 3.4 and 6.5 households respectively based on the average number of households each type of system serves in the area.

[3]O&M costs assume 150 gallons per person per day water use for indoor and outdoor purposes except where indoor only use is noted. Indoor water use only assumes 55 gallons per person per day.

[4]Pajaro Sunny Mesa Community Services District. "Exhibit "A" Pajaro/Sunny Mesa Community Services District Rate Schedule. Effective Date July 1, 2021. http://pajarosunnymesa.com/uploads/Rate%20Schedule%207-2021%20to%206-2022.pdf".

[5]Costs for offsite disposal are the largest component of O&M costs for Vendors A and B and may be avoidable if the Central Coast RWQCB allows onsite disposal of brine.

[6]These capital costs are associated with work not performed on private property such as installation of water mains. Such costs would be eligible for grant funding for all households regardless of economic status. Scenario A involves developing a new well to provide a second water source whereas Scenario B would connect the project area to the Sunny Mesa and Pajaro Systems if they consolidate in addition to connecting to the Springfield Project instead of developing a new well.

[7]These capital costs are associated with work performed on private property such as constructing a service line, demolition of an old well, or the installation of a backflow prevention device. When determining eligibility for state funding for these costs, a property owner's ability to pay for these costs themselves would be considered. If a property owner chooses to keep their well for outdoor water use, they would be responsible for the installation and maintenance of a backflow preventer to keep the well isolated from the public water system as well as any plumbing on their premises needed to avoid blending water from their private well with water from the community water system. The costs shown assume the work is performed by a contractor. If an owner obtains a simple Monterey County construction permit, which costs approximately $240, and installs the service line themselves, the assumed $6,500 cost for service line construction may be substantially reduced. The cost shown for lateral installation and well destruction does not include the full cost of destroying one well, because some wells serve multiple households. The cost shown represents the cost of destroying the approximately 50 wells in the project area divided among the 88 households.

[8]POU/POE capital costs include site assessments, technical oversight, diagnostic water quality sampling, an allowance for improvements to existing wells and storage tanks, project management, and replacement at 10 years.

Table ES-3. Comparisons of initial capital, 20-year O&M, and 20-year total costs per household for each alternative.

Alternative	Capital costs ($/household)[b]	20-year O&M costs ($/household)	20-year total cost ($/household)
Replace Private Well	37,800 to 166,000[a]	15,900 to 27,100[a]	53,700 to 193,000[a]
Consolidation: Scenario A	176,000	27,800	203,800
Consolidation: Scenario B	170,000	27,800	197,800
New CWS	254,000	27,800	281,800
Wellhead Treatment Vendor A	78,900 to 166,000[a]	1,070,000	541,000 to 1,240,000[a]
Wellhead Treatment Vendor B	165,000 to 707,000[a]	127,000 to 166,000[a]	292,000 to 872,000[a]
PW - POU/POE	70,540	112,000 to 115000[a]	182,000 to 185,000[a]

[a]For domestic well solutions, the cost per household will depend on how many houses share a well. For those solutions, a range of costs is provided, with the low end of the range being the cost per household for households in a state small water system serving approximately 6 or 7 households and the high end of the range being the per-household cost for a well serving just one property. [b]A 5% discount rate is assumed when calculating total 20-year costs.

The O&M costs shown in Table ES-3 were calculated using average household water consumption estimates in California and assume an occupancy of 4.7 residents per household, which leads to conservative (i.e., elevated) estimates for daily household water consumption of 705 gal per day per household. This level of water consumption is compared in Table ES-4 with several other possible scenarios assuming indoor water use only as well as average historical indoor and outdoor water consumption in nearby water systems and for individual households. When using the Pajaro Sunny Mesa Community Services District (CSD) water rate structure, monthly water bills would range between $23 and $116 per month per household for these different water consumption levels. Since the O&M costs for physical consolidation and a new CWS shown in Table ES-3 were determined using Pajaro Sunny Mesa CSD water rates and a daily household water consumption of 705 gal per household per day, O&M costs in Table ES-3 are likely conservative. Depending on the water use habits of residents, the number of residents per household, and the extent of landscaping/irrigation demands, water demand and bills could be substantially less in the project area.

Table ES-4. Potential household (HH) water bills for physical consolidation and new CWS alternatives assuming different water consumption scenarios and Pajaro Sunny Mesa CSD's current water rates.

Water Consumption Scenario	ADD (gpcd)	Residents / HH	Daily HH Use (gal/day/HH)	Monthly Bill ($/month)
Average Indoor+Outdoor Use in California[1]	150	4.7	705	186
Average Indoor Only Use in California[2]	55	4.7	259	86
Sunny Mesa Average (2019-2020)[3]	Unknown		281	91
2020 Average for example households in the Sunny Mesa Water System[4]				
Family of 4 w/ Landscaping	92	4	369	116
Family of 4 w/ Minimal Landscaping	61	4	246	88
Family of 2 w/ Landscaping	160	2	320	104
Family of 1 w/ Minimal Landscaping	25	1	25	23

[1]SWRCB. "Initial Statement of Reasons 1,2,3-Trichloropropane Maximum Contaminant Level Regulations. Title 22, California Code of Regulations", Last updated 2/17/19. Water bills calculated assuming the Pajaro Sunny Mesa CSD, "Rate Schedule" Accessed 7/6/21, http://pajarosunnymesa.com/uploads/Rate%20Schedule%207-2021%20to%206-2022.pdf. [2]SWRCB California Water Board, "Fast Facts on the Water Conservation Legislation" Accessed 5/28/21, https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/Files/PDFs/Water-Conservation-Legislation-Fact-Sheet_a_y19.pdf. Water bills calculated assuming the Pajaro Sunny Mesa CSD, "Rate Schedule". [3]Water consumption and bills based on personal communication between Kyle Shimabuku (Corona Environmental Consulting) and Judy Vazquez-Varela with Pajaro Sunny Mesa CSD, on July 6th, 2021. [4]Water consumption and water bills based on personal communication between Heather Lukacs (CWC) and Judy Vazquez-Varela with Pajaro Sunny Mesa CSD, on June 15th, 2021.

Summary of the Alternatives Evaluation

Cost and non-cost considerations from Table ES-2 were used to develop criteria to evaluate and rank each alternative. The criteria include funding availability, long-term sustainability/reliability, implementation challenges and considerations, the schedule to implement the alternatives, and the alternative's ability to address water quality issues for all homes in the project area. Also, combinations of alternatives were considered and ranked alongside the standalone alternatives. The combinations of alternatives that were considered include:

- Consolidation or new CWS and replacing existing wells
- Consolidation or new CWS and wellhead treatment
- Consolidation or new CWS and POU/POE treatment
- Consolidation or new CWS and no intervention for wells that are in compliance

Consolidation or a new CWS were considered in combination with other alternatives because the physical consolidation and new CWS solutions had the highest and second highest overall rankings, respectively. These combinations were considered to evaluate whether it may be possible to reduce consolidation or new CWS costs by providing a different solution or no intervention (if water quality standards are currently met) for households that are far away from others. A summary of this ranking is provided in Table ES-5.

Table ES-5. Summary of the alternatives evaluation

	Non-Treatment Alternative			Treatment Alternatives		Combination of Alternatives			
Criteria	**Physical Consolidation with Springfield**	**New Community Water System**	**Replacing Existing Wells**	**Wellhead Treatment**	**POU/POE Treatment**	**Consolidation or New CWS and Replacing Existing Wells**	**Consolidation or New CWS and Wellhead Treatment**	**Consolidation or New CWS and POU/POE Treatment**	**Consolidation or New CWS and No Intervention for some wells in compliance**
Grant funding to cover all homes									
Capital cost									
Annual operations and maintenance cost									
Estimated monthly water rate charged to households									
Schedule to implement, including estimated timeline for relevant permits									
Implementation challenges and considerations									
Long-term sustainability / reliability									
Addresses all homes									
Recommended for further consideration	Yes	Yes	No	No	No	No	No	No	Yes
Notes	Recommended alternative	Second choice alternative	Cannot reliably provide safe water to all homes in the project area	Cost prohibitive	Cannot provide safe water to all homes in the project area; grant eligibility depends on income; O&M costs are high	Less sustainable than physical consolidation only and limited opportunities to reduce consolidation costs with a new well	Unable to decrease costs relative to physical consolidation alone. Also has other drawbacks.	Not a long-term solution and may not be grant eligible	Needs further investigation. Could reduce capital and O&M costs, but may be less resilient/sustainable than providing a connection to a community water system for all households.

Key	
	Favorable
	Somewhat favorable
	Less favorable
	Not favorable

Recommended Alternatives for Further Consideration

When considering all of the criteria, the recommended alternative for further consideration is physical consolidation with the Springfield Project. This alternative is ranked above a new CWS because the capital cost is lower, the ongoing cost to residents is the same, and combining with an existing community water system is likely to be more sustainable because infrastructure and technical and managerial capacity would be shared with that system. Also, state grant funding would likely only be available for a new CWS if physical consolidation is not feasible. Both physical consolidation Scenarios A and B should be considered further, though Scenario B is the prefered option. Scenario B ranks better as a long-term and reliable solution as the project area would also be consolidated with systems that have groundwater sources that are further inland and may be less vulnerable to seawater intrusion. However, Scenario B depends on the completion of a consolidation project between the Sunny Mesa and Pajaro Systems, which does not have a start date. Therefore, Scenario A should be considered alongside Scenario B in the event that Scenario B cannot be pursued because, for instance, consolidation between the Sunny Mesa and Pajaro Systems is determined to be infeasible or its implementation timeline is substantially delayed. Also, the ability to implement either scenario is contingent on the successful completion of the Springfield Project. If for some reason this alternative is not viable or is delayed substantially, then the new CWS alternative can be pursued.

It may be advantageous for households to use grant funding that may be available to destroy existing domestic wells if physical consolidation is pursued as it would prevent surface water contamination of the aquifer from the well, avoid well maintenance costs, and potentially provide benefits to the community such as supporting aquifer management to limit seawater intrusion. However, property owners can decide to continue to use their well for irrigation and connect to the Springfield Project for indoor water use. For property owners to continue to use domestic wells for irrigation, a backflow preventer would need to be installed that is estimated to cost $2,340[1]. Modifications to premise plumbing needed to separate outdoor water piping from interior use water piping might incur additional costs that the property owner may need to cover. In addition, the backflow preventer would need to be tested annually, which currently costs $90 per year. When deciding to keep or destroy domestic wells, community members should consider the age of their well, as domestic wells can have an average useful life of 30 to 50 years[2]. Shallow domestic wells in the area may experience sea water intrusion in the future.

Although the other standalone alternatives each have advantages with respect to one or more of the criteria, they are ranked less favorable or unfavorable with respect to their ability to provide a solution for all households, reliably and sustainably provide safe water, and/or provide an affordable solution. Since these criteria are critical, these alternatives on their own are not recommended. In addition, combining these alternatives with physical consolidation or development of a new CWS are not recommended for many of the same reasons they are not recommended as a standalone alternative. Additionally, the combination of alternatives may not be able to meaningfully reduce the costs of consolidation with the Springfield Project or the development of a new community water system.

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[1]Based on the California Water Board, "2021 Drinking Water Needs Assessment" Accessed 8/10/21, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2021_needs_assessment.pdf. It also includes the 1.3 regional multiplier and a 20% contingency.

[2]Re/Max Executive Realty, "Well Inspections: Buying a Home with a Well", Accessed 5/28/21, https://www.maxrealestateexposure.com/buying-home-with-well/

It may be possible to reduce the capital costs of one of these community water system-based alternatives by not providing an intervention for groups of households that are (i) geographically distant from other households and (ii) served by wells with adequate water quality. Due to the limited availability of water quality data for the wells serving the geographically distant households, it is currently not possible to estimate the location and number of households that could be excluded from the project. Therefore, it is recommended that the water quality in the wells that serve these households be further investigated before this alternative is deemed to be a viable option. Also, even if water quality standards are currently being met, water quality at these wells could change and fall out of compliance with drinking water standards in the future due to seawater intrusion or contaminant plume migration, which should be considered before pursuing this option.

Next Phase of Work
This Final Report is the final deliverable in the phased process to produce a completed project deliverable. A summary of the phases of work is shown in Table ES-6. Prior to this Final Report, Corona Environmental Consulting developed an Public Draft Report, and Administrative Draft Report, and an Overview of Alternatives. The Public Draft Report, Administrative Draft Report, and Overview of Alternatives were reviewed by representatives from the SWRCB, Monterey County Environmental Health Bureau, and Pajaro Sunny Mesa Community Services District (CSD). The Public Draft was also made available to community members for comment. Key findings were also presented at community meetings, during which community members asked questions and provided input. This Final Report incorporates revisions to the PublicDraft Report based on input from stakeholders and community members. Findings from this final deliverable will be presented to community members.

Table ES-6. Project steps and timeline.

Task	Feb	Mar	Apr	May	Jun/Jul	Aug/Sep	Oct/Nov
Scope of Work							
Overview of Alternatives Draft Report							
Administrative Draft Report							
Public Draft Report							
Final Report							

indicates deliverable

indicates community meeting

indicates community comment

State Water Resources Control Board, Monterey County and Pajaro Sunny Mesa Community Services District review and comment

11.2. Appendix B – PWS Well No. 1 and No. 2 Water Quality Data

Pajaro Sunny Mesa Svc District
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Royal Oaks, CA 95076

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www.MBASinc.com
ELAP Certification Number: 2385

Wednesday, April 5, 2023

Sample Results

Lab Number: 230324_58-01 **Sample Description: Pajaro CSD, Well #2**

Collection Date/Time: 3/24/2023 12:00 Sample Collector: Grosser C Client Sample #:
Received Date/Time: 3/24/2023 16:25 System ID: CA2710020_002_002 Coliform Designation: Special

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Aggressivity Index	Calculation	NA	12.4	1				4/3/2023	14:00	OW
Anion-Cation Balance	Calculation	%	3	1				4/3/2023	14:00	OW
QC Anion Sum x 100	Calculation	%	104	1				4/3/2023	14:00	OW
QC Cation Sum x 100	Calculation	%	111	1				4/3/2023	14:00	OW
QC Ratio TDS/SEC	Calculation	NA	0.57	1				3/29/2023	10:00	BM
Asbestos	EPA 100.2	mF/L	0.40	1	E	0.2	7	4/2/2023	12:00	E
Asbestos Types: Chrysotile	*Sample ozonated prior to analysis due to lab receipt time exceeding 48hr method hold time.*									
Ammonia-N	EPA 350.1	mg/L	ND	1		0.15		3/28/2023	13:50	XQL
Turbidity	EPA180.1	NTU	ND	1		0.1	5	3/26/2023	10:27	CC
Calcium	EPA200.7	mg/L	37	1		1		3/31/2023	14:37	OW
Copper, Total	EPA200.7	µg/L	ND	1		20	1300	3/31/2023	14:37	OW
Hardness (as CaCO3)	EPA200.7	mg/L	291	1		5		4/3/2023	11:37	OW
Iron, Total	EPA200.7	µg/L	40	1		30	300	3/31/2023	14:37	OW
Magnesium	EPA200.7	mg/L	48.4	1		0.5		3/31/2023	14:37	OW
Manganese, Total	EPA200.7	µg/L	29	1		15	50	3/31/2023	14:37	OW
Potassium	EPA200.7	mg/L	2.1	1		0.5		3/31/2023	14:37	OW
Sodium	EPA200.7	mg/L	47	1		1		3/31/2023	14:37	OW
Zinc, Total	EPA200.7	µg/L	ND	1	IB	30	5000	3/31/2023	14:37	OW
IB: High bias in the QC sample does not affect result; analyte ND in associated sample.										
Aluminum, Total	EPA200.8	µg/L	ND	1		15	1000	4/4/2023	15:47	MW
Antimony, Total	EPA200.8	µg/L	ND	1		0.5	6	4/4/2023	15:47	MW
Arsenic, Total	EPA200.8	µg/L	ND	1		1	10	4/4/2023	15:47	MW
Barium, Total	EPA200.8	µg/L	25.9	1		5	1000	4/4/2023	15:47	MW
Beryllium, Total	EPA200.8	µg/L	ND	1		0.5	4	4/4/2023	15:47	MW
Cadmium, Total	EPA200.8	µg/L	ND	1		0.25	5	4/4/2023	15:47	MW
Chromium, Total	EPA200.8	µg/L	3.7	1		1	50	4/4/2023	15:47	MW
Lead, Total	EPA200.8	µg/L	ND	1		1	15	4/4/2023	15:47	MW

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments H: Analyzed outside of method hold time QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

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ELAP Certification Number: 2385
Wednesday, April 5, 2023

Pajaro Sunny Mesa Svc District
Don Rosa
136 San Juan Road
Royal Oaks, CA 95076

Lab Number: 230324_58-01 Sample Description: Pajaro CSD, Well #2

Collection Date/Time: 3/24/2023 12:00 Sample Collector: Grosser C Client Sample #:
Received Date/Time: 3/24/2023 16:25 System ID: CA2710020_002_002 Coliform Designation: Special

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Mercury, Total	EPA200.8	µg/L	ND	1	LO	0.3	2	4/4/2023	15:47	MW
LO: MS and MSD result unavailable. Acceptability based on LCS recovery.										
Nickel, Total	EPA200.8	µg/L	ND	1		5	100	4/4/2023	15:47	MW
Selenium, Total	EPA200.8	µg/L	ND	1		1	50	4/4/2023	15:47	MW
Silver, Total	EPA200.8	µg/L	2.4	1		1.5	100	4/4/2023	15:47	MW
Thallium, Total	EPA200.8	µg/L	ND	1		0.5	2	4/4/2023	15:47	MW
Bromide	EPA300.0	mg/L	0.1	1		0.1		3/27/2023	13:46	HC
Chloride	EPA300.0	mg/L	42.3	1		1	250	3/24/2023	19:45	HC
Fluoride	EPA300.0	mg/L	0.2	1		0.1	2	3/24/2023	19:45	HC
Nitrate as N	EPA300.0	mg/L	ND	1		0.1	10	3/24/2023	19:45	HC
Nitrate+Nitrite as N	EPA300.0	mg/L	ND	1		0.1	10	3/24/2023	19:45	HC
Nitrite as N	EPA300.0	mg/L	ND	1		0.1	1	3/24/2023	19:45	HC
Orthophosphate as P	EPA300.0	mg/L	ND	1		0.1		3/24/2023	19:45	HC
Sulfate	EPA300.0	mg/L	96	1		2	250	3/24/2023	19:45	HC
Perchlorate	EPA314.0	µg/L	ND	1		2	6	3/24/2023	16:51	HC
Trihalomethanes	EPA551.1	µg/L	ND	1	E		80	3/30/2023	21:59	E
Haloacetic Acids	EPA552	µg/L	1	1	E		60	3/30/2023	18:21	E
Chlorine Residual (Field)	External	mg/L	ND	1				3/24/2023	12:00	
Cyanide, Available	OIA-1677-09	µg/L	ND	1		4	150	3/30/2023	16:40	XQL
Color, Apparent (Unfiltered)	SM2120B	Color Units	ND	1		3	15	3/26/2023	11:25	CC
Odor Threshold at 60 C	SM2150B	TON	ND	1	H24	1	3	3/26/2023	11:50	DH
Odor not detected. H24: Holding time was > 24 hours.										
Alkalinity, Total (as CaCO3)	SM2320B	mg/L	211	1		10		3/28/2023	14:21	BM
Bicarbonate (as HCO3-)	SM2320B	mg/L	258	1		10		3/28/2023	14:21	BM
Carbonate as CaCO3	SM2320B	mg/L	ND	1		10		3/28/2023	14:21	BM
Hydroxide	SM2320B	mg/L	ND	1		10		3/28/2023	14:21	BM
Langelier Index, 15°C	SM2330B	NA	0.24	1				4/3/2023	14:00	OW
Langelier Index, 60°C	SM2330B	NA	1.07	1				4/3/2023	14:00	OW
Specific Conductance (EC)	SM2510B	µmho/cm @25.0°C	711	1		10	900	3/28/2023	14:21	BM

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
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Wednesday, April 5, 2023

Lab Number: 230324_58-01 Sample Description: Pajaro CSD, Well #2

Collection Date/Time: 3/24/2023 12:00 Sample Collector: Grosser C Client Sample #:
Received Date/Time: 3/24/2023 16:25 System ID: CA2710020_002_002 Coliform Designation: Special

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Total Dissolved Solids	SM2540C	mg/L	408	1		10	500	3/27/2023	10:40	BM
pH (Laboratory)	SM4500-H+B	pH (H)	8.1	1		1	8.5	3/26/2023	13:10	CC
Temperature (pH)	SM4500-H+B,temp	°C	23.9	1				3/26/2023	13:10	CC
MBAS (Surfactants)	SM5540C	mg/L	ND	1		0.05		3/24/2023	16:57	OW
Coliform, E Coli	SM9223B-18hr	/100mL	Absent	1				3/24/2023	17:21	SB
Coliform, Total	SM9223B-18hr	/100mL	Absent	1				3/24/2023	17:21	SB

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
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YFV

Monday, March 27, 2023

Sample Results

Lab Number: 230325_09-01

Collection Date/Time: 3/25/2023 7:36 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 3/25/2023 13:22 System ID: CA2710020_002_002 Coliform Designation: Special

Sample Description: Pajaro CSD, Well #2

Analyte	Method	Unit	Result	Qualifier	Dilution	PQL	Analysis Date/Time		Analyst
Chlorine Residual (Field)	External	mg/L	ND		1		3/25/2023	7:36	
Coliform, E Coli	SM9223B-18hr	/100mL	Absent		1		3/25/2023	15:25	CC
Coliform, Total	SM9223B-18hr	/100mL	Absent		1		3/25/2023	15:25	CC

Comments:

Lab Number: 230325_09-02

Collection Date/Time: 3/25/2023 7:55 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 3/25/2023 13:22 System ID: CA2710020_002_002 Coliform Designation: Special

Sample Description: Pajaro CSD, Well #2

Analyte	Method	Unit	Result	Qualifier	Dilution	PQL	Analysis Date/Time		Analyst
Chlorine Residual (Field)	External	mg/L	ND		1		3/25/2023	7:55	
Coliform, E Coli	SM9223B-18hr	/100mL	Absent		1		3/25/2023	15:25	CC
Coliform, Total	SM9223B-18hr	/100mL	Absent		1		3/25/2023	15:25	CC

Comments:

Report Approved by: David Holland, Laboratory Director

The results in this report are related only to the samples analyzed.
This certificate of analysis shall not be reproduced except in full, without written approval of the laboratory.

(1)

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
PQL: Practical Quantitation Limit
MCL: Maximum Contamination Level
ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments
H: Analyzed outside of method hold time
QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

EP 1st Q

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Monday, March 28, 2022

Sample Results

Lab Number: 220223_34-01 Sample Description: Pajaro CSD, Well #2

Collection Date/Time: 2/23/2022 10:15 Sample Collector: PIERCE E Client Sample #:
Received Date/Time: 2/23/2022 15:34 System ID: CA2710020_002_002

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Uranium, Radiological	EPA200.8	pCi/L	0.9	1		0.3	20	2/24/2022	17:14	MW
Uranium, Total	EPA200.8	µg/L	1.3	1		0.5	30	2/24/2022	17:14	MW
Radium 226	EPA903.0	pCi/L	0.203±0.172	1	E			3/25/2022	13:55	E
Radium 228	Ra - 05	pCi/L	0.000±0.634	1	E			3/25/2022	13:55	E

Lab Number: 220223_34-02 Sample Description: Pajaro CSD, Well #1

Collection Date/Time: 2/23/2022 10:15 Sample Collector: PIERCE E Client Sample #:
Received Date/Time: 2/23/2022 15:34 System ID: CA2710020_001_001

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Uranium, Radiological	EPA200.8	pCi/L	0.8	1		0.3	20	2/24/2022	17:17	MW
Uranium, Total	EPA200.8	µg/L	1.1	1		0.5	30	2/24/2022	17:17	MW
Radium 226	EPA903.0	pCi/L	0.181±0.166	1	E			3/25/2022	13:55	E
Radium 228	Ra - 05	pCi/L	0.000±0.765	1	E			3/25/2022	13:55	E

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
PQL: Practical Quantitation Limit
MCL: Maximum Contamination Level
ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments
H: Analyzed outside of method hold time
QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

2Q

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136 San Juan Road
Royal Oaks, CA 95076

Sample Results

Lab Number: 220516_93-01 Sample Description: Pajaro CSD, Well #2

Collection Date/Time: 5/16/2022 8:50 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 5/16/2022 16:15 System ID: CA2710020_002_002

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Uranium, Radiological	EPA200.8	pCi/L	0.3	1		0.3	20	5/23/2022	15:05	MW
Uranium, Total	EPA200.8	µg/L	0.5	1		0.5	30	5/23/2022	15:05	MW
Radium 226	EPA903.0	pCi/L	0.311±0.242	1	E			6/14/2022	10:05	E
Radium 228	Ra - 05	pCi/L	0.000±0.825	1	E			6/14/2022	10:05	E

Lab Number: 220516_93-02 Sample Description: Pajaro CSD, Well #1

Collection Date/Time: 5/16/2022 8:15 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 5/16/2022 16:15 System ID: CA2710020_001_001

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Gross Alpha	EPA900.0	pCi/L	1.64±1.22	1	E		15	6/9/2022	11:44	E

(2)

2nd Q

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Monday, June 6, 2022

Sample Results

Lab Number: 220516_95-01 Sample Description: Pajaro CSD, Well #1

Collection Date/Time: 5/16/2022 8:15 Sample Collector: Farfan R Client Sample #:

Received Date/Time: 5/16/2022 16:35 System ID: CA2710020_001_001

T22

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Aggressivity Index	Calculation	NA	12.4	1						
Anion-Cation Balance	Calculation	%	3	1						
QC Anion Sum x 100	Calculation	%	104	1						
QC Cation Sum x 100	Calculation	%	110	1						
QC Ratio TDS/SEC	Calculation	NA	0.58	1						
* Asbestos	EPA100.2	mF/L	0.2	1	E	0.2	7	5/20/2022	12:00	E
Turbidity	EPA180.1	NTU	1.0	1		0.1	5	5/17/2022	9:01	SB
Calcium	EPA200.7	mg/L	32	1		1		5/19/2022	16:36	OW
Copper, Total	EPA200.7	µg/L	31	1		20	1300	5/19/2022	16:36	OW
Hardness (as CaCO3)	EPA200.7	mg/L	219	1		5				
Iron, Total	EPA200.7	µg/L	666	1		30	300	5/19/2022	16:36	OW
Magnesium	EPA200.7	mg/L	34.1	1		0.5		5/19/2022	16:36	OW
Manganese, Total	EPA200.7	µg/L	308	1		15	50	5/19/2022	16:36	OW
Potassium	EPA200.7	mg/L	2.1	1		0.5		5/19/2022	16:36	OW
Sodium	EPA200.7	mg/L	50	1		1		5/19/2022	16:36	OW
Zinc, Total	EPA200.7	µg/L	42	1		30	5000	5/19/2022	16:36	OW
Aluminum, Total	EPA200.8	µg/L	ND	1		15	1000	5/23/2022	15:07	MW
Antimony, Total	EPA200.8	µg/L	ND	1		0.5	6	5/23/2022	15:07	MW
Arsenic, Total	EPA200.8	µg/L	ND	1		1	10	5/23/2022	15:07	MW
Barium, Total	EPA200.8	µg/L	43.3	1		5	1000	5/23/2022	15:07	MW
Beryllium, Total	EPA200.8	µg/L	ND	1		0.5	4	5/23/2022	15:07	MW
Cadmium, Total	EPA200.8	µg/L	ND	1		0.25	5	5/23/2022	15:07	MW
Chromium, Total	EPA200.8	µg/L	1.6	1		1	50	5/23/2022	15:07	MW
Lead, Total	EPA200.8	µg/L	2.0	1		1	15	5/23/2022	15:07	MW
Mercury, Total	EPA200.8	µg/L	ND	1		0.3	2	5/23/2022	15:07	MW
Nickel, Total	EPA200.8	µg/L	ND	1		5	100	5/23/2022	15:07	MW
Selenium, Total	EPA200.8	µg/L	ND	1		1	50	5/23/2022	15:07	MW
Silver, Total	EPA200.8	µg/L	ND	1		1.5	100	5/23/2022	15:07	MW
Thallium, Total	EPA200.8	µg/L	ND	1		0.5	2	5/23/2022	15:07	MW
Bromide	EPA300.0	mg/L	ND	1		0.1		5/16/2022	21:38	HC

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Monday, June 6, 2022

Lab Number: 220516_95-01 Sample Description: Pajaro CSD, Well #1

Collection Date/Time: 5/16/2022 8:15 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 5/16/2022 16:35 System ID: CA2710020_001_001

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Chloride	EPA300.0	mg/L	13.6	1		1	250	5/16/2022	21:38	HC
Fluoride	EPA300.0	mg/L	0.1	1		0.1	2	5/16/2022	21:38	HC
Nitrate as N	EPA300.0	mg/L	ND	1		0.1	10	5/16/2022	21:38	HC
Nitrate+Nitrite as N	EPA300.0	mg/L	ND	1		0.1	10	5/16/2022	21:38	HC
Nitrite as N	EPA300.0	mg/L	ND	1		0.1	1	5/16/2022	21:38	HC
Orthophosphate as P	EPA300.0	mg/L	ND	1		0.06		5/16/2022	21:38	HC
Sulfate	EPA300.0	mg/L	101	1		1	250	5/16/2022	21:38	HC
Volatile Organic Compounds (DW)	EPA524	µg/L	ND	1	E			5/24/2022	12:00	E
Synthetic Organic Compounds - Monterey *see attached: includes EPA 515.4, 525.3, 531.1, 549.2*	External	External	ND	1	E			5/29/2022	12:00	E
Cyanide, Available *H: Sample analyzed outside of holding time.*	OIA-1677-09	µg/L	5	1	H	4	150	6/1/2022	9:51	SC
Color, Apparent (Unfiltered)	SM2120B	Color Units	ND	1		3	15	5/17/2022	9:01	SB
Odor Threshold at 60 C *No odor observed*	SM2150B	TON	<1	1		1	3	5/17/2022	8:32	SB
Alkalinity, Total (as CaCO3)	SM2320B	mg/L	188	1		10		5/16/2022	22:14	BM
Bicarbonate (as HCO3-)	SM2320B	mg/L	229	1		10				
Carbonate as CaCO3	SM2320B	mg/L	ND	1		10		5/16/2022	22:14	BM
Hydroxide	SM2320B	mg/L	ND	1		10		5/16/2022	22:14	BM
Langelier Index, 15°C	SM2330B	NA	0.22	1						
Langelier Index, 60°C	SM2330B	NA	1.04	1						
Specific Conductance (EC)	SM2510B	µmhos/cm	600	1		3	900	5/16/2022	22:14	BM
Total Dissolved Solids	SM2540C	mg/L	350	1		10	500	5/17/2022	10:45	JP
pH (Laboratory)	SM4500-H+B	pH (H)	8.2	1		1	8.5	5/16/2022	22:14	BM
MBAS (Surfactants)	SM5540C	mg/L	ND	1		0.05		5/18/2022	8:56	OW

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
PQL: Practical Quantitation Limit
MCL: Maximum Contamination Level
ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments
H: Analyzed outside of method hold time
QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

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Thursday, April 6, 2023

Sample Results

Lab Number: 230329_38-01 **Sample Description: Pajaro CSD, Well #2**

Collection Date/Time: 3/29/2023 12:45 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 3/29/2023 15:32 System ID: CA2710020_002_002

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Dioxin - 2,3,7,8-TCDD	EPA 1613	pg/L	ND	1	E	5	30	3/31/2023	12:00	E
Ammonia-N	EPA 350.1	mg/L	ND	1		0.15		4/3/2023	16:13	XQL
Uranium, Radiological	EPA200.8	pCi/L	ND	1		0.3	20	4/4/2023	16:31	MW
Uranium, Total	EPA200.8	µg/L	ND	1		0.5	30	4/4/2023	16:31	MW
Volatile Organic Compounds (DW)	EPA524	µg/L	ND	1	E			4/5/2023	12:00	E
Gross Alpha	EPA900.0	pCi/L	0.862±1.590	1	E		15	4/4/2023	13:46	E
Synthetic Organic Compounds	External	External	ND	1	E			4/5/2023	12:00	E
**see sample 230327_94-01 for additional SOC results (EPA 515, 525, 531, 549)*										
1,2,3-Trichloropropane	SRL 524M	µg/L	ND	1	E	0.005	0.005	4/4/2023	5:50	E

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
PQL: Practical Quantitation Limit
MCL: Maximum Contamination Level
ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments
H: Analyzed outside of method hold time
QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

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T22 | Ammonia
KAV

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Wednesday, March 30, 2022

Pajaro Sunny Mesa Svc District
Don Rosa
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Royal Oaks, CA 95076

Sample Results

Lab Number: 220308_94-01 Sample Description: Sunny Mesa Water System, Well 1

Collection Date/Time: 3/8/2022 14:10 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 3/8/2022 15:54 System ID: CA2700773_001_001

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Aggressivity Index	Calculation	NA	11.5	1						
Anion-Cation Balance	Calculation	%	3	1						
QC Anion Sum x 100	Calculation	%	101	1						
QC Cation Sum x 100	Calculation	%	108	1						
QC Ratio TDS/SEC	Calculation	NA	0.62	1						
* Ammonia-N	EPA 350.1	mg/L	ND	1		0.15		3/17/2022	9:27	SC
Turbidity	EPA180.1	NTU	4.4	1		0.1	5	3/9/2022	12:15	BM
Calcium	EPA200.7	mg/L	33	1		1		3/16/2022	14:29	OW
Copper, Total	EPA200.7	µg/L	24 ✓	1		20	1300	3/16/2022	14:29	OW
Iron, Total	EPA200.7	µg/L	1560 ✓	1	CJ	30	300	3/16/2022	14:29	OW
CJ: Analyte concentration is >10% of the instrument calibration.										
Magnesium	EPA200.7	mg/L	23.8	1		0.5		3/16/2022	14:29	OW
Manganese, Total	EPA200.7	µg/L	25 ✓	1		15	50	3/16/2022	14:29	OW
Potassium	EPA200.7	mg/L	1.9	1		0.5		3/16/2022	14:29	OW
Sodium	EPA200.7	mg/L	40 ✓	1		1		3/16/2022	14:29	OW
Zinc, Total	EPA200.7	µg/L	93 ✓	1		30	5000	3/16/2022	14:29	OW
Aluminum, Total	EPA200.8	µg/L	630	1		15	1000	3/22/2022	20:17	MW
Antimony, Total	EPA200.8	µg/L	ND	1	IB	0.5	6	3/15/2022	20:55	MW
IB: High bias in the QC sample does not affect result; analyte ND.										
Arsenic, Total	EPA200.8	µg/L	1.6 ✓	1		1	10	3/15/2022	20:55	MW
Barium, Total	EPA200.8	µg/L	30.7 ✓	1		5	1000	3/15/2022	20:55	MW
Beryllium, Total	EPA200.8	µg/L	ND	1	IB	0.5	4	3/15/2022	20:55	MW
IB: High bias in the QC sample does not affect result; analyte ND.										
Cadmium, Total	EPA200.8	µg/L	ND	1		0.25	5	3/15/2022	20:55	MW
Chromium, Total	EPA200.8	µg/L	54.9 ✓	1		1	50	3/15/2022	20:55	MW
Lead, Total	EPA200.8	µg/L	ND	1		1	15	3/15/2022	20:55	MW
Mercury, Total	EPA200.8	µg/L	ND	1		0.3	2	3/15/2022	20:55	MW
Nickel, Total	EPA200.8	µg/L	5.8 ✓	1		5	100	3/15/2022	20:55	MW
Selenium, Total	EPA200.8	µg/L	2.1 ✓	1		1	50	3/15/2022	20:55	MW
Silver, Total	EPA200.8	µg/L	ND	1		1.5	100	3/15/2022	20:55	MW
Thallium, Total	EPA200.8	µg/L	ND	1		0.5	2	3/15/2022	20:55	MW

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Wednesday, March 30, 2022

Lab Number: 220308_94-01 Sample Description: Sunny Mesa Water System, Well 1

Collection Date/Time: 3/8/2022 14:10 Sample Collector: Farfan R Client Sample #:

Received Date/Time: 3/8/2022 15:54 System ID: CA2700773_001_001

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Bromide	EPA300.0	mg/L	0.2	1		0.1		3/9/2022	21:00	HC
Chloride	EPA300.0	mg/L	51.9	1		1	250	3/9/2022	21:00	HC
Fluoride	EPA300.0	mg/L	0.2	1		0.1	2	3/9/2022	21:00	HC
Nitrate as N	EPA300.0	mg/L	1.9	1		0.1	10	3/9/2022	21:00	HC
Nitrate+Nitrite as N	EPA300.0	mg/L	1.9	1		0.1	10	3/9/2022	21:00	HC
Nitrite as N	EPA300.0	mg/L	ND	1		0.1	1	3/9/2022	21:00	HC
Orthophosphate as P	EPA300.0	mg/L	0.12	1		0.06		3/9/2022	21:00	HC
Sulfate	EPA300.0	mg/L	12	1		1	250	3/9/2022	21:00	HC
Cyanide, Available	OIA-1677-09	µg/L	ND	1	IB, IL	4	150	3/16/2022	9:03	SC
IB: High bias in the QC sample does not affect result; analyte ND. IL: RPD exceeds laboratory control limit.										
Color, Apparent (Unfiltered)	SM2120B	Color Units	ND	1		3	15	3/9/2022	10:30	BM
Odor Threshold at 60 C	SM2150B	TON	<1	1		1	3	3/9/2022	10:00	BM
Odor: Not observed.										
Alkalinity, Total (as CaCO3)	SM2320B	mg/L	162	1		10		3/10/2022	22:39	BM
Bicarbonate (as HCO3-)	SM2320B	mg/L	197	1		10				
Carbonate as CaCO3	SM2320B	mg/L	ND	1		10		3/10/2022	22:39	BM
Hydroxide	SM2320B	mg/L	ND	1		10		3/10/2022	22:39	BM
Langelier Index, 15°C	SM2330B	NA	-0.59	1						
Langelier Index, 60°C	SM2330B	NA	0.24	1						
Hardness (as CaCO3)	SM2340B/Calc	mg/L	181	1		5				
Specific Conductance (EC)	SM2510B	µmhos/cm	503	1		3	900	3/8/2022	18:40	BM
Total Dissolved Solids	SM2540C	mg/L	312	1		10	500	3/11/2022	11:30	XQL
pH (Laboratory)	SM4500-H+B	pH (H)	7.4	1		0.1	8.5	3/8/2022	18:40	BM
MBAS (Surfactants)	SM5540C	mg/L	ND	1	IL	0.05		3/9/2022	11:10	OW
IL: RPD exceeds laboratory control limit.										

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments H: Analyzed outside of method hold time QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

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Pajaro Sunny Mesa Svc District
Don Rosa
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Royal Oaks, CA 95076

Thursday, June 20, 2019

Lab Number: 190610_31-01 **Sample Description: Sunny Mesa Water System, Well 1**

Collection Date/Time: 6/10/2019 08:20 Sample Collector: Marquez R Client Sample #:
Submittal Date/Time: 6/10/2019 14:03 System ID: 2700773-001

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Analysis Date / Time		Analyst
Ammonia-N	EPA 350.1	mg/L	ND	1		0.1		6/18/2019	11:02	HC
Nitrate as N	EPA300.0	mg/L	ND	1	LN	0.1	10	6/12/2019	05:51	BS
LN: MS and/or MSD below acceptance limits.										
Nitrite as N	EPA300.0	mg/L	ND	1	LN	0.1	1	6/12/2019	05:51	BS
1,2,3-Trichloropropane	SRL 524M	µg/L	ND	1	E	0.005	0.005	6/13/2019	13:49	

Lab Number: 190610_31-02 **Sample Description: Sunny Mesa Water System, Well 2**

Collection Date/Time: 6/10/2019 08:47 Sample Collector: Marquez R Client Sample #:
Submittal Date/Time: 6/10/2019 14:03 System ID: 2700773-002

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Analysis Date / Time		Analyst
Ammonia-N	EPA 350.1	mg/L	ND	1		0.1		6/18/2019	11:11	HC
Nitrate as N	EPA300.0	mg/L	2.2	1	LN	0.1	10	6/12/2019	06:07	BS
LN: MS and/or MSD below acceptance limits.										
Nitrite as N	EPA300.0	mg/L	ND	1	LN	0.1	1	6/12/2019	06:07	BS

Report Approved by: David Holland
David Holland, Laboratory Director

mg/L : Milligrams per liter (=ppm) µg/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit MCL : Maximum Contamination Level
H = Analyzed outside of hold time E = Analysis performed by External Laboratory; See Report attachments T = Temperature Exceedance
MDL = Method Detection Limit J = Result is less than PQL ND = Non Detect

Certificate of Analysis

Sample ID: S9J0127-01RE1
Sampled By: R. Marquez
Sample Description: Well #1 // 191003_27-01

Sample Date - Time: 10/03/19 - 08:10
Matrix: Drinking Water
Sample Type: Grab

BSK Associates Laboratory Fresno

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Hexavalent Chromium	EPA 218.7	**16**	0.25	ug/L	5	A915474	10/14/19	10/14/19	

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Monday, September 16, 2019

Lab Number: 190812_34-01 Sample Description: Sunny Mesa Water System, Well 1

Collection Date/Time: 8/12/2019 8:12 Sample Collector: Marquez R Client Sample #:
Submittal Date/Time: 8/12/2019 14:23 System ID: 2700773-001

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Analysis Date / Time		Analyst
Ammonia-N	EPA 350.1	mg/L	ND	1		0.1		8/13/2019	15:27	HC
Nitrate as N	EPA300.0	mg/L	2.5 ✓	1	CK, LN	0.1	10	8/14/2019	19:28	BS
CK: Initial analysis within holding time but failed QA/QC criteria. LN: MS and/or MSD below acceptance limits.										
Nitrite as N	EPA300.0	mg/L	ND	1	CK, LN	0.1	1	8/14/2019	19:28	BS
Gross Alpha	EPA900.0	pCi/L	2.10±1.36 ✓	1	E			8/23/2019	12:00	
1,2,3-Trichloropropane	SRL 524M	µg/L	ND ✓	1	E	0.005	0.005	8/15/2019	20:52	

Lab Number: 190812_34-02 Sample Description: Sunny Mesa Water System, Well 2

Collection Date/Time: 8/12/2019 7:45 Sample Collector: Marquez R Client Sample #:
Submittal Date/Time: 8/12/2019 14:23 System ID: 2700773-003

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Analysis Date / Time		Analyst
Ammonia-N	EPA 350.1	mg/L	ND	1		0.1		8/13/2019	15:29	HC
Nitrate as N	EPA300.0	mg/L	1.1 ✓	1	BB, CK	0.1	10	8/14/2019	21:12	BS
BB: Spiked sample > 4x spike concentration. CK: Initial analysis within holding time but failed QA/QC criteria.										
Nitrite as N	EPA300.0	mg/L	ND	1	BC, CK	0.1	1	8/14/2019	21:12	BS
BC: Matrix spike out of control, lab control sample within limits. CK: Initial analysis within holding time but failed QA/QC criteria.										
Perchlorate	EPA314.0	µg/L	ND	1	LN	2	6	8/12/2019	17:35	BS
LN: MS and/or MSD below acceptance limits.										
Gross Alpha	EPA900.0	pCi/L	1.36±1.73 ✓	1	E			8/19/2019	12:00	

Report Approved by: [signature]
David Holland, Laboratory Director

mg/L : Millgrams per liter (=ppm) µg/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit MCL : Maximum Contamination Level
H = Analyzed outside of hold time E = Analysis performed by External Laboratory; See Report attachments T = Temperature Exceedance
MDL = Method Detection Limit J = Result is less than PQL ND = Non Detect

4 Justin Court Suite D
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ELAP Certification Number: 2385

Certificate of Analysis

April 05, 2023

Pajaro Sunny Mesa Svc District
Pajaro Sunny Mesa Svc District
136 San Juan Road
Royal Oaks,CA 95076

Thank you for using Monterey Bay Analytical Services for your analytical testing needs.
In the following pages please find the test results for the samples submitted March 27, 2023 for order ID #: 230327_97

Sample results are on the Sample Results page and are related only to the samples analyzed.

The samples were analyzed in accordance with the attached Chain of Custody document. Sample receipt conditions were noted on the chain of custody forms and are reported at the end of this report. Any deviations from the quality requirements are specified in the Quality Control report attached (if applicable) to the analytical report.

This certificate of analysis shall not be reproduced except in full, without written approval of the laboratory.

Authorized by

David Holland
Laboratory Director
Monterey Bay Analytical Services

Thank you again for using MBAS. We value your business and appreciate your loyalty.

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Royal Oaks, CA 95076

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www.MBASinc.com
ELAP Certification Number: 2385
Wednesday, April 5, 2023

Sample Results

Lab Number: 230327_97-01 **Sample Description: Sunny Mesa WS, Well #2**

Collection Date/Time: 3/27/2023 9:00 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 3/27/2023 16:27 System ID: CA2700773_002_002

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date	/ Time	Analyst
Ammonia-N	EPA 350.1	mg/L	ND	1		0.15		3/28/2023	14:12	XQL
Asbestos	EPA100.2	mF/L	ND	1	E	0.2	7	4/2/2023	12:00	E
Uranium, Radiological	EPA200.8	pCi/L	0.7	1		0.3	20	4/4/2023	16:02	MW
Uranium, Total	EPA200.8	µg/L	1.1	1		0.5	30	4/4/2023	16:02	MW
Nitrate as N	EPA300.0	mg/L	0.2	1	LO	0.1	10	3/28/2023	5:43	HC
LO: MS and/or MSD result unavailable. Acceptability based on LCS recovery.										
Nitrite as N	EPA300.0	mg/L	ND	1	LO	0.1	1	3/28/2023	5:43	HC

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
PQL: Practical Quantitation Limit
MCL: Maximum Contamination Level
ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments
H: Analyzed outside of method hold time
QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

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136 San Juan Road
Royal Oaks, CA 95076

Wednesday, April 5, 2023

Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
QC23032916	230327_97-01: MS 1	Ammonia-N	1.0	mg/L	99		80 - 120
	230327_97-01: MSD 1	Ammonia-N	1.0	mg/L	99	0.8	0 - 20
	CCVB 1	Ammonia-N	ND	mg/L			
	CCVB 2	Ammonia-N	ND	mg/L			
	LCS 1	Ammonia-N	1.0	mg/L	98		90 - 110
	LCSD 1	Ammonia-N	1.0	mg/L	99	0.7	0 - 10
	LCSD 2	Ammonia-N	1.0	mg/L	101		0 - 10
	LCSL 1	Ammonia-N	0.1	mg/L	109		50 - 150
	Method Blank 1	Ammonia-N	ND	mg/L			
	QCS 1	Ammonia-N	1.0	mg/L	97		90 - 110
QC23032806	230327_109-01A: MS 1	Nitrate as N	--	mg/L			80 - 120
	230327_109-01A: MSD 1	Nitrate as N	--	mg/L			0 - 10
	CCVB 1	Nitrate as N	ND	mg/L			
	LCS 1	Nitrate as N	9.9	mg/L	99		90 - 110
	LCSD 1	Nitrate as N	10.0	mg/L	100	0.6	0 - 10
	LCSL 1	Nitrate as N	0.1	mg/L	67		50 - 150
	Method Blank 1	Nitrate as N	ND	mg/L			
	230327_109-01A: MS 1	Nitrite as N	--	mg/L			80 - 120
	230327_109-01A: MSD 1	Nitrite as N	--	mg/L			0 - 10
	CCVB 1	Nitrite as N	ND	mg/L			
	LCS 1	Nitrite as N	2.0	mg/L	102		90 - 110
	LCSD 1	Nitrite as N	2.2	mg/L	107	4.9	0 - 10
	LCSL 1	Nitrite as N	0.1	mg/L	76		50 - 150
	Method Blank 1	Nitrite as N	ND	mg/L			
QC23040517	CCVB 1	Uranium, Radiological	ND	pCi/L			
	Method Blank 1	Uranium, Radiological	ND	pCi/L			
	230329_34-01: MS 1	Uranium, Total	36.8	µg/L	71		70 - 130
	230329_34-01: MSD 1	Uranium, Total	47.2	µg/L	92	24.8	0 - 20
	CCVB 1	Uranium, Total	ND	µg/L			
	LCS 1	Uranium, Total	50.7	µg/L	101		85 - 115
	LCSD 1	Uranium, Total	47.3	µg/L	95	6.9	0 - 20

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments H: Analyzed outside of method hold time QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

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Wednesday, April 5, 2023

Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	Method Blank 1	Uranium, Total	ND	µg/L			
	QCS 1	Uranium, Total	49.7	µg/L	99		85 - 115

Abbreviations/Definitions:

mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
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ND: Not Detected at the PQL (or MDL, if shown)
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Wednesday, April 5, 2023

Sample Condition Upon Receipt

Order ID: 230327_97

Is there evidence of chilling? *NOTE: Systems are encouraged but not required to hold samples <10°C (Microbiology) or <6°C (Chemistry) during transit.	Yes
Did bottle arrive intact?	Yes
Did bottle labels agree with COC?	Yes
Adequate sample volume?	Yes

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments H: Analyzed outside of method hold time QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

1st Q

MBAS Order ID: 230327_97

MBAS
Monterey Bay Analytical Services

Chain of Custody / Analysis Request

4 Justin Court, Suite D, Monterey, CA 93940
(831) 375-MBAS (6227) * Fax: (831) 641-0734
info@mbasinc.com www.MBASinc.com

Client / Company Name:	Attention:	Email Address(es) to Send Report/Invoice:	Phone Number:
Pajaro/Sunny Mesa CSD	Don Rosa	info@pajarosunnymesa.com	831-722-1389
Project/System Info:	**System ID: *Required for EDT***	**Billing Address:**	**Contract/ P.O. #:**
Sunny Mesa WS	CA2700773	136 San Juan Road Royal Oaks, CA 95076	
Mark if YES: For Regulatory Reporting? ☒	Requires EDT? ☒		

Requested Analysis

LAB USE ONLY
1. ☑ DW ☐ WW ☐ Soil ☐ Other ______
2. Is there evidence of chilling? Y / N N/A < 2hrs — Y
3. Adequate sample volume? Y / N — Y
4. Was the sample filtered? Y / N — N
5. Did bottles agree with the COC? Y / N — Y
IR Used: 01

Preservative (include pH) Initials: ON

MBAS Lab #	Source Code or Client Sample ID *Required for EDT*	Sample Description	Sample Collection Date	Sample Collection Time	Receiving Temp (°C)	CL2 Residual (mg/L)	Routine	Other	Repeat	Special	# Cont.	Type*	Size	Nitrate/Nitrite	Ammonia	Combined Uranium	Asbestos	HNO3	H2SO4	NaOH	HCl	Na2S2O3
01	002_002	Well #2	3-27-23	9:00	17.7						4	P	Various	✔	✔	✔	✔	<2	<2			

	Printed Name	Signature	Date	Time	Comments
Sampled and Relinquished by:	Rafael Farfan	[signature]	3-27-23	12:10	
Received by:	Charles Grasse	[signature]	3-27-23	12:10	
Relinquished by:	Charles Grasse	[signature]	3-27-23	1627	
Received by:	Cody Roberts	[signature]	3/27/23	1627	

*Container Type: P=Plastic, G=Glass, V=Various

☐ Payment Received Check #: Amount: Date:

MBAS_COC_Rev. 3/20

LA Testing
520 Mission Street South Pasadena, CA 91030
Phone/Fax: (323) 254-9960 / (323) 254-9982
http://www.LATesting.com / pasadenalab@latesting.com

LA Testing Order ID: 322307926
Customer ID: MBAS42
Customer PO:
Project ID:

Attn: Sara Sugarman
Monterey Bay Analytical Services
4 Justin Court, Suite D
Monterey, CA 93940

Phone: (831) 375-6227
Fax: (831) 641-0734
Received: 03/28/2023
Analyzed: 04/02/2023

Proj: Sunny Mesa WS

Test Report: Determination of Asbestos Structures >10µm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	*Sample Filtration Date/Time*	*Original Sample Vol. Filtered (ml)*	*Effective Filter Area (mm²)*	*Area Analyzed (mm²)*	*ASBESTOS* Asbestos Types	Fibers Detected	Analytical Sensitivity (MFL)	Concentration (MFL)	Confidence Limits (MFL)
230327_97-01 322307926-0001	3/28/2023 02:10 PM	30	1288	0.2193	None Detected	ND	0.20	<0.20	0.00 - 0.72

MFL (million fibers per liter)

Collection Date/Time: 03/27/2023 09:00 AM

Analyst(s)
Sherrie Ahmad (1)

Jerry Drapala Ph.D, Laboratory Manager
or Other Approved Signatory

Any questions please contact Jerry Drapala.

Initial report from: 04/04/2023 07:10:16

LA TESTING
520 MISSION STREET
S. PASADENA, CA 91030
PHONE: (323) 254-9960
FAX: (323) 254-9982

Asbestos Chain of Custody

LA Testing Order Number *(Lab Use Only)*:

#322307926

Company : Monterey Bay Analytical Services (+32MBAS66)	LA Testing-Bill to: ☒ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: 4 Justin Court, Suite D	*Third Party Billing requires written authorization from third party*
City: Monterey State/Province: CA	Zip/Postal Code: 93940 Country: USA
Report To (Name): Sara Sugarman	Fax #: 831-641-0734
Telephone #: 831-375-6227	Email Address: info@mbasinc.com
Project Name/Number: Sunny Mesa WS	
Please Provide Results: ☐ Fax ☒ Email Purchase Order:	U.S. State Samples Taken: Ca

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☒ 1 Week ☐ 2 Week

**For TEM Air 3 hours through 6 hours, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with LA Testing's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☐ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ 4-4.5hr TAT (AHERA only)
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☒ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ EPA Protocol (Semi-Quantitative)
- ☐ EPA Protocol (Quantitative)

Other:
- ☐

☐ **Check For Positive Stop – Clearly Identify Homogenous Group**

Samplers Name: Rafael Farfan   Samplers Signature:

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
	Well #2	1L	3/27/23 0900
	Please EDT (CA2700773_002_002)		

Client Sample # (s): 230327_97-01 -   Total # of Samples: 1

Relinquished (Client): [signature]   Date: 3/27/2023   Time: 1600

Received (Lab): Annette McKissack   Date: 03/28/23 (Rc)   Time: 935

Comments/Special Instructions: Account: MBAS42. Please include sample description in report.

0.6°c

Page 1 of _____ pages

Controlled Document – Asbestos COC – R2 – 1/12/2010

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Certificate of Analysis

April 05, 2023

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Pajaro Sunny Mesa Svc District
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Royal Oaks,CA 95076

Thank you for using Monterey Bay Analytical Services for your analytical testing needs.
In the following pages please find the test results for the samples submitted March 27, 2023 for order ID #: 230327_97

Sample results are on the Sample Results page and are related only to the samples analyzed.

The samples were analyzed in accordance with the attached Chain of Custody document.
Sample receipt conditions were noted on the chain of custody forms and are reported at the end of this report. Any deviations from the quality requirements are specified in the Quality Control report attached (if applicable) to the analytical report.

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Authorized by

David Holland
Laboratory Director
Monterey Bay Analytical Services

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www.MBASinc.com
ELAP Certification Number: 2385
Wednesday, April 5, 2023

Sample Results

Lab Number: 230327_97-01 **Sample Description: Sunny Mesa WS, Well #2**

Collection Date/Time: 3/27/2023 9:00 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 3/27/2023 16:27 System ID: CA2700773_002_002

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Ammonia-N	EPA 350.1	mg/L	ND	1		0.15		3/28/2023	14:12	XQL
Asbestos	EPA100.2	mF/L	ND	1	E	0.2	7	4/2/2023	12:00	E
Uranium, Radiological	EPA200.8	pCi/L	0.7	1		0.3	20	4/4/2023	16:02	MW
Uranium, Total	EPA200.8	µg/L	1.1	1		0.5	30	4/4/2023	16:02	MW
Nitrate as N	EPA300.0	mg/L	0.2	1	LO	0.1	10	3/28/2023	5:43	HC
LO: MS and/or MSD result unavailable. Acceptability based on LCS recovery.										
Nitrite as N	EPA300.0	mg/L	ND	1	LO	0.1	1	3/28/2023	5:43	HC

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
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Wednesday, April 5, 2023

Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
QC23032916	230327_97-01: MS 1	Ammonia-N	1.0	mg/L	99		80 - 120
	230327_97-01: MSD 1	Ammonia-N	1.0	mg/L	99	0.8	0 - 20
	CCVB 1	Ammonia-N	ND	mg/L			
	CCVB 2	Ammonia-N	ND	mg/L			
	LCS 1	Ammonia-N	1.0	mg/L	98		90 - 110
	LCSD 1	Ammonia-N	1.0	mg/L	99	0.7	0 - 10
	LCSD 2	Ammonia-N	1.0	mg/L	101		0 - 10
	LCSL 1	Ammonia-N	0.1	mg/L	109		50 - 150
	Method Blank 1	Ammonia-N	ND	mg/L			
	QCS 1	Ammonia-N	1.0	mg/L	97		90 - 110
QC23032806	230327_109-01A: MS 1	Nitrate as N	--	mg/L			80 - 120
	230327_109-01A: MSD 1	Nitrate as N	--	mg/L			0 - 10
	CCVB 1	Nitrate as N	ND	mg/L			
	LCS 1	Nitrate as N	9.9	mg/L	99		90 - 110
	LCSD 1	Nitrate as N	10.0	mg/L	100	0.6	0 - 10
	LCSL 1	Nitrate as N	0.1	mg/L	67		50 - 150
	Method Blank 1	Nitrate as N	ND	mg/L			
	230327_109-01A: MS 1	Nitrite as N	--	mg/L			80 - 120
	230327_109-01A: MSD 1	Nitrite as N	--	mg/L			0 - 10
	CCVB 1	Nitrite as N	ND	mg/L			
	LCS 1	Nitrite as N	2.0	mg/L	102		90 - 110
	LCSD 1	Nitrite as N	2.2	mg/L	107	4.9	0 - 10
	LCSL 1	Nitrite as N	0.1	mg/L	76		50 - 150
	Method Blank 1	Nitrite as N	ND	mg/L			
QC23040517	CCVB 1	Uranium, Radiological	ND	pCi/L			
	Method Blank 1	Uranium, Radiological	ND	pCi/L			
	230329_34-01: MS 1	Uranium, Total	36.8	µg/L	71		70 - 130
	230329_34-01: MSD 1	Uranium, Total	47.2	µg/L	92	24.8	0 - 20
	CCVB 1	Uranium, Total	ND	µg/L			
	LCS 1	Uranium, Total	50.7	µg/L	101		85 - 115
	LCSD 1	Uranium, Total	47.3	µg/L	95	6.9	0 - 20

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
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Wednesday, April 5, 2023

Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	Method Blank 1	Uranium, Total	ND	µg/L			
	QCS 1	Uranium, Total	49.7	µg/L	99		85 - 115

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
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Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS (6227)
www.MBASinc.com
ELAP Certification Number: 2385

Wednesday, April 5, 2023

Sample Condition Upon Receipt

Order ID: 230327_97

Is there evidence of chilling? *NOTE: Systems are encouraged but not required to hold samples <10°C (Microbiology) or <6°C (Chemistry) during transit.	Yes
Did bottle arrive intact?	Yes
Did bottle labels agree with COC?	Yes
Adequate sample volume?	Yes

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments H: Analyzed outside of method hold time QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

1st Q

MBAS Order ID: 230327_97

MBAS
Monterey Bay Analytical Services

Chain of Custody / Analysis Request

4 Justin Court, Suite D, Monterey, CA 93940
(831) 375-MBAS (6227) * Fax: (831) 641-0734
info@mbasinc.com www.MBASinc.com

Client / Company Name:	Attention:	Email Address(es) to Send Report/Invoice:	Phone Number:
Pajaro/Sunny Mesa CSD	Don Rosa	info@pajarosunnymesa.com	831-722-1389
Project/System Info:	**System ID: *Required for EDT***	**Billing Address:**	**Contract/ P.O. #:**
Sunny Mesa WS	CA2700773	136 San Juan Road Royal Oaks, CA 95076	
Mark if YES: For Regulatory Reporting? ☒	Requires EDT? ☒		

Requested Analysis

LAB USE ONLY

1. ☑ DW ☐ WW ☐ Soil ☐ Other ______
2. Is there evidence of chilling? Y / N N/A < 2hrs — Y
3. Adequate sample volume? Y / N — Y
4. Was the sample filtered? Y / N — N
5. Did bottles agree with the COC? Y / N — Y

IR Used: 01

Preservative (include pH) Initials: CW

MBAS Lab #	Source Code or Client Sample ID *Required for EDT*	Sample Description	Sample Collection Date	Sample Collection Time	Receiving Temp (°C)	Coliform Analysis: CL2 Residual (mg/L)	Routine	Other	Repeat	Special	Container: # Cont.	Type*	Size	Nitrate/Nitrite	Ammonia	Combined Uranium	Asbestos	HNO3	H2SO4	NaOH	HCl	Na2S2O3
01	002_002	Well #2	3-27-23	9:00	12.7						4	P	Various	✔	✔	✔	✔	<2	<2			

	Printed Name	Signature	Date	Time	Comments
Sampled and Relinquished by:	Rafael Farfan	[signature]	3-27-23	12:10	
Received by:	Charles Grosse	[signature]	3-27-23	12:10	
Relinquished by:	Charles Grosse	[signature]	3-27-23	1627	
Received by:	Cody Roberts	[signature]	3/27/23	1627	

*Container Type: P=Plastic, G=Glass, V=Various

☐ Payment Received Check #: Amount: Date:

MBAS_COC_Rev. 3/20

LA Testing
520 Mission Street South Pasadena, CA 91030
Phone/Fax: (323) 254-9960 / (323) 254-9982
http://www.LATesting.com / pasadenalab@latesting.com

LA Testing Order ID: 322307926
Customer ID: MBAS42
Customer PO:
Project ID:

Attn: Sara Sugarman
Monterey Bay Analytical Services
4 Justin Court, Suite D
Monterey, CA 93940

Phone: (831) 375-6227
Fax: (831) 641-0734
Received: 03/28/2023
Analyzed: 04/02/2023

Proj: Sunny Mesa WS

Test Report: Determination of Asbestos Structures >10μm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	*Sample Filtration Date/Time*	*Original Sample Vol. Filtered (ml)*	*Effective Filter Area (mm²)*	*Area Analyzed (mm²)*	*ASBESTOS* Asbestos Types	Fibers Detected	Analytical Sensitivity (MFL)	Concentration (MFL)	Confidence Limits (MFL)
230327_97-01 322307926-0001	3/28/2023 02:10 PM	30	1288	0.2193	None Detected	ND	0.20	<0.20	0.00 - 0.72

MFL (million fibers per liter)

Collection Date/Time: *03/27/2023 09:00 AM*

Analyst(s)
Sherrie Ahmad (1)

Jerry Drapala Ph.D, Laboratory Manager
or Other Approved Signatory

Any questions please contact Jerry Drapala.

Initial report from: 04/04/2023 07:10:16

LA TESTING
520 MISSION STREET
S. PASADENA, CA 91030
PHONE: (323) 254-9960
FAX: (323) 254-9982

Asbestos Chain of Custody

LA Testing Order Number *(Lab Use Only)*:

#322307926

Company : Monterey Bay Analytical Services (+32MBAS66)	LA Testing-Bill to: ☒ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: 4 Justin Court, Suite D	*Third Party Billing requires written authorization from third party*
City: Monterey — State/Province: CA	Zip/Postal Code: 93940 — Country: USA
Report To (Name): Sara Sugarman	Fax #: 831-641-0734
Telephone #: 831-375-6227	Email Address: info@mbasinc.com
Project Name/Number: Sunny Mesa WS	
Please Provide Results: ☐ Fax ☒ Email — Purchase Order:	U.S. State Samples Taken: Ca

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☒ 1 Week ☐ 2 Week

**For TEM Air 3 hours through 6 hours, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with LA Testing's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air
☐ NIOSH 7400
☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
☐ PLM EPA 600/R-93/116 (<1%)
☐ PLM EPA NOB (<1%)
Point Count
☐ 400 (<0.25%) ☐ 1000 (<0.1%)
Point Count w/Gravimetric
☐ 400 (<0.25%) ☐ 1000 (<0.1%)
☐ NYS 198.1 (friable in NY)
☐ NYS 198.6 NOB (non-friable-NY)
☐ NIOSH 9002 (<1%)

TEM – Air ☐ 4-4.5hr TAT (AHERA only)
☐ AHERA 40 CFR, Part 763
☐ NIOSH 7402
☐ EPA Level II
☐ ISO 10312

TEM - Bulk
☐ TEM EPA NOB
☐ NYS NOB 198.4 (non-friable-NY)
☐ Chatfield SOP
☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
Fibers >10µm ☐ Waste ☒ Drinking
All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
☐ Microvac - ASTM D 5755
☐ Wipe - ASTM D6480
☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
☐ PLM CARB 435 - A (0.25% sensitivity)
☐ PLM CARB 435 - B (0.1% sensitivity)
☐ TEM CARB 435 - B (0.1% sensitivity)
☐ TEM CARB 435 - C (0.01% sensitivity)
☐ EPA Protocol (Semi-Quantitative)
☐ EPA Protocol (Quantitative)

Other:
☐

☐ **Check For Positive Stop – Clearly Identify Homogenous Group**

Samplers Name: Rafael Farfan — Samplers Signature:

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
	Well #2	1L	3/27/23 0900
	Please EDT (CA2700773_002_002)		

Client Sample # (s): 230327_97-01 - Total # of Samples: 1

Relinquished (Client): [signature] Date: 3/27/2023 Time: 1600

Received (Lab): Annette McKissack Date: 03/28/23 (Rc) Time: 935

Comments/Special Instructions: Account: MBAS42. Please include sample description in report.

0.6°c

Page 1 of _____ pages

Controlled Document – Asbestos COC – R2 – 1/12/2010

4 Justin Court Suite D
Monterey, CA 93940
Phone: (831) 375-MBAS (6227)
www.MBASinc.com

ELAP Certification Number: 2385

Certificate of Analysis

March 27, 2023

Don Rosa
Pajaro Sunny Mesa Svc District
136 San Juan Road
Royal Oaks,CA 95076

Thank you for using Monterey Bay Analytical Services for your analytical testing needs.
In the following pages please find the test results for the samples submitted March 20, 2023 for order ID #: 230320_24

Sample results are on the Sample Results page and are related only to the samples analyzed.

The samples were analyzed in accordance with the attached Chain of Custody document. Sample receipt conditions were noted on the chain of custody forms and are reported at the end of this report. Any deviations from the quality requirements are specified in the Quality Control report attached (if applicable) to the analytical report.

This certificate of analysis shall not be reproduced except in full, without written approval of the laboratory.

Authorized by

David Holland
Laboratory Director
Monterey Bay Analytical Services

CALIFORNIA SMALL BUSINESS
23348

Thank you again for using MBAS. We value your business and appreciate your loyalty.

3/27/23 SS

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ELAP Certification Number: 2385
Monday, March 27, 2023

Sample Results

Lab Number: 230320_24-01 Sample Description: Sunny Mesa WS, Well #2

Collection Date/Time:	3/20/2023 12:10	Sample Collector:	Farfan R	Client Sample #:	
Received Date/Time:	3/20/2023 14:02	System ID:	CA2700773_002_002	Coliform Designation:	Special

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Aggressivity Index	Calculation	NA	12.1	1				3/23/2023	14:30	SS
Anion-Cation Balance	Calculation	%	2	1				3/23/2023	14:30	SS
QC Anion Sum x 100	Calculation	%	104	1				3/23/2023	14:30	SS
QC Cation Sum x 100	Calculation	%	108	1				3/23/2023	14:30	SS
QC Ratio TDS/SEC	Calculation	NA	0.57	1				3/22/2023	14:15	BM
Ammonia-N	EPA 350.1	mg/L	ND	1		0.15		3/22/2023	10:39	XQL
Turbidity	EPA180.1	NTU	4.5	1		0.1	5	3/20/2023	15:20	CC
Calcium	EPA200.7	mg/L	34	1		1		3/22/2023	16:55	OW
Copper, Total	EPA200.7	µg/L	ND	1		20	1300	3/22/2023	16:55	OW
Hardness (as CaCO3)	EPA200.7	mg/L	278	1		5		3/22/2023	17:20	OW
Iron, Total	EPA200.7	µg/L	598	1		30	300	3/22/2023	16:55	OW
Magnesium	EPA200.7	mg/L	47.1	1		0.5		3/22/2023	16:55	OW
Manganese, Total	EPA200.7	µg/L	335	1		15	50	3/22/2023	16:55	OW
Potassium	EPA200.7	mg/L	2.7	1		0.5		3/22/2023	16:55	OW
Sodium	EPA200.7	mg/L	44	1		1		3/22/2023	16:55	OW
Zinc, Total	EPA200.7	µg/L	42	1		30	5000	3/22/2023	16:55	OW
Aluminum, Total	EPA200.8	µg/L	ND	1		15	1000	3/22/2023	16:07	OW
Antimony, Total	EPA200.8	µg/L	ND	1		0.5	6	3/22/2023	16:07	OW
Arsenic, Total	EPA200.8	µg/L	ND	1		1	10	3/22/2023	16:07	OW
Barium, Total	EPA200.8	µg/L	29.7	1		5	1000	3/22/2023	16:07	HC
Beryllium, Total	EPA200.8	µg/L	ND	1		0.5	4	3/22/2023	16:07	OW
Cadmium, Total	EPA200.8	µg/L	ND	1		0.25	5	3/22/2023	16:07	OW
Chromium, Total	EPA200.8	µg/L	6.1	1		1	50	3/22/2023	16:07	OW
Lead, Total	EPA200.8	µg/L	ND	1		1	15	3/22/2023	16:07	OW
Mercury, Total	EPA200.8	µg/L	ND	1		0.3	2	3/22/2023	16:07	OW
Nickel, Total	EPA200.8	µg/L	ND	1		5	100	3/22/2023	16:07	OW
Selenium, Total	EPA200.8	µg/L	ND	1		1	50	3/22/2023	16:07	OW

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
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ELAP Certification Number: 2385

Monday, March 27, 2023

Lab Number: 230320_24-01 Sample Description: Sunny Mesa WS, Well #2

Collection Date/Time:	3/20/2023	12:10	Sample Collector: Farfan R	Client Sample #:	
Received Date/Time:	3/20/2023	14:02	System ID: CA2700773_002_002	Coliform Designation:	Special

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Silver, Total	EPA200.8	µg/L	ND	1		1.5	100	3/24/2023	12:28	HC
Thallium, Total	EPA200.8	µg/L	ND	1		0.5	2	3/22/2023	16:07	OW
Bromide	EPA300.0	mg/L	0.2	1		0.1		3/21/2023	11:56	HC
Chloride	EPA300.0	mg/L	50.5	1		1	250	3/20/2023	17:22	HC
Fluoride	EPA300.0	mg/L	0.1	1		0.1	2	3/20/2023	17:22	HC
Nitrate as N	EPA300.0	mg/L	0.3	1		0.1	10	3/20/2023	17:22	HC
Nitrate+Nitrite as N	EPA300.0	mg/L	0.3	1		0.1	10	3/20/2023	17:22	HC
Nitrite as N	EPA300.0	mg/L	ND	1		0.1	1	3/20/2023	17:22	HC
Orthophosphate as P	EPA300.0	mg/L	ND	1		0.1		3/20/2023	17:22	HC
Sulfate	EPA300.0	mg/L	65	1		2	250	3/20/2023	17:22	HC
Perchlorate *LM: MS and/or MSD above acceptance limits.IL: RPD exceeds laboratory control limit.*	EPA314.0	µg/L	ND	1	LM, IL	2	6	3/24/2023	13:54	HC
Trihalomethanes	EPA551.1	µg/L	ND	1	E		80	3/24/2023	16:34	E
Haloacetic Acids	EPA552	µg/L	ND	1	E		60	3/24/2023	16:34	E
Chlorine Residual (Field)	External	mg/L	ND	1				3/20/2023	12:10	
Cyanide, Available	OIA-1677-09	µg/L	ND	1		4	150	3/20/2023	16:20	XQL
Color, Apparent (Unfiltered)	SM2120B	Color Units	5	1		3	15	3/21/2023	9:35	CC
Odor Threshold at 60 C *Odor: Not observed.*	SM2150B	TON	<1	1		1	3	3/20/2023	15:03	BM
Alkalinity, Total (as CaCO3)	SM2320B	mg/L	222	1		10		3/21/2023	14:44	BM
Bicarbonate (as HCO3-)	SM2320B	mg/L	271	1		10		3/21/2023	14:44	BM
Carbonate as CaCO3	SM2320B	mg/L	ND	1		10		3/21/2023	14:44	BM
Hydroxide	SM2320B	mg/L	ND	1		10		3/21/2023	14:44	BM
Langelier Index, 15°C	SM2330B	NA	-0.07	1				3/23/2023	14:30	SS
Langelier Index, 60°C	SM2330B	NA	0.76	1				3/23/2023	14:30	SS
Specific Conductance (EC)	SM2510B	µmho/cm @25.0°C	697	1		10	900	3/21/2023	14:44	BM
Total Dissolved Solids	SM2540C	mg/L	398	1		10	500	3/21/2023	8:50	BM
pH (Laboratory)	SM4500-H+B	pH (H)	7.8	1		1	8.5	3/20/2023	16:20	BM
Temperature (pH)	SM4500-H+B,temp	°C	24.3	1				3/20/2023	16:20	BM

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Monday, March 27, 2023

Lab Number: 230320_24-01 Sample Description: Sunny Mesa WS, Well #2

Collection Date/Time: 3/20/2023	12:10	Sample Collector: Farfan R	Client Sample #:	
Received Date/Time: 3/20/2023	14:02	System ID: CA2700773_002_002	Coliform Designation:	Special

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
MBAS (Surfactants) *MBAS, calculated as LAS, mol wt 342.4 g/mole*	SM5540C	mg/L	ND	1		0.05		3/21/2023	9:38	BM
Coliform, E Coli	SM9223B-18hr	/100mL	Absent	1				3/20/2023	16:45	SB
Coliform, Total	SM9223B-18hr	/100mL	Absent	1				3/20/2023	16:45	SB

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Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
QC23032202	230320_69-01: Duplicate 1	Alkalinity, Total (as CaCO3)	403.1	mg/L		1.4	0 - 10
	230321_33-01: Duplicate 2	Alkalinity, Total (as CaCO3)	256.4	mg/L		0.2	0 - 10
	CCVB 1	Alkalinity, Total (as CaCO3)	ND	mg/L			
	CCVB 2	Alkalinity, Total (as CaCO3)	ND	mg/L			
	LCS 1	Alkalinity, Total (as CaCO3)	39.2	mg/L	98		92 - 108
	LCSD 1	Alkalinity, Total (as CaCO3)	41.9	mg/L	105	6.6	0 - 10
	LCSD2 1	Alkalinity, Total (as CaCO3)	38.4	mg/L	96	2.0	0 - 10
	LCSL 1	Alkalinity, Total (as CaCO3)	9.3	mg/L	93		80 - 120
	Method Blank 1	Alkalinity, Total (as CaCO3)	ND	mg/L			
QC23032410	230320_24-01: MS 1	Aluminum, Total	51.2	µg/L	108		70 - 130
	230320_24-01: MSD 1	Aluminum, Total	49.0	µg/L	103	4.4	0 - 20
	CCVB 1	Aluminum, Total	ND	µg/L			
	LCS 1	Aluminum, Total	52.4	µg/L	105		85 - 115
	LCSD 1	Aluminum, Total	51.5	µg/L	103	1.7	0 - 20
	Method Blank 1	Aluminum, Total	ND	µg/L			
	QCS 1	Aluminum, Total	56.8	µg/L	114		85 - 115
QC23032225	230320_53-03: MS 1	Ammonia-N	1.1	mg/L	107		80 - 120
	230320_53-03: MSD 1	Ammonia-N	1.1	mg/L	105	2.0	0 - 20
	CCVB 1	Ammonia-N	ND	mg/L			
	LCS 1	Ammonia-N	0.9	mg/L	94		90 - 110
	LCSD 1	Ammonia-N	1.0	mg/L	101	7.4	0 - 10
	LCSL 1	Ammonia-N	0.1	mg/L	92		50 - 150
	Method Blank 1	Ammonia-N	ND	mg/L			
	QCS 1	Ammonia-N	0.9	mg/L	95		90 - 110
QC23032410	230320_24-01: MS 1	Antimony, Total	50.8	µg/L	102		70 - 130
	230320_24-01: MSD 1	Antimony, Total	50.9	µg/L	102	0.1	0 - 20
	CCVB 1	Antimony, Total	ND	µg/L			
	LCS 1	Antimony, Total	49.2	µg/L	98		85 - 115
	LCSD 1	Antimony, Total	48.4	µg/L	97	1.8	0 - 20
	Method Blank 1	Antimony, Total	ND	µg/L			
	QCS 1	Antimony, Total	48.2	µg/L	96		85 - 115

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Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	230320_24-01: MS 1	Arsenic, Total	51.8	µg/L	103		70 - 130
	230320_24-01: MSD 1	Arsenic, Total	51.1	µg/L	101	1.3	0 - 20
	CCVB 1	Arsenic, Total	ND	µg/L			
	LCS 1	Arsenic, Total	50.1	µg/L	100		85 - 115
	LCSD 1	Arsenic, Total	47.3	µg/L	95	5.9	0 - 20
	Method Blank 1	Arsenic, Total	ND	µg/L			
	QCS 1	Arsenic, Total	49.5	µg/L	99		85 - 115
	230320_24-01: MS 1	Barium, Total	80.3	µg/L	92		70 - 130
	230320_24-01: MSD 1	Barium, Total	78.7	µg/L	89	2.1	0 - 20
	CCVB 1	Barium, Total	ND	µg/L			
	LCS 1	Barium, Total	48.9	µg/L	98		85 - 115
	LCSD 1	Barium, Total	48.1	µg/L	96	1.5	0 - 20
	Method Blank 1	Barium, Total	ND	µg/L			
	QCS 1	Barium, Total	50.5	µg/L	101		85 - 115
	230320_24-01: MS 1	Beryllium, Total	48.8	µg/L	98		70 - 130
	230320_24-01: MSD 1	Beryllium, Total	47.5	µg/L	95	2.7	0 - 20
	CCVB 1	Beryllium, Total	ND	µg/L			
	LCS 1	Beryllium, Total	48.1	µg/L	96		85 - 115
	LCSD 1	Beryllium, Total	47.5	µg/L	95	1.3	0 - 20
	Method Blank 1	Beryllium, Total	ND	µg/L			
	QCS 1	Beryllium, Total	49.9	µg/L	100		85 - 115
QC23032205	230320_57-01A: MS 1	Bromide	2.2	mg/L	98		80 - 120
	230320_57-01A: MSD 1	Bromide	2.2	mg/L	98	0.2	0 - 10
	CCVB 1	Bromide	ND	mg/L			
	LCS 1	Bromide	2.0	mg/L	99		90 - 110
	LCSD 1	Bromide	2.0	mg/L	100	1.6	0 - 10
	LCSL 1	Bromide	0.1	mg/L	91		50 - 150
	Method Blank 1	Bromide	ND	mg/L			
QC23032410	230320_24-01: MS 1	Cadmium, Total	50.0	µg/L	100		70 - 130
	230320_24-01: MSD 1	Cadmium, Total	48.1	µg/L	96	3.9	0 - 20
	CCVB 1	Cadmium, Total	ND	µg/L			

Abbreviations/Definitions:
mg/L: Milligrams per liter (=ppm)
µg/L: Micrograms per liter (=ppb)
MPN: Most Probable Number
MDL: Method Detection Limit
PQL: Practical Quantitation Limit
MCL: Maximum Contamination Level
ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments
H: Analyzed outside of method hold time
QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

Pajaro Sunny Mesa Svc District
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Monday, March 27, 2023

Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	LCS 1	Cadmium, Total	49.3	µg/L	99		85 - 115
	LCSD 1	Cadmium, Total	48.2	µg/L	96	2.2	0 - 20
	Method Blank 1	Cadmium, Total	ND	µg/L			
	QCS 1	Cadmium, Total	48.7	µg/L	97		85 - 115
QC23032232	230322_25-01: MS 1	Calcium	121.8	mg/L	83		70 - 130
	230322_25-01: MSD 1	Calcium	120.6	mg/L	81	1.0	0 - 20
	CCVB 1	Calcium	ND	mg/L			
	LCS 1	Calcium	49.9	mg/L	100		95 - 105
	LCSD 1	Calcium	49.0	mg/L	98	1.8	0 - 10
	Method Blank 1	Calcium	ND	mg/L			
	QCS 1	Calcium	50.0	mg/L	100		95 - 105
QC23032104	230320_57-01: MS 1	Chloride	98.2	mg/L	93		80 - 120
	230320_57-01: MSD 1	Chloride	98.3	mg/L	94	0.1	0 - 10
	CCVB 1	Chloride	ND	mg/L			
	LCS 1	Chloride	20.0	mg/L	100		90 - 110
	LCSD 1	Chloride	20.1	mg/L	100	0.6	0 - 10
	LCSL 1	Chloride	0.8	mg/L	81		50 - 150
	Method Blank 1	Chloride	ND	mg/L			
QC23032410	230320_24-01: MS 1	Chromium, Total	54.5	µg/L	97		70 - 130
	230320_24-01: MSD 1	Chromium, Total	52.0	µg/L	92	4.6	0 - 20
	CCVB 1	Chromium, Total	ND	µg/L			
	LCS 1	Chromium, Total	48.6	µg/L	97		85 - 115
	LCSD 1	Chromium, Total	47.4	µg/L	95	2.6	0 - 20
	Method Blank 1	Chromium, Total	ND	µg/L			
	QCS 1	Chromium, Total	51.0	µg/L	102		85 - 115
QC23032113	230320_37-07: Duplicate 1	Color, Apparent (Unfiltered)	ND	Color Units		0.0	0 - 25
	230320_57-01: Duplicate 2	Color, Apparent (Unfiltered)	ND	Color Units		0.0	0 - 25
	230320_70-23: Duplicate 3	Color, Apparent (Unfiltered)	ND	Color Units		0.0	0 - 25
	CCVB 1	Color, Apparent (Unfiltered)	ND	Color Units			
	CCVB 2	Color, Apparent (Unfiltered)	ND	Color Units			
	CCVB 3	Color, Apparent (Unfiltered)	ND	Color Units			

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Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	LCS 1	Color, Apparent (Unfiltered)	5.0	Color Units	100		80 - 120
	LCSD 1	Color, Apparent (Unfiltered)	5.0	Color Units	100	0.0	0 - 20
	LCSD 2	Color, Apparent (Unfiltered)	5.0	Color Units	100	0.0	0 - 20
	LCSD 3	Color, Apparent (Unfiltered)	5.0	Color Units	100	0.0	0 - 20
	LCSD2 1	Color, Apparent (Unfiltered)	5.0	Color Units	100	0.0	0 - 20
	Method Blank 1	Color, Apparent (Unfiltered)	ND	Color Units			
QC23032232	230322_25-01: MS 1	Copper, Total	947.5	µg/L	95		70 - 130
	230322_25-01: MSD 1	Copper, Total	924.6	µg/L	93	2.5	0 - 20
	CCVB 1	Copper, Total	ND	µg/L			
	LCS 1	Copper, Total	985.2	µg/L	99		95 - 105
	LCSD 1	Copper, Total	978.7	µg/L	98	0.7	0 - 10
	Method Blank 1	Copper, Total	ND	µg/L			
	QCS 1	Copper, Total	965.0	µg/L	97		95 - 105
QC23032102	230320_24-01: MS 1	Cyanide, Available	53.4	µg/L	107		80 - 120
	230320_24-01: MSD 1	Cyanide, Available	52.0	µg/L	104	2.7	0 - 20
	CCVB 1	Cyanide, Available	ND	µg/L			
	LCS 1	Cyanide, Available	53.3	µg/L	107		90 - 110
	LCSD 1	Cyanide, Available	50.8	µg/L	102	4.9	0 - 10
	LCSL 1	Cyanide, Available	3.5	µg/L	87		50 - 150
	Method Blank 1	Cyanide, Available	ND	µg/L			
	QCS 1	Cyanide, Available	53.2	µg/L	107		90 - 110
QC23032104	230320_57-01: MS 1	Fluoride	2.3	mg/L	101		80 - 120
	230320_57-01: MSD 1	Fluoride	2.3	mg/L	100	0.2	0 - 10
	CCVB 1	Fluoride	ND	mg/L			
	LCS 1	Fluoride	2.0	mg/L	98		90 - 110
	LCSD 1	Fluoride	2.0	mg/L	99	1.3	0 - 10
	LCSL 1	Fluoride	0.1	mg/L	73		50 - 150
	Method Blank 1	Fluoride	ND	mg/L			
QC23032232	230322_25-01: MS 1	Iron, Total	895.8	µg/L	89		70 - 130
	230322_25-01: MSD 1	Iron, Total	895.4	µg/L	89	0.0	0 - 20
	CCVB 1	Iron, Total	ND	µg/L			

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QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	LCS 1	Iron, Total	965.2	µg/L	97		95 - 105
	LCSD 1	Iron, Total	994.9	µg/L	99	3.0	0 - 10
	Method Blank 1	Iron, Total	ND	µg/L			
	QCS 1	Iron, Total	993.1	µg/L	99		95 - 105
QC23032410	230320_24-01: MS 1	Lead, Total	48.4	µg/L	97		70 - 130
	230320_24-01: MSD 1	Lead, Total	47.9	µg/L	96	1.1	0 - 20
	CCVB 1	Lead, Total	ND	µg/L			
	LCS 1	Lead, Total	50.1	µg/L	100		85 - 115
	LCSD 1	Lead, Total	50.0	µg/L	100	0.3	0 - 20
	Method Blank 1	Lead, Total	ND	µg/L			
	QCS 1	Lead, Total	49.5	µg/L	99		85 - 115
QC23032232	230322_25-01: MS 1	Magnesium	90.9	mg/L	92		70 - 130
	230322_25-01: MSD 1	Magnesium	90.1	mg/L	90	0.9	0 - 20
	CCVB 1	Magnesium	ND	mg/L			
	LCS 1	Magnesium	51.1	mg/L	102		95 - 105
	LCSD 1	Magnesium	50.8	mg/L	102	0.5	0 - 10
	Method Blank 1	Magnesium	ND	mg/L			
	QCS 1	Magnesium	48.3	mg/L	97		95 - 105
	230322_25-01: MS 1	Manganese, Total	934.4	µg/L	91		70 - 130
	230322_25-01: MSD 1	Manganese, Total	934.0	µg/L	91	0.0	0 - 20
	CCVB 1	Manganese, Total	ND	µg/L			
	LCS 1	Manganese, Total	988.9	µg/L	99		95 - 105
	LCSD 1	Manganese, Total	1015.0	µg/L	101	2.6	0 - 10
	Method Blank 1	Manganese, Total	ND	µg/L			
	QCS 1	Manganese, Total	963.3	µg/L	96		95 - 105
QC23032114	230320_57-01: MS 1	MBAS (Surfactants)	0.3	mg/L	92		80 - 120
	230320_57-01: MSD 1	MBAS (Surfactants)	0.3	mg/L	106	13.1	0 - 20
	CCVB 1	MBAS (Surfactants)	ND	mg/L			
	LCS 1	MBAS (Surfactants)	0.2	mg/L	94		80 - 120
	LCSD 1	MBAS (Surfactants)	0.3	mg/L	109	15.0	0 - 20
	LCSL 1	MBAS (Surfactants)	ND	mg/L	94		50 - 150

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Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	Method Blank 1	MBAS (Surfactants)	ND	mg/L			
QC23032410	230320_24-01: MS 1	Mercury, Total	1.0	µg/L	106		70 - 130
	230320_24-01: MSD 1	Mercury, Total	1.0	µg/L	104	2.1	0 - 20
	CCVB 1	Mercury, Total	ND	µg/L			
	LCS 1	Mercury, Total	1.0	µg/L	100		85 - 115
	LCSD 1	Mercury, Total	1.0	µg/L	101	0.7	0 - 20
	Method Blank 1	Mercury, Total	ND	µg/L			
	QCS 1	Mercury, Total	0.9	µg/L	95		85 - 115
	230320_24-01: MS 1	Nickel, Total	47.9	µg/L	94		70 - 130
	230320_24-01: MSD 1	Nickel, Total	45.8	µg/L	90	4.5	0 - 20
	CCVB 1	Nickel, Total	ND	µg/L			
	LCS 1	Nickel, Total	49.2	µg/L	98		85 - 115
	LCSD 1	Nickel, Total	46.8	µg/L	93	5.1	0 - 20
	Method Blank 1	Nickel, Total	ND	µg/L			
	QCS 1	Nickel, Total	52.2	µg/L	104		85 - 115
QC23032104	230320_57-01: MS 1	Nitrate as N	14.0	mg/L	99		80 - 120
	230320_57-01: MSD 1	Nitrate as N	14.0	mg/L	100	0.1	0 - 10
	CCVB 1	Nitrate as N	ND	mg/L			
	LCS 1	Nitrate as N	10.0	mg/L	100		90 - 110
	LCSD 1	Nitrate as N	10.1	mg/L	101	0.4	0 - 10
	LCSL 1	Nitrate as N	0.1	mg/L	74		50 - 150
	Method Blank 1	Nitrate as N	ND	mg/L			
	230320_57-01: MS 1	Nitrate+Nitrite as N	16.0	mg/L	100		80 - 120
	230320_57-01: MSD 1	Nitrate+Nitrite as N	16.1	mg/L	100	0.1	0 - 10
	CCVB 1	Nitrate+Nitrite as N	ND	mg/L			
	LCS 1	Nitrate+Nitrite as N	12.1	mg/L	101		90 - 110
	LCSD 1	Nitrate+Nitrite as N	12.1	mg/L	101	0.6	0 - 10
	LCSL 1	Nitrate+Nitrite as N	0.2	mg/L	87		50 - 150
	Method Blank 1	Nitrate+Nitrite as N	ND	mg/L			
	230320_57-01: MS 1	Nitrite as N	2.0	mg/L	101		80 - 120
	230320_57-01: MSD 1	Nitrite as N	2.0	mg/L	102	0.3	0 - 10

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QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	CCVB 1	Nitrite as N	ND	mg/L			
	LCS 1	Nitrite as N	2.1	mg/L	103		90 - 110
	LCSD 1	Nitrite as N	2.1	mg/L	104	1.4	0 - 10
	LCSL 1	Nitrite as N	0.1	mg/L	99		50 - 150
	Method Blank 1	Nitrite as N	ND	mg/L			
	230320_57-01: MS 1	Orthophosphate as P	1.1	mg/L	100		80 - 120
	230320_57-01: MSD 1	Orthophosphate as P	1.1	mg/L	99	0.7	0 - 10
	CCVB 1	Orthophosphate as P	ND	mg/L			
	LCS 1	Orthophosphate as P	1.0	mg/L	101		90 - 110
	LCSD 1	Orthophosphate as P	1.1	mg/L	106	4.2	0 - 10
	LCSL 1	Orthophosphate as P	0.1	mg/L	101		50 - 150
	Method Blank 1	Orthophosphate as P	ND	mg/L			
QC23032426	230320_24-01: MS 1	Perchlorate	5.8	ug/L	116		85 - 115
	230320_24-01: MSD 1	Perchlorate	5.8	ug/L	117	0.6	0 - 10
	CCVB 1	Perchlorate	ND	µg/L			
	IPC 1	Perchlorate	4.9	µg/L	98		80 - 120
	LCS 1	Perchlorate	4.9	ug/L	98		90 - 110
	LCSD 1	Perchlorate	5.5	ug/L	110	11.6	0 - 10
	LCSL 1	Perchlorate	1.9	ug/L	93		75 - 125
	Method Blank 1	Perchlorate	ND	µg/L			
	QCS 1	Perchlorate	5.4	ug/L	109		90 - 110
QC23032101	230320_37-07: Duplicate 1	pH (Laboratory)	7.9	pH (H)		0.1	0 - 5
	230320_69-01: Duplicate 2	pH (Laboratory)	7.7	pH (H)		0.1	0 - 5
	LCS 1	pH (Laboratory)	6.8	pH (H)	100		95 - 105
	LCSD 1	pH (Laboratory)	6.9	pH (H)	100	0.4	0 - 10
	LCSD2 1	pH (Laboratory)	6.9	pH (H)	100	0.6	0 - 10
	LCSD3 1	pH (Laboratory)	6.9	pH (H)	100	0.4	0 - 10
QC23032232	230322_25-01: MS 1	Potassium	14.1	mg/L	100		70 - 130
	230322_25-01: MSD 1	Potassium	14.0	mg/L	99	0.8	0 - 20
	CCVB 1	Potassium	ND	mg/L			
	LCS 1	Potassium	10.4	mg/L	104		95 - 105

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Quality Control Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	LCSD 1	Potassium	10.7	mg/L	107	2.4	0 - 10
	Method Blank 1	Potassium	ND	mg/L			
	QCS 1	Potassium	10.1	mg/L	101		95 - 105
QC23032410	230320_24-01: MS 1	Selenium, Total	52.9	µg/L	104		70 - 130
	230320_24-01: MSD 1	Selenium, Total	53.1	µg/L	105	0.4	0 - 20
	CCVB 1	Selenium, Total	ND	µg/L			
	LCS 1	Selenium, Total	49.8	µg/L	100		85 - 115
	LCSD 1	Selenium, Total	49.2	µg/L	98	1.3	0 - 20
	Method Blank 1	Selenium, Total	ND	µg/L			
	QCS 1	Selenium, Total	50.2	µg/L	100		85 - 115
QC23032411	230320_24-01: MS 1	Silver, Total	44.6	µg/L	89		70 - 130
	230320_24-01: MSD 1	Silver, Total	50.1	µg/L	100	11.5	0 - 20
	CCVB 1	Silver, Total	ND	µg/L			
	LCS 1	Silver, Total	53.0	µg/L	106		85 - 115
	LCSD 1	Silver, Total	51.7	µg/L	103	2.5	0 - 20
	Method Blank 1	Silver, Total	ND	µg/L			
	QCS 1	Silver, Total	53.0	µg/L	106		85 - 115
QC23032232	230322_25-01: MS 1	Sodium	135.3	mg/L	93		70 - 130
	230322_25-01: MSD 1	Sodium	134.4	mg/L	91	0.6	0 - 20
	CCVB 1	Sodium	ND	mg/L			
	LCS 1	Sodium	51.1	mg/L	102		95 - 105
	LCSD 1	Sodium	51.0	mg/L	102	0.2	0 - 10
	Method Blank 1	Sodium	ND	mg/L			
	QCS 1	Sodium	49.0	mg/L	98		95 - 105
QC23032203	230320_69-01: Duplicate 1	Specific Conductance (EC)	1147.0	µmho/cm @25.0°C		0.2	0 - 25
	230321_33-01: Duplicate 2	Specific Conductance (EC)	1259.0	µmho/cm @25.0°C		0.0	0 - 25
	LCS 1	Specific Conductance (EC)	1416.0	µmho/cm @25.0°C	100		80 - 120
	LCSD 1	Specific Conductance (EC)	1412.0	µmho/cm @25.0°C	100	0.3	0 - 5

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QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	LCSD2 1	Specific Conductance (EC)	1414.0	µmho/cm @25.0°C	100	0.1	0 - 5
	LCSH 1	Specific Conductance (EC)	24900.0	µmho/cm @25.0°C	100		80 - 120
	LCSL 1	Specific Conductance (EC)	147.2	µmho/cm @25.0°C	100		80 - 120
QC23032104	230320_57-01: MS 1	Sulfate	158.6	mg/L	92		80 - 120
	230320_57-01: MSD 1	Sulfate	158.9	mg/L	93	0.2	0 - 10
	CCVB 1	Sulfate	ND	mg/L			
	LCS 1	Sulfate	19.8	mg/L	99		90 - 110
	LCSD 1	Sulfate	20.0	mg/L	100	0.7	0 - 10
	LCSL 1	Sulfate	0.7	mg/L	72		50 - 150
	Method Blank 1	Sulfate	ND	mg/L			
QC23032410	230320_24-01: MS 1	Thallium, Total	46.3	µg/L	93		70 - 130
	230320_24-01: MSD 1	Thallium, Total	45.4	µg/L	91	1.9	0 - 20
	CCVB 1	Thallium, Total	ND	µg/L			
	LCS 1	Thallium, Total	47.2	µg/L	94		85 - 115
	LCSD 1	Thallium, Total	47.5	µg/L	95	0.6	0 - 20
	Method Blank 1	Thallium, Total	ND	µg/L			
	QCS 1	Thallium, Total	46.3	µg/L	93		85 - 115
QC23032222	230320_76-02: Duplicate 1	Total Dissolved Solids	184.0	mg/L		3.3	0 - 10
	CCVB 1	Total Dissolved Solids	ND	mg/L			
	LCS 1	Total Dissolved Solids	498.0	mg/L	100		90 - 110
	LCSD 1	Total Dissolved Solids	484.0	mg/L	97	2.9	0 - 10
	LCSL 1	Total Dissolved Solids	46.0	mg/L	92		50 - 150
	Method Blank 1	Total Dissolved Solids	ND	mg/L			
QC23032013	230320_37-05: Duplicate 1	Turbidity	ND	NTU		0.0	0 - 20
	230320_37-15: Duplicate 2	Turbidity	ND	NTU		0.0	0 - 20
	230320_60-15: Duplicate 3	Turbidity	ND	NTU		0.0	0 - 20
	CCVB 1	Turbidity	ND	NTU			
	CCVB 2	Turbidity	ND	NTU			
	CCVB 3	Turbidity	ND	NTU			

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QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limit
	LCS 1	Turbidity	1.0	NTU	103		95 - 105
	LCSD 1	Turbidity	1.0	NTU	102	1.0	0 - 20
	LCSD2 1	Turbidity	1.0	NTU	101	2.0	0 - 20
	LCSD3 1	Turbidity	1.0	NTU	103	0.0	0 - 20
	Method Blank 1	Turbidity	ND	NTU			
QC23032232	230322_25-01: MS 1	Zinc, Total	919.4	µg/L	91		70 - 130
	230322_25-01: MSD 1	Zinc, Total	922.9	µg/L	91	0.4	0 - 20
	CCVB 1	Zinc, Total	ND	µg/L			
	LCS 1	Zinc, Total	970.1	µg/L	97		95 - 105
	LCSD 1	Zinc, Total	995.9	µg/L	100	2.6	0 - 10
	Method Blank 1	Zinc, Total	ND	µg/L			
	QCS 1	Zinc, Total	1017.0	µg/L	102		95 - 105

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments H: Analyzed outside of method hold time QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

Pajaro Sunny Mesa Svc District
Don Rosa
136 San Juan Road
Royal Oaks, CA 95076

Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS (6227)
www.MBASinc.com
ELAP Certification Number: 2385

Monday, March 27, 2023

Sample Condition Upon Receipt

Order ID: 230320_24

Is there evidence of chilling? *NOTE: Systems are encouraged but not required to hold samples <10°C (Microbiology) or <6°C (Chemistry) during transit.	Yes
Did bottle arrive intact?	Yes
Did bottle labels agree with COC?	Yes
Adequate sample volume?	Yes

Abbreviations/Definitions:

mg/L: Milligrams per liter (=ppm)	µg/L: Micrograms per liter (=ppb)	MPN: Most Probable Number	
MDL: Method Detection Limit	PQL: Practical Quantitation Limit	MCL: Maximum Contamination Level	ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments		H: Analyzed outside of method hold time	QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.			

MBAS Order ID: 230320-24

MBAS Monterey Bay Analytical Services

Chain of Custody / Analysis Request

4 Justin Court, Suite D, Monterey, CA 93940
(831) 375-MBAS (6227) * Fax: (831) 641-0734
info@mbasinc.com www.MBASinc.com

Client / Company Name:	Attention:	Email Address(es) to Send Report/Invoice:	Phone Number:
Pajaro/Sunny Mesa CSD	Don Rosa	info@pajarosunnymesa.com	831-722-1389
Project/System Info:	**System ID: *Required for EDT***	**Billing Address:**	**Contract/ P.O. #:**
Sunny Mesa WS	CA2700773	136 San Juan Road Royal Oaks, CA 95076	
Mark if YES: For Regulatory Reporting? X	Requires EDT? X		

Requested Analysis: T22, DBP, Ammonia, Bac-T P/A

LAB USE ONLY
1. ☒ DW ☐ WW ☐ Soil ☐ Other ______
2. Is there evidence of chilling? (Y) / N N/A < 2hrs
3. Adequate sample volume? (Y) / N
4. Was the sample filtered? Y / (N)
5. Did bottles agree with the COC? (Y) / N

IR Used: 04

Preservative (include pH) Initials: SR

MBAS Lab #	Source Code or Client Sample ID *Required for EDT*	Sample Description	Date	Time	Receiving Temp (°C)	CL2 Residual (mg/L)	Routine	Other	Repeat	Special	# Cont.	Type*	Size	T22	DBP	Ammonia	Bac-T P/A	HNO3	H2SO4	NaOH	HCl	Na2S2O3
	002-002	Well #2	32023	12:20	15.3	ND				X	11	V	V	X	X	X	X	<2	<2	>12		

3/27/23 SS: Confirmed by Pajaro Sunny Mesa via phone 10:20.

	Printed Name	Signature	Date	Time	Comments
Sampled and Relinquished by:	Rafael Farfan	[signature]	32023	12:20	for regulatory and adding ~~perch~~ perchlorate per phone call w/ Judy 3/20/23 1440
Received by:	Charles Grasser	[signature]	3/20/23	13:01	
Relinquished by:	Charles Grasser	[signature]	3/20/23	14:02	
Received by:	Sean Riley	[signature]	3/20/23	1402	

☐ Payment Received Check #: Amount:

*Container Type: P=Plastic, G=Glass, V=Various Date:

MBAS_COC_Rev. 3/20

March 24, 2023

Lab No. : SP 2304046
Customer No. : 2019144

Monterey Bay Analytical Services
4 Justin Court
Monterey, CA 93940

Laboratory Report

Introduction: This report package contains a total of 4 pages divided into 3 sections:

Case Narrative	(1 page)	: An overview of the work performed at FGL.
Sample Results	(1 page)	: Results for each sample submitted.
Quality Control	(2 pages)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab No.	Matrix
WELL 02	03/20/2023	03/21/2023	SP 2304046-001	DW

Sampling and Receipt Information:

The Sample was received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. The Sample was received, prepared and analyzed within the method specified holding times. All samples arrived at 6 ° C. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the associated Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to established quality control criteria. Any exceptions are noted in the Quality Control Section of this report.

Test Summary	
EPA 551.1	Preparation and analysis performed by FGL-Santa Paula (FGL-SP ELAP# 1573)
EPA 552.2	Preparation and analysis performed by FGL-Santa Paula (FGL-SP ELAP# 1573)

Certification: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above and in the QC Section. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature. This report shall not be reproduced except in full, without the written approval of the laboratory.

KD: MKH

Approved By **Kelly A. Dunnahoo, B.S.**
Digitally signed by Kelly A. Dunnahoo, B.S.
Title: Laboratory Director
Date: 2023-03-24

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FAX: (559)734-8435
CA ELAP Certification No. 2810

ORGANIC CHEMICALS ANALYSIS

Date of Report : March 24, 2023
Sample ID : SP 2304046-001

Laboratory Name : **FGL Environmental**
Sampled On : 03/20/2023-12:10
Received On : 03/21/2023-11:15
Completed On : 03/24/2023-16:34

Approved By **Kelly A. Dunnahoo, B.S.** Digitally signed by Kelly A. Dunnahoo, B.S. Title: Laboratory Director Date: 2023-03-24

Sampled By : Farfan R
Employed By : Not Available

Sample Point Information **EDT**

PS Code : CA2700773_002_002
Sample Point Name : WELL 02
Water System Name : SUNNY MESA WATER SYSTEM

REGULATED ORGANICS

Method Code	Chemicals	Analyte Code	Result	Units	MCL	DLR	ELAP
EPA 551.1	Bromodichloromethane	2943	ND	ug/L	---	1	1573
EPA 551.1	Bromoform	2942	ND	ug/L	---	1	1573
EPA 551.1	Chloroform (Trichloromethane)	2941	ND	ug/L	---	1	1573
EPA 551.1	Dibromochloromethane	2944	ND	ug/L	---	1	1573
EPA 551.1	Total Trihalomethanes (THM'S/TTHM)	2950	ND	ug/L	80		1573

MCL - Maximum Contaminant Level, DLR - Detection Limit for Reporting Purpose, ND - Not Detected at or above DLR

ADDITIONAL ORGANICS

Method Code	Chemicals	Analyte Code	Result	Units	MCL	DLR	ELAP
EPA 552.2	Dibromoacetic Acid	2454	ND	ug/L	---	1	1573
EPA 552.2	Dichloroacetic Acid	2451	ND	ug/L	---	1	1573
EPA 552.2	Monobromoacetic Acid	2453	ND	ug/L	---	1	1573
EPA 552.2	Monochloroacetic Acid	2450	ND	ug/L	---	2	1573
EPA 552.2	Trichloroacetic Acid	2452	ND	ug/L	---	1	1573
EPA 552.2	Haloacetic acids (five)	2456	ND	ug/L	60		1573

MCL - Maximum Contaminant Level, DLR - Detection Limit for Reporting Purpose, ND - Not Detected at or above DLR

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March 24, 2023
Monterey Bay Analytical Services

Lab No. : SP 2304046
Customer No. : 2019144

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Bromodichloromethane	551.1	03/22/2023:203043MNM	Blank	ug/L		ND	<1.14	
			LCS	ug/L	10.05	113%	80-120	
			MS	ug/L	10.08	123%	80-120	435
		(SP 2303868-002)	MSD	ug/L	9.785	123%	80-120	435
			MSRPD	ug/L	9.785	1.7%	≤20	
Bromoform	551.1	03/22/2023:203043MNM	Blank	ug/L		ND	<1.14	
			LCS	ug/L	10.05	117%	80-120	
			MS	ug/L	10.08	130%	80-120	435
		(SP 2303868-002)	MSD	ug/L	9.785	132%	80-120	435
			MSRPD	ug/L	9.785	0.5%	≤20	
Chloroform	551.1	03/22/2023:203043MNM	Blank	ug/L		ND	<1.14	
			LCS	ug/L	10.05	119%	80-120	
			MS	ug/L	10.08	107%	80-120	
		(SP 2303868-002)	MSD	ug/L	9.785	103%	80-120	
			MSRPD	ug/L	9.785	5.9%	≤20	
Decafluorobiphenyl	551.1	03/22/2023:203043MNM	Blank	ug/L	40.15	90.2%	80-120	
			LCS	ug/L	40.20	106%	80-120	
			MS	ug/L	80.62	95.5%	80-120	
		(SP 2303868-002)	MSD	ug/L	78.28	99.3%	80-120	
			MSRPD	ug/L	78.28	0.9%	≤20.0	
Dibromochloromethane	551.1	03/22/2023:203043MNM	Blank	ug/L		ND	<1.14	
			LCS	ug/L	10.05	114%	80-120	
			MS	ug/L	10.08	142%	80-120	435
		(SP 2303868-002)	MSD	ug/L	9.785	145%	80-120	435
			MSRPD	ug/L	9.785	0.4%	≤20	
2,3-Dibromopropionic Acid	552	03/22/2023:203057VMZ	Blank	ug/L	5.000	88.6%	70-130	
			LCS	ug/L	5.000	70.0%	70-130	
			MS	ug/L	5.000	108%	70-130	
		(SP 2304098-003)	MSD	ug/L	5.000	90.8%	70-130	
			MSRPD	ug/L	5.000	17.6%	≤20.0	
Dibromoacetic Acid	552	03/22/2023:203057VMZ	Blank	ug/L		ND	<1	
			LCS	ug/L	10.00	92.8%	70-130	
			MS	ug/L	10.00	102%	70-130	
		(SP 2304098-003)	MSD	ug/L	10.00	108%	70-130	
			MSRPD	ug/L	10.00	5.3%	≤20.0	
Dichloroacetic Acid	552	03/22/2023:203057VMZ	Blank	ug/L		ND	<1	
			LCS	ug/L	10.00	102%	70-130	
			MS	ug/L	10.00	105%	70-130	
		(SP 2304098-003)	MSD	ug/L	10.00	94.7%	70-130	
			MSRPD	ug/L	10.00	2.9%	≤20.0	
Monobromoacetic Acid	552	03/22/2023:203057VMZ	Blank	ug/L		ND	<1	
			LCS	ug/L	10.00	96.8%	70-130	
			MS	ug/L	10.00	94.1%	70-130	
		(SP 2304098-003)	MSD	ug/L	10.00	114%	70-130	
			MSRPD	ug/L	10.00	18.5%	≤20.0	
Monochloroacetic Acid	552	03/22/2023:203057VMZ	Blank	ug/L		ND	<2	

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Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
			LCS	ug/L	10.00	98.9%	70-130	
			MS	ug/L	10.00	585%	70-130	435
		(SP 2304098-003)	MSD	ug/L	10.00	498%	70-130	435
			MSRPD	ug/L	10.00	16.0%	≤20.0	
Trichloroacetic Acid	552	03/22/2023:203057VMZ	Blank	ug/L		ND	<1	
			LCS	ug/L	10.00	102%	70-130	
			MS	ug/L	10.00	175%	70-130	435
		(SP 2304098-003)	MSD	ug/L	10.00	120%	70-130	
			MSRPD	ug/L	10.00	11.0%	≤20.0	

Definition

Blank : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.

DQO : Data Quality Objective - This is the criteria against which the quality control data is compared.

LCS : Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.

MS : Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.

MSD : Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.

MSRPD : MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.

ND : Non-detect - Result was below the DQO listed for the analyte.

Explanation

435 : Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

Page 4 of 4

MBAS
Monterey Bay Analytical Services

Subcontract Chain of Custody

Please send Report and Inovice to:
4 Justin Court Suite D, Monterey, CA 93940
Email: info@mbasinc.com 831.375.MBAS (6227)
www.MBASinc.com

Subcontractor Name:
Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No 1573

2304046

Customer Name: Pajaro Sunny Mesa Svc District
Project ID: Sunny Mesa Water System
Sample Type: WW / DW / SaltWater/ Ground / ______
Report Type: EDT / Excel / GeoTracker / ______

Turn Around Time: Standard / RUSH
5 Day Rush per request
Approved by Ken
RUSH

Lab Number: 230320_24-01 System ID: CA2700773_002_002
Collection Date/Time: 3/20/2023 12:10 Sample Collector: Farfan R Client Sample #:

Sample Description: Sunny Mesa WS, Well #2

Analyte	Method	Sample type:	# of Bottles	Preservation
Trihalomethanes	EPA551.1	DW	4	y
Haloacetic Acids	EPA552	DW	1	y

Comments:

Reliquished by: MBAS **Date/Time:** 3/20/23 1600 **Received by:** ________ **Date/Time:** ________

Reliquished by: FedEx **Date/Time:** 3/21/23 **Received by:** CDA **Date/Time:** 3/21/23 11:30

Condition Upon Receipt (Attach to COC) SP 2304046

Sample Receipt at SP:

1. Number of ice chests/packages received: **1**
2. Shipper tracking numbers **771608958547**
3. Were samples received in a chilled condition?
   Temps: **6** / / / / / /
4. Surface water (SWTR) bact samples: A sample that has a temperature upon receipt of >10C, whether iced or not, should be flagged unless the time since sample collection has been less than two hours.
5. Do the number of bottles received agree with the COC? $\boxed{\textbf{Yes}}$ **No** **N/A**
6. Verify sample date, time, sampler $\boxed{\textbf{Yes}}$ **No** **N/A**
7. Were the samples received intact? (i.e. no broken bottles, leaks, etc.) $\boxed{\textbf{Yes}}$ **No**
8. Were sample custody seals intact? **Yes** **No** $\boxed{\textbf{N/A}}$

Sample Verification, Labeling and Distribution:

1. Were all requested analyses understood and acceptable? $\boxed{\textbf{Yes}}$ **No**
2. Did bottle labels correspond with the client's ID's? $\boxed{\textbf{Yes}}$ **No**
3. Were all bottles requiring sample preservation properly preserved? **Yes** **No** $\boxed{\textbf{N/A}}$ **FGL**
   [Exception: Oil & Grease, VOA and CrVI verified in lab]
4. VOAs checked for Headspace? $\boxed{\textbf{Yes}}$ **No** **N/A**
5. Were all analyses within holding times at time of receipt? $\boxed{\textbf{Yes}}$ **No**
6. Have rush or project due dates been checked and accepted? $\boxed{\textbf{Yes}}$ **No** **N/A**

Include a copy of the COC for lab delivery. (Bacti. Inorganics and Radio)

Sample Receipt, Login and Verification completed by: Reviewed and Approved By **Celina D. Arenas** Digitally signed by Celina D. Arenas Title: Sample Receiving Date: 03/22/2023-11:49:10

Discrepency Documentation:

Any items above which are "No" or do not meet specifications (i.e. temps) must be resolved.

1. Person Contacted: ______ Phone Number: ______
   Initiated By: ______ Date: ______
   Problem:

   Resolution:

2. Person Contacted: ______ Phone Number: ______
   Initiated By: ______ Date: ______
   Problem:

   Resolution:

(2019144)
Monterey Bay Analytical Services
SP 2304046
CDA-03/22/2023-11:49:10

1 0

Pajaro Sunny Mesa Svc District
Pajaro Sunny Mesa Svc District
136 San Juan Road
Royal Oaks, CA 95076

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Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS (6227)
www.MBASinc.com
ELAP Certification Number: 2385
Wednesday, April 5, 2023

Sample Results

Lab Number: 230327_97-01 **Sample Description: Sunny Mesa WS, Well #2**

Collection Date/Time: 3/27/2023 9:00 Sample Collector: Farfan R Client Sample #:
Received Date/Time: 3/27/2023 16:27 System ID: CA2700773_002_002

Analyte	Method	Unit	Result	Dilution	Qualifier	PQL	MCL	Analysis Date / Time		Analyst
Ammonia-N	EPA 350.1	mg/L	ND	1		0.15		3/28/2023	14:12	XQL
Asbestos	EPA100.2	mF/L	ND	1	E	0.2	7	4/2/2023	12:00	E
Uranium, Radiological	EPA200.8	pCi/L	0.7	1		0.3	20	4/4/2023	16:02	MW
Uranium, Total	EPA200.8	µg/L	1.1	1		0.5	30	4/4/2023	16:02	MW
Nitrate as N	EPA300.0	mg/L	0.2	1	LO	0.1	10	3/28/2023	5:43	HC
LO: MS and/or MSD result unavailable. Acceptability based on LCS recovery.										
Nitrite as N	EPA300.0	mg/L	ND	1	LO	0.1	1	3/28/2023	5:43	HC

Abbreviations/Definitions: mg/L: Milligrams per liter (=ppm) µg/L: Micrograms per liter (=ppb) MPN: Most Probable Number
MDL: Method Detection Limit PQL: Practical Quantitation Limit MCL: Maximum Contamination Level ND: Not Detected at the PQL (or MDL, if shown)
E: Analysis performed by External Laboratory; see Report attachments H: Analyzed outside of method hold time QC: Quality Control
J: Result is < PQL but ≥ MDL; the concentration is an approximate value.

April 10, 2023

Monterey Bay Analytical Services
4 Justin Court
Monterey, CA 93940

Lab No. : **SP 2304576**
Customer No. : **2019144**

Laboratory Report

Introduction: This report package contains a total of 3 pages divided into 2 sections:

Case Narrative	(1 page)	: An overview of the work performed at FGL.
Sample Results	(2 pages)	: Results for each sample submitted.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab No.	Matrix
WELL 02	03/29/2023	03/30/2023	SP 2304576-001	DW

Sampling and Receipt Information:

The Sample was received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. The Sample was received, prepared and analyzed within the method specified holding times. All samples arrived at 3 ° C. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the associated Chain of Custody and Condition Upon Receipt Form.

Test Summary	
EPA 900.0	Preparation and analysis performed by FGL-Santa Paula (FGL-SP ELAP# 1573)
SRL 524M-TCP	Preparation and analysis performed by FGL-Santa Paula (FGL-SP ELAP# 1573)

Certification: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above and in the QC Section. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature. This report shall not be reproduced except in full, without the written approval of the laboratory.

KD: SVH

April 10, 2023

Monterey Bay Analytical Services
4 Justin Court
Monterey, CA 93940

Description : WELL 02
Project : SUNNY MESA WATER SYSTEM

Lab No. : SP 2304576-001
Customer No. : 2019144

Sampled On : March 29, 2023 at 13:50
Sampled By : Rafael Farfan
Received On : March 30, 2023 at 10:10
Matrix : Drinking Water

Sample Results - Organic

Constituent	Result	RL	Units	MCL/AL	Dil.	DQF	Sample Preparation			Sample Analysis			
SRL 524M-TCP							Date	Time	Who	Method	Date	Time	Who
1,2,3-Trichloropropane	ND	0.005	ug/L	0.005	1	U	03/31/2023	09:00	vmz	SRL 524M-TCP	04/01/2023	06:20	vmz

ND=Non-Detected, RL=Reporting Level.

April 10, 2023

Monterey Bay Analytical Services
4 Justin Court
Monterey, CA 93940

Lab No.	: SP 2304576-001
Customer No.	: 2019144
Sampled On	: March 29, 2023 at 13:50
Sampled By	: Rafael Farfan
Received On	: March 30, 2023 at 10:10
Matrix	: Drinking Water

Description : WELL 02
Project : SUNNY MESA WATER SYSTEM

Sample Results - Radio

Constituent	Result ± Error	MDA	Units	MCL/AL	DQF	Sample Preparation			Sample Analysis			
Radio Chemistry						Date	Time	Who	Method	Date	Time	Who
Gross Alpha	0.0446 ± 1.28	2.11	pCi/L	15/5		04/03/2023	08:30	amr	EPA 900.0	04/04/2023	07:26	amr

DQF Flags Definition:
U Constituent results were non-detect.

ND=Non-Detected, RL=Reporting Level

MDA = Minimum Detectable Activity (Calculated at the 95% confidence level) = Data utilized by DHS to determine matrix interference.
MCL / AL = Maximum Contamination Level / Action Level. Alpha's Action Level of 5 pCi/L is based on the Assigned Value (AV).
AV = Assigned Value(Gross Alpha Result + (0.84 x Error)). CCR Section 64442: Drinking Water Compliance Note: Do the following If Gross Alpha's (AV) exceeds 5 pCi/L run Uranium. If Gross Alpha's (AV) minus Uranium exceeds 5 pCi/L run Radium 226.

Drinking Water Compliance:
Gross Alpha (AV) minus Uranium is less than or equal to 15 pCi/L
Uranium is less than or equal to 20 pCi/L
Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Note: Samples are held for 3-6 months prior to disposal.

BSK Associates Laboratory Fresno
687 N. Laverne Avenue
Fresno, CA 93727
559-497-2888 (Main)

Partial

AGC3532

04/07/2023

David Holland
Monterey Bay Analytical
4 Justin Court Suite D
Monterey, CA 93940

RE: Report for AGC3532 General EDT

Dear David Holland,

The results listed on this Partial report reflect only a subset of those requested on the Chain of Custody. The results may not be inclusive of all qualifications, narrations, and rightness review. The results are not intended as a substitute for our final report, the Certificate of Analysis, with all information contained therein. All data presented in this report must be considered preliminary and subject to change unless presented on a final Certificate of Analysis. Only the final Certificate of Analysis, either in hardcopy or Adobe PDF format with an authorizing signature, shall be considered the official version of our analytical results.

If additional clarification of any information is required, please contact your Client Services Representative, Mary Thao at 559-497-2888.

BSK ASSOCIATES

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Case Narrative

Project and Report Details		Invoice Details	
Client:	Monterey Bay Analytical	**Invoice To:**	Monterey Bay Analytical
Report To:	David Holland	**Invoice Attn:**	David Holland
Project #:	Sunny Mesa WS	**Project PO#:**	-
Received:	3/31/2023 - 11:35		
Report Due:	4/07/2023		

Sample Receipt Conditions

Cooler: Default Cooler
Temperature on Receipt ºC: 1.1

Containers Intact
COC/Labels Agree
Received On Wet Ice
Packing Material - Bubble Wrap
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Cooler: REC 3-31-23 113
Temperature on Receipt ºC: 1.6

Containers Intact
COC/Labels Agree
Received On Wet Ice
Packing Material - Bubble Wrap
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Data Qualifiers

The following qualifiers have been applied to one or more analytical results:

MS1.0 Matrix spike recoveries exceed control limits.

Report Distribution

Recipient(s)	Report Format	CC:
Monterey Bay Analytical Services	FINAL.RPT	DHolland@MBASinc.com

Certificate of Analysis

Sample ID: AGC3532-01
Sampled By: Rafael Farfan
Sample Description: Well 02 // 220329_34-01

Sample Date - Time: 03/29/2023 - 13:50
Matrix: Drinking Water
Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
EDB and DBCP by GC-ECD									
Ethylene Dibromide (EDB)	EPA 504.1	ND	0.020	ug/L	1	AGC1912	03/31/23	04/01/23	
Dibromochloropropane (DBCP)	EPA 504.1	ND	0.010	ug/L	1	AGC1912	03/31/23	04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	EPA 504.1	96 %	*Acceptable range: 70-130 %*						
Organohalide Pesticides and PCBs by GC-ECD									
Aldrin	EPA 505	ND	0.075	ug/L	1	AGC1912	03/31/23	04/01/23	
Chlordane (Technical)	EPA 505	ND	0.10	ug/L	1	AGC1912	03/31/23	04/01/23	
Dieldrin	EPA 505	ND	0.020	ug/L	1	AGC1912	03/31/23	04/01/23	
Endrin	EPA 505	ND	0.10	ug/L	1	AGC1912	03/31/23	04/01/23	
Heptachlor	EPA 505	ND	0.010	ug/L	1	AGC1912	03/31/23	04/01/23	
Heptachlor Epoxide	EPA 505	ND	0.010	ug/L	1	AGC1912	03/31/23	04/01/23	
Hexachlorobenzene	EPA 505	ND	0.50	ug/L	1	AGC1912	03/31/23	04/01/23	
Hexachlorocyclopentadiene	EPA 505	ND	1.0	ug/L	1	AGC1912	03/31/23	04/01/23	
Lindane	EPA 505	ND	0.20	ug/L	1	AGC1912	03/31/23	04/01/23	
Methoxychlor	EPA 505	ND	10	ug/L	1	AGC1912	03/31/23	04/01/23	
PCB Aroclor Screen	EPA 505	ND	0.50	ug/L	1	AGC1912	03/31/23	04/01/23	
Toxaphene	EPA 505	ND	1.0	ug/L	1	AGC1912	03/31/23	04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	EPA 505	96 %	*Acceptable range: 70-130 %*						
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.4	ND	1.0	ug/L	1	AGD0020	04/03/23	04/05/23	
2,4,5-TP (Silvex)	EPA 515.4	ND	1.0	ug/L	1	AGD0020	04/03/23	04/05/23	
2,4-D	EPA 515.4	ND	10	ug/L	1	AGD0020	04/03/23	04/05/23	
Bentazon	EPA 515.4	ND	2.0	ug/L	1	AGD0020	04/03/23	04/05/23	
Dalapon	EPA 515.4	ND	10	ug/L	1	AGD0020	04/03/23	04/05/23	
Dicamba	EPA 515.4	ND	1.5	ug/L	1	AGD0020	04/03/23	04/05/23	
Dinoseb	EPA 515.4	ND	2.0	ug/L	1	AGD0020	04/03/23	04/05/23	
Pentachlorophenol	EPA 515.4	ND	0.20	ug/L	1	AGD0020	04/03/23	04/05/23	
Picloram	EPA 515.4	ND	1.0	ug/L	1	AGD0020	04/03/23	04/05/23	
Surrogate: DCPAA	EPA 515.4	103 %	*Acceptable range: 70-130 %*						
Volatile Organics (SDWA Regulated) by GC-MS									
1,1,1-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,1,2,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 524.2	ND	10	ug/L	1	AGD0112	04/04/23	04/04/23	
1,1,2-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,1-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,1-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,2,4-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,2-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,2-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
1,4-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	

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Certificate of Analysis

Sample ID: AGC3532-01
Sampled By: Rafael Farfan
Sample Description: Well 02 // 220329_34-01

Sample Date - Time: 03/29/2023 - 13:50
Matrix: Drinking Water
Sample Type: Grab

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics (SDWA Regulated) by GC-MS									
Benzene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Carbon Tetrachloride	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Chlorobenzene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
cis-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
cis-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Dichloromethane	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Ethylbenzene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
m,p-Xylenes	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Methyl-t-butyl ether	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
o-Xylene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Styrene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Tetrachloroethene (PCE)	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Toluene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
trans-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
trans-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Trichloroethene (TCE)	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Trichlorofluoromethane	EPA 524.2	ND	5.0	ug/L	1	AGD0112	04/04/23	04/04/23	
Vinyl Chloride	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Total 1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Total Xylenes	EPA 524.2	ND	0.50	ug/L	1	AGD0112	04/04/23	04/04/23	
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.2	110 %	*Acceptable range: 70-130 %*						
Surrogate: Bromofluorobenzene	EPA 524.2	110 %	*Acceptable range: 70-130 %*						
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	AGD0090	04/04/23	04/05/23	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	AGD0090	04/04/23	04/05/23	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	AGD0090	04/04/23	04/05/23	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	AGD0090	04/04/23	04/05/23	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	AGD0090	04/04/23	04/05/23	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	AGD0090	04/04/23	04/05/23	
Methomyl	EPA 531.1	ND	2.0	ug/L	1	AGD0090	04/04/23	04/05/23	
Oxamyl	EPA 531.1	ND	20	ug/L	1	AGD0090	04/04/23	04/05/23	
Glyphosate by HPLC									
Glyphosate	EPA 547	ND	25	ug/L	1	AGC1881	03/30/23	03/30/23	
Surrogate: AMPA	EPA 547	97 %	*Acceptable range: 70-130 %*						
Endothall by GC-MS									
Endothall	EPA 548.1	ND	45	ug/L	1	AGC1969	03/31/23	04/03/23	
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	AGD0010	04/02/23	04/04/23	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 504.1 - Quality Control

Batch: AGC1912 Prepared: 3/31/2023

Prep Method: EPA 504/505 Analyst: VTL

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGC1912-BLK1)											
Ethylene Dibromide (EDB)	ND	0.020	ug/L							04/01/23	
Dibromochloropropane (DBCP)	ND	0.010	ug/L							04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.45*			*0.46*		*99*	*70-130*			04/01/23	
Blank Spike (AGC1912-BS1)											
Ethylene Dibromide (EDB)	0.11	0.020	ug/L	0.10	ND	108	70-130			04/01/23	
Dibromochloropropane (DBCP)	0.10	0.010	ug/L	0.10	ND	102	70-130			04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.47*			*0.46*		*102*	*70-130*			04/01/23	
Blank Spike Dup (AGC1912-BSD1)											
Ethylene Dibromide (EDB)	0.11	0.020	ug/L	0.10	ND	110	70-130	2	20	04/01/23	
Dibromochloropropane (DBCP)	0.11	0.010	ug/L	0.10	ND	108	70-130	6	20	04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.47*			*0.46*		*103*	*70-130*			04/01/23	
Matrix Spike (AGC1912-MS1), Source: AGC2926-01											
Ethylene Dibromide (EDB)	0.098	0.020	ug/L	0.10	ND	97	65-135			04/01/23	
Dibromochloropropane (DBCP)	0.090	0.010	ug/L	0.10	ND	90	65-135			04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.41*			*0.46*		*89*	*70-130*			04/01/23	

EPA 505 - Quality Control

Batch: AGC1912 Prepared: 3/31/2023

Prep Method: EPA 504/505 Analyst: VTL

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGC1912-BLK1)											
Aldrin	ND	0.075	ug/L							04/01/23	
Chlordane (Technical)	ND	0.10	ug/L							04/01/23	
Dieldrin	ND	0.020	ug/L							04/01/23	
Endrin	ND	0.10	ug/L							04/01/23	
Heptachlor	ND	0.010	ug/L							04/01/23	
Heptachlor Epoxide	ND	0.010	ug/L							04/01/23	
Hexachlorobenzene	ND	0.50	ug/L							04/01/23	
Hexachlorocyclopentadiene	ND	1.0	ug/L							04/01/23	
Lindane	ND	0.20	ug/L							04/01/23	
Methoxychlor	ND	10	ug/L							04/01/23	
PCB Aroclor Screen	ND	0.50	ug/L							04/01/23	
Toxaphene	ND	1.0	ug/L							04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.45*			*0.46*		*99*	*70-130*			04/01/23	
Blank Spike (AGC1912-BS1)											
Aldrin	0.74	0.075	ug/L	0.74	ND	99	70-130			04/01/23	
Dieldrin	0.20	0.020	ug/L	0.20	ND	102	70-130			04/01/23	
Endrin	0.099	0.10	ug/L	0.10	ND	99	70-130			04/01/23	
Heptachlor	0.10	0.010	ug/L	0.10	ND	100	70-130			04/01/23	
Heptachlor Epoxide	0.10	0.010	ug/L	0.10	ND	100	70-130			04/01/23	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 505 - Quality Control

Batch: AGC1912 Prepared: 3/31/2023
Prep Method: EPA 504/505 Analyst: VTL

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank Spike (AGC1912-BS1)											
Hexachlorobenzene	1.0	0.50	ug/L	1.0	ND	102	70-130			04/01/23	
Hexachlorocyclopentadiene	0.99	1.0	ug/L	1.0	ND	99	70-130			04/01/23	
Lindane	0.21	0.20	ug/L	0.20	ND	107	70-130			04/01/23	
Methoxychlor	1.0	10	ug/L	1.0	ND	104	70-130			04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.47*			*0.46*		*102*	*70-130*			04/01/23	
Blank Spike Dup (AGC1912-BSD1)											
Aldrin	0.77	0.075	ug/L	0.74	ND	103	70-130	4	20	04/01/23	
Dieldrin	0.21	0.020	ug/L	0.20	ND	104	70-130	1	20	04/01/23	
Endrin	0.095	0.10	ug/L	0.10	ND	95	70-130	5	20	04/01/23	
Heptachlor	0.10	0.010	ug/L	0.10	ND	100	70-130	0	20	04/01/23	
Heptachlor Epoxide	0.10	0.010	ug/L	0.10	ND	101	70-130	1	20	04/01/23	
Hexachlorobenzene	1.1	0.50	ug/L	1.0	ND	106	70-130	3	20	04/01/23	
Hexachlorocyclopentadiene	1.0	1.0	ug/L	1.0	ND	102	70-130	4	20	04/01/23	
Lindane	0.21	0.20	ug/L	0.20	ND	107	70-130	1	20	04/01/23	
Methoxychlor	0.99	10	ug/L	1.0	ND	99	70-130	5	20	04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.47*			*0.46*		*103*	*70-130*			04/01/23	
Matrix Spike (AGC1912-MS1), Source: AGC2926-01											
Aldrin	0.62	0.075	ug/L	0.75	ND	82	65-135			04/01/23	
Dieldrin	0.18	0.020	ug/L	0.20	ND	89	65-135			04/01/23	
Endrin	0.082	0.10	ug/L	0.10	ND	77	65-135			04/01/23	
Heptachlor	0.086	0.010	ug/L	0.10	ND	86	65-135			04/01/23	
Heptachlor Epoxide	0.087	0.010	ug/L	0.10	ND	87	65-135			04/01/23	
Hexachlorobenzene	0.86	0.50	ug/L	1.0	ND	85	65-135			04/01/23	
Hexachlorocyclopentadiene	0.83	1.0	ug/L	1.0	ND	83	65-135			04/01/23	
Lindane	0.18	0.20	ug/L	0.20	ND	88	65-135			04/01/23	
Methoxychlor	0.84	10	ug/L	1.0	ND	84	65-135			04/01/23	
Surrogate: 1-Br-2-Nitrobenzene	*0.41*			*0.46*		*89*	*70-130*			04/01/23	

EPA 515.4 - Quality Control

Batch: AGD0020 Prepared: 4/3/2023
Prep Method: EPA 515.4 Analyst: PNN

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGD0020-BLK1)											
2,4,5-T	ND	1.0	ug/L							04/05/23	
2,4,5-TP (Silvex)	ND	1.0	ug/L							04/05/23	
2,4-D	ND	10	ug/L							04/05/23	
Bentazon	ND	2.0	ug/L							04/05/23	
Dalapon	ND	10	ug/L							04/05/23	
Dicamba	ND	1.5	ug/L							04/05/23	
Dinoseb	ND	2.0	ug/L							04/05/23	
Pentachlorophenol	ND	0.20	ug/L							04/05/23	
Picloram	ND	1.0	ug/L							04/05/23	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 515.4 - Quality Control

Batch: AGD0020 Prepared: 4/3/2023
Prep Method: EPA 515.4 Analyst: PNN

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGD0020-BLK1)											
Surrogate: DCPAA	*37*			*36*		*102*	*70-130*			04/05/23	
Matrix Spike (AGD0020-MS1), Source: AGC3443-01											
2,4,5-T	1.6	1.0	ug/L	1.6	ND	103	70-130			04/05/23	
2,4,5-TP (Silvex)	0.81	1.0	ug/L	0.80	ND	101	70-130			04/05/23	
2,4-D	0.37	10	ug/L	0.40	ND	93	70-130			04/05/23	
Bentazon	2.1	2.0	ug/L	2.0	ND	104	70-130			04/05/23	
Dalapon	4.3	10	ug/L	4.0	ND	108	70-130			04/05/23	
Dicamba	0.80	1.5	ug/L	0.80	ND	101	70-130			04/05/23	
Dinoseb	0.85	2.0	ug/L	0.80	ND	106	70-130			04/05/23	
Pentachlorophenol	0.16	0.20	ug/L	0.16	ND	100	70-130			04/05/23	
Picloram	0.38	1.0	ug/L	0.40	ND	96	70-130			04/05/23	
Surrogate: DCPAA	*39*			*36*		*108*	*70-130*			04/05/23	
Matrix Spike Dup (AGD0020-MSD1), Source: AGC3443-01											
2,4,5-T	1.6	1.0	ug/L	1.6	ND	103	70-130	0	30	04/05/23	
2,4,5-TP (Silvex)	0.83	1.0	ug/L	0.80	ND	103	70-130	2	30	04/05/23	
2,4-D	0.38	10	ug/L	0.40	ND	96	70-130	3	30	04/05/23	
Bentazon	2.1	2.0	ug/L	2.0	ND	105	70-130	2	30	04/05/23	
Dalapon	4.2	10	ug/L	4.0	ND	105	70-130	2	30	04/05/23	
Dicamba	0.82	1.5	ug/L	0.80	ND	103	70-130	2	30	04/05/23	
Dinoseb	0.84	2.0	ug/L	0.80	ND	105	70-130	1	30	04/05/23	
Pentachlorophenol	0.16	0.20	ug/L	0.16	ND	100	70-130	1	30	04/05/23	
Picloram	0.39	1.0	ug/L	0.40	ND	97	70-130	2	30	04/05/23	
Surrogate: DCPAA	*38*			*36*		*104*	*70-130*			04/05/23	

EPA 524.2 - Quality Control

Batch: AGD0112 Prepared: 4/4/2023
Prep Method: EPA 524.2 Analyst: CMH

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGD0112-BLK1)											
1,1,1-Trichloroethane	ND	0.50	ug/L							04/04/23	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							04/04/23	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	10	ug/L							04/04/23	
1,1,2-Trichloroethane	ND	0.50	ug/L							04/04/23	
1,1-Dichloroethane	ND	0.50	ug/L							04/04/23	
1,1-Dichloroethene	ND	0.50	ug/L							04/04/23	
1,2,4-Trichlorobenzene	ND	0.50	ug/L							04/04/23	
1,2-Dichlorobenzene	ND	0.50	ug/L							04/04/23	
1,2-Dichloroethane	ND	0.50	ug/L							04/04/23	
1,2-Dichloropropane	ND	0.50	ug/L							04/04/23	
1,4-Dichlorobenzene	ND	0.50	ug/L							04/04/23	
Benzene	ND	0.50	ug/L							04/04/23	
Carbon Tetrachloride	ND	0.50	ug/L							04/04/23	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 524.2 - Quality Control

Batch: AGD0112 Prepared: 4/4/2023

Prep Method: EPA 524.2 Analyst: CMH

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGD0112-BLK1)											
Chlorobenzene	ND	0.50	ug/L							04/04/23	
cis-1,2-Dichloroethene	ND	0.50	ug/L							04/04/23	
cis-1,3-Dichloropropene	ND	0.50	ug/L							04/04/23	
Dichloromethane	ND	0.50	ug/L							04/04/23	
Ethylbenzene	ND	0.50	ug/L							04/04/23	
m,p-Xylenes	ND	0.50	ug/L							04/04/23	
Methyl-t-butyl ether	ND	0.50	ug/L							04/04/23	
o-Xylene	ND	0.50	ug/L							04/04/23	
Styrene	ND	0.50	ug/L							04/04/23	
Tetrachloroethene (PCE)	ND	0.50	ug/L							04/04/23	
Toluene	ND	0.50	ug/L							04/04/23	
trans-1,2-Dichloroethene	ND	0.50	ug/L							04/04/23	
trans-1,3-Dichloropropene	ND	0.50	ug/L							04/04/23	
Trichloroethene (TCE)	ND	0.50	ug/L							04/04/23	
Trichlorofluoromethane	ND	5.0	ug/L							04/04/23	
Vinyl Chloride	ND	0.50	ug/L							04/04/23	
Total 1,3-Dichloropropene	ND	0.50	ug/L							04/04/23	
Total Xylenes	ND	0.50	ug/L							04/04/23	
Surrogate: 1,2-Dichlorobenzene-d4	*49*			*50*		*97*	*70-130*			04/04/23	
Surrogate: Bromofluorobenzene	*48*			*50*		*97*	*70-130*			04/04/23	
Blank Spike (AGD0112-BS1)											
1,1,1-Trichloroethane	9.4	0.50	ug/L	10	ND	94	70-130			04/04/23	
1,1,2,2-Tetrachloroethane	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
1,1,2-Trichloro-1,2,2-trifluoroethane	8.9	10	ug/L	10	ND	89	70-130			04/04/23	
1,1,2-Trichloroethane	9.9	0.50	ug/L	10	ND	99	70-130			04/04/23	
1,1-Dichloroethane	9.7	0.50	ug/L	10	ND	97	70-130			04/04/23	
1,1-Dichloroethene	9.2	0.50	ug/L	10	ND	92	70-130			04/04/23	
1,2,4-Trichlorobenzene	8.5	0.50	ug/L	10	ND	85	70-130			04/04/23	
1,2-Dichlorobenzene	9.4	0.50	ug/L	10	ND	94	70-130			04/04/23	
1,2-Dichloroethane	9.3	0.50	ug/L	10	ND	93	70-130			04/04/23	
1,2-Dichloropropane	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
1,4-Dichlorobenzene	9.1	0.50	ug/L	10	ND	91	70-130			04/04/23	
Benzene	9.1	0.50	ug/L	10	ND	91	70-130			04/04/23	
Carbon Tetrachloride	9.6	0.50	ug/L	10	ND	96	70-130			04/04/23	
Chlorobenzene	9.3	0.50	ug/L	10	ND	93	70-130			04/04/23	
cis-1,2-Dichloroethene	8.6	0.50	ug/L	10	ND	86	70-130			04/04/23	
cis-1,3-Dichloropropene	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
Dichloromethane	9.4	0.50	ug/L	10	ND	94	70-130			04/04/23	
Ethylbenzene	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
m,p-Xylenes	19	0.50	ug/L	20	ND	95	70-130			04/04/23	
Methyl-t-butyl ether	20	0.50	ug/L	20	ND	98	70-130			04/04/23	
o-Xylene	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	

BSK Associates Laboratory Fresno

Organics Quality Control Report

EPA 524.2 - Quality Control

Batch: AGD0112 Prepared: 4/4/2023

Prep Method: EPA 524.2 Analyst: CMH

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank Spike (AGD0112-BS1)											
Styrene	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
Tetrachloroethene (PCE)	9.6	0.50	ug/L	10	ND	96	70-130			04/04/23	
Toluene	9.8	0.50	ug/L	10	ND	98	70-130			04/04/23	
trans-1,2-Dichloroethene	9.6	0.50	ug/L	10	ND	96	70-130			04/04/23	
trans-1,3-Dichloropropene	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
Trichloroethene (TCE)	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
Trichlorofluoromethane	9.4	5.0	ug/L	10	ND	94	70-130			04/04/23	
Vinyl Chloride	9.5	0.50	ug/L	10	ND	95	70-130			04/04/23	
Surrogate: 1,2-Dichlorobenzene-d4	*50*			*50*		*100*	*70-130*			04/04/23	
Surrogate: Bromofluorobenzene	*50*			*50*		*99*	*70-130*			04/04/23	
Blank Spike Dup (AGD0112-BSD1)											
1,1,1-Trichloroethane	11	0.50	ug/L	10	ND	110	70-130	16	30	04/04/23	
1,1,2,2-Tetrachloroethane	9.4	0.50	ug/L	10	ND	94	70-130	2	30	04/04/23	
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10	ND	107	70-130	18	30	04/04/23	
1,1,2-Trichloroethane	9.7	0.50	ug/L	10	ND	97	70-130	2	30	04/04/23	
1,1-Dichloroethane	11	0.50	ug/L	10	ND	108	70-130	11	30	04/04/23	
1,1-Dichloroethene	11	0.50	ug/L	10	ND	110	70-130	18	30	04/04/23	
1,2,4-Trichlorobenzene	9.7	0.50	ug/L	10	ND	97	70-130	13	30	04/04/23	
1,2-Dichlorobenzene	9.5	0.50	ug/L	10	ND	95	70-130	1	30	04/04/23	
1,2-Dichloroethane	9.8	0.50	ug/L	10	ND	98	70-130	6	30	04/04/23	
1,2-Dichloropropane	9.6	0.50	ug/L	10	ND	96	70-130	1	30	04/04/23	
1,4-Dichlorobenzene	9.2	0.50	ug/L	10	ND	92	70-130	2	30	04/04/23	
Benzene	9.7	0.50	ug/L	10	ND	97	70-130	7	30	04/04/23	
Carbon Tetrachloride	10	0.50	ug/L	10	ND	104	70-130	9	30	04/04/23	
Chlorobenzene	9.4	0.50	ug/L	10	ND	94	70-130	1	30	04/04/23	
cis-1,2-Dichloroethene	11	0.50	ug/L	10	ND	108	70-130	22	30	04/04/23	
cis-1,3-Dichloropropene	9.4	0.50	ug/L	10	ND	94	70-130	1	30	04/04/23	
Dichloromethane	10	0.50	ug/L	10	ND	101	70-130	7	30	04/04/23	
Ethylbenzene	9.7	0.50	ug/L	10	ND	97	70-130	2	30	04/04/23	
m,p-Xylenes	19	0.50	ug/L	20	ND	96	70-130	1	30	04/04/23	
Methyl-t-butyl ether	22	0.50	ug/L	20	ND	108	70-130	10	30	04/04/23	
o-Xylene	9.5	0.50	ug/L	10	ND	95	70-130	1	30	04/04/23	
Styrene	9.5	0.50	ug/L	10	ND	95	70-130	0	30	04/04/23	
Tetrachloroethene (PCE)	9.8	0.50	ug/L	10	ND	98	70-130	2	30	04/04/23	
Toluene	9.8	0.50	ug/L	10	ND	98	70-130	0	30	04/04/23	
trans-1,2-Dichloroethene	11	0.50	ug/L	10	ND	110	70-130	13	30	04/04/23	
trans-1,3-Dichloropropene	9.3	0.50	ug/L	10	ND	93	70-130	2	30	04/04/23	
Trichloroethene (TCE)	9.7	0.50	ug/L	10	ND	97	70-130	2	30	04/04/23	
Trichlorofluoromethane	11	5.0	ug/L	10	ND	112	70-130	18	30	04/04/23	
Vinyl Chloride	11	0.50	ug/L	10	ND	113	70-130	18	30	04/04/23	
Surrogate: 1,2-Dichlorobenzene-d4	*49*			*50*		*98*	*70-130*			04/04/23	
Surrogate: Bromofluorobenzene	*49*			*50*		*98*	*70-130*			04/04/23	

BSK Associates Laboratory Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

EPA 531.1 - Quality Control

Batch: AGD0090 Prepared: 4/4/2023
Prep Method: EPA 531.1 Analyst: YNV

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGD0090-BLK1)											
3-Hydroxycarbofuran	ND	1.0	ug/L							04/04/23	
Aldicarb	ND	0.50	ug/L							04/04/23	
Aldicarb Sulfone	ND	0.80	ug/L							04/04/23	
Aldicarb Sulfoxide	ND	0.50	ug/L							04/04/23	
Carbaryl	ND	1.0	ug/L							04/04/23	
Carbofuran	ND	0.90	ug/L							04/04/23	
Methomyl	ND	1.0	ug/L							04/04/23	
Oxamyl	ND	1.0	ug/L							04/04/23	
Blank Spike (AGD0090-BS1)											
3-Hydroxycarbofuran	3.7	1.0	ug/L	4.0	ND	91	80-120			04/04/23	
Aldicarb	1.8	0.50	ug/L	2.0	ND	89	80-120			04/04/23	
Aldicarb Sulfone	3.0	0.80	ug/L	3.2	ND	94	80-120			04/04/23	
Aldicarb Sulfoxide	1.8	0.50	ug/L	2.0	ND	92	80-120			04/04/23	
Carbaryl	3.5	1.0	ug/L	4.0	ND	88	80-120			04/04/23	
Carbofuran	3.2	0.90	ug/L	3.6	ND	90	80-120			04/04/23	
Methomyl	3.7	1.0	ug/L	4.0	ND	92	80-120			04/04/23	
Oxamyl	3.8	1.0	ug/L	4.0	ND	94	80-120			04/04/23	
Blank Spike Dup (AGD0090-BSD1)											
3-Hydroxycarbofuran	4.2	1.0	ug/L	4.0	ND	105	80-120	14	20	04/04/23	
Aldicarb	2.0	0.50	ug/L	2.0	ND	98	80-120	9	20	04/04/23	
Aldicarb Sulfone	3.1	0.80	ug/L	3.2	ND	98	80-120	4	20	04/04/23	
Aldicarb Sulfoxide	2.0	0.50	ug/L	2.0	ND	98	80-120	6	20	04/04/23	
Carbaryl	3.8	1.0	ug/L	4.0	ND	94	80-120	7	20	04/04/23	
Carbofuran	3.4	0.90	ug/L	3.6	ND	95	80-120	6	20	04/04/23	
Methomyl	3.9	1.0	ug/L	4.0	ND	97	80-120	5	20	04/04/23	
Oxamyl	3.9	1.0	ug/L	4.0	ND	98	80-120	4	20	04/04/23	
Matrix Spike (AGD0090-MS1), Source: AGC3146-03											
3-Hydroxycarbofuran	3.9	1.0	ug/L	4.0	ND	97	65-135			04/04/23	
Aldicarb	1.7	0.50	ug/L	2.0	ND	87	65-135			04/04/23	
Aldicarb Sulfone	3.1	0.80	ug/L	3.2	ND	97	65-135			04/04/23	
Aldicarb Sulfoxide	1.9	0.50	ug/L	2.0	ND	96	65-135			04/04/23	
Carbaryl	3.7	1.0	ug/L	4.0	ND	92	65-135			04/04/23	
Carbofuran	3.3	0.90	ug/L	3.6	ND	90	65-135			04/04/23	
Methomyl	3.8	1.0	ug/L	4.0	ND	94	65-135			04/04/23	
Oxamyl	4.0	1.0	ug/L	4.0	ND	99	65-135			04/04/23	

EPA 547 - Quality Control

Batch: AGC1881 Prepared: 3/30/2023
Prep Method: EPA 547 Analyst: VTL

BSK Associates Laboratory Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

EPA 547 - Quality Control

Batch: AGC1881 Prepared: 3/30/2023
Prep Method: EPA 547 Analyst: VTL

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGC1881-BLK1)											
Glyphosate	ND	25	ug/L							03/30/23	
Surrogate: AMPA	*200*			*200*		*99*	*70-130*			03/30/23	
Blank Spike (AGC1881-BS1)											
Glyphosate	99	25	ug/L	100	ND	99	70-130			03/30/23	
Surrogate: AMPA	*200*			*200*		*98*	*70-130*			03/30/23	
Blank Spike Dup (AGC1881-BSD1)											
Glyphosate	98	25	ug/L	100	ND	98	70-130	1	30	03/30/23	
Surrogate: AMPA	*190*			*200*		*95*	*70-130*			03/30/23	
Matrix Spike (AGC1881-MS1), Source: AGC3530-01											
Glyphosate	94	25	ug/L	100	ND	94	70-130			03/30/23	
Surrogate: AMPA	*190*			*200*		*94*	*70-130*			03/30/23	

EPA 548.1 - Quality Control

Batch: AGC1969 Prepared: 3/31/2023
Prep Method: EPA 548.1 Analyst: VTL

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGC1969-BLK1)											
Endothall	ND	2.0	ug/L							04/03/23	
Blank Spike (AGC1969-BS1)											
Endothall	15	2.0	ug/L	20	ND	75	39-122			04/03/23	
Blank Spike Dup (AGC1969-BSD1)											
Endothall	16	2.0	ug/L	20	ND	81	39-122	7	30	04/03/23	
Matrix Spike (AGC1969-MS1), Source: AGC3610-01											
Endothall	ND	2.0	ug/L	20	ND	0	39-122			04/03/23	MS1.0 ***Low***

EPA 549.2 - Quality Control

Batch: AGD0010 Prepared: 4/2/2023
Prep Method: EPA 549.2 Analyst: YNV

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (AGD0010-BLK1)											
Diquat	ND	0.40	ug/L							04/04/23	
Blank Spike (AGD0010-BS1)											
Diquat	3.6	0.40	ug/L	4.0	ND	89	70-130			04/04/23	
Blank Spike Dup (AGD0010-BSD1)											
Diquat	3.4	4.0	ug/L	4.0	ND	85	70-130	5	30	04/04/23	
Matrix Spike (AGD0010-MS1), Source: AGC3527-01											

BSK Associates Laboratory Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

EPA 549.2 - Quality Control

Batch: AGD0010 Prepared: 4/2/2023

Prep Method: EPA 549.2 Analyst: YNV

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Matrix Spike (AGD0010-MS1), Source: AGC3527-01											
Diquat	3.5	0.40	ug/L	4.0	ND	89	70-130			04/04/23	
Matrix Spike (AGD0010-MS2), Source: AGC3527-02											
Diquat	3.6	0.40	ug/L	4.0	ND	89	70-130			04/04/23	

Certificate of Analysis

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Field tests are outside the scope of laboratory accreditation and there is no certification available for field testing.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.
- (2) - Formerly known as Bis(2-Chloroisopropyl) ether.

Unless otherwise noted, TOC results by SM 5310C method do not include purgeable organic carbon, which is removed along with the inorganic carbon interference. The POC contribution to TOC is considered to be negligible.

Certificate of Analysis

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected below MRL/MDL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	PicoCuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit	U:	The analyte was not detected at or above the reported sample quantitation limit.

Please see the individual Subcontract Lab's report for applicable certifications.

The following parameters are not available for certification through CA ELAP:

Odor   Diisopropyl ether (DIPE) by EPA 524.2

The following parameters are calculated values and are outside the scope of our NELAP accreditation:

Total Nitrogen   Aggressive Index   Trivalent Chromium

BSK is not accredited under the NELAP program for the following additional parameters: **NA**

Certifications: **Please refer to our website for a copy of our Accredited Fields of Testing under each certification.**

Fresno

State of California - ELAP	1180	State of Hawaii	4021
Los Angeles CSD	9254479	NELAP certified	4021-020
State of Nevada	CA000792022-1	State of Oregon - NELAP	4021-020
EPA UCMR5	CA00079	State of Washington	C997-22a

Sacramento

State of California - ELAP	1180-S1

San Bernardino

State of California - ELAP	1180-S2	Los Angeles CSD	9254478
NELAP certified	4119-007	State of Oregon - NELAP	4119-007

Vancouver

NELAP certified	WA100008-015	State of Oregon - NELAP	WA100008-015
State of Washington	C824-22		

AGC3532 Monte6227 03/30/2023

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Sample Integrity

BSK Bottles: Yes No ✱ Page 1 of 1

COC Info	Was temperature within range? Chemistry ≤ 6°C Micro < 8°C	Yes No NA		Were correct containers and preservatives received for the tests requested?	Yes No NA
	If samples were taken today, is there evidence that chilling has begun?	Yes No NA		Bubbles Present VOAs (524.2/TTHM/TCP)? TB Received? (Check Method Below)	Yes No NA / Yes No NA
	Did all bottles arrive unbroken and intact?	~~Yes~~ No		Was a sufficient amount of sample received?	Yes No
	Did all bottle labels agree with COC?	Yes ~~No~~		Do samples have a hold time <72 hours?	Yes ~~No~~
	Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes NA		Was PM notified of discrepancies? PM: By/Time:	Yes No NA

Bottles Received "—" means preservation/chlorine checks are either N/A or are performed in the lab

250ml(A) 500ml(B) 1Liter(C) 40mlVOA(V) 125ml(D)	Checks*	Passed?	1					
Bacti $Na_2S_2O_3$	—	—						
None (P) White Cap	—	—						
Cr6 (P) Lt. Green Label/Blue Cap NH4OH(NH4)2SO4 **DW**	Cl, pH > 8	P F						
Cr6 (P) Pink Label/Blue Cap NH4OH(NH4)2SO4 **WW**	pH 9.3-9.7	P F						
Cr6 (P) Black Label/Blue Cap NH4OH(NH4)2SO4 **7199** ***24 HOUR HOLD TIME***	pH 9.0-9.5	P F						
HNO_3 (P) Red Cap or HCl (P) Purple Cap/Lt. Blue Label	—	—						
H_2SO_4 (P) or (AG) Yellow Cap/Label	pH < 2	P F						
NaOH (P) Green Cap	Cl, pH >10	P F						
NaOH + ZnAc (P)	pH > 9	P F						
Dissolved Oxygen 300ml (g)	—	—						
None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	—	—						
HCl (AG) Lt. Blue Label O&G, Diesel, **TCP**	—	—						
Ascorbic, EDTA, KH_2Ct (AG) Pink Label 525	—	—	2C					
Na_2SO_3 250mL (AG) Neon Green Label 515	—	—	1A					
$Na_2S_2O_3$ 1 Liter (Brown P) 549	—	—	1C✱					
$Na_2S_2O_3$ (AG) Blue Label 548, THM, 524	—	—	1A					
$Na_2S_2O_3$ (CG) Blue Label 504, 505, 547	—	—	7V					
$Na_2S_2O_3$ + MCAA (CG) Orange Label 531	pH < 3	P F	1V					
NH_4Cl (AG) Purple Label 552	—	—						
EDA (P) or (AG) Brown Label DBPs	—	—						
HCL (CG) 524.2,BTEX,Gas, MTBE, 8260/624	—	—	3V					
Buffer pH 4 (CG)	—	—						
H_3PO_4 (CG) Salmon Label	—	—						
Trizma – EPA 537.1 Light Blue Label **FB**	---	---						
Ammonia Acetate - EPA 533 Purple Label **FB**	—	---						
Bottled Water	—	—						
Asbestos 1L (P) w/ Foil / LL Metals Bottle	—	—						
Clear Glass	—	—						
OTHER:	—	—						

NA 3.30.23

Split

	Container	Preservative	Lot #	Initials	Date/Time	Preservation Check
S P						pH Lot #
S P						Cl Lot #

Comments

***Preservation check completed by lab performing analysis.**

✓ **Indicates Blanks Received**

504 ___ 524.2 ___ TTHM ___ 537/533 ___ TCP___

✓ **MS/MSD Received Method:** ________

Labeled by: **Labels Checked by:**

Scanned: Cen Rush/Short HT Page: ________ Time:_______

K2

BSK Associates Engineers & Laboratories

1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
[X] ~~Standard - 10 business days~~
[X] Rush (Surcharge may apply)
Date needed: 5day TAT

AGC3532 Monte6227 03/30/2023

5

*Required Fields

Temp: 1.1° #53

Company/Client Name*: Monterey Bay Analytical Services	Report Attention*: Sara Sugarman; Additional cc's: David Holland	Invoice To*: David Holland; PO#:	Phone*: 831-375-6227; Fax: 831-641-0734; E-mail*: info@mbasinc.com
Address*: 4 Justin Court, Suite D	City*: Monterey	State*: CA; Zip*: 93940	
Project: Sunny Mesa WS	Project #:	How would you like to receive your completed results?* [X] E-Mail [ ] Fax [ ] Mail	
Reporting Options: [ ] Trace (J-Flag) [ ] Swamp [ ] EDD Type:	Regulatory Carbon Copies: [ ] SWRCB (Drinking Water) [ ] Merced Co [ ] Fresno Co [ ] Madera Co [ ] Tulare Co [ ] Other:	Regulatory Compliance: [X] EDT to California SWRCB (Drinking Water); System Number*: CA2700773; [ ] Geotracker #:	
Sampler Name (Printed/Signature)*: Rafael Farfan			

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX	EPA 504	EPA 505	EPA 515	EPA 524	EPA 525	EPA 531	EPA 547	EPA 548	EPA 549
1.	Well 02	3/29/23	1350	DW	220329_34-01	X	X	X	X	X	X	X	X	X
	Please EDT (CA2700773_002_002)													

NH 3-30-23

Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
David Holland	MBAS	3/29/23	1600		
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name) N HAMMOND		3-30-23	1100	Payment Received at Delivery: Date: Amount: PIA#: Check / Cash Init.	

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier:

Cooling Method: Wet Blue None

Custody Seal: Y / N

Chilling Process Begun: Y / N

BSK Associates SR-FL-0002-24

AGC3532 Monte6227 03/31/2023

5

Sample Integrity

BSK Bottles: Yes No Page 1 of 1

COC Info

Was temperature within range? Chemistry ≤ 6°C Micro < 8°C	Yes No NA	Were correct containers and preservatives received for the tests requested?	Yes No NA
If samples were taken today, is there evidence that chilling has begun?	Yes No NA	Bubbles Present VOAs (524.2/TTHM/TCP)? TB Received? (Check Method Below)	Yes No NA / Yes No NA
Did all bottles arrive unbroken and intact?	Yes No	Was a sufficient amount of sample received?	Yes No
Did all bottle labels agree with COC?	Yes No	Do samples have a hold time <72 hours?	Yes No
Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes NA	Was PM notified of discrepancies? PM: By/Time:	Yes No NA

Bottles Received

"—" means preservation/chlorine checks are either N/A or are performed in the lab

250ml(A) 500ml(B) 1Liter(C) 40mlVOA(V) 125ml(D)	Checks*	Passed?	1					
Bacti $Na_2S_2O_3$	—	—						
None (P) White Cap	—	—						
Cr6 (P) Lt. Green Label/Blue Cap NH4OH(NH4)2SO4 **DW**	Cl, pH > 8	P F						
Cr6 (P) Pink Label/Blue Cap NH4OH(NH4)2SO4 **WW**	pH 9.3-9.7	P F						
Cr6 (P) Black Label/Blue Cap NH4OH(NH4)2SO4 **7199** ***24 HOUR HOLD TIME***	pH 9.0-9.5	P F						
HNO_3 (P) Red Cap or HCl (P) Purple Cap/Lt. Blue Label	—	—						
H_2SO_4 (P) or (AG) Yellow Cap/Label	pH < 2	P F						
NaOH (P) Green Cap	Cl, pH >10	P F						
NaOH + ZnAc (P)	pH > 9	P F						
Dissolved Oxygen 300ml (g)	—	—						
None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	—	—						
HCl (AG) Lt. Blue Label O&G, Diesel, **TCP**	—	—						
Ascorbic, EDTA, KH_2Ct (AG) Pink Label 525	—	—	2C					
Na_2SO_3 250mL (AG) Neon Green Label 515	—	—	1A					
$Na_2S_2O_3$ 1 Liter (Brown P) 549	—	—	1C*					
$Na_2S_2O_3$ (AG) Blue Label 548, THM, 524	—	—						
$Na_2S_2O_3$ (CG) Blue Label 504, 505, 547	—	—						
$Na_2S_2O_3$ + MCAA (CG) Orange Label 531	pH < 3	P F	1V					
NH_4Cl (AG) Purple Label 552	—	—						
EDA (P) or (AG) Brown Label DBPs	—	—						
HCL (CG) 524.2,BTEX,Gas, MTBE, 8260/624	—	—						
Buffer pH 4 (CG)	—	—						
H_3PO_4 (CG) Salmon Label	—	—						
Trizma – EPA 537.1 Light Blue Label **FB**	---	---						
Ammonia Acetate - EPA 533 Purple Label **FB**	—	—						
Bottled Water	—	—						
Asbestos 1L (P) w/ Foil / LL Metals Bottle	—	—						
Clear Glass	—	—						
OTHER:	—	—						

NA 3-31-23

Split

	Container	Preservative	Lot #	Initials	Date/Time
S P					
S P					

Preservation Check
pH Lot #
Cl Lot #

Comments

*Preservation check completed by lab performing analysis.

✓ **Indicates Blanks Received**

504 ___ 524.2 ___ TTHM ___ 537/533 ___ TCP___

✓ **MS/MSD Received Method:** _________

Labeled by: **Labels Checked by:**

Scanned: _________ Rush/Short HT Page: _________ Time:________

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(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
- [x] Standard - 10 business days
- [ ] Rush (Surcharge may apply)
- Date needed:

AGC3532 Monte6227 03/31/2023

5 Y

*Required Fields

Temp: 1.6° #53

Company/Client Name*: Monterey Bay Analytical Services	Report Attention*: Sara Sugarman Additional cc's: David Holland	Invoice To*: David Holland PO#:	Phone*: 831-375-6227 Fax: 831-641-0734 E-mail*: info@mbasinc.com
Address*: 4 Justin Court, Suite D	City*: Monterey	State*: CA Zip*: 93940	
Project: Sunny Mesa WS	Project #:	How would you like to receive your completed results?* [x] E-Mail [ ] Fax [ ] Mail	
Reporting Options: [ ] Trace (J-Flag) [ ] Swamp [ ] EDD Type:	Regulatory Carbon Copies: [ ] SWRCB (Drinking Water) [ ] Merced Co [ ] Fresno Co [ ] Madera Co [ ] Tulare Co [ ] Other:	Regulatory Compliance: [x] EDT to California SWRCB (Drinking Water) System Number*: CA2700773 [ ] Geotracker #:	
Sampler Name (Printed/Signature)*: Rafael Farfan			

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX	EP A504	EPA 505	EPA 515	EPA 524	EPA 525	EPA 531	EPA 547	EPA 548	EPA 549
1.	Well 02	3/29/23	1350	DW	220329_34-01	X	X	X	X	X	X	X	X	X
	Please EDT (CA2700773_002_002)													

Missing Bottles Shipment from 3/29/23 DM

NH 3-31-23

Relinquished by: (Signature and Printed Name) David Holland	Company MBAS	Date	Time 1600	Received by: (Signature and Printed Name)	Company
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name) N HAMMOND		Date 3-31-23	Time 1135	Payment Received at Delivery: Date: Amount: PIA#:	Check / Cash Init.

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: ______

Cooling Method: Wet Blue None

Custody Seal: Y / N

Chilling Process Begun: Y / N

SR-FL-0012-06

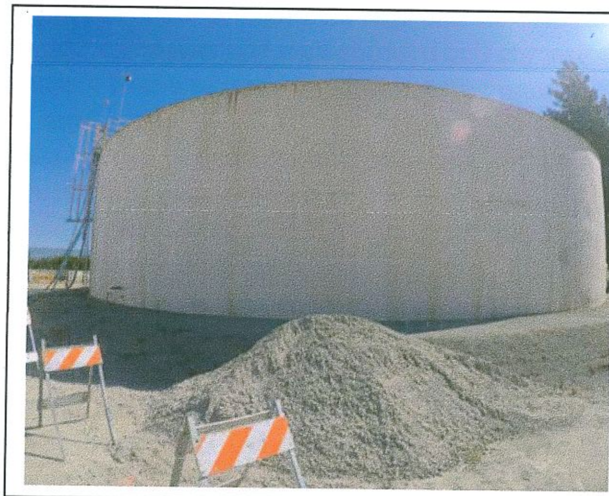
11.3. Appendix C – Pajaro Tank No. 1 Inspection Report

Inland Potable Services, Inc.

16297 E. Crestline Lane
Centennial, CO 80015
Phone: 303-400-4220
Fax: 303-400-4215

Inspection Report for

Pajaro/Sunny Mesa Community Services District
Royal Oaks, CA



600KG Steel On-Grade
Pajaro Tank

Date Completed: August 13, 2019

Commercial Dive Team:

Diver – Erik Oldenburger
Dive Controller – Devon Merrill-Cox
Tender – Brian Martin

Scope of Work:

Our team completed sediment removal using underwater vacuum equipment. Sediment averaging 1/8 inch of iron and manganese was removed from the tank floor. When the cleaning process was finished, a full visual inspection was performed of the tank interior and all interior fixtures. The team also performed a full visual inspection of the tank exterior and all attached fixtures. The details of the inspection findings are included in the report below.

Summary of the Inspection:

Exterior Inspection

1. There was good access to the tank, which is in a gated area.
2. The base of the tank was found in good condition.
3. The wall was found in good condition with minor oxidation, corrosive staining, cracking in the coating and pinholes, moderate delamination, chalking, sags and runs, and 0.03% uniform surface corrosion.
4. The overflow was found in good condition with minor oxidation, corrosive staining, blistering, cracking in the coating, pinholes, sags and runs, moderate delamination, and 0.03% uniform surface corrosion and concentrated cell corrosion.
5. The two manways were found in good condition with minor delamination, moderate chalking, sags and runs.
6. The float level indicator was found accurate, attached, and in good condition with 0.03% concentrated cell corrosion.
7. The access ladder was found secure, OSHA approved, and in good condition with minor oxidation, delamination, organic growth, sags and runs, 0.03% intergranular corrosion, and 0.1% uniform surface corrosion and concentrated cell corrosion.
8. The roof was found in good condition with minor pinholes, sags and runs, moderate oxidation and delamination, 0.03% concentrated cell corrosion, and 0.1% uniform surface corrosion and intergranular corrosion.
9. The access hatch was found locked with a gasket in place and in good condition with moderate organic growth, sags and runs, heavy oxidation and delamination, 0.1% concentrated cell corrosion, and 0.3% uniform surface corrosion.
10. The vent was found with a #24 mesh screen in place and in good condition with moderate delamination, corrosive staining, pinholes, sags and runs, heavy organic growth, 0.1% concentrated cell corrosion, and 0.3% uniform surface corrosion and intergranular corrosion.

Key
Excellent – Like new, no repairs needed
Good – Cosmetic problems, repair if utility wants
Fair – Minor problems, repairs needed
Poor – Major problems, fix now

Summary of the Inspection:

Interior Inspection

1. The interior roof was found in good to fair condition with minor sags and runs, moderate oxidation and chalking, 0.03% intergranular corrosion, 0.1% concentrated cell corrosion, and 0.3% uniform surface corrosion.
2. The ladder was found in good to fair condition with heavy delamination, sediment staining, blistering, sags and runs, 0.03% rust noduling, 0.1% intergranular corrosion, and 0.3% uniform surface corrosion.
3. The overflow was found in good to fair condition with moderate corrosive staining, blistering, sags and runs, 0.03% concentrated cell corrosion and rust noduling, and 0.1% uniform surface corrosion.
4. The interior wall was found in good condition with minor delamination, minor blistering, heavy sediment staining, and 0.03% uniform surface corrosion.
5. The tank floor was found in fair condition with moderate delamination and pinholes, heavy sediment staining, and 0.3% rust noduling with 1/32 inch pitting.
6. The two manways were found in fair condition with moderate delamination, sags and runs, heavy corrosive and sediment staining, and blistering, 0.1% concentrated cell corrosion and rust noduling with 1/16 inch pitting.
7. The inlet was found in fair condition with moderate blistering, heavy delamination, staining, sags and runs, and 0.3% rust noduling.
8. The outlet was found in good to fair condition with minor delamination and blistering, heavy sediment and corrosive staining, sags and runs, and 0.1% concentrated cell corrosion and rust noduling.
9. The float was found sealed and in good condition; however, the guidelines and cables are not properly attached.
10. The support column was found in good to fair condition with minor sags and runs, moderate delamination and blistering, moderate to heavy sediment and corrosive staining, and 0.03% uniform surface corrosion and concentrated cell corrosion.

Recommendations:

1. Install a #24 mesh screen at the opening of the overflow.
2. Reattach or replace the float cables and guidelines.
3. Schedule a blast and recoat of the interior as soon as budgets will allow. In the interim, to help extend the life of the tank, epoxy repairs can be made to the pitted areas on the floor where rust noduling and corrosion are the heaviest. (Approximately 1 day)
4. Continue to schedule time to clean and inspect every 3-5 years per AWWA recommendations.

Key

Excellent – Like new, no repairs needed
Good – Cosmetic problems, repair if utility wants
Fair – Minor problems, repairs needed
Poor – Major problems, fix now

Inland Potable Services, Inc.

Exterior Inspection Report

Foundation Condition

Foundation Exposed? Y ☐ N ☒
Anchor Bolts Present? Y ☐ N ☒
Corrosion on Anchor Bolts Present? Y ☐ N ☐ N/A ☒
Anchor Bolts Loose? Y ☐ N ☐ N/A ☒

Cracking Noted In Foundation? Y ☐ N ☐ N/A ☒
Spalling Noted? Y ☐ N ☐ N/A ☒

Summary: The base of the tank was found in good condition.

Wall Panel Condition

Coating Condition: Good
Corrosion Present? Y ☒ N ☐
Seams/Welds Condition: Good
Oxidation Present? Y ☒ N ☐
De-lamination Present? Y ☒ N ☐
Dents Present? Y ☐ N ☒
Holes Present? Y ☐ N ☒

Summary: The wall was found in good condition with minor oxidation, corrosive staining, cracking in the coating and pinholes, moderate delamination, chalking, sags and runs, and 0.03% uniform surface corrosion.

Overflow Structure Condition

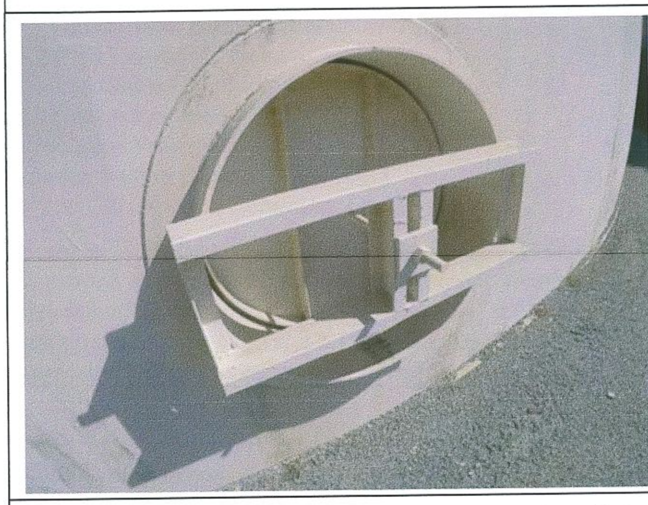
Coating Condition: Good/Fair
Corrosion Present? Y ☒ N ☐
Seams/Welds Condition: Good
Oxidation Present? Y ☒ N ☐
De-lamination Present? Y ☒ N ☐
Stand Off Supports Condition: N/A
End Cap Present? Y ☒ N ☐
Hinge And Cap Condition: Good
#24 Mesh Screen Present? Y ☐ N ☒
Condition: Good

Summary: The overflow was found in good condition with minor oxidation, corrosive staining, blistering, cracking in the coating, pinholes, sags and runs, moderate delamination, and 0.03% uniform surface corrosion and concentrated cell corrosion.

Manway Condition

Coating Condition: Both Good
Weld/Seam Condition: Both Good
Corrosion Present? Y ☐ N ☒
Oxidation Present? Y ☐ N ☐
De-lamination Present? Y ☒ N ☐

Summary: The two manways were found in good condition with minor delamination, moderate chalking, sags and runs.



Water Level Indicator Condition

Marker Condition: Good
  Attached & Accurate? Y ☒ N ☐
Marker Board Condition: Good
  Is level reading visible? Y ☒ N ☐
Pulley Condition: Good
  Attached Properly? Y ☒ N ☐
Cable Condition: Good
  Attached Properly? Y ☒ N ☐
Hardware Condition: Good
Corrosion Present? Y ☒ N ☐

Summary: The float level indicator was found accurate, attached, and in good condition with 0.03% concentrated cell corrosion.

Access Ladder Condition

Ladder Type: Steel
Is Ladder and Safety Climb **OSHA** Approved? Y ☒ N ☐
Is Vandal Guard Present? Y ☒ N ☐
Locked? Y ☒ N ☐
Safety Climb Type: Cage
Safety Climb Condition: Good
Is Top Of Tank Easily Accessible? Y ☒ N ☐
Coating Condition: Good
Seams/Welds Condition: Good
Corrosion Present? Y ☒ N ☐
Oxidation Present? Y ☒ N ☐
De-lamination Present? Y ☒ N ☐
Stand Off Supports Condition: Good

Summary: The access ladder was found secure, OSHA approved, and in good condition with minor oxidation, delamination, organic growth, sags and runs, 0.03% intergranular corrosion, and 0.1% uniform surface corrosion and concentrated cell corrosion.

Roof Condition

Roof Type: Pitched
Coating Condition: Good/Fair
Seams/Welds Condition: Good
Corrosion Present? Y ☒ N ☐
Oxidation Present? Y ☒ N ☐
De-lamination Present? Y ☒ N ☐
Low Spots Present? Y ☒ N ☐
Holes in Roof? Y ☐ N ☒
Cathodic Protection Plates Present? Y ☐ N ☒
Sealed Edges: Y ☐ N ☐ N/A ☒
Loose Plates? Y ☐ N ☐ N/A ☒
Missing Plates? Y ☐ N ☐ N/A ☒

Summary: The roof was found in good condition with minor pinholes, sags and runs, moderate oxidation and delamination, 0.03% concentrated cell corrosion, and 0.1% uniform surface corrosion and intergranular corrosion.

Access Hatch Condition

Coating Condition: Good
Seams/Welds Condition: Good
Corrosion Present: Y ☒ N ☐
Oxidation Present? Y ☒ N ☐
De-lamination Present? Y ☒ N ☐
Hatch Size: 2.5 foot square
Riser Height: 4 inches Lid Height: 2 inches
Hatch Locked? Y ☒ N ☐
Hinge Condition: Good
Gasket Present? Y ☒ N ☐
Intact? Y ☒ N ☐ N/A ☐
Insects, Dirt Or Debris Present Under Hatch? Y ☒ N ☐

Summary: The access hatch was found locked with a gasket in place and in good condition with moderate organic growth, sags and runs, heavy oxidation and delamination, 0.1% concentrated cell corrosion, and 0.3% uniform surface corrosion.

Vent Condition	
Coating Condition: Good/Fair Seams/Welds Condition: Good Corrosion Present: Y ☒ N ☐ Oxidation Present? Y ☐ N ☒ De-lamination Present? Y ☒ N ☐ #24 Mesh Screen in Place? Y ☒ N ☐ Condition: Good Height of screen from roof: 0 inches All Openings Sealed? Y ☒ N ☐ Cap Condition: Good Summary: The vent was found with a #24 mesh screen in place and in good condition with moderate delamination, corrosive staining, pinholes, sags and runs, heavy organic growth, 0.1% concentrated cell corrosion, and 0.3% uniform surface corrosion and intergranular corrosion.	

Inland Potable Services, Inc.

Interior Inspection Report

Roof Condition

Coating Condition: Good
Welds/seam Condition: Good
Corrosion Present On Panels? Y ☒ N ☐
Metal De-alloying Noted? Y ☐ N ☒
Oxidation Present? Y ☒ N ☐
De-lamination Present? Y ☐ N ☒

Summary: The interior roof was found in good to fair condition with minor sags and runs, moderate oxidation and chalking, 0.03% intergranular corrosion, 0.1% concentrated cell corrosion, and 0.3% uniform surface corrosion.

Ladder Condition

Ladder Location: 12 o'clock
Coating Condition: Good
Weld/Seam Condition: Good
Supports Condition: Good
Corrosion Present? Y ☒ N ☐
Oxidation Present? Y ☐ N ☒
De-lamination Present? Y ☒ N ☐

Summary: The ladder was found in good to fair condition with heavy delamination, sediment staining, blistering, sags and runs, 0.03% rust noduling, 0.1% intergranular corrosion, and 0.3% uniform surface corrosion.

Overflow Condition

Overflow Location: 10 o'clock
Coating Condition: Good
Weld/Seam Condition: Good
Corrosion Present? Y ☒ N ☐
Oxidation Present? Y ☐ N ☒
De-lamination Present? Y ☐ N ☒

Summary: The overflow was found in good to fair condition with moderate corrosive staining, blistering, sags and runs, 0.03% concentrated cell corrosion and rust noduling, and 0.1% uniform surface corrosion.

Wall Panel Condition	
Coating Condition: Good Welds/seam Condition: Good Corrosion Present On Panel? Y ☒ N ☐ Oxidation Present? Y ☐ N ☒ De-lamination Present? Y ☒ N ☐ Is Biofilm Present? Y ☐ N ☒ Any irregularities or structural deficiencies? Y ☐ N ☒ Summary: The interior wall was found in good condition with minor delamination, minor blistering, heavy sediment staining, and 0.03% uniform surface corrosion.	

Floor Condition	
Coating Condition: Good Welds/seam Condition: Good Corrosion Present? Y ☒ N ☐ Oxidation Present? Y ☐ N ☒ De-lamination Present? Y ☒ N ☐ Any irregularities or structural deficiencies? Y ☐ N ☒ Summary: The tank floor was found in fair condition with moderate delamination and pinholes, heavy sediment staining, and 0.3% rust noduling with 1/32 inch pitting.	

Manway Condition	
Manway Location(s): 3 & 9 o'clock Coating Condition: Both Good/Fair Weld/Seam Condition: Both Good Corrosion Present? Y ☒ N ☐ Oxidation Present? Y ☐ N ☒ De-lamination Present? Y ☒ N ☐	Summary: The two manways were found in fair condition with moderate delamination, sags and runs, heavy corrosive and sediment staining, and blistering, 0.1% concentrated cell corrosion and rust noduling with 1/16 inch pitting.
	

Inlet and Outlet Condition

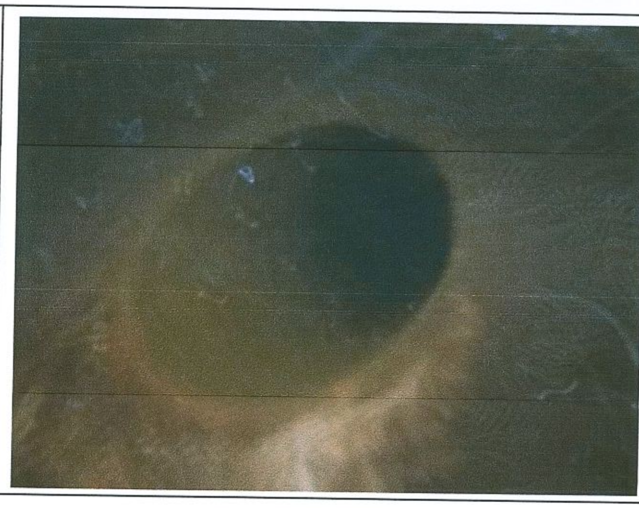
Common Inlet/Outlet? Y ☐ N ☒ Location: N/A
If No:
Outlet Location: 11:30 o'clock
Inlet Location: 4 o'clock
Coating Condition: Good
Weld/Seam Condition: Good
Corrosion Present? Y ☒ N ☐
Oxidation Present? Y ☐ N ☒
De-lamination Present? Y ☒ N ☐

Summary: The inlet was found in fair condition with moderate blistering, heavy delamination, staining, sags and runs, and 0.3% rust noduling.

Outlet Condition

Common Inlet/Outlet? Y ☐ N ☒ Location: N/A
If No:
Outlet Location: 11:30 o'clock
Coating Condition: Good
Weld/Seam Condition: Good
Corrosion Present? Y ☒ N ☐
Oxidation Present? Y ☐ N ☒
De-lamination Present? Y ☒ N ☐

Summary: The outlet was found in good to fair condition with minor delamination and blistering, heavy sediment and corrosive staining, sags and runs, and 0.1% concentrated cell corrosion and rust noduling.



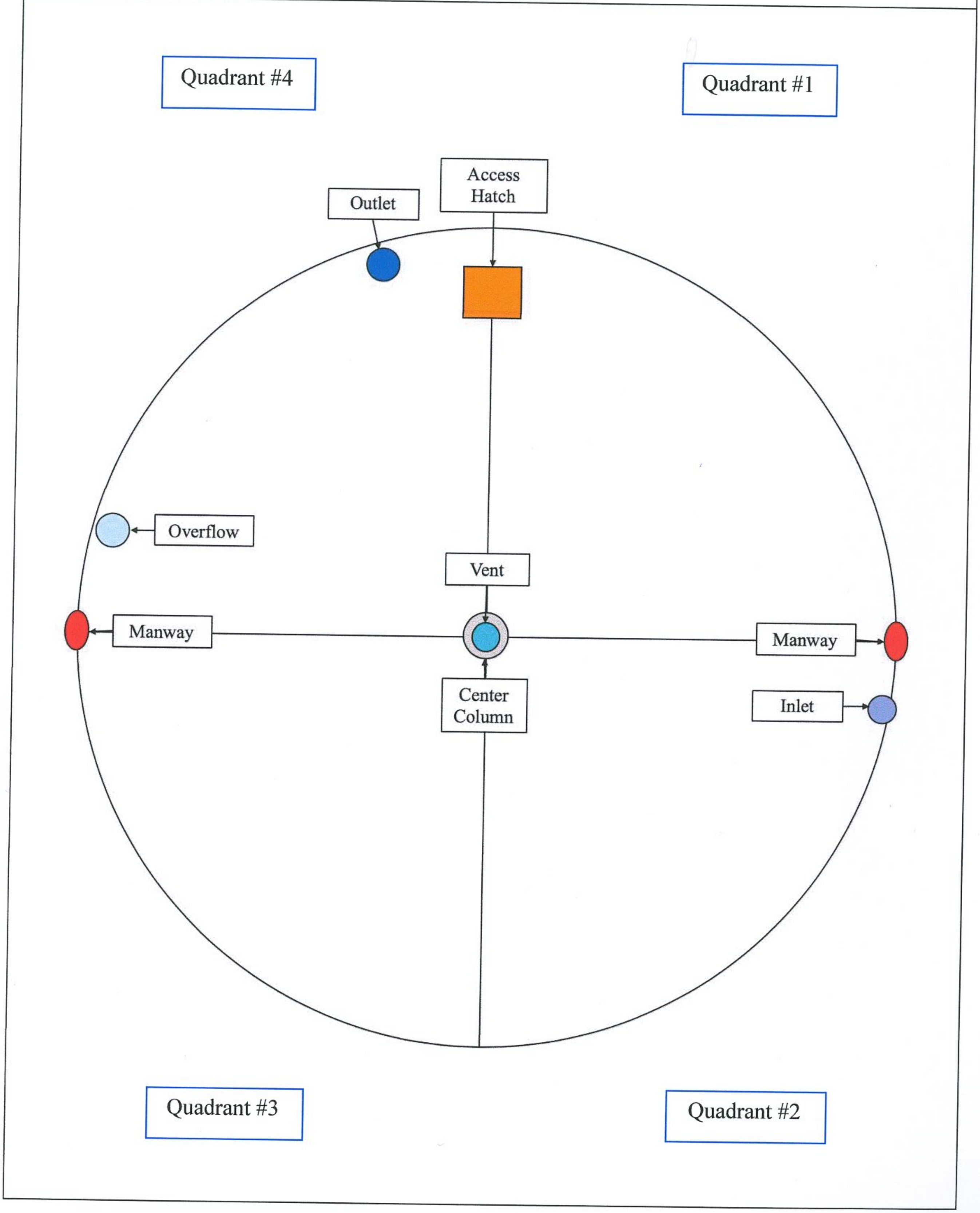
Float Condition

Float Condition: Good
Float Sealed? Y ☒ N ☐
Guidelines Condition: Good
Attached Properly? Y ☐ N ☒
Cable Condition: Good
Attached Properly? Y ☐ N ☒
Hardware Condition: Good
Corrosion Present? Y ☒ N ☐
Percentage: 0.1%

Summary: The float was found sealed and in good condition; however, the guidelines and cables are not properly attached.

Support Column Condition	
Number of Columns: 1 Coating Condition: Good Welds/seam Condition: Good Corrosion Present? Y ☒ N ☐ Oxidation Present? Y ☐ N ☒ De-lamination Present? Y ☒ N ☐	Summary: The support column was found in good to fair condition with minor sags and runs, moderate delamination and blistering, moderate to heavy sediment and corrosive staining, and 0.03% uniform surface corrosion and concentrated cell corrosion.
	

Tank Layout



Quadrant #4
Quadrant #1
Outlet
Access Hatch
Overflow
Vent
Manway
Manway
Center Column
Inlet
Quadrant #3
Quadrant #2

11.4. Appendix D – Environmental Constraints Analysis

Denise Duffy & Associates, Inc.

PLANNING AND ENVIRONMENTAL CONSULTING

Memorandum

To: Nick Panofsky, PE, MNS Engineers, Inc.
Brian Snow, PE, MNS Engineers, Inc.

From: Conor O'Toole, Associate Planner
Denise Duffy, Principal

Date: November 3, 2023

Subject: North of Moss Landing Regional Consolidation Project – Preliminary Environmental Constraints Memorandum

I. INTRODUCTION

The purpose of the memorandum is to provide guidance to Pajaro Sunny Mesa Community Services District (PSMCSD or District) in determining the Preliminary Environmental Constraints for the North of Moss Landing Water System Consolidation Project (Proposed Project). This memorandum is intended to be supplemental to the preliminary engineering report prepared by the project's engineers, MNS Engineers, Inc. (MNS), for the Proposed Project.

Purpose of Preliminary Environmental Constraints

The purpose of this technical memo is to document the general environmental constraints associated with implementation of the Proposed Project, including known sensitive resources such as land uses, air quality, agricultural lands, waterways, biological resources, and cultural resources. A feasibility study will be submitted to the State Water Resources Control Board (SWRCB) Division of Financial Assistance (DFA) and the Community Water Center (CWC) to support a potential consolidation project and initiate a planning and construction application. DFA administers the implementation of the SWRCB's financial assistance programs, which include loan and grant funding for the construction of municipal water projects such as the Proposed Project. Many of the funding sources of these financial assistance programs are distributed from federal funding sources.

Project Background

The Moss Landing and Pajaro communities are rural, low-density residential areas located north of Moss Landing and south of Watsonville in unincorporated Monterey County (County). Land uses consist mainly of agricultural parcels, residential parcels, State Highways, and County rights-of-way. Water service in the study area is provided by three public water systems owned and operated by the District, including the Pajaro Water System (PWS), the Sunny Mesa Water System (SMWS), and the Springfield Water System (SWS), as well as the North of Moss Landing (NOML) areas not currently served by the District or other centralized water purveyor. The NOML area contains 88 identified households with 34 houses sourcing water from two state regulated small water systems and five locally regulated small water systems; and 54 individual households reliant on private domestic wells. The existing distribution system is shown in **Figure 1. Project Location.**

The Proposed Project is needed to address long-standing contamination issues within the wells within the North of Moss Landing area. These water sources have extensive quality, sustainability, and reliability issues. Specifically, many of the wells in the NOML area have elevated levels of multiple contaminants including nitrate and 123-tri-chloro-propane (123 TCP), and three of the small water systems are currently out of compliance for exceeding arsenic and/or nitrate maximum contaminant level (MCL). Due to the proximity of these wells to the Pacific Ocean, they are also highly susceptible to seawater intrusion. Therefore, water quality issues and subsequent compliance orders from exceedance of MCLs have necessitated the evaluation of potential solutions to contamination issues.

Per MNS, prior work to study the NOML area and surrounding water systems considered several alternatives. These alternatives include a physical consolidation with the SWS; a regional physical consolidation with the PWS, SMWS, and SWS; creation of a new community water system; replacement of existing domestic wells; wellhead treatment; and point of use/point of entry treatment.

Proposed Project

Based on the previous analyses and considerations done by MNS and others, the Proposed Project consists of a regional consolidation to provide water service to the NOML area. A regional consolidation was selected due to lower capital costs, equivalent ongoing cost, and the increased reliability and sustainability of a consolidation with a public agency that has the technical, managerial, and financial (TMF) capacity to operate and maintain a consolidated system. The regional consolidation will create a new public water system. The PWS, SMWS, and SWS will cease to exist, with each of the service areas being designated as separate pressure zones within the new water system. The consolidated system will be owned and operated by PSMCSD with existing staff.

The consolidation relies on existing infrastructure within the PWS, SMWS, and SWS, with additional infrastructure to interconnect the systems and to provide service to the NOML area. Required project elements to achieve the consolidation include:

- Iron/Manganese Water Treatment Plant at Pajaro Well No. 1.
- Approximately 12 Miles of transmission and distribution pipelines including associated appurtenances such as valves, fire hydrants, blow off valves, air release valves, and water sampling stations.
- Service connections to 88 existing residences in the North of Moss Landing Area.
- One Transmission Booster Pump Station.
- Water Storage Facility for the Bluff/Jensen Zone, with chemical dosing facilities and a booster pump station to maintain pressure in the Bluff/Jensen Zone.
- Modifications to the existing PWS which include fill modifications to the PWS storage tanks and rehabilitation of one of the PWS's 600,000-gallon storage tanks.
- Abandonment of excess infrastructure in the North of Moss Landing Area.
- Destruction of Existing Sunny Mesa Wells Nos. 1 and 2.
- Replacement of water meters in the PWS and SMWS to radio read meters.

Figure 1 shows the project location within northern Monterey County and **Figure 2a and Figure 2b** show the various project components associated with the NOML Consolidation Project. More specifically, additional transmission mains will interconnect the SMWS with the Bluff/Jensen area and the SWS in the south. These transmission pipelines will provide water to a new water storage and pumping facility in the Bluff/Jensen Zone and convey water to the SWS. A new distribution network in the Bluff/Jensen Zone, and an expansion of the SWS distribution system will provide service to the NOML area. An iron and manganese treatment plant at the

PSMCSD's Pajaro Well No. 1 site will be constructed. The treatment plant will consist of electrical upgrades, pressure filter treatment vessels, piping, valves and appurtenances, and other improvements to form a secure municipal site. Hardening existing facilities and installing new elevated facilities will occur to protect against loss of service due to flooding. A more detailed description of the Proposed Project is included in **Section 6. Selected Project** of the Preliminary Engineering Report for the North of Moss Landing Water System Consolidation Project prepared by MNS.

Project Impact

As shown on **Figure 2a** and **Figure 2b** the Proposed Project is primarily located within agricultural parcels, residential parcels, industrial parcels, County rights-of-way, and State Route 1. Construction of the Proposed Project would be primarily within the existing right-of-way and is expected to require use of both trenched and trenchless installation The use of trenchless installation for the entirety of the replacement pipeline may be difficult to accomplish given long runs, existing utilities, and non-direct pathways. Trenched installation would involve cutting of surface features such as concrete, digging a pipe trench, laying pipe, backfilling, and restoring the surface features. Staging of construction equipment would occur along roadways and not create additional impacts.

A total of approximately 12 miles[1] (approximately 63,000 linear feet) of pipeline would be installed. Additionally, a new water treatment facility would be constructed at the existing Pajaro Well No. 1 and include service connections to 88 existing residences within the NOML project area, installation of one booster pump station, rehabilitation of the existing PWS storage tanks, and the abandonment of infrastructure within the PWS. All impacts would be within the limits shown on **Figure 2a** and **Figure 2b.**

Regulatory Context

The preliminary analysis included in this technical memo is intended to support early planning efforts and is not intended to represent a level of analysis that will be required under the California Environmental Quality Act (CEQA). CEQA requires that state and local government agencies consider the environmental consequences of projects over which they have discretionary authority before taking action on those projects (Public Resources Code [PRC] 21000 et seq.). Future planning and/or construction of individual projects may be undertaken and would be subject to the required CEQA compliance process. It is expected that a Draft Initial Study/Mitigated Negative Declaration (IS/MND) would be the appropriate level of CEQA documentation for the Proposed Project; however, that will be confirmed after more refined project mapping of project components at the next stage of the project review. Issues that will be analyzed in the IS/MND would include aesthetics, agriculture and forest resources, air quality, biological resources, cultural resources, geology/soils, greenhouse gas emissions, hazards/hazardous materials, hydrology/water quality, land use/planning, mineral resources, noise, population/housing, public services, recreation, transportation/traffic, and utility/service systems.

[1] Since the preparation of the Preliminary Environmental Constraints Analysis, a portion of the proposed pipeline alignment for the North of Moss Landing Regional Consolidation Project was proposed as an option to provide service connections to two additional residences. This change to the pipeline alignment would require additional pipeline. This additional pipeline would extend the alignment along Struve Road and an existing agricultural road to the south and will require revisions to the biological constraints analysis and the cultural resources report. Further analyses to confirm these assumptions would be completed at the time of the preparation of the CEQA document.

Future Environmental Considerations

PSMCSD would be considered the "Lead Agency" under CEQA for environmental review. Since the consolidation project would be provided funding through the Clean Water State Revolving Fund (CWSRF) Program which is partially funded by the U.S. Environmental Protection Agency (EPA), the Proposed Project must comply with both CEQA and the federal cross-cutting regulations to address National Environmental Policy Act (NEPA). The SWRCB would act as Responsible Agency and will act on behalf of EPA to review and consider the environmental documents before approving financing. Completion of the CEQA document is required to complete the required Environmental Package under the CWSRF Program, which requires consultation with relevant federal agencies on the following federal environmental regulations, if applicable to the project: Clean Air Act, Coastal Zone Management Act, ESA (Endangered Species Act), Floodplain Management, Migratory Bird Treaty Act, National Historic Preservation Act, Protection of Wetlands, and Safe Drinking Water Act.

II. CONSIDERATION OF PRELIMINARY ENVIRONMENTAL CONSTRAINTS

Approach

To identify the general environmental constraints associated with implementation of the Proposed Project, DD&A's environmental specialists reviewed existing published sources such as the Monterey County General Plan and zoning for the project area, available GIS data from the County, as well as available data and aerial mapping provided by MNS. In addition, the potential for special-status species known to occur and/or having the potential to occur in the study area was evaluated using data from the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), California Natural Diversity Database (CNDDB), and the California Native Plant Society (CNPS) database. A desktop survey approach was used, and field reconnaissance surveys were not undertaken at this time. DD&A evaluated the study area identified in **Figure 1** which includes the proposed locations of the water system improvements and the extent of the Proposed Project.

The following discussion evaluates areas of known resources for the Proposed Project. DD&A coordinated with the project engineering team (MNS) to understand the potential impact areas within the project site. The following early evaluation of environmental constraints is based on the above approach as well as the understanding of the project impact areas as identified in **Figure 2a** and **Figure 2b.**

The discussion focuses on key resource areas and does not consider all topical areas of the CEQA Checklist under Appendix G.

Biological Resources

Published occurrence data within the project site and surrounding quadrangles were evaluated to compile a table of special-status species known to occur in the vicinity of the project site. Each of these species was evaluated for their likelihood to occur within and immediately adjacent to the project site (see **Attachment A**). The special-status species that are known to or have been determined to have a moderate or high potential to occur within or immediately adjacent to the project site are listed below. For a full discussion of species with potential to occur within the project site, see **Attachment A**.

Special-Status Plants

No special-status plant species are known to occur within the project site. However, based on the presence of potentially suitable habitat, known plant species range, and known occurrences in the vicinity several special-status plant species have a moderate potential to occur within the vicinity of the project site. If present within the site, construction of the project may result in loss of individuals and/or habitat for these species. Detailed habitat mapping would be required to confirm suitable habitat is present for species identified in **Attachment A**. Subsequently, a focused survey during the appropriate blooming period for the species with suitable habitat would be necessary to identify their presence/absence within proposed development areas and facilitate an impact analysis sufficient for the CEQA process.

Special-Status Wildlife

Federal and State-Listed Amphibians

The California tiger salamander, California red-legged frog, and Santa Cruz long-toes salamander are assumed to be present throughout the project site due to the presence of suitable habitat, known species range, and known occurrences in the area. Further analysis of the potential for these species to occur, such as detailed habitat assessments or protocol-level surveys, are not recommended for the California tiger salamander, California red-legged frog, and Santa Cruz long-toes salamander as it is unlikely that these analyses would change the outcome of the assumed presence of these species.

Fish

Additionally, the Tidewater goby and Monterey hitch are fish species whose assumed presence is adjacent to the Pajaro River, which is suitable habitat for these special-status wildlife species. In addition, the Pajaro River is designated critical habitat for South-Central California Coast Steelhead and this species may also occur in the river.

Nesting Raptors and Other Protected Avian Species

Raptors, their nests, and other nesting birds are protected under the California Fish and Game Code. While the life histories of these species vary, overlapping nesting and foraging similarities allow for their concurrent discussion. Most raptors are breeding residents throughout much of the wooded portions of the state. Stands of live oak, riparian deciduous, or other forest habitats, as well as open grasslands, are used most frequently for nesting. Breeding occurs February through September, with peak activity occurring May through July. Prey for these species include small birds, small mammals, and some reptiles and amphibians. Many raptor species hunt in open woodland and habitat edges. Various species of raptors and other nesting birds have the potential to nest within any of the large trees present within and adjacent to the project site.

Protected Trees

The County regulates the removal or damage of oak trees within both the North County Coastal and North County Inland Land Use Plans, including the project site. Removal of oak trees would require a tree removal permit from the County. Removal of more than three oak trees would also require a forest management plan. A biological survey would be required to determine if any protected oak trees are present within the project site.

Western Bumblebee

The grassland areas within the project vicinity have the potential to support Crotch's bumble bee and Western bumble bee (candidates for listing under California Endangered Species Act). A habitat assessment to determine the presence/absence of sufficient flowering resources would be recommended to determine whether candidate bumble bees would be impacted by the project.

Smith's Blue Butterly
The dune scrub and scrub and chaparral habitats within the project vicinity may provide suitable habitat for Smith's blue butterfly (listed as endangered under federal Endangered Species Act). Surveys to determine the presence of the host plants are recommended to determine if this species has the potential to occur within or immediately adjacent to the project site.

Bats
The Highway 1 overpass may provide suitable night roost habitat for special status bat species, including pallid bat and Townsend's big-eared bat. If night work in this area cannot be avoided, then pre-construction surveys by a bat specialist would be necessary to determine the presence/absence of these species.

Conclusion

Special-status species, including California tiger salamander, California red-legged frog, and Santa Cruz long-toes salamander, and other raptors and nesting birds, have the potential to occur within and adjacent to the project site. Protected plant species such as oak trees may also occur within the project site. Some species would require the acquisition of Incidental Take Permits from the USFWS and CDFW and other impacts could be mitigated by installation of Best Management Practices (BMPs) or mitigation measures. For species where presence is unknown, reconnaissance-level biological surveys would be required to determine if suitable habitat conditions to support these resources are present within the site. Additionally, protocol level biological surveys would be required for special-status plant species to confirm the assumptions of the Biological Constraints Analysis. These surveys would be conducted prior to the finalization of the CEQA document.

<u>Aesthetics</u>

Most of the proposed project site is within agricultural parcels, residential parcels, industrial parcels, County rights-of-way, and State Route 1. Impacts related to aesthetics include the substantial degradation of the existing visual character or quality of public views of the site and its surroundings. Improvements associated with the Proposed Project would not substantially degrade the existing visual character or quality of public views of the site. Most of the improvements would include the installation of below-grade pipelines with some improvements on agricultural and industrial parcels that include booster pump stations and water treatment facilities adjacent to existing water supply infrastructure. This above-grade development would be consistent with existing uses and not substantially degrade the existing visual character or quality of public views. These assumptions would be analyzed further in the future CEQA documentation.

<u>Agricultural Lands</u>

In accordance with CEQA Appendix G: "In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board."

Development of the Proposed Project would not result in the conversion of Prime Farmland to non-agricultural use. The Proposed Project would not conflict with any Williamson Act contract and is located primarily within existing roadways and surrounded by agricultural land. The Proposed Project would not affect nearby agricultural land as construction would occur within roadways. Future CEQA evaluation will be conducted to address agricultural and farmlands per Appendix G, as noted above. The project site is not designated as forestland or in an area for timberland production.

Air Quality/GHG

The proposed project site is located within the North Central Coast Air Basin (NCCAB) and within the jurisdiction of the Monterey Bay Air Resources District (MBARD). Air Quality in the region is affected by its topography, meteorology, and climate. The NCCAB encompasses Santa Cruz, San Benito, and Monterey counties. The NCCAB is bordered by the Pacific Ocean to the west, the San Francisco Bay Area Air Basin (SFBAAB) to the north, the San Joaquin Valley Air Basin to the east, and the South-Central Coast Air Basin to the south. Onshore sea breezes dominate regional wind patterns, bringing fog and cool air into the coastal valleys during the summer months. In the fall, winds generally slow or reverse direction toward the sea. In the winter, the Pacific high-pressure system moves south and has less influence on the NCCAB. In general, mild annual temperatures dominate in the maritime and coastal areas, and the interior and valley areas experience warmer summers and cooler winters.

Primary criteria pollutants are emitted directly from a source (e.g., vehicle tailpipe, an exhaust stack of a factory, etc.) into the atmosphere. Primary criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), fine particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2) and lead (Pb). Ozone is considered a secondary criteria pollutant because it is created by atmospheric chemical and photochemical reactions between volatile organic compounds (VOC) and nitrogen oxides (NO_x). The proposed project would generate emissions of CO, PM_{10}, $PM_{2.5}$, and SO_2 as well as ozone precursors VOC and NO_x (including NO_2) during construction and operation. These pollutants can have adverse impacts on human health at certain levels of exposure.

The MBARD is the agency primarily responsible for ensuring that National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) are not exceeded. MBARD also ensures that air quality conditions are maintained in the North Central Coast Air Basin (NCCAB), within which the project is located. The Proposed Project would be required to address the potential for exceedance of thresholds established by the published standards for both construction and post-construction impacts but would not be expected to exceed established thresholds. Further modeling and analysis would be required for a future CEQA document.

Cultural Resources

A cultural assessment was prepared by Achasta Archaeological Services (Achasta) to determine whether any previously recorded archaeological resources are present in the Project area that may be affected by the Proposed Project, and to provide preliminary recommendations about their potential significance using the criteria for eligibility for listing on the California Register of Historical Resources (CRHR) pursuant to CEQA Section 15064.5. An archival record search was conducted by staff of the California Historical Resources Information System (CHRIS), Northwest Information Center (NWIC) at Sonoma State University to identify potentially significant archaeological resources that could be impacted by the Project design (File no. 23-0135). The NWIC reported three previously recorded resources, including one Precontact, one historic, and one built environment resource, identified within the Project area of potential effect (APE). Twelve additional resources, including two precontact, two historic, seven built environment, and one isolate, were reported within 750-feet (ft) of the Project APE. In addition to the archival record search, on October 13, 2023, Achasta conducted a Phase I survey of the Project APE. Although no resources or site indicators were observed during the field assessment, portions of the Project APE are considered highly sensitive due to its location within and adjacent to Precontact resources containing mortuary components.

California Assembly Bill 52 (AB 52) addresses requirements and the process for tribal cultural resources to be considered under CEQA. Tribal cultural resources may include sites, features, places, cultural landscapes, sacred places, or objects with cultural value to a California Native American tribe that are listed or determined to be eligible for listing in the CRHR, included in a local register of historical resources, or a resource determined by the lead CEQA agency, in its discretion and supported by substantial evidence, to be significant and eligible for listing on the CRHR. AB 52 requires that the lead CEQA agency consult with California Native American tribes that have requested consultation for projects that may affect tribal cultural resources. The PSMCSD, as lead CEQA agency, will initiate consultation with participating Native American tribes prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report. Under AB 52, a project that has the potential to cause a substantial adverse change to a tribal cultural resource constitutes a significant effect on the environment unless mitigation reduces such effects to a less than significant level.

Because of the positive results of the Phase 1 Archaeological Assessment, a more detailed description of the cultural resources and mitigation measures will be addressed as part of the CEQA document, including required tribal consultation. The Phase 1 Archaeological Assessment cover page is included as **Attachment B;** due to the confidential nature of the report, the full report is transmitted under separate cover, with note that it is not for public distribution.

Groundwater

Appendix G of the CEQA checklist includes the Hydrology and Water Quality section that analyzes a project's impacts to groundwater resources within a groundwater basin. The proposed project is located within the Pajaro Valley Groundwater Basin (PVGB) managed by Pajaro Valley Water Management Agency (PVWMA). The primary aquifers within the PVGB include water-bearing portions of the deeper Purisima Formation, the Aromas Red Sands Formation, and the uppermost terrace, alluvium, and dune deposits. The PVWMA is charged with the management of existing and supplemental water supplies in the Pajaro Valley Groundwater Basin, which is in an overdraft condition as defined by the California Sustainable Groundwater Management Act (SGMA). The overdraft condition of the PVGB led to extensive seawater intrusion within the upper Aromas Red Sands and the alluvial aquifers of the PVGB (Balance Hydrologics, 2018). However, efforts to reverse seawater intrusion through reduced pumping have shown some success by slowing or stopping the advancement of seawater[2].

Further analysis would be conducted during the CEQA document preparation phase of the Proposed Project. The existing water systems in the area of the Proposed Project already use groundwater resources and no additional connections would be constructed as part of the Proposed Project. The Proposed Project would consolidate existing water systems and change the location where groundwater is pumped. Therefore, it is not anticipated that the Proposed Project would result in significant impacts to groundwater resources, though it is

[2] Source: Project Alternatives for the Area North of Moss Landing, Kyle Groundwater, March 2021

important to note existing issues related to seawater intrusion. No additional wells would be constructed and no additional groundwater would be pumped from the PVGB. These assumptions would be confirmed during the preparation of the CEQA document.

Flood Hazards

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues flood insurance rate maps for communities participating in the NFIP. These maps delineate flood hazard zones in the community. Based on a review of the available flood insurance maps for the project area, small portions of the project area to the south and west are located within FEMA Flood Zone A or AE (shaded)[3]. Additionally, a majority of the portion of the project areas to the north along Salinas Road are within FEMA Flood Zone AE (shaded), which means these areas are within the floodplain of a 100-year and 500-year flood event. Most of the project area is located within Flood Zone X (unshaded) and is considered to be of low risk for flooding. Flood Zone X is described as an area of minimal flood hazard outside of the 500-year flood area and protected by levees from 100-year flood events. Because components of the Proposed Project are within the 100-year floodplain, environmental constraints related to flood hazards may come up for those specific areas. These components include the Springfield distribution expansion along Springfield Road, the western portion of the Bluff-Jensen expansion, and the northernmost components of the NOML transmission components. The flood hazard constraints related to these components of the Proposed Project would be confirmed as part of the future CEQA documentation for the Proposed Project.

Land Use/Regulatory

The Proposed Project is subject to the following policy documents: Monterey County General Plan; North County Land Use Plan; Monterey County Coastal Implementation Plan Part 2; and Monterey County Zoning Ordinance (Title 20). The Proposed Project would include improvements to the Springfield Water System; most of the project area is located within the North County Coastal Land Use Plan and designated as Agricultural Conservation, Agricultural Preservation, and Wetlands and Coastal Strand. The northernmost project components are located within the North County Inland Land Use Plan and designated as Resource Conservation, Farmlands, and Industrial. The project area is currently utilized primarily for agricultural uses with minor industrial uses near the northernmost portions. The project area is surrounded by agricultural uses in all directions with some low-density residential and medium-density residential uses near the intersection of Salinas Road and Elkhorn Road, and in the communities of Pajaro and Sunny Mesa.

Implementation of the Proposed Project would not be likely to interfere with the existing land uses within the project area. Most of the work associated with the Proposed Project would occur within the public-right-of-way and other disturbed areas. In addition, implementation of the Proposed Project would not result in conflicts with the General Plan or Zoning designations of the project area. Public utility uses and accessory structures are allowed in this area subject to a Coastal Development Permit. Therefore, the proposed development would likely be considered an allowed use. As a result, the Proposed Project is not anticipated to encounter major regulatory constraints with respect to land use regulations and allowable uses. This conclusion would be

[3] https://gis.bam.water.ca.gov/bam/#leftSliderContainer

confirmed as part of the future CEQA documentation for the Proposed Project. Additionally, future CEQA analysis would review potential for growth inducement impacts from implementation of the Proposed Project.

III. CONCLUSIONS

As noted previously, the preliminary analysis included in this technical memo is intended to support early planning efforts and to identify the general environmental constraints associated with implementation of the Proposed Project under consideration at this time. As described above, potential constraints associated with the Proposed Project include disturbance of nesting raptors and other avian species, impacts to special-status species, including California tiger salamander, California red-legged frog, and Santa Cruz long-toes salamander, and other potentially sensitive animal species as well as protected oak trees. Additionally, the Proposed Project is located in an area of high archaeological sensitivity and portions of the Proposed Project are located within the 100-year flood plain. Last, the Proposed Project has the possibility to come across archaeological resources as a result of ground disturbing activities. The Proposed Project is not expected to encounter significant constraints related to impacts to aesthetics, agricultural lands, air quality and greenhouse gas emissions, or land use. To confirm the conclusions made in this constraints analysis, a more detailed environmental review will be required throughout the planning process.

Table 1. Summary of Environmental Permitting Requirements

Environmental Issue Area	Permit/Study Potentially Required	Estimated Cost	Estimate Timeline
Regulatory Biological Permitting	Federal Biological Assessment (BA)	~$10k	~10 weeks
	Botanical surveys	$5k - $6k	April-May
	Focused surveys for special-status wildlife species	$6k - $10k per species, estimated up to $20k total*	Dependent on species and survey protocol timing
	Endangered Species Act (ESA) Section 7 consultation with USFWS for federally listed species	$8k - $10k	4 – 6 months
	CFGC Section 2081 Consultation with CDFW for state-listed plants and wildlife (Incidental Take Permit)	$25k (additional $7,500 - $43,770 fee, dependent on total cost to implement project and complexity)	~12 months
	Compensatory Mitigation Plan	$5k - $10k	4 – 6 months (linked to 2081 ITP)
	Pre-construction surveys and construction monitoring	Estimated at 20 - 25 days, for a total of ~$20k – $25k for areas of sensitive habitat	Prior to initiation of construction activities and within and/or adjacent to sensitive habitat

Jurisdictional Resources Permitting	Wetland Delineation	~$5k – $6k	~6 – 8 weeks, can be conducted concurrently with BA
	USACE Section 404 Permit with Section 7 Consultation	$5k - $8k	6 – 9 months
	CDFW Notification of Lake/Streambed Alteration	$6k - $8k (additional $700 - $6,236 fee, dependent on total cost to implement project)	4 – 6 months
Cultural Resources	Cultural Resources Assessment Report Phase II	$25k - $30k	6 – 8 months
	Archaeological and Native American construction monitoring dependent	~$30k-$40k	1 to 2 months construction period requiring monitoring
Coastal Development Permits (CDPs)	County of Monterey CDP	$33k - $35k (fee) plus $24k for processing	10-14 months
	State Coastal Commission Appeal (if necessary)	Additional $15k	
CEQA	Prepare IS/MND (or EIR)	IS/MND under existing contract, if EIR required, additional estimate of $30k	~12 months (EIR)
Total Cost Estimate Range	~$250k – $300k (plus $8k – $50k in filing fees)		

USFWS = United States Fish and Wildlife Service; CFGC = California Fish and Game Code; CDFW = California Department of Fish and Wildlife; USACE = United States Army Corps of Engineers

*If it is determined through the environmental analysis that the project may result in significant and unavoidable environmental impacts, then an Environmental Impact Report would be required.

*Implementation of mitigation requirements will have additional costs which are not included in this table because they are unknown at this time.

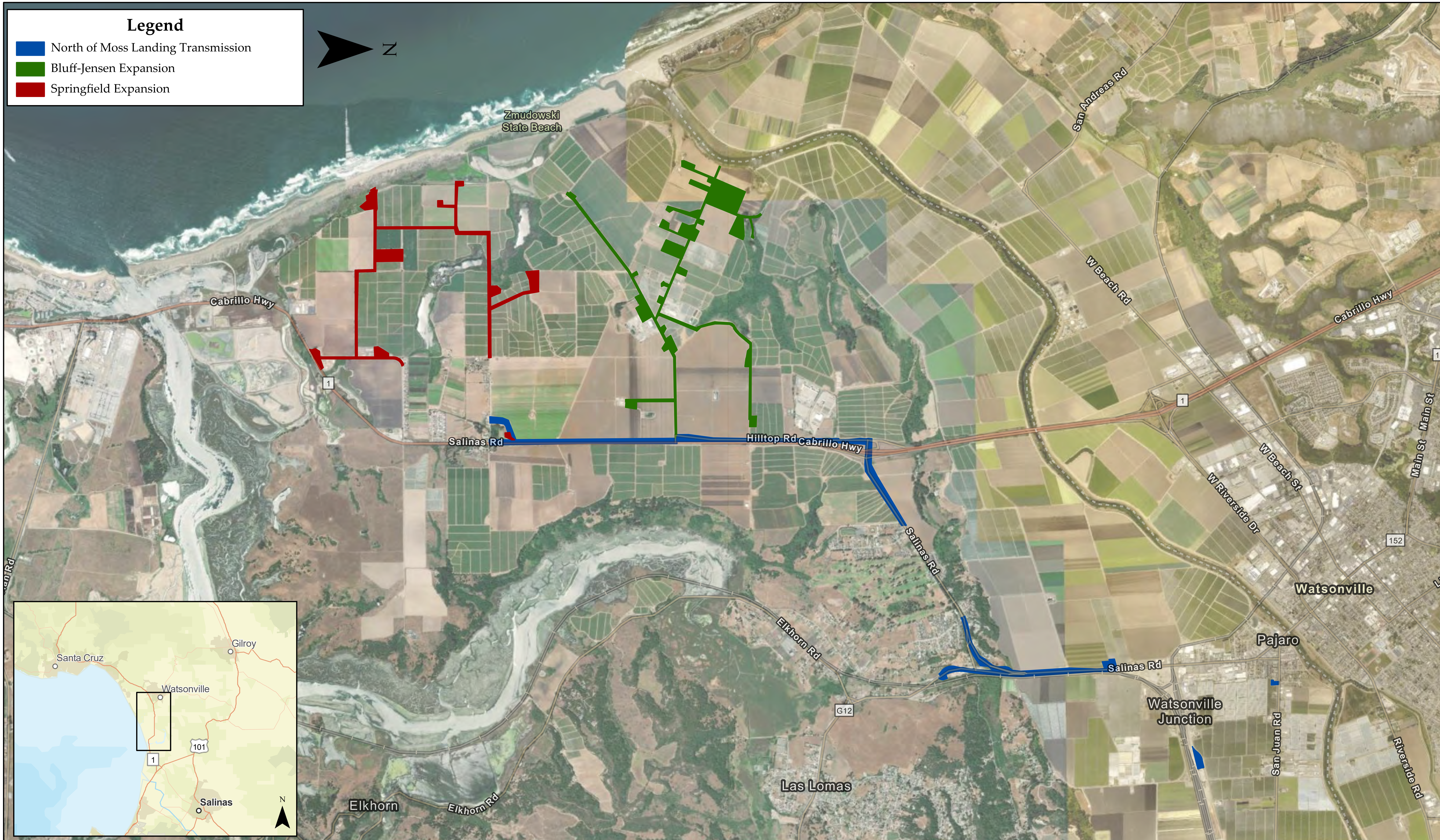
* Focused surveys for special-status wildlife species assume survey days can be combined to reduce field time.

*County of Monterey permit fees are estimated and subject to change. Additionally, the California Coastal Commission typically waives permit application fees for public agencies; however, application fees may apply.

* Note: If required, costs for management (e.g., permit actions, treatment, disposal) of PFAS-contaminated soil and groundwater are not included in this estimate because they are unknown at this time.

ATTACHMENT A

BIOLOGICAL CONSTRAINTS ANALYSIS



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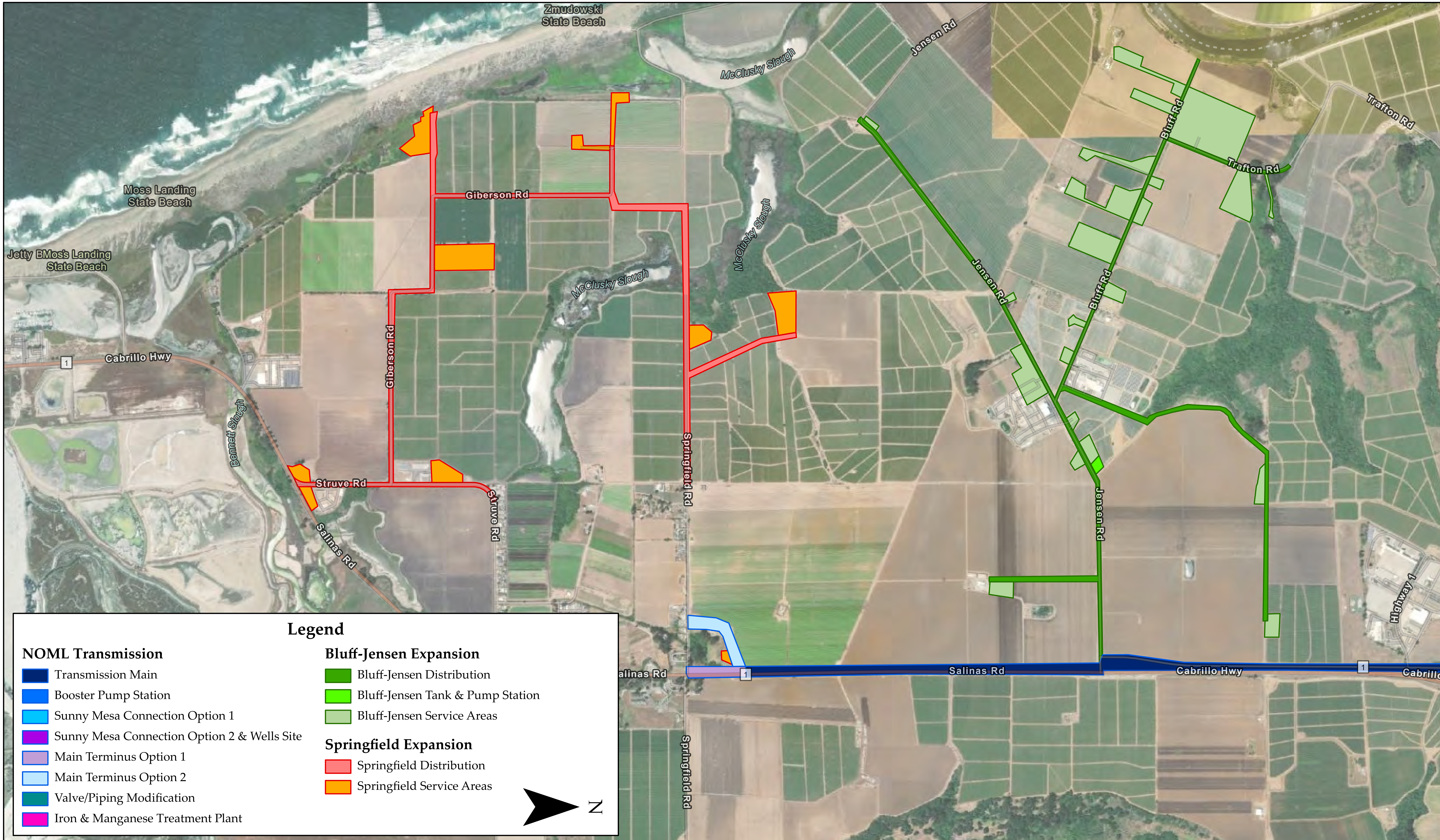
North Of Moss Landing Regional Consolidation Project
Project Location

0 0.25 0.5 1 mi
0 0.5 1 2 km

Date: 9/22/2023
Scale: 1 inch equals 3,333 feet
Project: 2023-47

Monterey | San Jose
Denise Duffy and Associates, Inc.
Environmental Consultants Resource Planners
947 Cass Street, Suite 5
Monterey, CA 93940
(831) 373-4341

Figure
1



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North Of Moss Landing Regional Consolidation Project
Project Components

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Date: 10/30/2023

Scale: 1 inch equals 1,500 feet

Project: 2023-47

Monterey | San Jose
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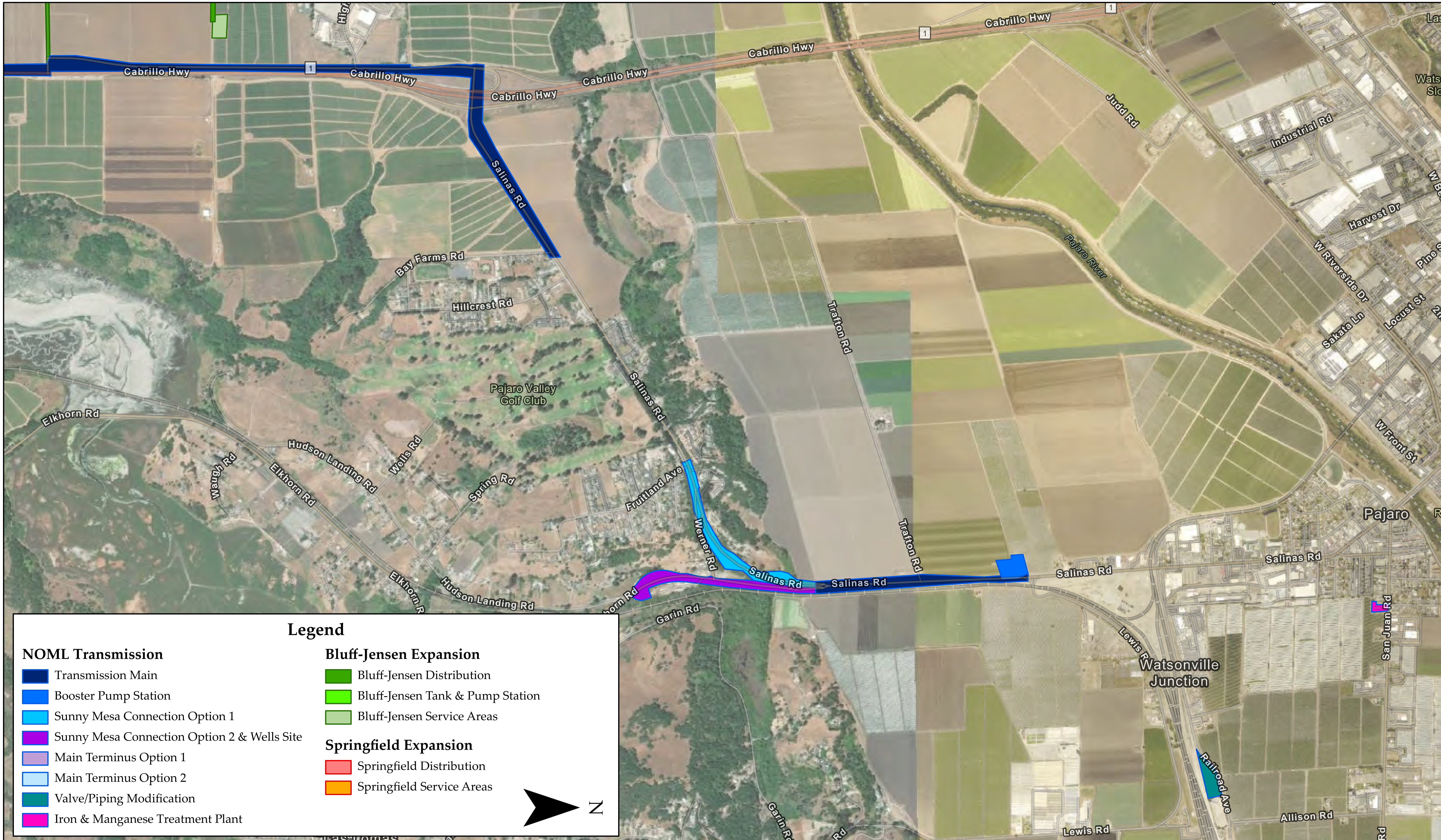
Figure
2a



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North Of Moss Landing Regional Consolidation Project
Project Components

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Date: 10/30/2023

Scale: 1 inch equals 1,500 feet

Project: 2023-47

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Figure 2b

DENISE DUFFY & ASSOCIATES, INC.
PLANNING AND ENVIRONMENTAL CONSULTING

MEMORANDUM

Date: October 30, 2023

To: Nick Panofsky, PE – MNS Engineers

From: Matthew Johnson - Senior Environmental Scientist/Project Manager, DD&A, Inc.
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Subject: North of Moss Landing Water Consolidation Project – Biological Constraints Analysis

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This Biological Constraints Analysis provides the results of a desktop-level biological analysis conducted for the North of Moss Landing Water Consolidation Project for potential future Pajaro-Sunny Mesa Water District (PSMWD) water distribution facilities, located north of Moss Landing in Monterey County, California (Attachment A - Figure 1). The evaluation areas discussed in this memo are as follows (Attachment A – Figure 2):

North of Moss Landing Transmission:

- Transmission Main
- Booster Pump Station
- Sunny Mesa Connection Option 1
- Sunny Mesa Connection Option 2 & Wells Site
- Main Terminus Option 1
- Main Terminus Option 2
- Valve/Piping Modification
- Iron & Manganese Treatment Plant

Bluff-Jensen Expansion:

- Bluff-Jensen Distribution & Service Areas
- Bluff-Jensen Tank and Pump Station

Springfield Expansion:

- Springfield Distribution & Service Areas

The purpose of this memo is to assess the environmental conditions within and immediately adjacent to the each evaluation area, evaluate the general habitat features present; assess the potential for sensitive habitats and special-status plant and wildlife species at the sites; evaluate environmental constraints at the sites and within the local vicinity; and identify typical mitigation measures for impacts, future biological surveys, and potential regulatory permit requirements.

METHODS

Habitat types within the evaluation areas were identified using aerial imagery and Google Street View (Google, 2023) and existing Geographic Information System (GIS) data. GIS data analyzed included the National Wetlands Inventory (U.S. Fish and Wildlife Service [USFWS], 2023b), Web Soil Survey (U.S. Department of Agriculture - Natural Resources Conservation Service [USDA-NRCS], 2023), and the National Hydrography Dataset (U.S. Geological Survey [USGS], 2023). Field surveys were not conducted to identify dominant plant species within each habitat type as part of this effort, and the habitat descriptions provided are generalized and do not include vegetation associations identified in *A Manual of California Vegetation* (Sawyer, et. al., 2009).

The California Department of Fish and Wildlife's (CDFW's) *Natural Communities List* (CDFW, 2023a), which uses vegetation associations from *A Manual of California Vegetation*, is one resource used to determine sensitive habitats in California. Additional surveys would be required to identify specific vegetation associations and determine the presence/absence of sensitive habitat types on CDFW's *Natural Communities List.* However, our best professional opinion on the likelihood of sensitive habitats is provided below in the results discussion. In addition, sensitive habitats designated by other resource agencies, such as those regulated under federal regulations (such as the Clean Water Act [CWA], the Rivers and Harbors Act, and Executive Order 11990 – Protection of Wetlands), state regulations (such as the California Environmental Quality Act [CEQA], the CDFW's Streambed Alteration Program, and the California Coastal Act [CCA]), or local ordinances or policies (such as City or County tree ordinances, Habitat Management Plan areas, and General Plan elements), are also discussed in the results section below. A wetland delineation was not completed in accordance with federal or state standards; however, resources identified above were utilized to determine presence of potentially jurisdictional wetlands and waters.

Special-status species are those plants and animals that have been formally listed or proposed for listing as Endangered or Threatened, or are Candidates for such listing under the Endangered Species Act (ESA) or the California Endangered Species Act (CESA). Listed species are afforded legal protection under the ESA and CESA. Species that meet the definition of Rare or Endangered under CEQA Section 15380 are also considered special-status species. Species that meet this definition and are typically provided management consideration through the CEQA and National Environmental Policy Act (NEPA) processes, although they are not legally protected under the ESA or CESA include: animals identified as "species of special concern" on CDFW's Special Animals list; California fully protected species; plants listed as rare under the California Native Plant Protection Act (CNPPA) or included in California Native Plant Society (CNPS) California Rare Plant Ranks (CRPR) 1A, 1B, 2A, and 2B; raptors and other birds protected under the federal Migratory Bird Treaty Act (MBTA) of 1918 and Fish and Game Code; and marine mammals protected under the Marine Mammal Act of 1972. Species with no formal special-status designation but thought by experts to be rare or in serious decline may also be considered special-status animal species in some cases, depending on project-specific analysis and relevant, localized conservation needs or precedence.

Special-status plant and wildlife species occurrence records from CDFW's California Natural Diversity Database (CNDDB; CDFW, 2023b, Attachment B) were reviewed to create a list of special-status plant and wildlife species known or with the potential to occur in the vicinity of each evaluation area. Occurrences within the USGS Moss Landing, Watsonville East, Watsonville West, Soquel, Prunedale, Marina and Salinas quadrangles were evaluated. The USFWS's Information Planning and Consulting

(IPaC) species list for the project area was also utilized to determine the federally-listed species potentially present (USFWS, 2023a; Attachment B). In addition, data gathered by the Rare Amphibian Detection in California (RADICAL) team, which is made up of scientists from Elkhorn Slough Reserve, UC Santa Cruz, Santa Lucia Reserve, USFWS, and Washington State University, was also evaluated to determine potential presence of three state and/or federally-listed amphibian species (California tiger salamander [CTS, *Ambystoma californiense*], California red-legged frog [CRLF, *Rana draytonii*], and Santa Cruz long-toed salamander [SCLTS, *A. macrodactylum croceum]*). This analysis did not include any focused botanical or protocol-level wildlife surveys. However, habitat types identified during the desktop analysis as well as professional knowledge of natural resources in the area were used to identify potential suitable habitat for special-status plant and wildlife species.

SURVEY RESULTS

Habitat Types

As described in the Methods section, generalized habitat types were identified for each of the evaluation areas. Table 1 provides an overview of the habitats observed within and adjacent to each evaluation area and identifies if sensitive habitats are present or potentially present. Additional discussion of sensitive habitats is provided below. A map of potential sensitive habitat areas, including wetland data provided by the National Wetlands Inventory is provided on Attachment A - Figure 3. Please note that field surveys would be required to confirm and refine the boundaries of these sensitive habitats.

Table 1. Habitat Types within the Project Site

Evaluation Area	Habitats within Evaluation Area	Adjacent Habitats	Sensitive Habitats
NOML Transmission Main			
Transmission Main	Developed (paved road) Ruderal Agricultural Emergent Wetland (potential) Riparian Grassland	Developed Ruderal Agricultural Aquatic (Pond)	Emergent Wetland (potential) Riparian
Booster Pump Station	Developed (paved road, commercial) Ruderal Agricultural	Same as Evaluation Area	
Sunny Mesa Connection Option 1	Developed (paved road) Ruderal Oak Woodland Scrub Eucalyptus Grove	Developed Ruderal Agricultural Oak Woodland Scrub Eucalyptus Grove Grassland	

Evaluation Area	Habitats within Evaluation Area	Adjacent Habitats	Sensitive Habitats
Sunny Mesa Connection Option 2 & Wells Site	Developed (paved road) Ruderal Riparian Emergent Wetland (potential) Scrub Chaparral (potential) Oak woodland	Developed Ruderal Agricultural Riparian Scrub Oak Woodland	Riparian Emergent Wetland (potential) Chaparral (potential)
Main Terminus Option 1	Ruderal Developed Riparian (potential) Emergent Wetland (potential)	Ruderal Developed Agricultural	Riparian (potential) Emergent Wetland (potential)
Main Terminus Option 2	Ruderal Developed Agricultural	Same as Evaluation Area	None
Valve/Pipeline Modification & Treatment Plant	Developed (paved road, tank site, well site) Ruderal	Developed (railroad, paved road, residential) Agricultural Ruderal	None
Bluff-Jensen Expansion			
Bluff-Jensen Distribution & Service Areas	Ruderal Developed (paved road, residential, commercial) Agricultural	Agricultural Aquatic (pond, Pajaro River) Riparian	Aquatic (adjacent)
Bluff-Jensen Tank & Pump Station	Agricultural Ruderal	Agricultural Developed Ruderal	None
Springfield Expansion			
Springfield Distribution & Service Areas	Ruderal Developed (paved road, residential, commercial) Agricultural Freshwater Emergent Wetland Riparian/Freshwater Forested/Shrub Wetland	Ruderal Developed Agricultural Freshwater Emergent Wetland Riparian/Freshwater Freshwater pond Dune Scrub	Freshwater Emergent Wetland Riparian/Freshwater Forested/Shrub Wetland Freshwater Pond (adjacent) Dune Scrub (adjacent)

Sensitive Habitats

Riparian

Riparian habitats are those plant communities supporting woody vegetation found along rivers, creeks, streams, canyon bottom drainages, and seeps. They can range from a dense thicket of shrubs to a closed canopy of large mature trees. Riparian habitats within and adjacent to the evaluation areas are very likely identified as sensitive on the CDFW's *Natural Communities List* (CDFW, 2023a). In addition, riparian areas are subject to the jurisdiction of CDFW under Section 1602 of the Fish and Game Code, and may provide suitable habitat for federal- and state-listed wildlife species, such as SCLTS, CRLF, and tricolored blackbird (*Agelaius tricolor*). Riparian habitat is also subject to the jurisdiction of the Monterey County under County Code Section 21.66.020, which prohibits development in or within 100 feet of riparian habitat unless the development will not have a significant adverse impact on the habitat's long-term maintenance or where conditions of approval are available which will mitigate adverse impacts and allow for the long-term maintenance of the habitat. Within the coastal zone, riparian habitat is also considered an Environmentally Sensitive Habitat Area (ESHA). Some riparian areas may also meet the conditions to be classified as wetlands under the jurisdiction of the U.S. Army Corps of Engineers (ACOE) and/or Regional Water Quality Control Board (Regional Board). Impacts to riparian habitat would require acquisition of a Streambed Alternation Agreement from CDFW; within coastal zone areas (which include the majority of the project site), a Coastal Development Permit (CDP) would also be required. Detailed habitat mapping is recommended for any components considered further that support or are immediately adjacent to riparian habitat in order to sufficiently quantify impacts. Typical mitigation required by regulatory permits includes revegetation at a 1:1 ratio for temporary impacts and restoration at a 3:1 ratio for permanent impacts. The California Coastal Commission (CCC) may require up to a 5:1 mitigation ratio.

Wetlands and Waters

The Springfield Distribution component crosses the McClusky Slough just east of the Springfield Road terminus. The National Wetlands Inventory identifies that freshwater emergent wetland and freshwater forested shrub wetland (likely also considered riparian habitat) is present in this location (USFWS, 2023a). The distribution pipeline is proposed to be Horizontal Directional Drilling (HDD) under the McClusky Slough and is therefore unlikely to directly impact jurisdictional wetlands; however, CDFW requires a Streambed Alteration Agreement for HDD. The National Wetlands Inventory also identifies freshwater emergent wetland within the Main Terminus Option 1 evaluation area and near Giberson Road within the Springfield Service Area that is adjacent to the dunes.

The Pajaro River, which represents waters of the U.S. and state, is present immediately adjacent to the Bluff-Jensen Distribution component. This component is above the ordinary high water mark (OHWM) of the Pajaro River; however, there is a potential for indirect impacts due to proximity. Areas within 200 feet of a river are also subject to the jurisdiction of the County under County Code Section 16.16.050 (K), which prohibits encroachment unless it can be proven that the proposed development will not significantly reduce the capacity of the existing river or otherwise adversely affect any other properties by increasing stream velocities or depths or diverting the flow, and that the proposed new development will be safe from flow related erosion and will not cause flow related erosion hazards.

The National Hydrography Dataset (USGS, 2023) identifies several drainages with headwaters within the evaluation area and drainages that run immediately adjacent to the evaluation area. In addition, review of aerial imagery identified several roadside ditches and culverts within the evaluation area. These drainages may convey jurisdictional waters of the U.S. and/or state; however, additional analysis would be required to determine if these features are jurisdictional as some agricultural and roadside ditches are excluded from the definition.

Riparian areas within and adjacent to the evaluation areas may also support jurisdictional wetlands. All waters and wetlands within the coastal zone would also be considered ESHA.

A wetland delineation should be conducted according to federal and state standards to identify wetlands and waters under the jurisdiction of ACOE, Regional Board, and California Coastal Commission within any components considered further. Results of the delineation should be used to determine impacts to wetlands and/or waters and to facilitate acquisition of water quality certifications from the RWQCB and/or ACOE. A Streambed Alternation Agreement from CDFW would likely also be required, and within the coastal zone a CDP would be necessary. Typical mitigation required by regulatory permits includes revegetation at a 1:1 ratio for temporary impacts and restoration at a 3:1 ratio for permanent impacts. The CCC may require up to a 5:1 mitigation ratio.

Dune Scrub

Dune scrub habitat is present immediately adjacent to one of the Springfield Service Areas, near Giberson Road. Dune scrub habitats typically support vegetation associations identified as sensitive on the CDFW's *Natural Communities List* (CDFW, 2023a) and may also be considered ESHA within the coastal zone. Dune scrub may provide suitable habitat for several special-status plant species and for federal- and state-listed wildlife species, such as western snowy plover (*Charadrius alexandrinus nivosus*) and Smith's blue butterfy (*Euphilotes enoptes smithi*). Additional analysis would be required to determine the extent of the dune scrub habitat in the area, the vegetation associations present, and whether or not impacts could occur.

Chaparral

Chaparral habitat is potentially present within and immediately adjacent to the Sunny Mesa Connection Option 2 component based on Google Street view imagery. Chaparral habitats may support vegetation associations identified as sensitive on the CDFW's *Natural Communities List* (CDFW, 2023a). Chaparral habitats may also be considered ESHA within the coastal zone. Additional analysis would be required to determine the vegetation associations present, if the habitat is sensitive, and whether or not impacts could occur.

Critical Habitat

The Pajaro River is designated critical habitat for South-Central California Coast Steelhead (S-CCC steelhead; *Oncorhynchus mykiss*). Per the definition of the lateral extent of critical habitat for steelhead, the OHWM within the Pajaro River is the extent of the critical habitat. As identified above in the Wetlands and Waters discussion, the Bluff-Jensen Distribution component is above the OHWM of the Pajaro River; however, there is a potential for indirect impacts due to proximity. Critical habitat for Monterey spineflower is also present within the dune scrub habitat identified immediately adjacent to one of the Springfield Service Areas, near Giberson Road. Impacts to critical habitat may require mitigation if the project has a federal nexus (see discussion of federally-listed amphibians below for more information regarding a federal nexus).

Special-Status Wildlife Species

Tables 2 and 3 summarize the special-status wildlife species that are known or have a moderate to high potential to occur within the evaluation areas based on presence of suitable habitat identified on aerial imagery. Please note that for format and spacing purposes, only the components with the potential to support special-status wildlife species are included on Table 2; the analysis identified that it is unlikely that any special-status wildlife species would occur within the Valve/Piping Modification component and Iron and Manganese Treatment Plant component due to the developed and disturbed nature of these sites. However, trees present in these areas may still support nesting for protected avian species (see discussion below). Each of these species' known or potential presence within the sites are discussed below, along with typical avoidance, minimization, and mitigation measures to reduce impacts to each species and any future biological surveys and regulatory permits that may be required. No other special-status wildlife species are expected to occur based on lack of suitable habitat. Please refer to Attachment B for lists of all species evaluated for potential to occur.

Table 2. Special-Status Wildlife Species Known or With the Potential to Occur Within or Adjacent to the North of Moss Landing Transmission Component

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component					
			Transmission Main	Booster Pump Station	Sunny Mesa Connection Option 1	Sunny Mesa Connection Option 2 & Wells Site	Main Terminus Option 1	Main Terminus Option 2
Mammals								
Antrozous pallidus Pallid bat	-- / CSC	Occurs in a wide variety of habitats including grasslands, shrublands, arid desert areas, oak savanna, coastal forested areas, and coniferous forests of the mountain regions of California. Most common in open, dry habitats with rocky areas for roosting. Day roosts include caves, crevices, mines, and occasionally hollow trees and buildings. Seems to prefer rocky outcrops, cliffs, and crevices with access to open habitats for foraging. Similar structures are used for night roosting and will also use more open sites such as eaves, awnings, and open areas under bridges for feeding roosts.	**Moderate** Trees and the Highway 1 overpass may provide suitable night roost habitat.					
Corynorhinus townsendii Townsend's big-eared bat	-- / CSC	Primarily rural settings from inland deserts to coastal redwoods, oak woodland of the inner Coast Ranges and Sierra foothills, and low to mid-elevation mixed coniferous-deciduous forests. Day roosts are in limestone caves, lava tubes, and mines, but can roost in buildings that offer suitable conditions. Night roosts are in more open settings and include bridges, rock crevices, and trees.	**Moderate** Trees and the Highway 1 overpass may provide suitable night roost habitat.					
Neotoma macrotis luciana Monterey dusky-footed woodrat	-- / CSC	Forest and oak woodland habitats of moderate canopy with moderate to dense understory. Also occurs in chaparral habitats.			**Moderate** Suitable habitat present within the oak woodland habitat.	**Moderate** Suitable habitat present within the riparian habitat surrounding Werner Lake and oak woodland, scrub, and chaparral habitat.		
Sorex ornatus salarius Monterey shrew	-- / CSC	Mostly moist or riparian woodland habitats, and within chaparral, grassland, and emergent wetland habitats where there is a thick duff or downed logs.				**Moderate** Suitable habitat present within the riparian habitat surrounding Werner Lake.		
Birds								
Agelaius tricolor Tricolored blackbird (nesting colony)	-- / ST	Nest in colonies in dense riparian vegetation, along rivers, lagoons, lakes, and ponds. Forages over grassland or aquatic habitats.				**Moderate** Suitable habitat present within the riparian habitat surrounding Werner Lake, where the CNDDB reports a 1960 occurrence, although none were observed from 1963-2014.		

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component					
			Transmission Main	Booster Pump Station	Sunny Mesa Connection Option 1	Sunny Mesa Connection Option 2 & Wells Site	Main Terminus Option 1	Main Terminus Option 2
Athene cunicularia Burrowing owl (burrow sites & some wintering sites)	-- / CSC	Year-round resident of open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Frequent open grasslands and shrublands with perches and burrows. Use rodent burrows for roosting and nesting cover. Pipes, culverts, and nest boxes may also be used.	**Moderate Adjacent** Suitable nesting habitat is present within adjacent grassland areas.		**Moderate Adjacent** Suitable nesting habitat is present within adjacent grassland areas.			
Lanius ludovicianus Loggerhead shrike	-- / CSC	Resident in dry open grasslands and agricultural areas. Scattered shrubs or trees, particularly thick or thorny species, serve as nesting substrates and hunting perches. Fences, utility wires, grasses, and forbs also may be used as perches.	**Moderate** Suitable nesting habitat is present.		**Moderate** May nest within oak woodland habitat or any other trees.	**Moderate** May nest within riparian, scrub, and oak woodland habitats or any other trees.	**Moderate** Suitable nesting habitat is present.	**Moderate** Suitable nesting habitat is present.
Elanus leucurus White-tailed kite (nesting)	-- / CFP	Open groves, river valleys, marshes, and grasslands. Prefer such an area with low roosts (fences etc.). Nest in shrubs and trees adjacent to grasslands.	**Moderate** Suitable nesting habitat is present.		**Moderate** Suitable nesting habitat is present.	**Moderate** Suitable nesting habitat is present.	**Moderate** Suitable nesting habitat is present.	**Moderate** Suitable nesting habitat is present.
Reptiles and Amphibians								
Ambystoma californiense California tiger salamander	FT / ST	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Need underground refuges and vernal pools or other seasonal water sources.	**Assumed Present** Marginal upland habitat is present. Component is within 380 meters of an occurrence near an assumed breeding pond. Two other occurrences are known from the CNDDB & RADICAL data within 2.2km.				**Moderate** Marginal upland habitat is present. Several occurrences are known from the CNDDB & RADICAL data within 2.2km; however, all occurrences are over 1km.	**Moderate** Marginal upland habitat is present. Several occurrences are known from the CNDDB & RADICAL data within 2.2km; however, all occurrences are over 1km.
Ambystoma macrodactylum croceum Santa Cruz long-toed salamander	FE / SE&CFP	Preferred habitats include ponderosa pine, montane hardwood-conifer, mixed conifer, montane riparian, red fir and wet meadows. Occurs in a small number of localities in Santa Cruz and Monterey Counties. Adults spend the majority of the time in underground burrows and beneath objects. Larvae prefer shallow water with clumps of vegetation.					**Moderate** No breeding habitat present. Riparian habitat may provide suitable upland habitat. Component is within 1.6 km of known occurrences within McClusky Slough and Struve Pond.	
Anniella pulchra Northern California legless lizard	-- / CSC	Requires moist, warm habitats with loose soil for burrowing and prostrate plant cover, often forages in leaf litter at plant bases; may be found on beaches, sandy washes, and in woodland, chaparral, and riparian areas.			**Moderate** Suitable habitat and soils are present.	**Moderate** Suitable habitat and soils are present.		
Emys marmorata Western pond turtle	-- / CSC	Associated with permanent or nearly permanent water in a wide variety of habitats including streams, lakes, ponds, irrigation ditches, etc. Require basking sites such as partially submerged logs, rocks, mats of vegetation, or open banks.	**Moderate** Marginal upland habitat is present adjacent to pond along Hilltop Rd.					

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component					
			Transmission Main	Booster Pump Station	Sunny Mesa Connection Option 1	Sunny Mesa Connection Option 2 & Wells Site	Main Terminus Option 1	Main Terminus Option 2
Rana draytonii California red-legged frog	FT / CSC	Lowlands and foothills in or near permanent or late-season sources of deep water with dense, shrubby, or emergent riparian vegetation. During late summer or fall adults are known to utilize a variety of upland habitats with leaf litter or mammal burrows.	**High** No breeding habitat present. Potential upland habitat is present within undeveloped areas surrounding the pond adjacent to Hilltop Rd. near the Highway 1 overpass. Suitable dispersal habitat is present. Several occurrences are known from the CNDDB & RADICAL data within the vicinity, including an occurrence at the Hilltop Road pond.	**Moderate** No breeding or upland habitat is present; however, suitable dispersal habitat is present. Several occurrences are known from the CNDDB & RADICAL data within the vicinity, the nearest of which are located approx. 0.8 mile south within Werner Lake and 1.1 mile northwest within the Pajaro River.	**Moderate** No breeding or upland habitat is present; however, suitable dispersal habitat is present. Several occurrences are known from the CNDDB & RADICAL data within the vicinity, the nearest of which are located approx. 0.2 mile east within Werner Lake, 1.3 mile northeast within the Pajaro River, and 1.3 mile southeast near the Highway 1 overpass.	**High** The CNDDB and RADICAL data report a breeding occurrence within the adjacent Werner Lake (approx. 250m west). Areas of riparian habitat within 300 m of lake provide suitable upland habitat. Suitable dispersal habitat is present within undeveloped areas.	**Moderate** No breeding or upland habitat is present; however, suitable dispersal habitat is present. Several occurrences are known from the CNDDB & RADICAL data within the vicinity, the nearest of which is located approx. 0.8 mile southeast.	**Moderate** No breeding or upland habitat is present; however, suitable dispersal habitat is present. Several occurrences are known from the CNDDB & RADICAL data within the vicinity, the nearest of which is located approx. 0.9 mile southeast.
Taricha torosa Coast range newt	-- / CSC	Occurs mainly in valley-foothill hardwood, valley-foothill hardwood-conifer, coastal scrub, and mixed chaparral but is known to occur in grasslands and mixed conifer types. Seek cover under rocks and logs, in mammal burrows, rock fissures, or man-made structures such as wells. Breed in intermittent ponds, streams, lakes, and reservoirs.			**Moderate** Marginal upland habitat is present.	**Moderate** Marginal upland habitat is present.		
Invertebrates								
Bombus crotchii Crotch bumble bee	-- / SC	Occurs in open grassland and scrub at relatively warm and dry sites. Requires plants that bloom and provide adequate nectar and pollen throughout the colony’s life cycle, which is from early February to late October. Generally nests underground, often in abandoned mammal burrows. Within California this species is known to occur in the Mediterranean, Pacific Coast, Western Desert, as well as Great Valley and adjacent foothill regions.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.		**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.
Bombus occidentalis Western bumble bee	-- / SC	Occurs in open grassy areas, urban parks, urban gardens, chaparral, and meadows. Requires plants that bloom and provide adequate nectar and pollen throughout the colony’s life cycle, which is from early February to late November. Typically nests underground, often in abandoned mammal burrows. Populations are currently largely restricted to high elevation sites in the Sierra Nevada; however, the historic range includes the northern California coast.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.		**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component					
			Transmission Main	Booster Pump Station	Sunny Mesa Connection Option 1	Sunny Mesa Connection Option 2 & Wells Site	Main Terminus Option 1	Main Terminus Option 2
Euphilotes enoptes smithi Smith's blue butterfly	FE / --	Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz Counties. Plant hosts are *Eriogonum latifolium* and *E. parvifolium*.				**Moderate** Suitable habitat is present within scrub and chaparral habitat; however, surveys would be necessary to determine if the obligate host plant species are present.		

STATUS DEFINITIONS

Federal

FE = listed as Endangered under the federal Endangered Species Act
FT = listed as Threatened under the federal Endangered Species Act
-- = no listing

State

SE = listed as Endangered under the California Endangered Species Act
ST = listed as Threatened under the California Endangered Species Act
SC = Candidate for listing under the California Endangered Species Act
CSC = California Department of Fish and Wildlife Species of Concern
CFP = California Fully Protected Animal
-- = no listing

POTENTIAL TO OCCUR

Present = known occurrence of species within the site; presence of suitable habitat conditions; or observed during field surveys
High = known occurrence of species in the immediate vicinity from the CNDDB or other documentation; presence of ideal habitat conditions
Moderate = known occurrence of species in the vicinity from the CNDDB or other documentation; presence of suitable habitat conditions within or adjacent to the site

Table 3. Special-Status Wildlife Species Known or With the Potential to Occur Within or Adjacent to the Bluff-Jensen and Springfield Expansions

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component		
			Bluff-Jensen Distribution & Service Areas	Bluff-Jensen Tank & Pump Station	Springfield Distribution & Service Areas
Mammals					
Neotoma macrotis luciana Monterey dusky-footed woodrat	-- / CSC	Forest and oak woodland habitats of moderate canopy with moderate to dense understory. Also occurs in chaparral habitats.	**Moderate Adjacent** Suitable habitat is present within the adjacent riparian habitat.		**Moderate** Suitable habitat is present within the riparian habitat.
Sorex ornatus salarius Monterey shrew	-- / CSC	Mostly moist or riparian woodland habitats, and within chaparral, grassland, and emergent wetland habitats where there is a thick duff or downed logs.	**Moderate Adjacent** Suitable habitat is present within the adjacent riparian habitat.		**Moderate** Suitable habitat is present within the riparian habitat and emergent wetland habitat.
Birds					
Agelaius tricolor Tricolored blackbird (nesting colony)	-- / ST	Nest in colonies in dense riparian vegetation, along rivers, lagoons, lakes, and ponds. Forages over grassland or aquatic habitats.	**Moderate Adjacent** Nesting habitat may be present at the adjacent Pajaro River near the end of Bluff Rd. and in adjacent riparian areas.		**Moderate** Suitable nesting habitat may be present within the freshwater emergent wetland and riparian habitat associated with McClusky Slough and riparian habitat associated with Struve Pond.

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component		
			Bluff-Jensen Distribution & Service Areas	Bluff-Jensen Tank & Pump Station	Springfield Distribution & Service Areas
Asio flammeus Short-eared owl (nesting)	-- / CSC	Open areas with few trees, such as annual and perennial grasslands, prairies, meadows, dunes, irrigated lands, and saline and freshwater emergent marshes. Dense vegetation is required for roosting and nesting cover. Treeless areas containing elevated sites for perching, such as fence posts or small mounds, are also needed. Some individuals breed in northern California.	**Moderate Adjacent** Suitable nesting habitat may be present at the adjacent Pajaro River near the end of Bluff Rd.		**Moderate** Suitable nesting habitat may be present within the freshwater emergent wetland associated with McClusky Slough, and the adjacent dune scrub habitat and immediately adjacent areas.
Athene cunicularia Burrowing owl (burrow sites & some wintering sites)	-- / CSC	Year-round resident of open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Frequent open grasslands and shrublands with perches and burrows. Use rodent burrows for roosting and nesting cover. Pipes, culverts, and nest boxes may also be used.	**Moderate Adjacent** Suitable nesting habitat may be present adjacent near the Pajaro River at the end of Bluff Road.		**Moderate** Suitable nesting habitat may be present within the adjacent dune scrub habitat and immediately adjacent areas within this component.
Charadrius alexandrinus nivosus Western snowy plover (nesting)	FT / CSC	Sandy beaches on marine and estuarine shores, also salt pond levees and the shores of large alkali lakes. Requires sandy, gravelly or friable soil substrate for nesting.			**Moderate** Suitable habitat is present within adjacent dune scrub habitat. This species is known to occur at Zumdowski State Beach.
Elanus leucurus White-tailed kite (nesting)	-- / CFP	Open groves, river valleys, marshes, and grasslands. Prefer such an area with low roosts (fences etc.). Nest in shrubs and trees adjacent to grasslands.	**Moderate** Suitable nesting habitat is present.		**Moderate** Suitable nesting habitat is present.
Lanius ludovicianus Loggerhead shrike	-- / CSC	Resident in dry open grasslands and agricultural areas. Scattered shrubs or trees, particularly thick or thorny species, serve as nesting substrates and hunting perches. Fences, utility wires, grasses, and forbs also may be used as perches.	**Moderate** Suitable nesting habitat is present.		**Moderate** Suitable nesting habitat is present.
Riparia riparia Bank swallow (nesting)	-- / ST	Nest colonially in sand banks. Found near water; fields, marshes, streams, and lakes.	**Moderate Adjacent** Adjacent bank of Pajaro River at end of Bluff Road may provide suitable habitat. Occurrences from the "Mouth of the Pajaro River" from the 1980's overlaps with component.		
Reptiles and Amphibians					
Ambystoma californiense California tiger salamander	FT / ST	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Need underground refuges and vernal pools or other seasonal water sources.	**Assumed Present** Marginal upland habitat is present. Nearly the entire component (except the end of Bluff Rd) is within 2.2 km of a known occurrence near an assumed breeding pond. A portion of this component is within 100 meters of this pond. Several other agricultural ponds that could provide breeding habitat are present within the immediate vicinity with no known occurrence date.	**Moderate** Marginal upland habitat is present. This component is within 630 meters of a known occurrence near an assumed breeding pond. Several other agricultural ponds that could provide breeding habitat are present within the immediate vicinity with no known occurrence date.	**Assumed Present** Marginal upland habitat is present. McClusky Slough could provide suitable breeding habitat; however, this species has not been detected at this resource. The entire is within 2.2 km of known or assumed breeding ponds. Portions of this component are within 630 meters of Struve Pond. Several other agricultural ponds that could provide breeding habitat are present within the immediate vicinity with no known occurrence date.

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component		
			Bluff-Jensen Distribution & Service Areas	Bluff-Jensen Tank & Pump Station	Springfield Distribution & Service Areas
Ambystoma macrodactylum croceum Santa Cruz long-toed salamander	FE / SE&CFP	Preferred habitats include ponderosa pine, montane hardwood-conifer, mixed conifer, montane riparian, red fir and wet meadows. Occurs in a small number of localities in Santa Cruz and Monterey Counties. Adults spend the majority of the time in underground burrows and beneath objects. Larvae prefer shallow water with clumps of vegetation.	**Assumed Present** This species is known to breed at the adjacent McClusky Slough. The majority of this component is within 1.6 km of this occurrence and portions are within 0.6 km. Riparian habitat within and adjacent to this component may provide suitable upland habitat.		**Assumed Present** This species is known to breed at McClusky Slough and the immediately adjacent Struve Pond. This entire component is within 0.6 km of these occurrences. Riparian habitat within and adjacent to this component may provide suitable upland habitat.
Anniella pulchra Northern California legless lizard	-- / CSC	Requires moist, warm habitats with loose soil for burrowing and prostrate plant cover, often forages in leaf litter at plant bases; may be found on beaches, sandy washes, and in woodland, chaparral, and riparian areas.			**Moderate** Riparian and dune scrub habitats within and adjacent to the project site may provide suitable habitat.
Emys marmorata Western pond turtle	-- / CSC	Associated with permanent or nearly permanent water in a wide variety of habitats including streams, lakes, ponds, irrigation ditches, etc. Require basking sites such as partially submerged logs, rocks, mats of vegetation, or open banks.	**Moderate Adjacent** Suitable habitat may be present at the adjacent Pajaro River near the end of Bluff Rd. Two occurrences of this species are known from the Pajaro River, the nearest of which is approximately two miles upstream from Bluff Rd.		**Moderate** McClusky slough may provide suitable habitat for this species.
Rana draytonii California red-legged frog	FT / CSC	Lowlands and foothills in or near permanent or late-season sources of deep water with dense, shrubby, or emergent riparian vegetation. During late summer or fall adults are known to utilize a variety of upland habitats with leaf litter or mammal burrows.	**Moderate** No breeding or upland habitat present. Suitable dispersal habitat is present throughout this component. Several occurrences are known from the CNDDB & RADICAL data within the vicinity, including an occurrence at the Hilltop Road pond, located approximately 0.5 mile northeast of this component.	**Moderate** No breeding or upland habitat present. Suitable dispersal habitat is present. Several occurrences are known from the CNDDB & RADICAL data within the vicinity, including an occurrence at the Hilltop Road pond, located approximately 1.0 mile northeast of this component.	**Assumed Present** This species is known to breed at McClusky Slough and the immediately adjacent Struve Pond. Emergent wetland and riparian habitat within and adjacent to this component may provide suitable upland habitat. Suitable dispersal habitat is present throughout this component.
Taricha torosa Coast range newt	-- / CSC	Occurs mainly in valley-foothill hardwood, valley-foothill hardwood-conifer, coastal scrub, and mixed chaparral but is known to occur in grasslands and mixed conifer types. Seek cover under rocks and logs, in mammal burrows, rock fissures, or man-made structures such as wells. Breed in intermittent ponds, streams, lakes, and reservoirs.	**Moderate Adjacent** Adjacent riparian areas may provide suitable upland habitat; however, no occurrences of this species are known in the immediate vicinity.		**Moderate** McClusky slough may provide suitable breeding habitat for this species; however, no occurrences are reported within this resources. Riparian areas may provide suitable upland habitat.
Invertebrates					
Bombus crotchii Crotch bumble bee	-- / SC	Occurs in open grassland and scrub at relatively warm and dry sites. Requires plants that bloom and provide adequate nectar and pollen throughout the colony's life cycle, which is from early February to late October. Generally nests underground, often in abandoned mammal burrows. Within California this species is known to occur in the Mediterranean, Pacific Coast, Western Desert, as well as Great Valley and adjacent foothill regions.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.		**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.

Species	Status (USFWS/ CDFW)	General Habitat	Potential Occurrence within Component		
			Bluff-Jensen Distribution & Service Areas	Bluff-Jensen Tank & Pump Station	Springfield Distribution & Service Areas
Bombus occidentalis Western bumble bee	-- / SC	Occurs in open grassy areas, urban parks, urban gardens, chaparral, and meadows. Requires plants that bloom and provide adequate nectar and pollen throughout the colony's life cycle, which is from early February to late November. Typically nests underground, often in abandoned mammal burrows. Populations are currently largely restricted to high elevation sites in the Sierra Nevada; however, the historic range includes the northern California coast.	**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.		**Moderate** Suitable habitat may be present in undeveloped areas; however, surveys would be necessary to determine if sufficient flowering resources are present.
Euphilotes enoptes smithi Smith's blue butterfly	FE / --	Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz Counties. Plant hosts are *Eriogonum latifolium* and *E. parvifolium*.			**Moderate** Suitable habitat is present within adjacent dune scrub habitat; however, surveys would be necessary to determine if the obligate host plant species are present.
Fish					
Eucyclogobius newberryi Tidewater goby	FE / CSC	Brackish water habitats, found in shallow lagoons and lower stream reaches. Tidewater gobies appear to be naturally absent (now and historically) from three large stretches of coastline where lagoons or estuaries are absent and steep topography or swift currents may prevent tidewater gobies from dispersing between adjacent localities. The southernmost large, natural gap occurs between the Salinas River in Monterey County and Arroyo del Oso in San Luis Obispo County.	**Assumed Present Adjacent** This species is known to occur within the Pajaro River, adjacent to this component at the end of Bluff Rd.		
Lavinia exilicauda harengus Monterey hitch (Pajaro/Salinas hitch)	-- / CSC	Found only within the Pajaro and Salinas River systems. Can occupy a wide variety of habitats, however, they are most abundant in lowland areas with large pools or small reservoirs that mimic such conditions. May be found in brackish water conditions within the Salinas River lagoon during the early summer months when the sandbar forms at the mouth of the river.	**Assumed Present Adjacent** This species is known to occur within the Pajaro River, adjacent to this component at the end of Bluff Rd.		
Oncorhynchus mykiss irideus Steelhead (south-central California coast DPS)	FT / --	Cold headwaters, creeks, and small to large rivers and lakes; anadromous in coastal streams.	**Moderate Adjacent** The Pajaro River, located adjacent to the end of Bluff Rd, is designated critical habitat for this species.		

STATUS DEFINITIONS

Federal
FE = listed as Endangered under the federal Endangered Species Act
FT = listed as Threatened under the federal Endangered Species Act
-- = no listing

State
SE = listed as Endangered under the California Endangered Species Act
ST = listed as Threatened under the California Endangered Species Act
SC = Candidate for listing under the California Endangered Species Act
CSC = California Department of Fish and Wildlife Species of Concern
CFP = California Fully Protected Animal
-- = no listing

POTENTIAL TO OCCUR
Present = known occurrence of species within the site; presence of suitable habitat conditions; or observed during field surveys
High = known occurrence of species in the immediate vicinity from the CNDDB or other documentation; presence of ideal habitat conditions
Moderate = known occurrence of species in the vicinity from the CNDDB or other documentation; presence of suitable habitat conditions within or adjacent to the site

California Species of Special Concern

Species designated only as a California species of special concern by the CDFW do not require regulatory permits for project-related impacts. Presence/absence surveys are not recommended at this time; however, mitigation measures consistent with CDFW recommendations are typically provided during the CEQA process if the project has the potential to impact the species. An analysis of the potential for impacts to occur resulting from the proposed development can be prepared once the final project area is identified. Standard measures may include an employee education program, pre-construction surveys of proposed impact areas, and/or construction-phase monitoring by a qualified biologist.

Nesting Raptors and Other Protected Avian Species

Potential nesting habitat for raptors and other protected avian species is present within or immediately adjacent to all of the evaluation areas. Individual trees, oak woodland, and riparian habitat may provide nesting habitat for raptor species, special-status avian species, and other avian species protected under the MBTA and Fish & Game Code, such as such as red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), and great horned owl (*Bubo virginianus*), and white-tailed kite (*Elanus lecurus*). These habitats, as well as scrub and chaparral habitats may also support nesting for the loggerhead shrike (*Lanias ludovicianus*). Ruderal , grassland, and emergent wetland areas may also support nesting of several ground-nesting avian species, including the burrowing owl (*Athene cunicularia*) and short-eared owl (*Asio flammeus*). No permits are required for potential impacts to these species and presence/absence surveys are not recommended as preconstruction surveys are sufficient to avoid significant impacts to these species (except for burrowing owl; see below). Mitigation measures consistent with CDFW recommendations are typically provided during the CEQA process if the project has the potential to impact these species. Standard measures may include an employee education program, pre-construction nesting surveys within the habitat appropriate for each species, implementation of a no-disturbance buffer if nests are identified until the young-of-the-year have fledged and are no longer reliant upon the nest or parental care for survival, and construction-phase monitoring by a qualified biologist. Pre-construction surveys typically occur within 200-300 feet of construction areas due to potential for noise disturbance.

Grassland and ruderal habitats may contain suitable habitat for the western burrowing owl. No permits are required for impacts to this species; however, mitigation measures consistent with CDFW recommendations are typically provided during the CEQA process if the project has the potential to impact the species. If potential habitat is identified within project development areas, surveys in conformance with the CDFW's 2012 Staff Report protocol to determine burrowing owl presence/absence within the project site are recommended. These surveys include four nesting season surveys; one between February 15 and April 15 and three between April 15 and July 15, with at least one visit after June 15. If no burrowing owls are found, no further mitigation is required. If burrowing owls are identified on site, typical mitigation includes, but is not limited to, preserving at least 6.5 acres of habitat on site per individual or pair of birds or 1.5 to three times as much habitat off site per individual or pair of birds.

Suitable habitat for tricolored blackbird (listed as threatened under CESA) is present in areas with riparian and emergent wetland habitat within and adjacent to the evaluation areas. Areas adjacent to the Pajaro River may also provide nesting habitat for this species and bank swallow (*Riparia riparia*; also listed as threatened under CESA); however, additional analysis would be required to determine if suitable habitat features for this species is present in the vicinity of the project. In addition, suitable habitat for the western snowy plover (listed as threatened under ESA) is present within the dune scrub habitat present immediately adjacent to one of the Springfield Service Areas. Impacts to these species would require an incidental take permit (ITP) from CDFW or USFWS. However, because populations of these species move and nest in different areas during different years, presence/absence surveys are not recommended at this time. Impacts to these species can be avoided by timing construction to avoid the nesting season, and/or through pre-construction surveys combined with implementation of a no-disturbance buffer if nests are identified. If commitments are made to avoid these species, then acquisition of ITPs would not be required. This risk associated with this approach is that if nests are found prior to construction (typically conducted within 30 days of groundbreaking), then delay to construction may occur (for portions of the project site within 300 feet of the nest) until nests until the young-of-the-year have fledged and are no longer reliant upon the nest or parental care for survival.

Federal and State-Listed Amphibians

The evaluation areas are within the known range of the CTS (federal and state threatened), CRLF (federally threatened), and SCLTS (federal and state endangered and California fully protected). Several known and potential breeding resources for these species are present within the immediate vicinity, including McClusky Slough, Struve Pond, detention basins, drainages, and agricultural ponds (Figures 4 to 6). Surrounding riparian and oak woodland areas provide suitable upland and dispersal habitat for CRLF and SCLTS. Grassland habitat that provides typical upland habitat for CTS is limited within the vicinity and restricted only to the margins of the Main Transmission component within the project site. However, ruderal and agricultural areas may be used as upland habitat for CTS where small mammal burrows or other protective features are present. Developed roadways do not provide suitable habitat; however, these species may disperse across roads.

Due to the proximity of known occurrences and habitats present, it should be assumed that all three species are present within the Transmission Main, the Bluff-Jensen Distribution and Service Areas, and the Springfield Distribution and Service Areas. These species also have a moderate to high potential to occur in other project components that are within dispersal distance for these species, but are further from the aquatic resources, as identified in Tables 2 and 3. Further analysis of the potential for these species to occur, such as detailed habitat assessments or protocol-level surveys, are not recommended as it is unlikely that these analyses would change the outcome (i.e., it is unlikely that the analyses would result in a negative finding and that acquisition of regulatory permits would not be necessary). Instead, acquisition of ITPs from the USFWS and CDFW are recommended. Previously CDFW would not issue an ITP for California fully protected species, including SCLTS. However, on July 10, 2023, Governor Newsom signed Senate Bill 147 (SB 147) allowing for permits to take fully protected species for certain renewable energy and infrastructure projects, which took effect immediately. Eligible projects include maintenance, repair, or improvement project to the State Water Project, including existing infrastructure, undertaken by the Department of Water Resources or to critical regional or local water agency infrastructure. Therefore, the project is likely eligible to obtain an ITP for SCLTS. Although ITPs are recommended, it is also recommended to make every effort to avoid habitat for these species in order to reduce impacts, which would in turn avoid or reduce compensatory mitigation requirements and costs. Avoidance and minimization measures for these species may include timing construction during the dry season, pre-construction clearance surveys and monitoring by a qualified biologist, moving individuals out of the work site if observed, covering excavations left open overnight, burrow excavation, and fencing work areas. The typical mitigation ratio for habitat impacts is 3:1 for area impacted and mitigation may be provided on site through restoration or preservation, or credits may be purchased from mitigation banks. Habitat for these species would also be considered ESHA within the coastal zone; the CCC may require increased mitigation ratios.

Please also note that permitting for federally-listed species varies based on whether the project has a federal nexus (i.e. federal funding, other federal permits, or other federal responsibilities). If the project has a federal nexus, Section 7 consultation is initiated between the USFWS and the other responsible federal agency. This includes preparation of a Biological Assessment (BA) and issuance of a Biological Opinion (BO) by the USFWS. If the project does not have a federal nexus, ESA is satisfied by the implementation of Section 10, which includes preparation of a Habitat Conservation Plan (HCP) and issuance of an ITP. Section 7 consultation typically takes less time due to statutory timelines (a BO must be issued within 135 days of initiation of consultation, which starts when all required information is received) and is typically less costly than Section 10.

Fish

The tidewater goby (*Eucyclogobius newberryi*; listed as endangered under ESA) and Monterey hitch (*Lavinia exilicauda harengus*; a California species of special concern) are known to occur within the Pajaro River, which is located immediately adjacent to the Bluff-Jensen Distribution component. In addition, the Pajaro River is designated critical habitat for S-CCC steelhead (see critical habitat discussion above), and this species may also occur in the river. As identified above in the Wetlands and Waters discussion, the Bluff-Jensen Distribution component is above the OHWM of the Pajaro River; however, there is a potential for indirect impacts due to proximity. However, if standard Best Management Practices (BMPs) and other avoidance measures are implemented to avoid all impacts to the Pajaro River, an ITP would not be required.

Western Bumble Bee

Grassland areas have the potential to support the crotch bumble bee and western bumble bee (candidates for listing under CESA). Crotch and western bumble bees require plants that bloom and provide adequate nectar and pollen throughout the colony's life cycle, which is from early February to late October/November. A habitat assessment to determine the presence/absence of sufficient flowering resources is recommended for any components that are identified with the potential to support this species in Tables 2 and 3. If sufficient flowering resources are observed, focused bumble bee surveys can be implemented, which includes at least four rounds of surveys to capture and identify bumble bees within the site, conducted during the appropriate flight season (April to November). If candidate bumble bees are found and would be impacted by the project, acquisition of a state ITP would be necessary.

Smith's Blue Butterfly

Dune scrub habitat within the Springfield Service Area component and scrub and chaparral habitats within the Sunny Mesa Connection Option 2 component may provide suitable habitat for the Smith's blue butterfly (listed as endangered under ESA). However, this species is closely tied to two buckwheat species (*Eriogonum parvifolium* and *E. latifolium*). Surveys to determine the presence of the host plants are recommended to determine if this species has the potential to occur within or immediately adjacent to the project site. If host plant species are found, avoidance of the host plants, work buffers, and/or seasonal work restrictions may be implemented to avoid impacts and acquisition of a federal ITP. If host plant species cannot be avoided, focused surveys may be implemented; however, the typical approach is to assume presence and acquire an ITP. Mitigation for impacts typically includes collecting the host plant species and duff and soil under the plants and moving them to adjacent host plants outside of the work area and habitat mitigation at a 3:1 ratio for area impacted or individual host plants impacts. The CCC may require up to a 5:1 mitigation ratio as habitat for this species is typically designated as ESHA.

Bats

The Transmission Main component would traverse the Highway 1 overpass within an existing utility conduit within the bridge. The Highway 1 overpass may provide suitable night roost habitat for special-status bat species, including pallid bat (*Antrozous pallidus*) and Townsends big-eared bat (*Corynorhinus townsendii*). Conducting work activities only during daylight hours would avoid impacts to these species. If night work is required at the Highway 1 overpass, pre-construction surveys by a bat specialist would be necessary to determine presence/absence of these species. If found, work activities may need to be delayed until the individuals have moved out of the area, or excluded or moved from the site by a bat specialist.

Special-Status Plant Species

Tables 4 summarizes the special-status plant species that have a moderate to high potential to occur within the evaluation areas based on presence of suitable habitat identified on aerial imagery. Please note that for format and spacing purposes, only the alternatives with the potential to support special-status plant species are included on Table 4; the analysis identified that there is a low potential or it is unlikely that any special-status plant species would occur within the Booster Pump Station, Main Terminus Option 2, Valve/Piping Modification, Iron and Manganese Treatment Plant, and Bluff-Jensen Tank and Pump Station components due to the developed and disturbed nature of these sites. Please refer to Attachments B and C for a list of all species evaluated for potential to occur.

Detailed habitat mapping would be required to confirm suitable habitat is present for species identified in Table 4. Subsequently, a focused survey during the appropriate blooming period for the species with suitable habitat would be necessary to identify their presence/absence within proposed development areas and facilitate an impact analysis sufficient for the CEQA process. No permits are required for impacts to species only identified as special-status on CNPS's Inventory of Rare Plants; however, mitigation measures consistent with CDFW recommendations are typically provided during the CEQA process. Standard measures that are typically recommended to reduce impacts to these species include avoidance and/or replacement at a 1:1 ratio for number of individuals or area impacted and preparation of a Restoration Plan by a qualified biologist. This ratio may be higher within the coastal zone.

Impacts to species listed under ESA would require acquisition of an ITP from CDFW. Impacts to species listed under ESA would only require acquisition of an ITP from USFWS if one or more federally-listed wildlife species were also impacted by the project. If impacts to state- or federally-listed plant species occur, the replacement ratio for federally-listed plant species is typically 3:1 for number of individuals or area impacted. This ratio may be higher within the coastal zone.

Although they are not considered a special-status species, oak trees are regulated under Monterey County code, which provides for the preservation of oaks and other protected tree species within the unincorporated areas of the County. No oak may be removed in any area of the County designated in the area plan as Resource Conservation, Residential, Commercial or Industrial without a permit. Removal of more than three protected trees on a lot in a one-year period requires a Forest Management Plan (FMP), to be prepared by a qualified forester selected from the County's list of consultants, and approval of a Use Permit by the

Monterey County Planning Commission. The applicant is required to relocate or replace each removed tree on a one-to-one ratio. This ratio may be varied upon showing that such a requirement will create a special hardship in the use of the site or such a replacement would be detrimental to the long-term health and maintenance of the remaining habitat.

Table 4. Special-Status Plant Species Known or With the Potential to Occur Within or Adjacent to the Project

Species	Status (USFWS/ CDFW/CNPS)	General Habitat	Potential Occurrence within Component					
			Transmission Main	Sunny Mesa Connection Option 1	Sunny Mesa Connection Option 2 & Wells Site	Main Terminus Option 1	Bluff-Jensen Distribution & Service Areas	Springfield Distribution & Service Areas
Arctostaphylos hookeri ssp. *hookeri* Hooker's manzanita	-- / -- / 1B	Closed-cone coniferous forest, chaparral, cismontane woodland, and coastal scrub on sandy soils at elevations of 85-536 meters. Evergreen shrub in the Ericaceae family; blooms January-June.		**Moderate** Marginal habitat is present within the oak woodland habitat.	**Moderate** Suitable habitat is present within the scrub and (potential) chaparral areas.			
Arctostaphylos pajaroensis Pajaro manzanita	-- / -- / 1B	Chaparral on sandy soils at elevations of 30-760 meters. Evergreen shrub in the Ericaceae family; blooms December-March.			**Moderate** Suitable habitat is present within the scrub and (potential) chaparral areas.			
Centromadia parryi ssp. *congdonii* Congdon's tarplant	-- / -- / 1B	Valley and foothill grassland on heavy clay, saline, or alkaline soils at elevations of 0-230 meters. Annual herb in the Asteraceae family; blooms May-November.	**Moderate** Suitable habitat may be present in ruderal areas where appropriate soils occur.					**Moderate** Suitable habitat may be present in ruderal areas where appropriate soils occur.
Chorizanthe pungens var. *pungens* Monterey spineflower	FT / -- / 1B	Maritime chaparral, cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland on sandy soils at elevations of 3-450 meters. Annual herb in the Polygonaceae family; blooms April-July.	**Moderate** Marginal habitat is present in ruderal areas. An occurrence of this species overlaps with this component along Highway 1.	**Moderate** Suitable habitat may be present in ruderal areas.	**Moderate** Suitable habitat may be present in ruderal, scrub, and (potential) chaparral areas.	**Moderate** Marginal habitat is present in ruderal areas. An occurrence of this species overlaps with this component along Highway 1.	**Moderate** Marginal habitat is present in ruderal areas. An occurrence of this species overlaps with this component on Trafton Rd.	**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat. Marginal habitat is also present in ruderal areas.
Chorizanthe robusta var. *robusta* Robust spineflower	FE / -- / 1B	Openings in cismontane woodland, coastal dunes, maritime chaparral, and coastal scrub on sandy or gravelly soils at elevations of 3-300 meters. Annual herb in the Polygonaceae family; blooms April-September.						**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Cordylanthus rigidus ssp. *littoralis* Seaside bird's-beak	-- / SE / 1B	Closed-cone coniferous forests, maritime chaparral, cismontane woodlands, coastal dunes, and coastal scrub on sandy soils, often on disturbed sites, at elevations of 0-425 meters. Annual hemi-parasitic herb in the Orobanchaceae family; blooms April-October.			**Moderate** Suitable habitat is present within the scrub and (potential) chaparral areas.			**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Ericameria fasciculata Eastwood's goldenbush	-- / -- / 1B	Openings in closed-cone coniferous forest, maritime chaparral, coastal dunes, and coastal scrub on sandy soils at elevations of 30-275 meters. Evergreen shrub in the Asteraceae family; blooms July-October.			**Moderate** Suitable habitat is present within the scrub and (potential) chaparral areas.			**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Erysimum ammophilum Sand-loving wallflower	-- / -- / 1B	Openings in maritime chaparral, coastal dunes, and coastal scrub on sandy soils at elevations of 0-60 meters. Perennial herb in the Brassicaceae family; blooms February-June.			**Moderate** Marginal habitat is present within the scrub and (potential) chaparral areas.			**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.

Species	Status (USFWS/ CDFW/CNPS)	General Habitat	Potential Occurrence within Component					
			Transmission Main	Sunny Mesa Connection Option 1	Sunny Mesa Connection Option 2 & Wells Site	Main Terminus Option 1	Bluff-Jensen Distribution & Service Areas	Springfield Distribution & Service Areas
Erysimum menziesii Menzies' wallflower	FE / SE / 1B	Coastal dunes at elevations of 0-35 meters. Perennial herb in the Brassicaceae family; blooms March-September.						**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Gilia tenuiflora ssp. *arenaria* Monterey gilia	FE / ST / 1B	Openings in maritime chaparral, cismontane woodland, coastal dunes, and coastal scrub on sandy soils at elevations of 0-45 meters. Annual herb in the Polemoniaceae family; blooms April-June.						**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Horkelia cuneata var. *sericea* Kellogg's horkelia	-- / -- / 1B	Openings of closed-cone coniferous forests, maritime chaparral, coastal dunes, and coastal scrub on sandy or gravelly soils at elevations of 10-200 meters. Perennial herb in the Rosaceae family; blooms April-September.		**Moderate** Marginal habitat is present within the oak woodland habitat	**Moderate** Suitable habitat is present within the scrub and (potential) chaparral areas.			**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Horkelia marinensis Point Reyes horkelia	-- / -- / 1B	Coastal dunes, coastal prairie, and coastal scrub on sandy soils at elevations of 5-350 meters. Perennial herb in the Rosaceae family; blooms May-September.			**Moderate** Suitable habitat is present within the scrub habitat.			**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Lasthenia californica ssp. *macrantha* Perennial goldfields	-- / -- / 1B	Coastal bluff scrub, coastal dunes, and coastal scrub at an elevation of 5-520 meters. Perennial herb in the Asteraceae family. Blooms January – November.						**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Monardella sinuata ssp. *nigrescens* Northern curly-leaved monardella	-- / -- /1B	Chaparral, coastal dunes, coastal scrub, and lower montane coniferous forest (ponderosa pine sandhills) on sandy soils at elevations of 0-300 meters. Annual herb in the Lamiaceae family; blooms April-September.			**Moderate** Suitable habitat is present within the scrub and (potential) chaparral areas.			**Moderate Adjacent** Suitable habitat is present within the adjacent dune scrub habitat.
Piperia yadonii Yadon's rein orchid	FE / -- / 1B	Sandy soils in coastal bluff scrub, closed-cone coniferous forest, and maritime chaparral at elevations of 10-510 meters. Annual herb in the Orchidaceae family; blooms February-August.			**Moderate** Suitable habitat is present within the potential chaparral habitat.			
Trifolium hydrophilum Saline clover	-- / -- / 1B	Marshes and swamps, mesic and alkaline valley and foothill grassland, and vernal pools at elevations of 0-300 meters. Annual herb in the Fabaceae family; blooms April-June.						**Moderate** Suitable habitat may be present in emergent wetland areas.

STATUS DEFINITIONS

Federal
FE = listed as Endangered under the federal Endangered Species Act
FT = listed as Threatened under the federal Endangered Species Act
-- = no listing

State
SE = listed as Endangered under the California Endangered Species Act
-- = no listing

California Native Plant Society
1B = California Rare Plant Rank 1B species; rare, threatened, or endangered in California and elsewhere

POTENTIAL TO OCCUR
High = known occurrence of species in the immediate vicinity from the CNDDB or other documentation; presence of ideal habitat conditions
Moderate = known occurrence of species in the vicinity from the CNDDB or other documentation; presence of suitable habitat conditions within the site

CONCLUSION & RECOMMENDATIONS

Table 5 provides a summary of the sensitive natural resources identified or with the potential to occur within and adjacent to each component, regulatory permits that may be required if these resources are impacted, and additional surveys that are recommended if the component is considered further for development. In addition, the summary below provides the main environmental concerns and permitting requirements for the alternatives considered for the Sunny Mesa Connection (Options 1 and 2) and the Main Terminus (Options 1 and 2). In addition, please note that the summary below and Table 5 do not include wildlife species that are only designated as California species of special concern or plant species only designated as special-status on CNPS's Inventory of Rare Plants because impacts to these species do not require acquisition of regulatory permits. As identified above, mitigation measures consistent with CDFW recommendations are typically provided during the CEQA process if the project has the potential to impact these species, such as implementation of an employee education program, pre-construction surveys of proposed impact areas, construction-phase monitoring by a qualified biologist, and preparation and implementation of a restoration plan. These typical mitigation measures are not expected to increase project budget or schedule by a significant amount when compared to sensitive natural resources that require additional regulatory permitting.

Comparison of Alternative Components

Sunny Mesa Connections

Both Sunny Mesa Connection Options 1 and 2 contain suitable habitat to support CRLF, white-tailed kite, crotch and western bumble bees, and Monterey spineflower. However, the Option 2 evaluation area contains sensitive riparian habitat and may also contain sensitive chaparral habitat. As such, there is also potential for Option 2 to impact listed species that may occur within these sensitive habitats, including tricolored blackbird, seaside bird's-beak, and Yadon's rein orchid. The Option 2 evaluation area may also contain a roadside ditch that has the potential to support wetlands or other waters of the state. Although Option 2 has the potential to support more sensitive resources, many potential impacts can be avoided through project design (i.e., avoiding sensitive habitats) if this is the preferred alternative. Permits required for listed species are likely to be required for other project components and therefore, Option 2 is unlikely to trigger any new permits.

Main Terminus Options

Both Main Terminus Options 1 and 2 contain suitable habitat to support CTS, CRLF, white-tailed kite, and crotch and western bumble bees. However, the Option 1 evaluation area may contain sensitive riparian habitat and a drainage that could support state waters or wetlands. As such, there is also potential for Option 1 to impact SCLTS, which may occur within these sensitive habitat areas. Monterey spineflower may also occur within the Option 1 area as a CNDDB occurrence is noted along Highway 1. Additional analysis would be required to determine if these sensitive habitats and species occur within Option 1. Although Option 1 has the potential to support more sensitive resources, many potential impacts can be avoided through project design (i.e., avoiding sensitive habitats). Permits required for listed species are likely to be required for other project components and therefore, Option 1 is unlikely to trigger any new permits.

Table 6. Summary of Sensitive Biological Resources and Regulatory Permits

Project Component	Sensitive Habitat			Listed Species		Regulatory Permits							Additional Surveys Recommended
	Wetlands/ Waters	Riparian	Other	Federal	State	USFWS ITP	NOAA ITP	CDFW ITP	CDFW 1602	ACOE 404	RWQCB 401 or Discharge	CDP	
North of Moss Landing Transmission													
Transmission Main	Potential Ditches and Culverts	Yes	ESHA	CA Tiger Salamander (FT) CA Red-legged Frog (FT) Monterey Spineflower (FT)	White-tailed Kite (CFP) CA Tiger Salamander (ST) Crotch Bumble Bee (SC) Western Bumble Bee (SC)	Yes	No	Yes	Potential	Unlikely	Potential	Yes	Detailed habitat mapping Wetland delineation Focused rare plant surveys Bumble bee habitat assessment
Booster Pump Station	No	No	No	CA Red-legged Frog (FT)	None	Yes	No	No	No	No	No	No	None
Sunny Mesa Connection Option 1	No	No	No	CA Red-legged Frog (FT) Monterey Spineflower (FT)	White-tailed Kite (CFP) Crotch Bumble Bee (SC) Western Bumble Bee (SC)	Yes	No	Potential	Potential	Unlikely	Potential	No	Detailed habitat mapping Focused rare plant surveys Bumble bee habitat assessment
Sunny Mesa Connection Option 2 & Wells Site	Potential Ditches and Culverts	Yes	Chaparral (Potential)	Monterey Spineflower (FT) CA Red-legged Frog (FT)	Tricolored Blackbird (ST) White-tailed Kite (CFP) Crotch Bumble Bee (SC) Western Bumble Bee (SC) Seaside Bird's-beak (SE) Yadon's Rein Orchid (FE)	Yes	No	Potential	Potential	Unlikely	Potential	Yes	Detailed habitat mapping Wetland delineation Focused rare plant surveys Bumble bee habitat assessment
Main Terminus Option 1	Potential Drainage	Potential	ESHA (Potential)	CA Tiger Salamander (FT) Santa Cruz Long-toed Salamander (FE) CA Red-legged Frog (FT) Monterey Spineflower (FT)	White-tailed Kite (CFP) CA Tiger Salamander (ST) Santa Cruz Long-toed Salamander (SE/CFP) Crotch Bumble Bee (SC) Western Bumble Bee (SC)	Yes	No	Yes	Potential	Unlikely	Potential	Yes	Detailed habitat mapping Wetland delineation Focused rare plant surveys Bumble bee habitat assessment
Main Terminus Option 2	No	No	No	CA Tiger Salamander (FT) CA Red-legged Frog (FT)	White-tailed Kite (CFP) CA Tiger Salamander (ST) Crotch Bumble Bee (SC) Western Bumble Bee (SC)	Yes	No	Yes	No	No	No	Yes	Detailed habitat mapping Bumble bee habitat assessment
Valve/Piping Modification	No	No	No	None	None	No	No	No	No	No	No	No	None
Iron & Manganese Treatment Plant	No	No	No	None	None	No	No	No	No	No	No	No	None

Project Component	Sensitive Habitat			Listed Species		Regulatory Permits							Additional Surveys Recommended
	Wetlands/ Waters	Riparian	Other	Federal	State	USFWS ITP	NOAA ITP	CDFW ITP	CDFW 1602	ACOE 404	RWQCB 401 or Discharge	CDP	
Bluff-Jensen Expansion													
Bluff-Jensen Expansion & Distribution	Potential Culverts Adjacent Pajaro River	Adjacent	ESHA (Adjacent)	CA Tiger Salamander (FT) Santa Cruz Long-toed Salamander (FE) CA Red-legged Frog (FT) Tidewater Goby (FE) S-CCC Steelhead (FT) Monterey Spineflower (FT)	Tricolored Blackbird (ST) White-tailed Kite (CFP) Bank Swallow (ST) CA Tiger Salamander (ST) Santa Cruz Long-toed Salamander (SE/CFP) Crotch Bumble Bee (SC) Western Bumble Bee (SC)	Yes	Potential (likely can avoid)	Yes	Potential	Unlikely	Potential	Yes	Detailed habitat mapping Wetland delineation Focused rare plant surveys Bumble bee habitat assessment
Bluff-Jensen Tank & Pump Station	No	No	No	CA Tiger Salamander (FT) CA Red-legged Frog (FT)	CA Tiger Salamander (ST)	Yes	No	Yes	No	No	No	Yes	None
Springfield Expansion													
Springfield Expansion & Distribution	McClusky Slough Potential Ditches, Culverts, & Drainages	Yes	ESHA	Western Snowy Plover (FT) CA Tiger Salamander (FT) Santa Cruz Long-toed Salamander (FE) CA Red-legged Frog (FT) Smith's Blue Butterfly (FE) Monterey Spineflower (FT) Robust Spineflower (FE) Menzies' Wallflower (FE) Monterey Gilia (FE)	Tricolored Blackbird (ST) White-tailed Kite (CFP) CA Tiger Salamander (ST) Santa Cruz Long-toed Salamander (SE/CFP) Crotch Bumble Bee (SC) Western Bumble Bee (SC) Seaside Bird's-beak (SE) Menzies' Wallflower (SE) Monterey Gilia (ST)	Yes	No	Yes	Yes	Potential	Potential	Yes	Detailed habitat mapping Wetland delineation Focused rare plant surveys Bumble bee habitat assessment

References

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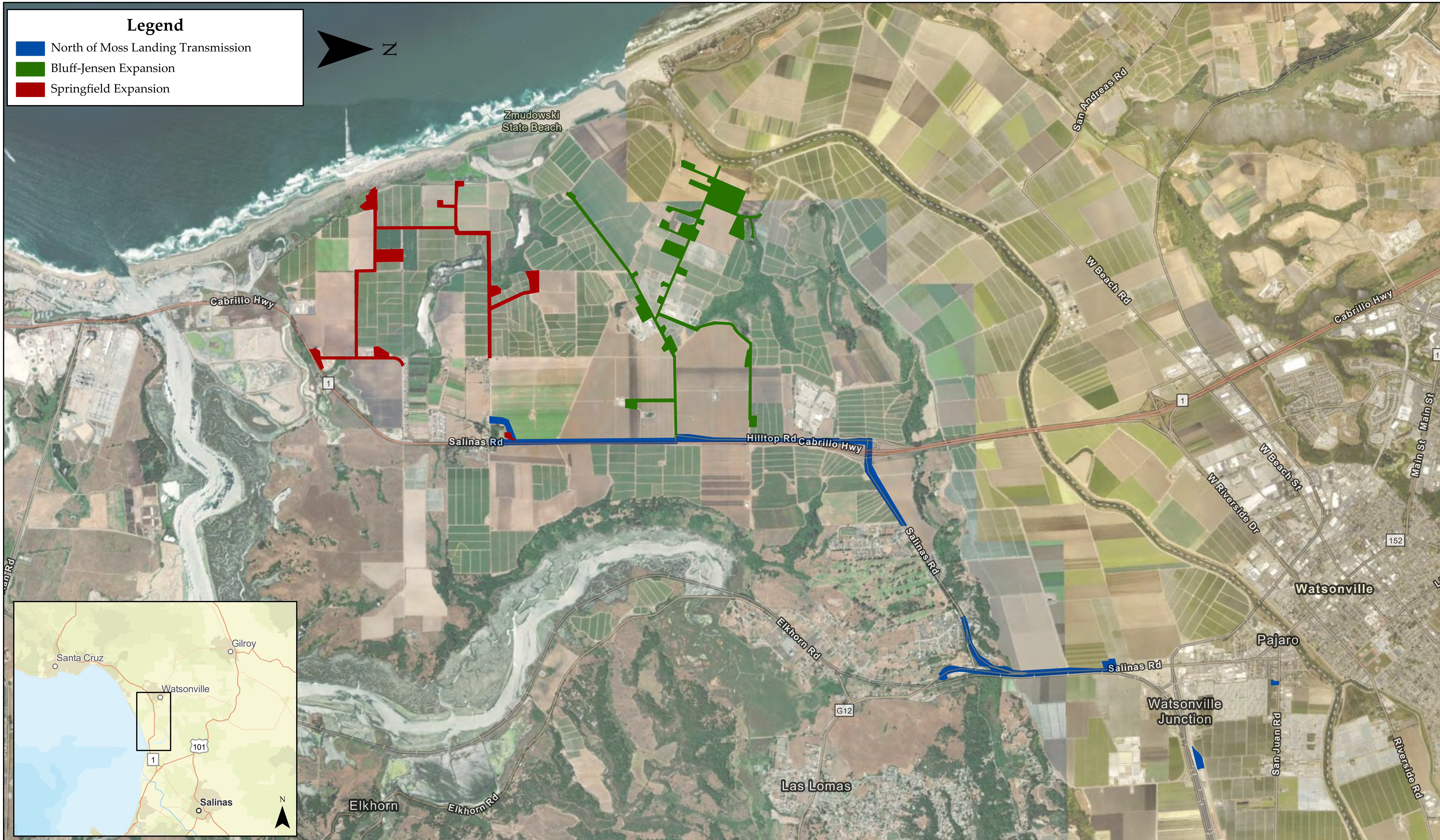
Attachments

Attachment A: Figures 1-6
Attachment B: CNDDB and IPaC

Attachment A: Figures 1-6



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North Of Moss Landing Regional Consolidation Project
Project Location

0 0.25 0.5 1 mi
0 0.5 1 2 km

Date: 9/22/2023
Scale: 1 inch equals 3,333 feet
Project: 2023-47

Monterey | San Jose
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Environmental Consultants Resource Planners
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Monterey, CA 93940
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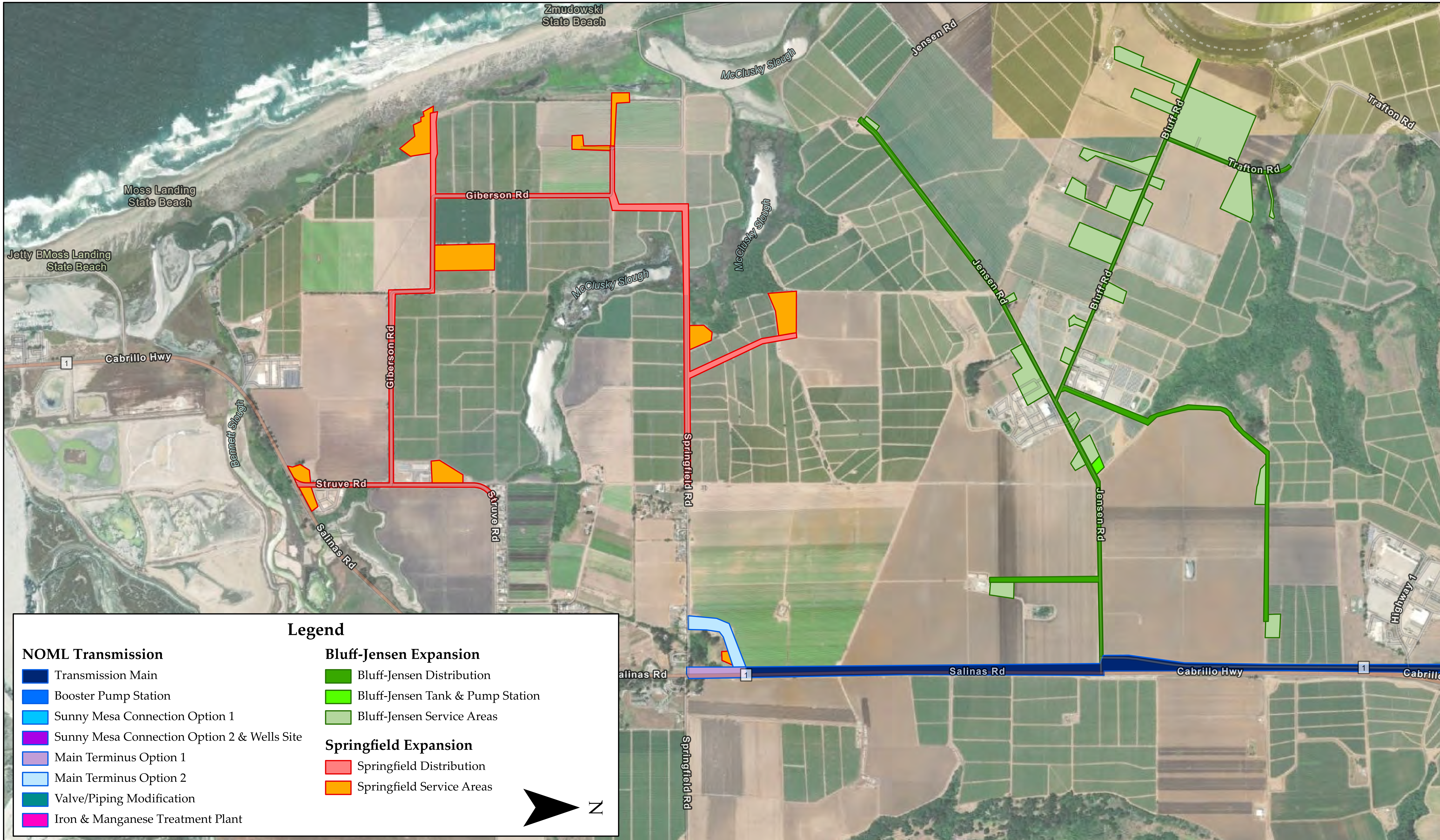
Figure 1



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North Of Moss Landing Regional Consolidation Project
Project Components

0 0.15 0.3 0.6 mi
0 0.25 0.5 1 km

Date: 10/30/2023
Scale: 1 inch equals 1,500 feet
Project: 2023-47

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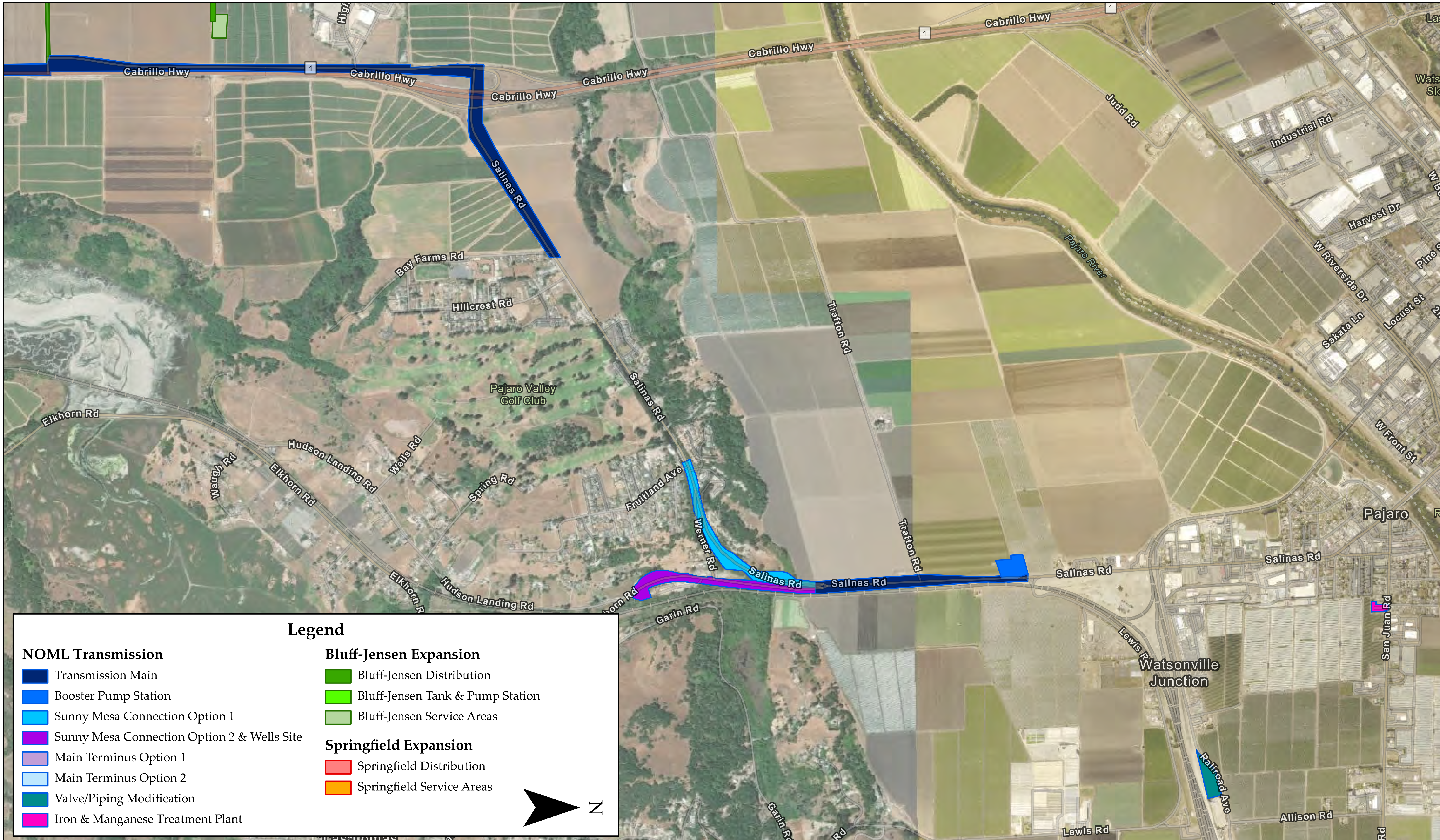
Figure
2a



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North Of Moss Landing Regional Consolidation Project
Project Components

0 0.15 0.3 0.6 mi
0 0.25 0.5 1 km

Date: 10/30/2023
Scale: 1 inch equals 1,500 feet
Project: 2023-47

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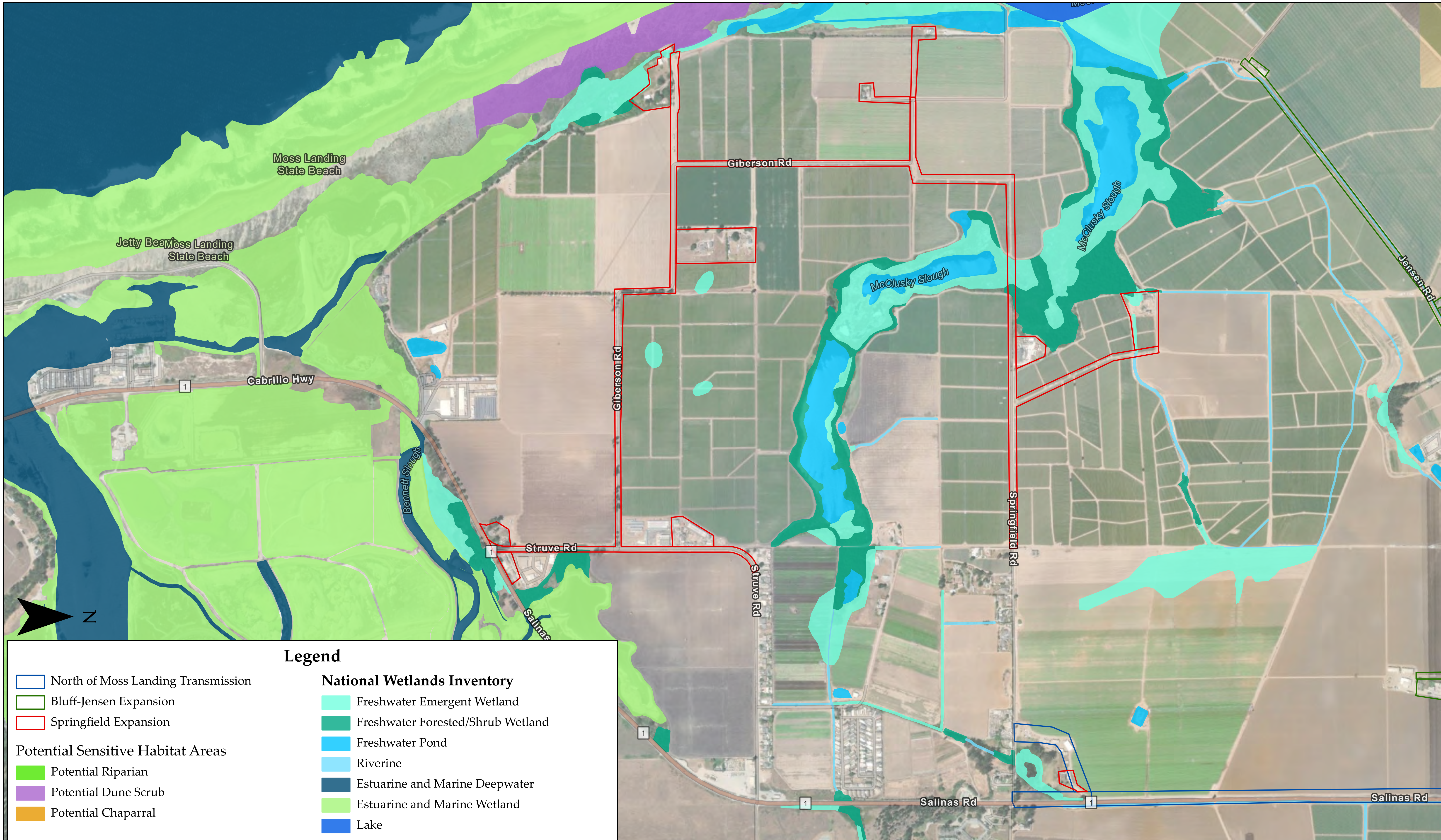
Figure 2b



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North Of Moss Landing Regional Consolidation Project
Sensitive Habitats

0 0.1 0.2 0.4 mi
0 0.17 0.35 0.7 km

Date: 9/22/2023
Scale: 1 inch equals 1,125 feet
Project: 2023-47

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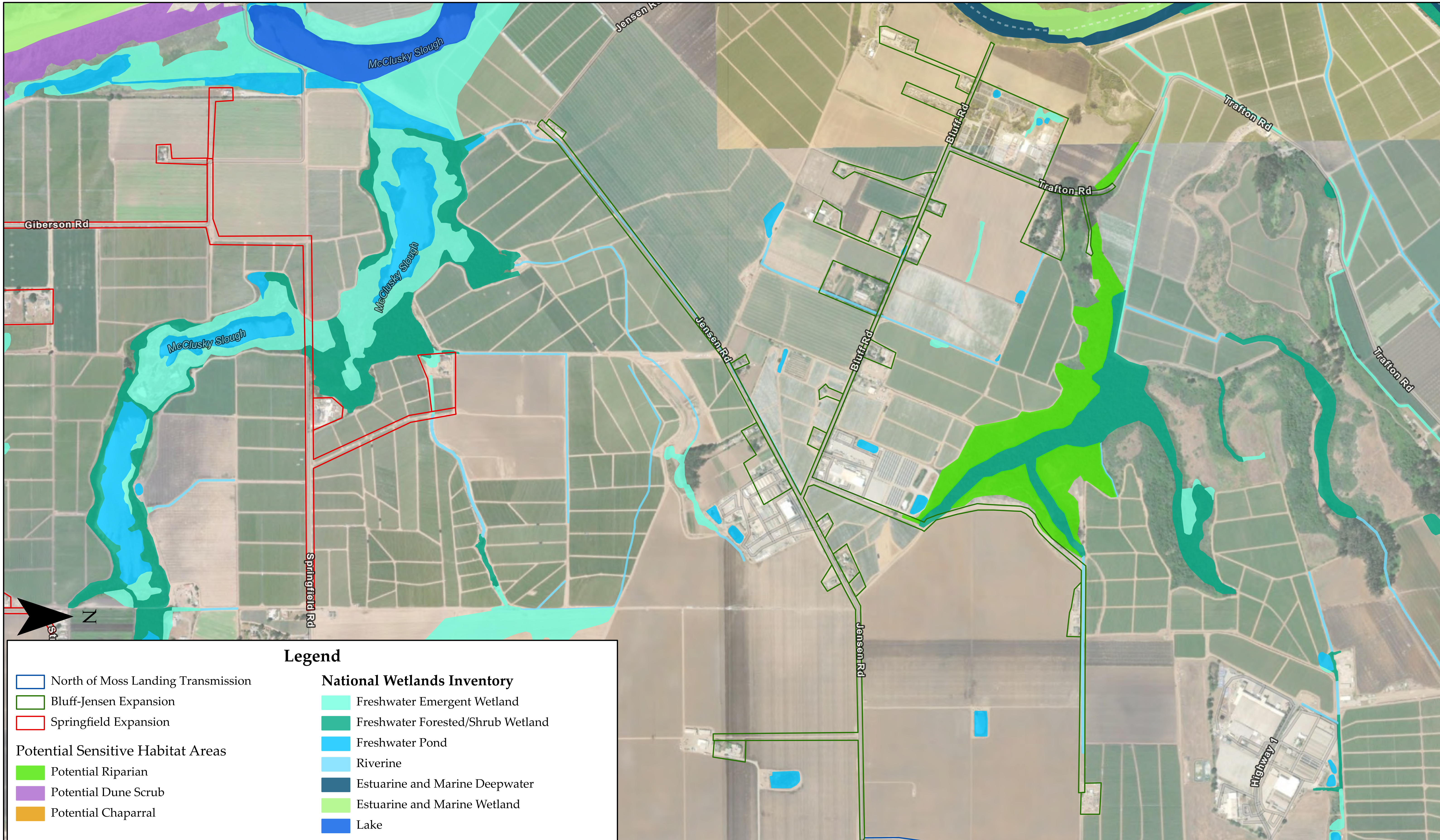
Figure 3a



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North Of Moss Landing Regional Consolidation Project
Sensitive Habitats

0 0.1 0.2 0.4 mi

0 0.17 0.35 0.7 km

Date: 9/22/2023

Scale: 1 inch equals 1,125 feet

Project: 2023-47

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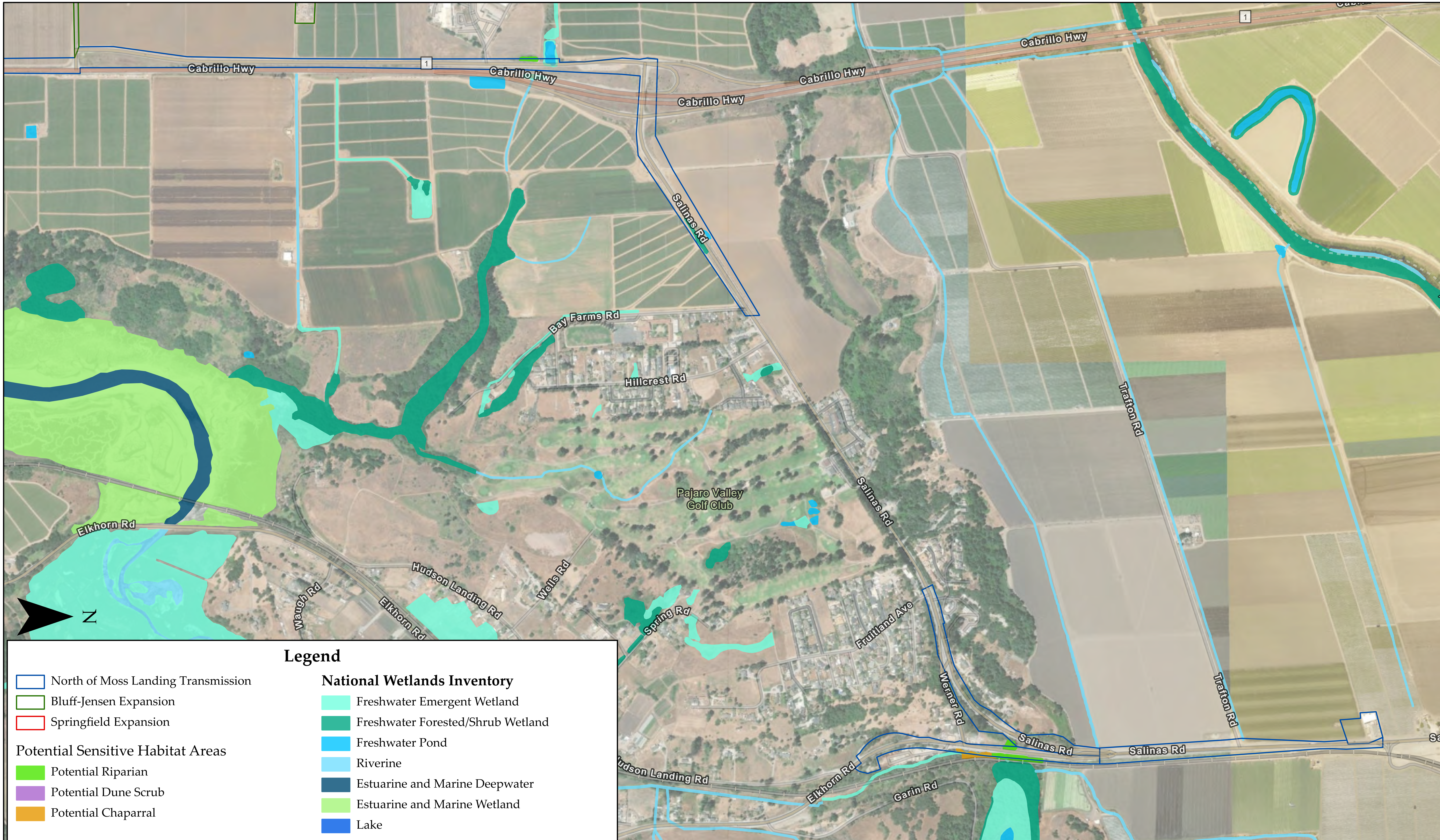
Figure 3b



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North Of Moss Landing Regional Consolidation Project
Sensitive Habitats

0 0.1 0.2 0.4 mi
0 0.17 0.35 0.7 km

Date: 9/22/2023
Scale: 1 inch equals 1,125 feet
Project: 2023-47

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Figure
3c

C:\GIS\GIS_Projects\2023-47 Moss Landing Water Consolidation\2023-47 Moss Landing Water Consolidation.aprx

North Of Moss Landing Regional Consolidation Project
California Tiger Salamander Occurrence Map

0 0.5 1 2 km
0 0.25 0.5 1 mi

Date: 9/22/2023
Scale: 1 inch equals 3,360 feet
Project: 2023-47

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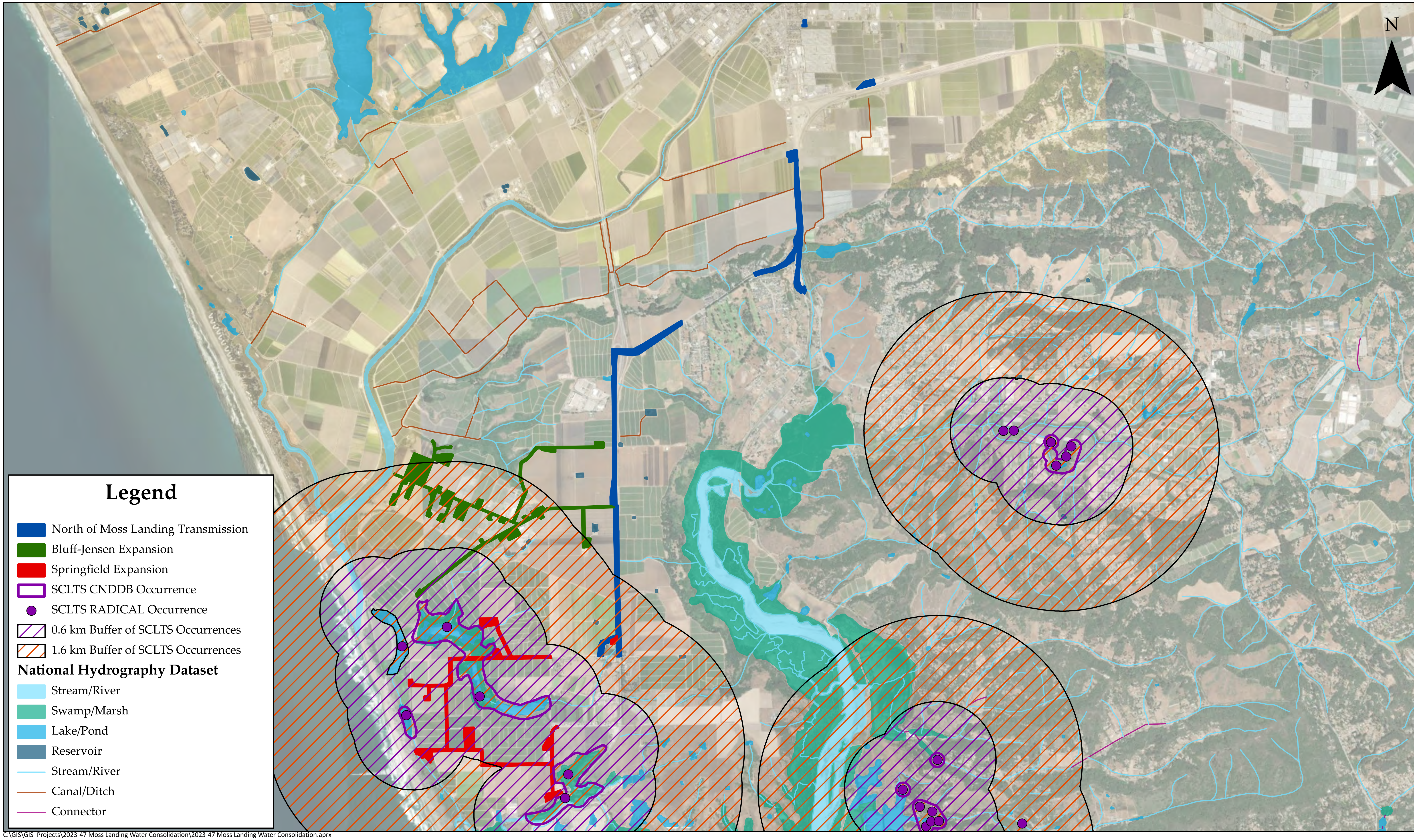
Figure 4



North Of Moss Landing Regional Consolidation Project
Santa Cruz Long-toed Salamander Occurrence Map

0 0.5 1 2 km
0 0.25 0.5 1 mi

Date: 9/22/2023
Scale: 1 inch equals 3,250 feet
Project: 2023-47

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DD&A
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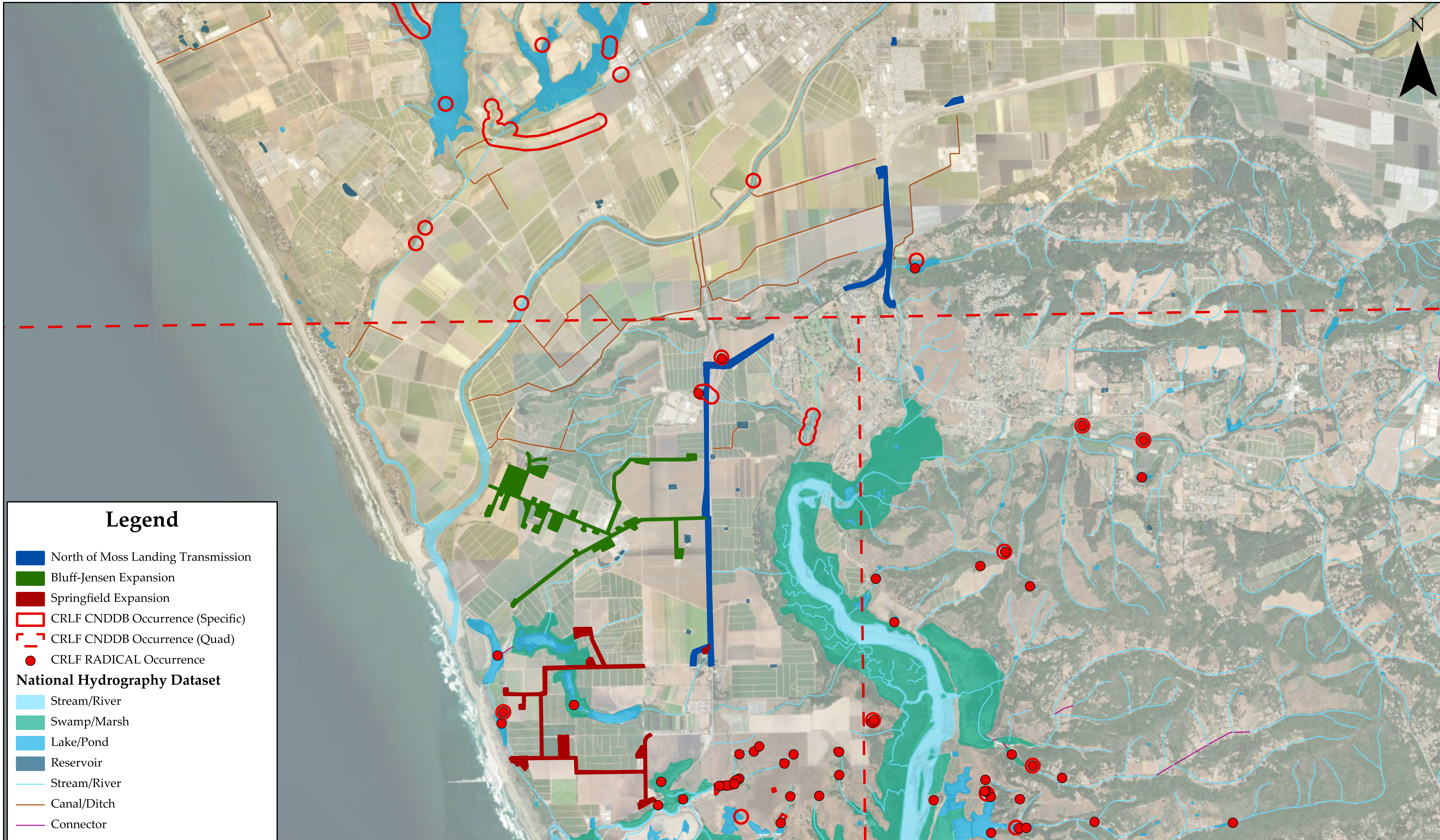
Figure
5



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North Of Moss Landing Regional Consolidation Project
California Red-legged Frog Occurrence Map

0 0.5 1 2 km
0 0.25 0.5 1 mi

Date: 9/22/2023
Scale: 1 inch equals 3,360 feet
Project: 2022-82

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Figure
6

Attachment B: CNDDB and IPaC

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Moss Landing (3612177) OR Marina (3612167) OR Watsonville East (3612186) OR Watsonville West (3612187) OR Prunedale (3612176) OR Salinas (3612166) OR Soquel (3612188))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G1G2	S2	SSC
Agrostis lacuna-vernalis vernal pool bent grass	PMPOA041N0	None	None	G1	S1	1B.1
Allium hickmanii Hickman's onion	PMLIL02140	None	None	G2	S2	1B.2
Ambystoma californiense pop. 1 California tiger salamander - central California DPS	AAAAA01181	Threatened	Threatened	G2G3T3	S3	WL
Ambystoma macrodactylum croceum Santa Cruz long-toed salamander	AAAAA01082	Endangered	Endangered	G5T1T2	S2	FP
Aneides niger Santa Cruz black salamander	AAAAD01070	None	None	G3	S3	SSC
Anniella pulchra Northern California legless lizard	ARACC01020	None	None	G3	S2S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G4	S3	SSC
Arctostaphylos andersonii Anderson's manzanita	PDERI04030	None	None	G2	S2	1B.2
Arctostaphylos hookeri ssp. hookeri Hooker's manzanita	PDERI040J1	None	None	G3T2	S2	1B.2
Arctostaphylos montereyensis Toro manzanita	PDERI040R0	None	None	G2?	S2?	1B.2
Arctostaphylos pajaroensis Pajaro manzanita	PDERI04100	None	None	G1	S1	1B.1
Arctostaphylos pumila sandmat manzanita	PDERI04180	None	None	G1	S1	1B.2
Asio flammeus short-eared owl	ABNSB13040	None	None	G5	S2	SSC
Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1	None	None	G2T1	S1	1B.2
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S2	SSC
Bombus caliginosus obscure bumble bee	IIHYM24380	None	None	G2G3	S1S2	
Bombus crotchii Crotch bumble bee	IIHYM24480	None	Candidate Endangered	G2	S2	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Bombus occidentalis western bumble bee	IIHYM24252	None	Candidate Endangered	G3	S1	
Bombus pensylvanicus American bumble bee	IIHYM24260	None	None	G3G4	S2	
Buteo regalis ferruginous hawk	ABNKC19120	None	None	G4	S3S4	WL
Castilleja ambigua var. insalutata pink Johnny-nip	PDSCR0D403	None	None	G4T2	S2	1B.1
Central Dune Scrub Central Dune Scrub	CTT21320CA	None	None	G2	S2.2	
Central Maritime Chaparral Central Maritime Chaparral	CTT37C20CA	None	None	G2	S2.2	
Centromadia parryi ssp. congdonii Congdon's tarplant	PDAST4R0P1	None	None	G3T2	S2	1B.1
Charadrius nivosus nivosus western snowy plover	ABNNB03031	Threatened	None	G3T3	S3	SSC
Chorizanthe minutiflora Fort Ord spineflower	PDPGN04100	None	None	G1	S1	1B.2
Chorizanthe pungens var. pungens Monterey spineflower	PDPGN040M2	Threatened	None	G2T2	S2	1B.2
Chorizanthe robusta var. robusta robust spineflower	PDPGN040Q2	Endangered	None	G2T1	S1	1B.1
Cicindela ohlone Ohlone tiger beetle	IICOL026L0	Endangered	None	G1	S1	
Coastal and Valley Freshwater Marsh Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	G3	S2.1	
Coastal Brackish Marsh Coastal Brackish Marsh	CTT52200CA	None	None	G2	S2.1	
Coelus globosus globose dune beetle	IICOL4A010	None	None	G1G2	S1S2	
Cordylanthus rigidus ssp. littoralis seaside bird's-beak	PDSCR0J0P2	None	Endangered	G5T2	S2	1B.1
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	None	G4	S2	SSC
Coturnicops noveboracensis yellow rail	ABNME01010	None	None	G4	S2	SSC
Danaus plexippus plexippus pop. 1 monarch - California overwintering population	IILEPP2012	Candidate	None	G4T1T2Q	S2	
Dicamptodon ensatus California giant salamander	AAAAH01020	None	None	G2G3	S2S3	SSC
Dipodomys venustus venustus Santa Cruz kangaroo rat	AMAFD03042	None	None	G4T1	S1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Elanus leucurus white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Eremophila alpestris actia California horned lark	ABPAT02011	None	None	G5T4Q	S4	WL
Ericameria fasciculata Eastwood's goldenbush	PDAST3L080	None	None	G2	S2	1B.1
Erysimum ammophilum sand-loving wallflower	PDBRA16010	None	None	G2	S2	1B.2
Erysimum menziesii Menzies' wallflower	PDBRA160R0	Endangered	Endangered	G1	S1	1B.1
Eucyclogobius newberryi tidewater goby	AFCQN04010	Endangered	None	G3	S3	
Euphilotes enoptes smithi Smith's blue butterfly	IILEPG2026	Endangered	None	G5T2	S2	
Falco peregrinus anatum American peregrine falcon	ABNKD06071	Delisted	Delisted	G4T4	S3S4	
Fritillaria liliacea fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
Gilia tenuiflora ssp. arenaria Monterey gilia	PDPLM041P2	Endangered	Threatened	G3G4T2	S2	1B.2
Gonidea angulata western ridged mussel	IMBIV19010	None	None	G3	S2	
Holocarpha macradenia Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
Horkelia cuneata var. sericea Kellogg's horkelia	PDROS0W043	None	None	G4T1?	S1?	1B.1
Horkelia marinensis Point Reyes horkelia	PDROS0W0B0	None	None	G2	S2	1B.2
Lasthenia californica ssp. macrantha perennial goldfields	PDAST5L0C5	None	None	G3T2	S2	1B.2
Lasthenia conjugens Contra Costa goldfields	PDAST5L040	Endangered	None	G1	S1	1B.1
Lavinia exilicauda harengus Monterey hitch	AFCJB19013	None	None	G4T3	S3	SSC
Legenere limosa legenere	PDCAM0C010	None	None	G2	S2	1B.1
Linderiella occidentalis California linderiella	ICBRA06010	None	None	G2G3	S2S3	
Microseris paludosa marsh microseris	PDAST6E0D0	None	None	G2	S2	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Monardella sinuata ssp. nigrescens northern curly-leaved monardella	PDLAM18162	None	None	G3T2	S2	1B.2
Monolopia gracilens woodland woollythreads	PDAST6G010	None	None	G3	S3	1B.2
Neotoma macrotis luciana Monterey dusky-footed woodrat	AMAFF08083	None	None	G5T3	S3	SSC
Northern Coastal Salt Marsh Northern Coastal Salt Marsh	CTT52110CA	None	None	G3	S3.2	
Oncorhynchus mykiss irideus pop. 8 steelhead - central California coast DPS	AFCHA0209G	Threatened	None	G5T3Q	S3	
Oncorhynchus mykiss irideus pop. 9 steelhead - south-central California coast DPS	AFCHA0209H	Threatened	None	G5T2Q	S2	
Pedicularis dudleyi Dudley's lousewort	PDSCR1K180	None	Rare	G2	S2	1B.2
Pentachaeta bellidiflora white-rayed pentachaeta	PDAST6X030	Endangered	Endangered	G1	S1	1B.1
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G4	S4	SSC
Piperia yadonii Yadon's rein orchid	PMORC1X070	Endangered	None	G1	S1	1B.1
Plagiobothrys chorisianus var. chorisianus Choris' popcornflower	PDBOR0V061	None	None	G3T1Q	S1	1B.2
Plagiobothrys diffusus San Francisco popcornflower	PDBOR0V080	None	Endangered	G1Q	S1	1B.1
Rallus obsoletus obsoletus California Ridgway's rail	ABNME05011	Endangered	Endangered	G3T1	S2	FP
Rana boylii pop. 4 foothill yellow-legged frog - central coast DPS	AAABH01054	Proposed Threatened	Endangered	G3T2	S2	
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Reithrodontomys megalotis distichlis Salinas harvest mouse	AMAFF02032	None	None	G5T1	S2	
Riparia riparia bank swallow	ABPAU08010	None	Threatened	G5	S3	
Rosa pinetorum pine rose	PDROS1J0W0	None	None	G2	S2	1B.2
Scaphinotus behrensi Behrens' snail-eating beetle	IICOL4L070	None	None	G2G4	S2S4	
Sorex ornatus salarius Monterey shrew	AMABA01105	None	None	G5T1T2	S1S2	SSC
Spea hammondii western spadefoot	AAABF02020	None	None	G2G3	S3S4	SSC

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Spirinchus thaleichthys longfin smelt	AFCHB03010	Candidate	Threatened	G5	S1	
Taricha torosa Coast Range newt	AAAAF02032	None	None	G4	S4	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Thaleichthys pacificus eulachon	AFCHB04010	Threatened	None	G5	S1	
Trifolium buckwestiorum Santa Cruz clover	PDFAB402W0	None	None	G2	S2	1B.1
Trifolium hydrophilum saline clover	PDFAB400R5	None	None	G2	S2	1B.2
Trimerotropis infantilis Zayante band-winged grasshopper	IIORT36030	Endangered	None	G1	S1	
Tryonia imitator mimic tryonia (=California brackishwater snail)	IMGASJ7040	None	None	G2	S2	

Record Count: 90

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Project information

NAME

North of Moss Landing Water Consolidation Project

LOCATION

Monterey County, California

DESCRIPTION

Some(Water distribution facilities consolidation including transmission main, booster pump station, distribution pipelines, pump station, tank, and a treatment plant)

Local office

Ventura Fish And Wildlife Office

(805) 644-1766
(805) 644-3958
FW8VenturaSection7@FWS.Gov

2493 Portola Road, Suite B
Ventura, CA 93003-7726

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
California Clapper Rail *Rallus longirostris obsoletus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4240	Endangered
California Condor *Gymnogyps californianus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8193	Endangered
California Least Tern *Sterna antillarum browni* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered
Least Bell's Vireo *Vireo bellii pusillus* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5945	Endangered
Marbled Murrelet *Brachyramphus marmoratus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened
Southwestern Willow Flycatcher *Empidonax traillii extimus* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6749	Endangered
Western Snowy Plover *Charadrius nivosus nivosus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8035	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander *Ambystoma californiense* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened
Foothill Yellow-legged Frog *Rana boylii* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5133	Proposed Threatened
Foothill Yellow-legged Frog *Rana boylii* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5133	Proposed Endangered

NAME	STATUS
Santa Cruz Long-toed Salamander Ambystoma macrodactylum croceum Wherever found There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/7405	Endangered

Fishes

NAME	STATUS
Tidewater Goby Eucyclogobius newberryi Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/57	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp Branchinecta lynchi Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Marsh Sandwort Arenaria paludicola Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2229	Endangered
Monterey Gilia Gilia tenuiflora ssp. arenaria Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/856	Endangered
Monterey Spineflower Chorizanthe pungens var. pungens Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/396	Threatened
Santa Cruz Tarplant Holocarpha macradenia Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6832	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Monterey Spineflower Chorizanthe pungens var. pungens https://ecos.fws.gov/ecp/species/396#crithab	Final

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 1 to Aug 31

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

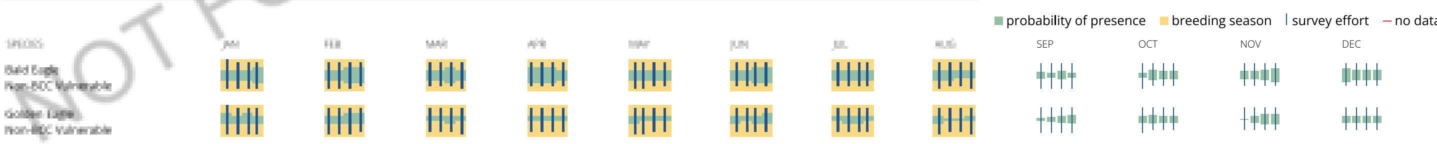
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/ documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME — BREEDING SEASON

Allen's Hummingbird Selasphorus sasin — Breeds Feb 1 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9637

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Belding's Savannah Sparrow Passerculus sandwichensis beldingi — Breeds Apr 1 to Aug 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/8

Black Oystercatcher Haematopus bachmani — Breeds Apr 15 to Oct 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9591

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Black Swift Cypseloides niger — Breeds Jun 15 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8878

Black Tern Chlidonias niger — Breeds May 15 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3093

Black Turnstone Arenaria melanocephala — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Bullock's Oriole Icterus bullockii — Breeds Mar 21 to Jul 25
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

California Gull Larus californicus — Breeds Mar 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

California Thrasher Toxostoma redivivum — Breeds Jan 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Clark's Grebe Aechmophorus clarkii — Breeds Jun 1 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Gull-billed Tern Gelochelidon nilotica — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9501

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Marbled Godwit Limosa fedoa — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Mountain Plover Charadrius montanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3638

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Olive-sided Flycatcher Contopus cooperi — Breeds May 20 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3914

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Western Grebe aechmophorus occidentalis — Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

https://ecos.fws.gov/ecp/species/6743

Willet Tringa semipalmata — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence ( )

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ( )

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ( )

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

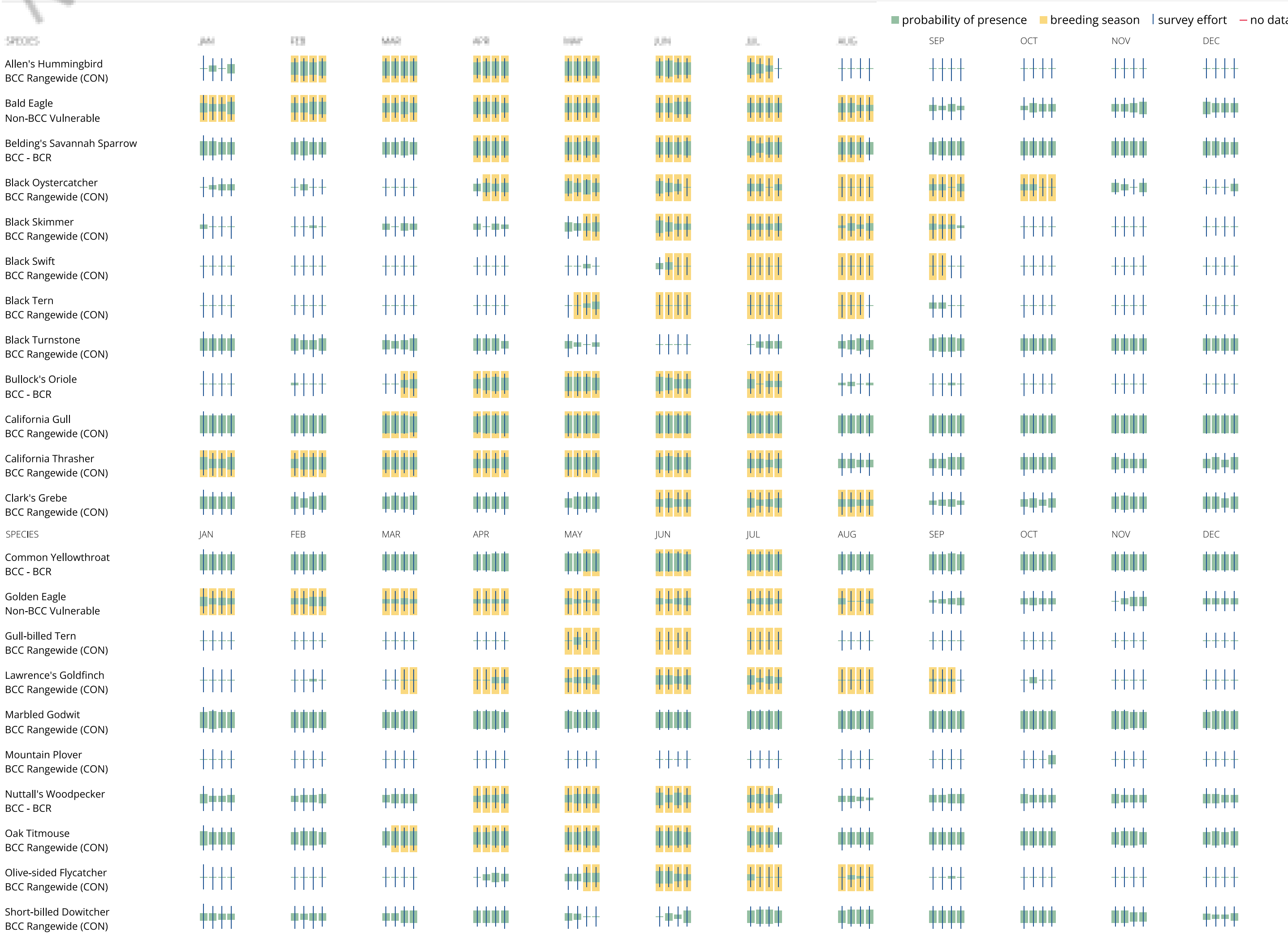
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

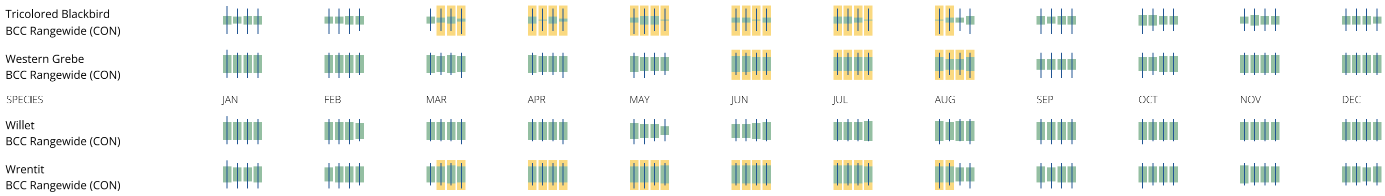
No Data ( )

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

Wildlife refuges and fish hatcheries

Refuge and fish hatchery information is not available at this time

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1F
- PEM1C
- PEM1Cx
- PEM1/SSA
- PEM1A

FRESHWATER FORESTED/SHRUB WETLAND

- PFOC
- PSSC
- PFOA
- PSSAx
- PSSCx

FRESHWATER POND

- PUBFx

RIVERINE

- R4SBCx
- R5UBFx

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

ATTACHMENT B

CULTURAL RESOURCES

CONFIDENTIAL DOCUMENT SUBMITTED SEPARATELY

CULTURAL REPORTS ARE NOT FOR PUBLIC DISSEMINATION

Phase I Archaeological Assessment in Support of the North of Moss Landing Community Water Center Project, Monterey County, California

Prepared for:
Denise Duffy & Associates, Inc.
947 Cass St. Suite 5
Monterey, California 93940

Prepared by:

Achasta Archaeological Services
Susan Morley, M.A., RPA and Brenna Wheelis, B.A.
3059 Bostick Avenue ◊ Marina, California 93933
(831) 262-2300

November 2023
(Project No. 23-0040)

Evidence of Human Remains in the Project APE?	Yes
Evidence of Anything of Archaeological Significance?	Yes
Positive Findings of Historical Significance?	Yes

11.5. Appendix E – Supplemental Consolidation Forms

State Water Resources Control Board
Division of Financial Assistance
Drinking Water State Revolving Fund

SUPPLEMENTAL INFORMATION FORM
CONSOLIDATION PROJECTS

Excluding the applicant, one supplemental information form must be filled out for each public water system (PWS) involved in the consolidation project. The following information must be returned with the completed DWSRF application. Please refer to the Guidelines for Consolidation Projects for additional information on the roles and responsibilities of each PWS.

PWS Information:

PWS Name: Pajaro Water System
PWS Number: CA2710020
Physical Address: 136 San Juan Road
Royal Oaks, CA 95076
Mailing Address: 136 San Juan Road
Royal Oaks, CA 95076

Primary Contact Information:

Contact Name: Judy Vasquez-Varela - General Manager
Phone Number: 831-722-1389
Email Address: info@pajarosunnymesa.com

This PWS is involved in the consolidation project as a:

- ☑ Restructured water system (will remain a PWS after the consolidation)
- ☐ Consolidating water system (will cease to operate as a PWS)

Problem Description

Attach documentation of problem (e.g., water quality testing results from a certified lab).

This PWS is classified as a:

- ☑ Community Water System
- ☐ Non-transient, Non-community Water System
- ☐ Transient, Non-community Water System
- ☐ Not currently classified as a water system

This PWS has the following ownership type(s) (check all that apply):

- ☑ Public
  - ☐ Municipality
  - ☐ County Agency
  - ☑ Special District
  - ☐ State Agency
  - ☐ Irrigation District
- ☐ Private
  - ☐ Corporation (includes Nonprofit Mutual Water Company)
    (Federal Tax ID No. ______________)
  - ☐ Partnership
    - ☐ Limited Partnership
    - ☐ General Partnership
  - ☐ Limited Liability Company
  - ☐ Revocable Family Trust
  - ☐ Sole Proprietorship

☐ Other (please describe): ____

Applicant is in contact with this PWS regarding the consolidation project.

☑ Yes ☐ No

Applicant has contacted the Division to inform them of this PWS's participation in the consolidation project.

☐ Yes ☑ No

If this is a <u>planning</u> project, the following must be attached to this information form:

- ☐ Documentation showing the PWS's commitment to the consolidation planning project, and authorization for Applicant to act on behalf of the PWS with respect to the planning project
- ☐ Documentation supporting the PWS's ownership type identified above
- ☐ A map delineating the PWS's service area boundaries and its physical proximity to the service areas of Applicant and other PWS's participating in this project
- ☐ For a publicly owned water system, please submit its three most recent years of audited financial statements. For a privately owned water system, please submit its last three years of federal income tax returns (all schedules). For either, please submit debt documents of the system.

If this is a <u>construction</u> project, the following must be attached to this information form

- ☐ Documentation showing the PWS's commitment to the consolidation construction project and authorization for Applicant to act on behalf of the PWS with respect to the project

- ☐ Draft Consolidation and Water Service Agreement(s) identifying the terms of consolidation and water service
- ☐ Documentation supporting the PWS's ownership type identified above
- ☐ For a publicly owned water system, please submit its three most recent years of audited financial statements. For a privately owned water system, please submit its last three years of federal income tax returns (all schedules). For either, please submit debt documents of the system.
- ☐ A map delineating the PWS's service area boundaries and its physical proximity to the service areas of Applicant and other PWSs participating in this project

CERTIFICATION

I hereby certify that I am the Applicant's authorized representative and that the information provided on this Supplemental Information Form is accurate to the best of my knowledge.

______________	______________________________
Date	Authorized Representative's Signature
	______________________________
	Authorized Representative's Name
	______________________________
	Authorized Representative's Title

State Water Resources Control Board
Division of Financial Assistance
Drinking Water State Revolving Fund

SUPPLEMENTAL INFORMATION FORM
CONSOLIDATION PROJECTS

Excluding the applicant, one supplemental information form must be filled out for each public water system (PWS) involved in the consolidation project. The following information must be returned with the completed DWSRF application. Please refer to the Guidelines for Consolidation Projects for additional information on the roles and responsibilities of each PWS.

PWS Information:

PWS Name: Springfield Water System

PWS Number: CA2700771

Physical Address:

Royal Oaks, CA 95076

Mailing Address: 136 San Juan Road

Royal Oaks, CA 95076

Primary Contact Information:

Contact Name: Judy Vasquez-Varela - General Manager

Phone Number: 831-722-1389

Email Address: info@pajarosunnymesa.com

This PWS is involved in the consolidation project as a:

- ☐ Restructured water system (will remain a PWS after the consolidation)
- ☑ Consolidating water system (will cease to operate as a PWS)

Problem Description

Attach documentation of problem (e.g., water quality testing results from a certified lab).

This PWS is classified as a:

- ☑ Community Water System
- ☐ Non-transient, Non-community Water System
- ☐ Transient, Non-community Water System
- ☐ Not currently classified as a water system

This PWS has the following ownership type(s) (check all that apply):

☑ Public
- ☐ Municipality
- ☐ County Agency
- ☑ Special District
- ☐ State Agency
- ☐ Irrigation District

☐ Private
- ☐ Corporation (includes Nonprofit Mutual Water Company)
  (Federal Tax ID No. ______________)
- ☐ Partnership
  - ☐ Limited Partnership
  - ☐ General Partnership
- ☐ Limited Liability Company
- ☐ Revocable Family Trust
- ☐ Sole Proprietorship

☐ Other (please describe): ____

Applicant is in contact with this PWS regarding the consolidation project.

☑ Yes ☐ No

Applicant has contacted the Division to inform them of this PWS's participation in the consolidation project.

☐ Yes ☑ No

If this is a <u>planning</u> project, the following must be attached to this information form:

- ☐ Documentation showing the PWS's commitment to the consolidation planning project, and authorization for Applicant to act on behalf of the PWS with respect to the planning project
- ☐ Documentation supporting the PWS's ownership type identified above
- ☐ A map delineating the PWS's service area boundaries and its physical proximity to the service areas of Applicant and other PWS's participating in this project
- ☐ For a publicly owned water system, please submit its three most recent years of audited financial statements. For a privately owned water system, please submit its last three years of federal income tax returns (all schedules). For either, please submit debt documents of the system.

If this is a <u>construction</u> project, the following must be attached to this information form

- ☐ Documentation showing the PWS's commitment to the consolidation construction project and authorization for Applicant to act on behalf of the PWS with respect to the project

- ☐ Draft Consolidation and Water Service Agreement(s) identifying the terms of consolidation and water service
- ☐ Documentation supporting the PWS's ownership type identified above
- ☐ For a publicly owned water system, please submit its three most recent years of audited financial statements. For a privately owned water system, please submit its last three years of federal income tax returns (all schedules). For either, please submit debt documents of the system.
- ☐ A map delineating the PWS's service area boundaries and its physical proximity to the service areas of Applicant and other PWSs participating in this project

CERTIFICATION

I hereby certify that I am the Applicant's authorized representative and that the information provided on this Supplemental Information Form is accurate to the best of my knowledge.

_______________ Date

____________________________________ Authorized Representative's Signature

____________________________________ Authorized Representative's Name

____________________________________ Authorized Representative's Title

State Water Resources Control Board
Division of Financial Assistance
Drinking Water State Revolving Fund

SUPPLEMENTAL INFORMATION FORM
CONSOLIDATION PROJECTS

Excluding the applicant, one supplemental information form must be filled out for each public water system (PWS) involved in the consolidation project. The following information must be returned with the completed DWSRF application. Please refer to the Guidelines for Consolidation Projects for additional information on the roles and responsibilities of each PWS.

PWS Information:

PWS Name: Sunny Mesa Water System
PWS Number: CA2700773
Physical Address: Salinas Rd.
Royal Oaks, CA 95076
Mailing Address: 136 San Juan Road
Royal Oaks, CA 95076

Primary Contact Information:

Contact Name: Judy Vasquez-Varela - General Manager
Phone Number: 831-722-1389
Email Address: info@pajarosunnymesa.com

This PWS is involved in the consolidation project as a:

- ☐ Restructured water system (will remain a PWS after the consolidation)
- ☑ Consolidating water system (will cease to operate as a PWS)

Problem Description

Attach documentation of problem (e.g., water quality testing results from a certified lab).

This PWS is classified as a:

- ☑ Community Water System
- ☐ Non-transient, Non-community Water System
- ☐ Transient, Non-community Water System
- ☐ Not currently classified as a water system

This PWS has the following ownership type(s) (check all that apply):

☑ Public
- ☐ Municipality
- ☐ County Agency
- ☑ Special District
- ☐ State Agency
- ☐ Irrigation District

☐ Private
- ☐ Corporation (includes Nonprofit Mutual Water Company)
  (Federal Tax ID No. ______________)
- ☐ Partnership
  - ☐ Limited Partnership
  - ☐ General Partnership
- ☐ Limited Liability Company
- ☐ Revocable Family Trust
- ☐ Sole Proprietorship

☐ Other (please describe): ____

Applicant is in contact with this PWS regarding the consolidation project.

☑ Yes ☐ No

Applicant has contacted the Division to inform them of this PWS's participation in the consolidation project.

☐ Yes ☑ No

If this is a <u>planning</u> project, the following must be attached to this information form:

- ☐ Documentation showing the PWS's commitment to the consolidation planning project, and authorization for Applicant to act on behalf of the PWS with respect to the planning project
- ☐ Documentation supporting the PWS's ownership type identified above
- ☐ A map delineating the PWS's service area boundaries and its physical proximity to the service areas of Applicant and other PWS's participating in this project
- ☐ For a publicly owned water system, please submit its three most recent years of audited financial statements. For a privately owned water system, please submit its last three years of federal income tax returns (all schedules). For either, please submit debt documents of the system.

If this is a <u>construction</u> project, the following must be attached to this information form

- ☐ Documentation showing the PWS's commitment to the consolidation construction project and authorization for Applicant to act on behalf of the PWS with respect to the project

- ☐ Draft Consolidation and Water Service Agreement(s) identifying the terms of consolidation and water service
- ☐ Documentation supporting the PWS's ownership type identified above
- ☐ For a publicly owned water system, please submit its three most recent years of audited financial statements. For a privately owned water system, please submit its last three years of federal income tax returns (all schedules). For either, please submit debt documents of the system.
- ☐ A map delineating the PWS's service area boundaries and its physical proximity to the service areas of Applicant and other PWSs participating in this project

CERTIFICATION

I hereby certify that I am the Applicant's authorized representative and that the information provided on this Supplemental Information Form is accurate to the best of my knowledge.

________________	____
Date	Authorized Representative's Signature
	____
	Authorized Representative's Name
	____
	Authorized Representative's Title

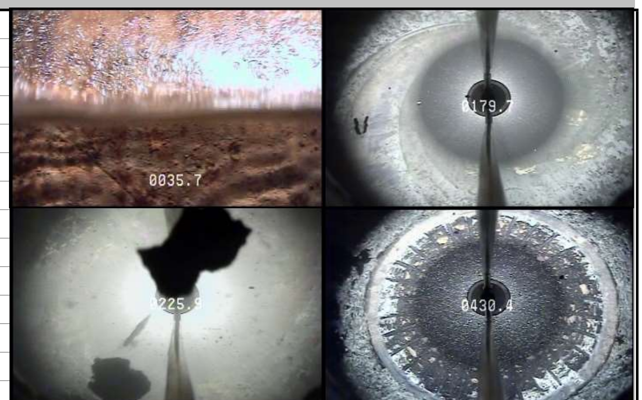
11.6. Appendix F – Pajaro Well No. 1 Inspection Report

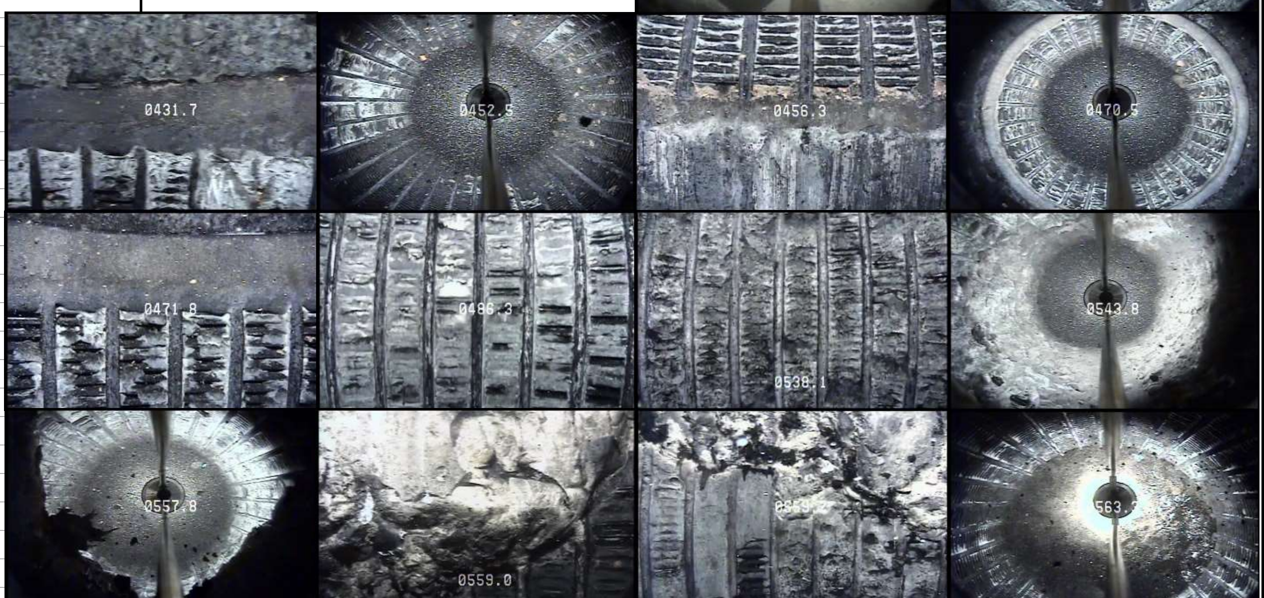
Newman Well Surveys

Video Survey Report

Company:	Maggiora Bros Pump & Drilling Company	**Date:**	3-Nov-23
Well:	Pajaro Sunny Mesa Well #1(136 San Juan Rd)	**Run No.**	One
Field:	Royal Oaks	**Job Ticket:**	76255
State:	California	**Total Depth:**	564.8 ft
		Water Level:	35.7 ft
Location:	136 San Juan Rd, Royal Oaks, CA	**Elevation:**	30.0 ft
		lat 36.903867°	lon -121.745893°
Zero Datum:	Top of casing	**Tool Zero:**	Side view lens (Add 1.5 ft. to downward view)
Reason for Survey:	General Inspection		

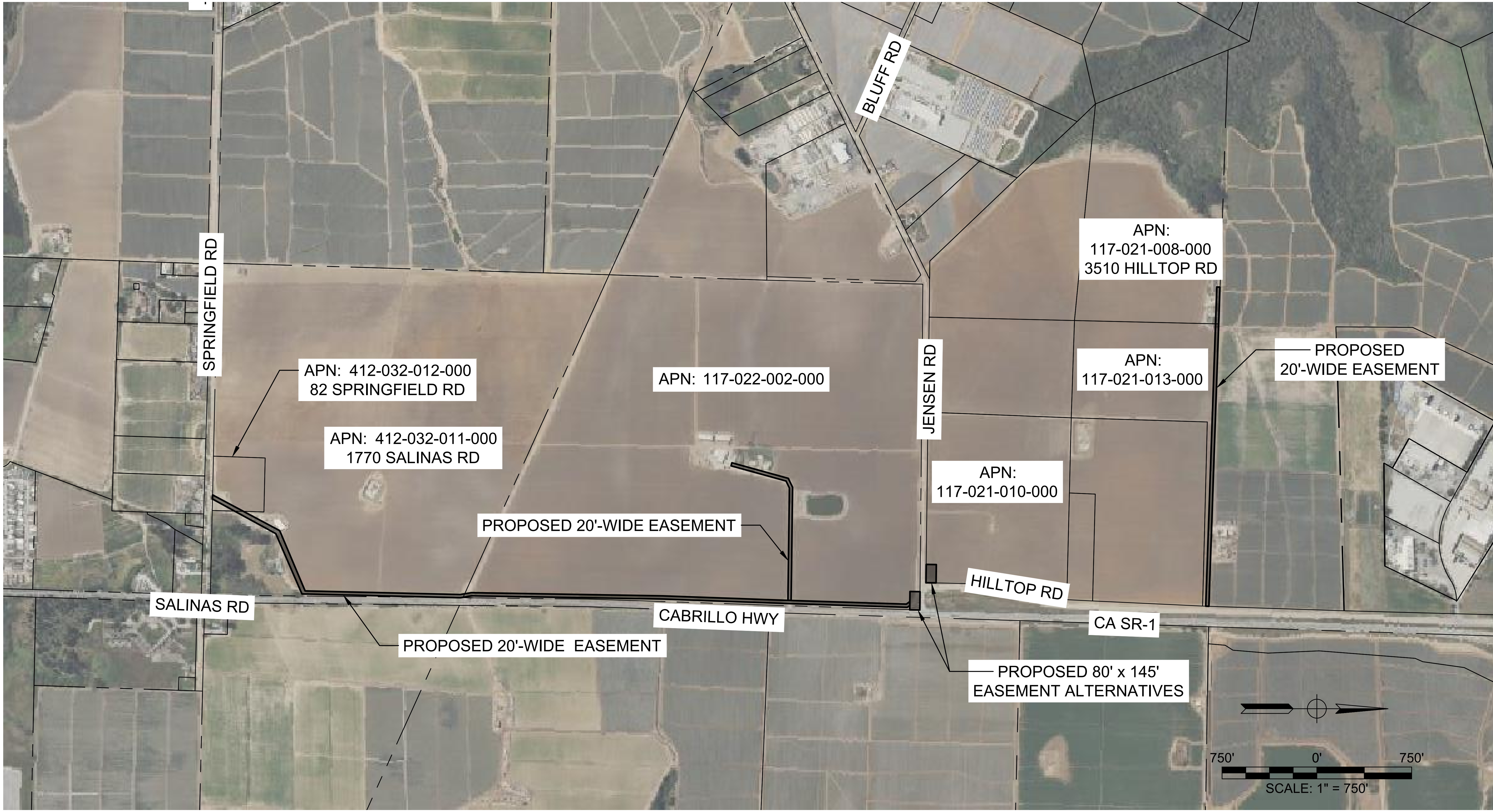
Depth	Remarks
35.7 ft	Water level.
431.7 ft	Perforation screen begins, continues to 564.8 ft.
564.8 ft	Total depth.





Notes: No casing damage was seen. Perforation screen is heavily plugged throughout the well.

11.7. Appendix G – Proposed Easement Maps



C:\Box\Projects\CWTRC - Community Water Center\CWTRC.200476.01 Eng For North Of Moss Landing\2 Eng\CAD\Exhibits\Easement Boundaries.dwg

Fri 27.Oct.23 04:00:38 PM

MNS

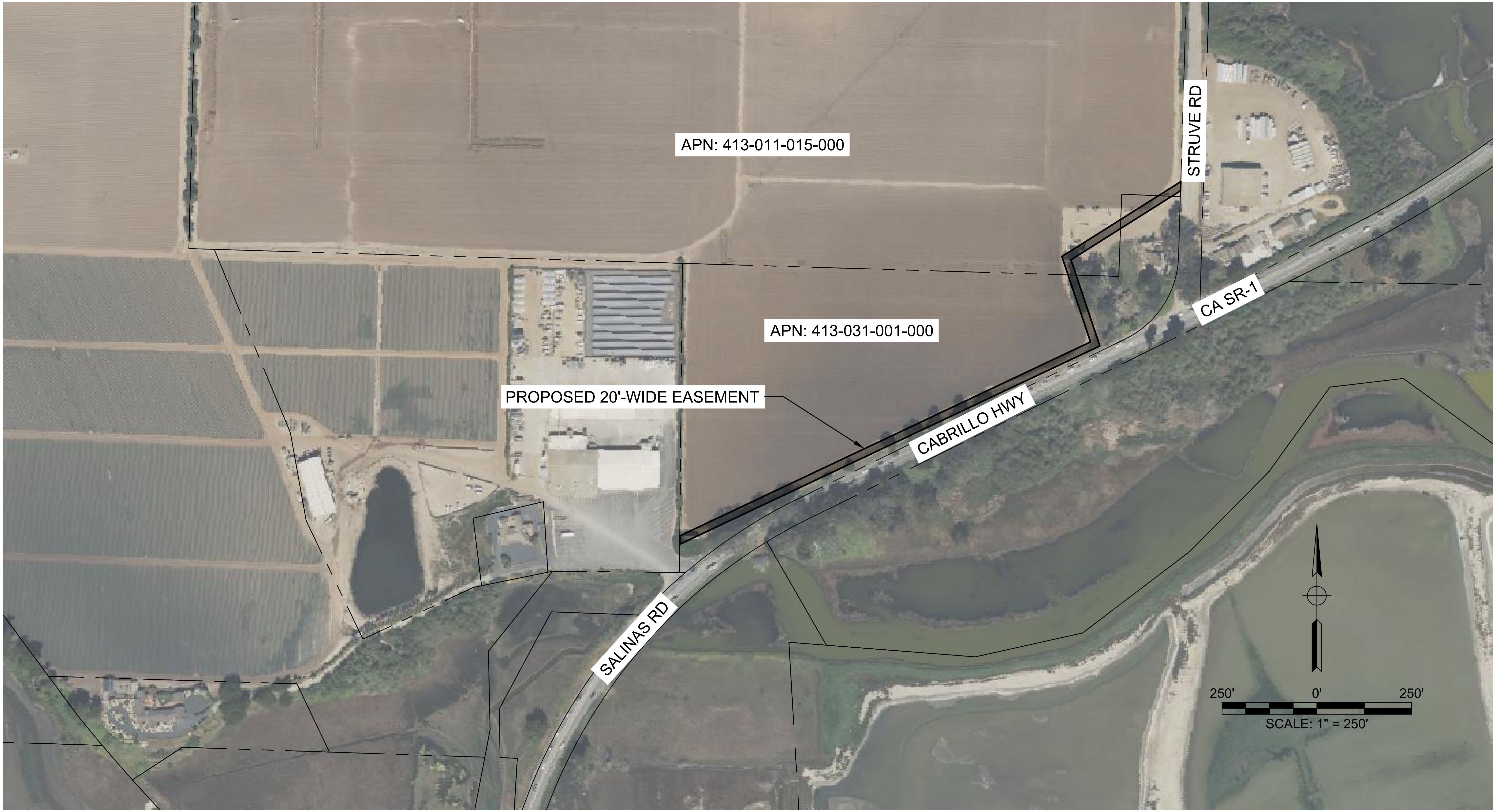
0 1/2 1 2

THIS BAR IS 2 INCHES AT FULL SCALE. IF NOT 2 INCHES, THEN SCALE ACCORDINGLY.

SCALE: 1"=750'

NORTH OF MOSS LANDING WATER CONSOLIDATION

NOML AREA POTENTIAL EASEMENT LOCATIONS



MNS

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THIS BAR IS 2 INCHES AT FULL SCALE. IF NOT 2 INCHES, THEN SCALE ACCORDINGLY.

SCALE:

1"=250'

NORTH OF MOSS LANDING WATER CONSOLIDATION

SOUTHERN STRUVE ROAD POTENTIAL EASEMENT LOCATIONS

C:\Box\Projects\CWTRC - Community Water Center\CWTRC.200476.01 Eng For North Of Moss Landing\2 Eng\CAD\Exhibits\Easement Boundaries.dwg
Fri 27 Oct 23 04:00:38 PM

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Fri 27.Oct.23 04:00:38 PM

MNS

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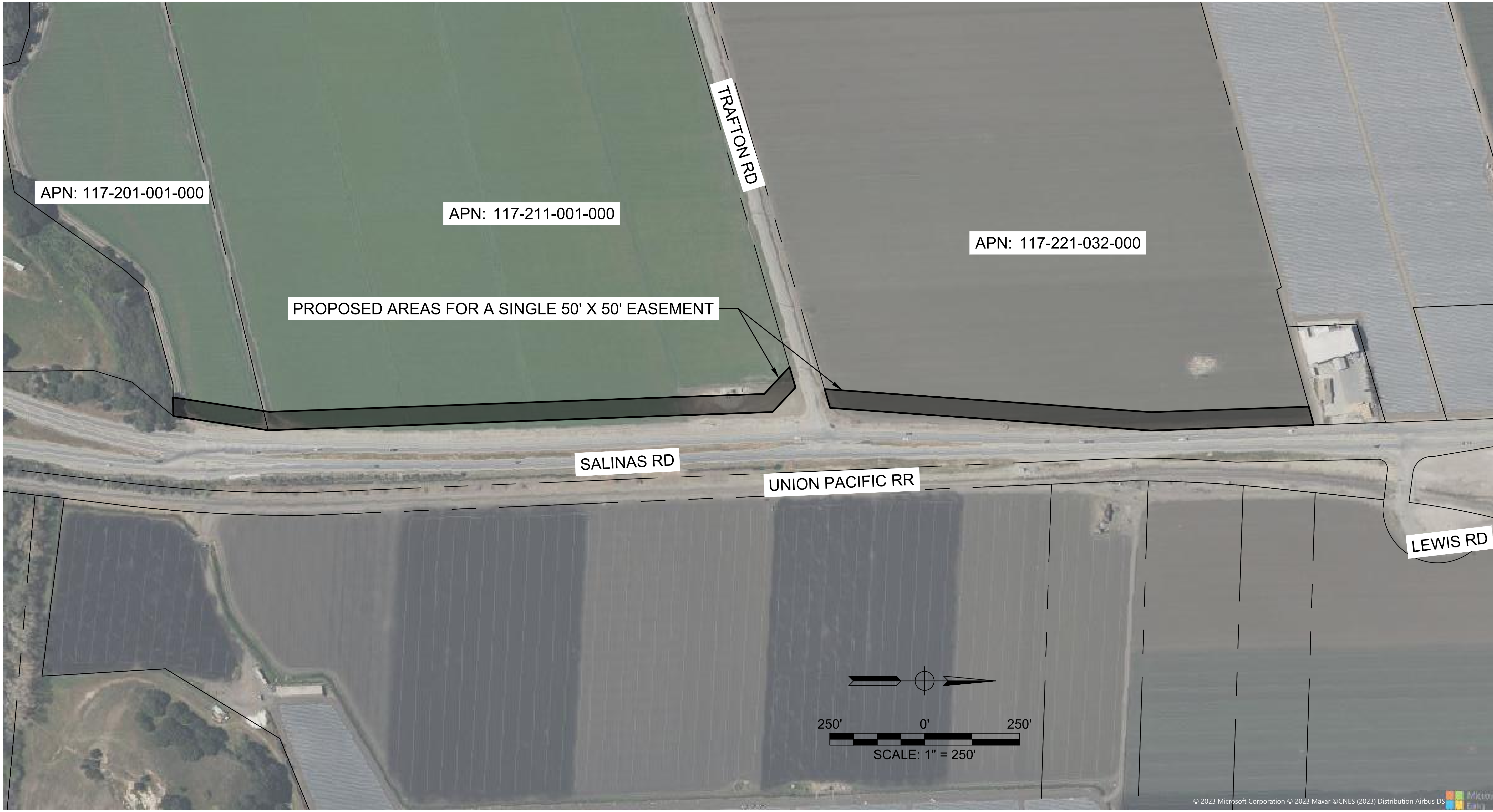
THIS BAR IS 2 INCHES AT FULL SCALE. IF NOT 2 INCHES, THEN SCALE ACCORDINGLY.

SCALE: 1"=300'

NORTH OF MOSS LANDING WATER CONSOLIDATION

SPRINGFIELD EXPANSION POTENTIAL EASEMENT LOCATION



C:\Box\Projects\CWTRC - Community Water Center\CWTRC.200476.01 Eng For North Of Moss Landing\2 Eng\CAD\Exhibits\Easement Boundaries.dwg

Fri 27 Oct 23 04:00:38 PM

MNS

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THIS BAR IS 2 INCHES AT FULL SCALE. IF NOT 2 INCHES, THEN SCALE ACCORDINGLY.

SCALE:

1"=250'

NORTH OF MOSS LANDING WATER CONSOLIDATION
TRANSMISSION PUMP STATION POTENTIAL EASEMENT LOCATIONS

11.8. Appendix H – Cost Estimates

OPINION OF PROBABLE CONSTRUCTION COST

MNS

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC
Date Prepared: 4/19/2024
MNS Proj. No. CWTRC.200476.01

Building, Area: Bluff / Jensen Pump Station

Estimate Type:
- ☐ Conceptual
- ☑ Preliminary (w/o plans)
- ☐ Design Development @ ____ % complete
- ☐ Construction
- ☐ Change Order

Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials		Installation		Sub-Contractor		Total
				$/Unit	Total	$/Unit	Total	$/Unit	Total	
1	Mobilization	1	LS	$5,000.00	$5,000.00	$80,000.00	$80,000.00			$85,000.00
2	Site Clearing and Grubbing	1	LS	$1,000.00	$1,000.00	$5,000.00	$5,000.00			$6,000.00
3	8' High Chain Link Fence	500	LF	$35.00	$17,500.00	$35.00	$17,500.00			$35,000.00
4	20' Wide Rolling Gate	1	LS	$3,000.00	$3,000.00	$1,500.00	$1,500.00			$4,500.00
5	Site Grading	1	LS	$1,000.00	$1,000.00	$5,000.00	$5,000.00			$6,000.00
6	AC Paving	1050	SY	$15.00	$15,750.00	$25.00	$26,250.00			$42,000.00
7	Miscellaneous Site Improvements	1	LS	$10,000.00	$10,000.00	$15,000.00	$15,000.00			$25,000.00
8	PG&E Service and Transformer	1	LS					$60,000.00	$60,000.00	$60,000.00
9	Generator and Fuel Tank	1	LS	$70,000.00	$70,000.00	$20,000.00	$20,000.00			$90,000.00
10	Well Pump	1	LS	$4,000.00	$4,000.00	$6,000.00	$6,000.00			$10,000.00
11	Wellhead Slab and Pedestal	1	LS	$4,000.00	$4,000.00	$4,000.00	$4,000.00			$8,000.00
12	Concrete Foundations	1	LS	$30,000.00	$30,000.00	$60,000.00	$60,000.00			$90,000.00
13	1" Air release Valve	2	EA	$2,000.00	$4,000.00	$600.00	$1,200.00			$5,200.00
14	Miscellaneous Site Piping	1	LS	$75,000.00	$75,000.00	$75,000.00	$75,000.00			$150,000.00
15	Bypass Valve Vault	1	LS	$10,000.00	$10,000.00	$5,000.00	$5,000.00			$15,000.00
16	Pipe and Valve Coatings	1	LS	$5,000.00	$5,000.00	$6,000.00	$6,000.00			$11,000.00
17	Tank Ringwall Foundation	1	EA	$30,000.00	$30,000.00	$30,000.00	$30,000.00			$60,000.00
18	125,000-Gal Bolted Steel Water Storage Tank and Appurtenances	1	EA	$170,000.00	$170,000.00	$170,000.00	$170,000.00			$340,000.00
19	Internal Tank Mixing and Dosing System	1	EA	$30,000.00	$30,000.00	$10,000.00	$10,000.00			$40,000.00
20	4" Flexible Expansion Joints	2	EA	$4,000.00	$8,000.00	$1,500.00	$3,000.00			$11,000.00
21	10" Flexible Expansion Joint	1	EA	$15,000.00	$15,000.00	$2,500.00	$2,500.00			$17,500.00
22	80-GPM Duty Pump	2	EA	$58,000.00	$116,000.00	$10,000.00	$20,000.00			$136,000.00
23	1,100-GPM Fire Pump	2	EA	$72,000.00	$144,000.00	$20,000.00	$40,000.00			$184,000.00
24	3,000-Gal Hydropneumatic Tank and Surge System	1	LS	$125,000.00	$125,000.00	$75,000.00	$75,000.00			$200,000.00
25	CMU Chemical / Electrical Building	1	LS	$60,000.00	$60,000.00	$20,000.00	$20,000.00			$80,000.00
26	Electrical Equipment and Controls	1	LS					$135,000.00	$135,000.00	$135,000.00
27	Site Lighting Improvements	1	LS	$5,000.00	$5,000.00	$5,000.00	$5,000.00			$10,000.00
28	Site Cleanup/Punchlist	1	LS	$5,000.00	$5,000.00	$5,000.00	$5,000.00			$10,000.00
	Subtotals				$963,250.00		$707,950.00		$195,000.00	$1,866,200.00
	Division 1 Costs	@	2.00%		$19,265.00		$14,159.00		$3,900.00	$37,324.00
	Subtotals				$982,515.00		$722,109.00		$198,900.00	$1,903,524.00
	Taxes - Materials Costs	@	7.75%		$76,144.91					$76,144.91
	Subtotals				$1,058,659.91		$722,109.00		$198,900.00	$1,979,668.91
	Contractor Markup for Sub	@	12.00%						$23,868.00	$23,868.00
	Subtotals				$1,058,659.91		$722,109.00		$222,768.00	$2,003,536.91
	Contractor OH&P	@	15.00%		$158,798.99		$108,316.35		$33,415.20	$300,530.54
	Subtotals				$1,217,458.90		$830,425.35		$256,183.20	$2,304,067.45
	Estimate Contingency	@	30.00%		$365,237.67		$249,127.61		$76,854.96	$691,220.23
	Subtotals				$1,582,696.57		$1,079,552.96		$333,038.16	$2,995,287.68
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$197,621.82		$134,797.30		$41,584.48	$374,003.60
	Estimated Bid Cost				$1,780,318.39		$1,214,350.26		$374,622.64	$3,369,291.29
	Total Estimate									**$3,370,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

MNS

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC

Date Prepared: 4/19/2024

Building, Area: Pajaro to Sunny Mesa Booster Station

MNS Proj. No. CWTRC.200476.01

Estimate Type:

- [ ] Conceptual
- [x] Preliminary (w/o plans)
- [ ] Design Development @ ______ % complete
- [ ] Construction
- [ ] Change Order

Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00	$25,000.00	$25,000.00			$30,000.00
2	Site Clearing and Grubbing	1	LS	$1,000.00	$1,000.00	$5,000.00	$5,000.00			$6,000.00
3	8' High Chain Link Fence	200	LF	$35.00	$7,000.00	$35.00	$7,000.00			$14,000.00
4	15' Wide Rolling Gate	1	LS	$2,500.00	$2,500.00	$1,500.00	$1,500.00			$4,000.00
5	Site Grading	1	LS	$1,000.00	$1,000.00	$2,000.00	$2,000.00			$3,000.00
6	AC Paving	230	SY	$15.00	$3,450.00	$25.00	$5,750.00			$9,200.00
7	Miscellaneous Site Improvements	1	LS	$2,500.00	$2,500.00	$3,000.00	$3,000.00			$5,500.00
8	PG&E Service and Transformer	1	LS					$60,000.00	$60,000.00	$60,000.00
9	Automatic Transfer Switch	1	LS					$30,000.00	$30,000.00	$30,000.00
10	Generator	1	LS	$25,000.00	$25,000.00	$15,000.00	$15,000.00			$40,000.00
11	Pipe and Valve Coatings	1	LS	$750.00	$750.00	$1,500.00	$1,500.00			$2,250.00
12	10" Gate Valve	3	EA	$4,600.00	$13,800.00	$650.00	$1,950.00			$15,750.00
13	10" PVC Piping	115	LF	$75.00	$8,625.00	$75.00	$8,625.00			$17,250.00
14	Concrete Foundations	1	LS	$15,000.00	$15,000.00	$30,000.00	$30,000.00			$45,000.00
15	Package Pump Station w/ Enclosure	1	EA	$275,000.00	$275,000.00	$82,500.00	$82,500.00			$357,500.00
16	Site Lighting Improvements	1	LS	$3,500.00	$3,500.00	$3,500.00	$3,500.00			$7,000.00
17	Site Cleanup/Punchlist	1	LS	$2,500.00	$2,500.00	$2,500.00	$2,500.00			$5,000.00
	Subtotals				$366,625.00		$194,825.00		$90,000.00	$651,450.00
	Division 1 Costs	@	2.00%		$7,332.50		$3,896.50		$1,800.00	$13,029.00
	Subtotals				$373,957.50		$198,721.50		$91,800.00	$664,479.00
	Taxes - Materials Costs	@	7.75%		$28,981.71					$28,981.71
	Subtotals				$402,939.21		$198,721.50		$91,800.00	$693,460.71
	Contractor Markup for Sub	@	12.00%						$11,016.00	$11,016.00
	Subtotals				$402,939.21		$198,721.50		$102,816.00	$704,476.71
	Contractor OH&P	@	15.00%		$60,440.88		$29,808.23		$15,422.40	$105,671.51
	Subtotals				$463,380.09		$228,529.73		$118,238.40	$810,148.21
	Estimate Contingency	@	30.00%		$139,014.03		$68,558.92		$35,471.52	$243,044.46
	Subtotals				$602,394.11		$297,088.64		$153,709.92	$1,053,192.68
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$75,217.34		$37,095.68		$19,192.84	$131,505.85
	Estimated Bid Cost				$677,611.45		$334,184.32		$172,902.76	$1,184,698.53
	Total Estimate									**$1,180,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC
Date Prepared: 4/19/2024
MNS Proj. No. CWTRC.200476.01

Building, Area: Fe / Mn Treatment Site

Estimate Type:
- [ ] Conceptual
- [x] Preliminary (w/o plans)
- [ ] Design Development @ ______ % complete
- [ ] Construction
- [ ] Change Order

Months to Midpoint of Construction: 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00	$25,000.00	$25,000.00			$30,000.00
2	Site Clearing and Grubbing	1	LS	$1,000.00	$1,000.00	$1,000.00	$1,000.00			$2,000.00
3	Fence Removal	55	LF	$10.00	$550.00	$10.00	$550.00			$1,100.00
4	Site Grading	1	LS	$1,000.00	$1,000.00	$400.00	$400.00			$1,400.00
5	AC Paving	230	SY	$15.00	$3,450.00	$25.00	$5,750.00			$9,200.00
6	Site Flood Hardening	1	LS	$15,000.00	$15,000.00	$30,000.00	$30,000.00			$45,000.00
7	Concrete Foundations	1	LS	$15,000.00	$15,000.00	$30,000.00	$30,000.00			$45,000.00
8	Miscellaneous Site Improvements	1	LS	$2,500.00	$2,500.00	$3,000.00	$3,000.00			$5,500.00
9	Backwash Tank, 25,000 Gal	1	EA	$80,000.00	$80,000.00	$80,000.00	$80,000.00			$160,000.00
10	Fe / Mn Removal System	1	EA			$100,000.00	$100,000.00	$600,000.00	$600,000.00	$700,000.00
11	Pipe and Valve Coatings	1	LS	$750.00	$750.00	$1,500.00	$1,500.00			$2,250.00
12	8" Gate Valve	2	EA	$4,600.00	$9,200.00	$650.00	$1,300.00			$10,500.00
13	8" PVC Piping	200	LF	$75.00	$15,000.00	$75.00	$15,000.00			$30,000.00
14	Electrical Improvements	1	LS					$30,000.00	$30,000.00	$30,000.00
15	Site Lighting Improvements	1	LS	$300.00	$300.00	$300.00	$300.00			$600.00
16	Site Cleanup/Punchlist	1	LS	$2,500.00	$2,500.00	$2,500.00	$2,500.00			$5,000.00
	Subtotals				$151,250.00		$296,300.00		$630,000.00	$1,077,550.00
	Division 1 Costs	@	2.00%		$3,025.00		$5,926.00		$12,600.00	$21,551.00
	Subtotals				$154,275.00		$302,226.00		$642,600.00	$1,099,101.00
	Taxes - Materials Costs	@	7.75%		$11,956.31					$11,956.31
	Subtotals				$166,231.31		$302,226.00		$642,600.00	$1,111,057.31
	Contractor Markup for Sub	@	12.00%						$77,112.00	$77,112.00
	Subtotals				$166,231.31		$302,226.00		$719,712.00	$1,188,169.31
	Contractor OH&P	@	15.00%		$24,934.70		$45,333.90		$107,956.80	$178,225.40
	Subtotals				$191,166.01		$347,559.90		$827,668.80	$1,366,394.71
	Estimate Contingency	@	30.00%		$57,349.80		$104,267.97		$248,300.64	$409,918.41
	Subtotals				$248,515.81		$451,827.87		$1,075,969.44	$1,776,313.12
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$31,030.68		$56,417.04		$134,349.85	$221,797.56
	Estimated Bid Cost				$279,546.49		$508,244.91		$1,210,319.29	$1,998,110.68
	Total Estimate									**$2,000,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

MNS

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC

Date Prepared: 4/19/2024

Building, Area: Pajaro Tank Rehabilitation and Piping Modifications

MNS Proj. No. CWTRC.200476.01

Estimate Type:

- [ ] Conceptual
- [x] Preliminary (w/o plans)
- [ ] Design Development @ ______ % complete
- [ ] Construction
- [ ] Change Order

Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00	$30,000.00	$30,000.00			$35,000.00
2	Interior Tank Coating Removal and Recoating	16000	SF	$10.00	$160,000.00	$15.00	$240,000.00			$400,000.00
3	Exterior Tank Coating Removal and Recoating	10000	SF	$7.50	$75,000.00	$10.00	$100,000.00			$175,000.00
4	Piping Modifications	1	LS	$15,000.00	$15,000.00	$30,000.00	$30,000.00			$45,000.00
5	Electrical and Communications	1	LS					$10,000.00	$10,000.00	$10,000.00
6	Interior Tank Structural Repairs	1	LS	$10,000.00	$10,000.00	$50,000.00	$50,000.00			$60,000.00
7	Tank Appurtenance Repair	1	LS	$20,000.00	$20,000.00	$40,000.00	$40,000.00			$60,000.00
	Subtotals				$285,000.00		$490,000.00		$10,000.00	$785,000.00
	Division 1 Costs	@	2.00%		$5,700.00		$9,800.00		$200.00	$15,700.00
	Subtotals				$290,700.00		$499,800.00		$10,200.00	$800,700.00
	Taxes - Materials Costs	@	7.75%		$22,529.25					$22,529.25
	Subtotals				$313,229.25		$499,800.00		$10,200.00	$823,229.25
	Contractor Markup for Sub	@	12.00%						$1,224.00	$1,224.00
	Subtotals				$313,229.25		$499,800.00		$11,424.00	$824,453.25
	Contractor OH&P	@	15.00%		$46,984.39		$74,970.00		$1,713.60	$123,667.99
	Subtotals				$360,213.64		$574,770.00		$13,137.60	$948,121.24
	Estimate Contingency	@	30.00%		$108,064.09		$172,431.00		$3,941.28	$284,436.37
	Subtotals				$468,277.73		$747,201.00		$17,078.88	$1,232,557.61
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$58,471.03		$93,298.51		$2,132.54	$153,902.07
	Estimated Bid Cost				$526,748.76		$840,499.51		$19,211.42	$1,386,459.68
	Total Estimate									**$1,390,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC
Date Prepared: 4/19/2024

Building, Area: Consolidation Pipelines

MNS Proj. No. CWTRC.200476.01

Estimate Type:
☐ Conceptual
☑ Preliminary (w/o plans)
☐ Design Development @ ________ % complete
☐ Construction
☐ Change Order

Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials		Installation		Sub-Contractor		Total
				$/Unit	Total	$/Unit	Total	$/Unit	Total	
1	Mobilization	1	LS	$50,000.00	$50,000.00	$200,000.00	$200,000.00			$250,000.00
2	Miscellaneous Road Repair	1	LS	$900,000.00	$900,000.00	$900,000.00	$900,000.00			$1,800,000.00
	Transmission Mains									
4	10" PVC SDR 18	5500	LF	$160.00	$880,000.00	$160.00	$880,000.00			$1,760,000.00
5	10" D.I. Tee	5	EA	$600.00	$3,000.00	$250.00	$1,250.00			$4,250.00
6	10" In-Line Gate Valve	7	EA	$4,250.00	$29,750.00	$1,000.00	$7,000.00			$36,750.00
7	10" 45-Degree D.I. Elbow	12	EA	$1,000.00	$12,000.00	$350.00	$4,200.00			$16,200.00
8	10" 90-Degree D.I. Elbow	10	EA	$1,000.00	$10,000.00	$350.00	$3,500.00			
9	6" PVC SDR 18	14600	LF	$125.00	$1,825,000.00	$125.00	$1,825,000.00			$3,650,000.00
10	6" D.I. Tee	12	EA	$600.00	$7,200.00	$250.00	$3,000.00			$10,200.00
11	6" In-Line Gate Valve	10	EA	$2,500.00	$25,000.00	$600.00	$6,000.00			$31,000.00
12	6" 45-Degree D.I. Elbow	18	EA	$1,000.00	$18,000.00	$350.00	$6,300.00			$24,300.00
13	Blowoff Valve	6	EA	$3,700.00	$22,200.00	$2,500.00	$15,000.00			$37,200.00
14	Air Release Valve	6	EA	$3,700.00	$22,200.00	$2,500.00	$15,000.00			$37,200.00
	Transmission Main Subtotal				$2,854,350.00		$2,766,250.00			
	Springfield Expansion									
15	6" PVC SDR 18	17100	LF	$110.00	$1,881,000.00	$110.00	$1,881,000.00			$3,762,000.00
17	6" HDPE DR 17 (HDD)	1600	LF	$150.00	$240,000.00	$300.00	$480,000.00			$720,000.00
18	6" D.I. Tee	8	EA	$600.00	$4,800.00	$250.00	$2,000.00			$6,800.00
19	6" In-Line Gate Valve	20	EA	$2,500.00	$50,000.00	$600.00	$12,000.00			$62,000.00
20	6" 45-Degree D.I. Elbow	20	EA	$1,000.00	$20,000.00	$350.00	$7,000.00			$27,000.00
21	6" 90-Degree D.I. Elbow	14	EA	$1,000.00	$14,000.00	$350.00	$4,900.00			$18,900.00
22	Fire Hydrant, Bury, Lateral, and Gate Valve	4	EA	$10,000.00	$40,000.00	$3,500.00	$14,000.00			$54,000.00
23	Blowoff Valve	10	EA	$3,700.00	$37,000.00	$2,500.00	$25,000.00			$62,000.00
24	Air Release Valve	6	EA	$3,700.00	$22,200.00	$2,500.00	$15,000.00			$37,200.00
	Springfield Expansion Subtotal				$2,309,000.00		$2,440,900.00			
	Bluff / Jensen Distribution									
25	6" PVC SDR 18	22500	LF	$110.00	$2,475,000.00	$110.00	$2,475,000.00			$4,950,000.00
26	6" D.I. Tee	6	EA	$600.00	$3,600.00	$250.00	$1,500.00			$5,100.00
27	6" In-Line Gate Valve	23	EA	$2,500.00	$57,500.00	$600.00	$13,800.00			$71,300.00
28	6" 45-Degree D.I. Elbow	20	EA	$1,000.00	$20,000.00	$350.00	$7,000.00			$27,000.00

29	6" 90-Degree D.I. Elbow	18	EA	$1,000.00	$18,000.00	$350.00	$6,300.00			$24,300.00
30	Fire Hydrant, Bury, Lateral, and Gate Valve	20	EA	$10,000.00	$200,000.00	$3,500.00	$70,000.00			$270,000.00
31	Blowoff Valve	6	EA	$3,700.00	$22,200.00	$2,500.00	$15,000.00			$37,200.00
32	Air Release Valve	6	EA	$3,700.00	$22,200.00	$2,500.00	$15,000.00			$37,200.00
	Bluff / Jensen Distribution Subtotal				$2,818,500.00		$2,603,600.00			
	Subtotals				$8,931,850.00		$8,910,750.00			$17,829,100.00
	Division 1 Costs	@	2.00%		$178,637.00		$178,215.00			$356,852.00
	Subtotals				$9,110,487.00		$9,088,965.00			$18,199,452.00
	Taxes - Materials Costs	@	7.75%		$706,062.74					$706,062.74
	Subtotals				$9,816,549.74		$9,088,965.00			$18,905,514.74
	Contractor OH&P	@	15.00%		$1,472,482.46		$1,363,344.75			$2,835,827.21
	Subtotals				$11,289,032.20		$10,452,309.75			$21,741,341.95
	Estimate Contingency	@	20.00%		$2,257,806.44		$2,090,461.95			$4,348,268.39
	Subtotals				$13,546,838.64		$12,542,771.70			$26,089,610.34
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$1,691,512.46		$1,566,140.65			$3,257,653.11
	Subtotals				$15,238,351.11		$14,108,912.35			$29,347,263.45
	Estimated Bid Cost									$29,347,263.45
	Total Estimate									**$29,350,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC

Date Prepared: 4/19/2024

Building, Area: Bluff / Jensen Connections

MNS Proj. No. CWTRC.200476.01

Estimate Type:

- ☐ Conceptual
- ☑ Preliminary (w/o plans)
- ☐ Design Development @
- ☐ Construction
- ☐ Change Order

% complete

Months to Midpoint of Construction 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$10,000.00	$10,000.00	$30,000.00	$30,000.00			$40,000.00
1	Remote Meter Reader and Training	1	LS	$10,000.00	$10,000.00	$5,000.00	$5,000.00			$15,000.00
2	Water Service Connection and Meter	68	EA	$10,000.00	$680,000.00	$10,000.00	$680,000.00			$1,360,000.00
	Subtotals				$700,000.00		$715,000.00			$1,415,000.00
	Division 1 Costs	@	2.00%		$14,000.00		$14,300.00			$28,300.00
	Subtotals				$714,000.00		$729,300.00			$1,443,300.00
	Taxes - Materials Costs	@	7.75%		$55,335.00					$55,335.00
	Subtotals				$769,335.00		$729,300.00			$1,498,635.00
	Contractor Markup for Sub	@	12.00%							
	Subtotals				$769,335.00		$729,300.00			$1,498,635.00
	Contractor OH&P	@	15.00%		$115,400.25		$109,395.00			$224,795.25
	Subtotals				$884,735.25		$838,695.00			$1,723,430.25
	Estimate Contingency	@	30.00%		$265,420.58		$251,608.50			$517,029.08
	Subtotals				$1,150,155.83		$1,090,303.50			$2,240,459.33
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$143,613.06		$136,139.66			$279,752.71
	Estimated Bid Cost				$1,293,768.88		$1,226,443.16			$2,520,212.04
	Total Estimate									**$2,520,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

Project: North of Moss Landing Water Consolidation Project

Building, Area: Springfield Connections

Prepared By: EC
Date Prepared: 4/19/2024
MNS Proj. No. CWTRC.200476.01

Estimate Type:
- ☐ Conceptual
- ☑ Preliminary (w/o plans)
- ☐ Design Development @ ____ % complete
- ☐ Construction
- ☐ Change Order

Months to Midpoint of Construction: 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00	$15,000.00	$15,000.00			$20,000.00
2	Water Service Connection and Meter	20	EA	$10,000.00	$200,000.00	$10,000.00	$200,000.00			$400,000.00
3	Optional Water Service Connection and Meter	2	EA	$10,000.00	$20,000.00	$10,000.00	$20,000.00			$40,000.00
	Subtotals				$225,000.00		$235,000.00			$460,000.00
	Division 1 Costs	@	2.00%		$4,500.00		$4,700.00			$9,200.00
	Subtotals				$229,500.00		$239,700.00			$469,200.00
	Taxes - Materials Costs	@	7.75%		$17,786.25					$17,786.25
	Subtotals				$247,286.25		$239,700.00			$486,986.25
	Contractor Markup for Sub	@	12.00%							
	Subtotals				$247,286.25		$239,700.00			$486,986.25
	Contractor OH&P	@	15.00%		$37,092.94		$35,955.00			$73,047.94
	Subtotals				$284,379.19		$275,655.00			$560,034.19
	Estimate Contingency	@	30.00%		$85,313.76		$82,696.50			$168,010.26
	Subtotals				$369,692.94		$358,351.50			$728,044.44
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$46,161.34		$44,745.20			$90,906.54
	Estimated Bid Cost				$415,854.28		$403,096.70			$818,950.99
	Total Estimate									**$820,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC
Date Prepared: 4/19/2024
MNS Proj. No. CWTRC.200476.01

Building, Area: Springfield MHP Destruction

Estimate Type:
- [ ] Conceptual
- [x] Preliminary (w/o plans)
- [ ] Design Development @ ____ % complete
- [ ] Construction
- [ ] Change Order

Months to Midpoint of Construction: 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$6,000.00	$6,000.00	$6,000.00	$6,000.00			$12,000.00
2	Well Destruction	1	LS					$180,000.00	$180,000.00	$180,000.00
3	Well Site Demolition and Clean-up	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00			$40,000.00
	Subtotals				$26,000.00		$26,000.00		$180,000.00	$232,000.00
	Division 1 Costs	@	2.00%		$520.00		$520.00		$3,600.00	$4,640.00
	Subtotals				$26,520.00		$26,520.00		$183,600.00	$236,640.00
	Taxes - Materials Costs	@	7.75%		$2,055.30					$2,055.30
	Subtotals				$28,575.30		$26,520.00		$183,600.00	$238,695.30
	Contractor Markup for Sub	@	12.00%						$22,032.00	$22,032.00
	Subtotals				$28,575.30		$26,520.00		$205,632.00	$260,727.30
	Contractor OH&P	@	15.00%		$4,286.30		$3,978.00		$30,844.80	$39,109.10
	Subtotals				$32,861.60		$30,498.00		$236,476.80	$299,836.40
	Estimate Contingency	@	20.00%		$6,572.32		$6,099.60		$47,295.36	$59,967.28
	Subtotals				$39,433.91		$36,597.60		$283,772.16	$359,803.67
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$4,923.88		$4,569.72		$35,432.93	$44,926.53
	Estimated Bid Cost				$44,357.79		$41,167.32		$319,205.09	$404,730.20
	Total Estimate									**$400,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

MNS

Project:	North of Moss Landing Water Consolidation Project	Prepared By:	EC
		Date Prepared:	4/19/2024
Building, Area:	Sunny Mesa Wells Destruction	MNS Proj. No.	CWTRC.200476.01

Estimate Type:

- [ ] Conceptual
- [x] Preliminary (w/o plans)
- [ ] Design Development @ ____ % complete
- [ ] Construction
- [ ] Change Order

Months to Midpoint of Construction: 36

Item No.	Description	Qty.	Units	Materials		Installation		Sub-Contractor		Total
				$/Unit	Total	$/Unit	Total	$/Unit	Total	
1	Mobilization	1	LS	$10,000.00	$10,000.00	$10,000.00	$10,000.00			$20,000.00
2	Well Destruction	1	LS					$350,000.00	$350,000.00	$350,000.00
3	Well Site Demolition and Clean-up	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00			$40,000.00
	Subtotals				$30,000.00		$30,000.00		$350,000.00	$410,000.00
	Division 1 Costs	@	2.00%		$600.00		$600.00		$7,000.00	$8,200.00
	Subtotals				$30,600.00		$30,600.00		$357,000.00	$418,200.00
	Taxes - Materials Costs	@	7.75%		$2,371.50					$2,371.50
	Subtotals				$32,971.50		$30,600.00		$357,000.00	$420,571.50
	Contractor Markup for Sub	@	12.00%						$42,840.00	$42,840.00
	Subtotals				$32,971.50		$30,600.00		$399,840.00	$463,411.50
	Contractor OH&P	@	15.00%		$4,945.73		$4,590.00		$59,976.00	$69,511.73
	Subtotals				$37,917.23		$35,190.00		$459,816.00	$532,923.23
	Estimate Contingency	@	20.00%		$7,583.45		$7,038.00		$91,963.20	$106,584.65
	Subtotals				$45,500.67		$42,228.00		$551,779.20	$639,507.87
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$5,681.40		$5,272.76		$68,897.36	$79,851.51
	Estimated Bid Cost				$51,182.07		$47,500.76		$620,676.56	$719,359.38
	Total Estimate									**$720,000.00**

OPINION OF PROBABLE CONSTRUCTION COST

Project: North of Moss Landing Water Consolidation Project

Prepared By: EC
Date Prepared: 4/19/2024
MNS Proj. No. CWTRC.200476.01

Building, Area: Radio Meters

Estimate Type:
- [ ] Conceptual
- [x] Preliminary (w/o plans)
- [ ] Design Development @ ____ % complete
- [ ] Construction
- [ ] Change Order

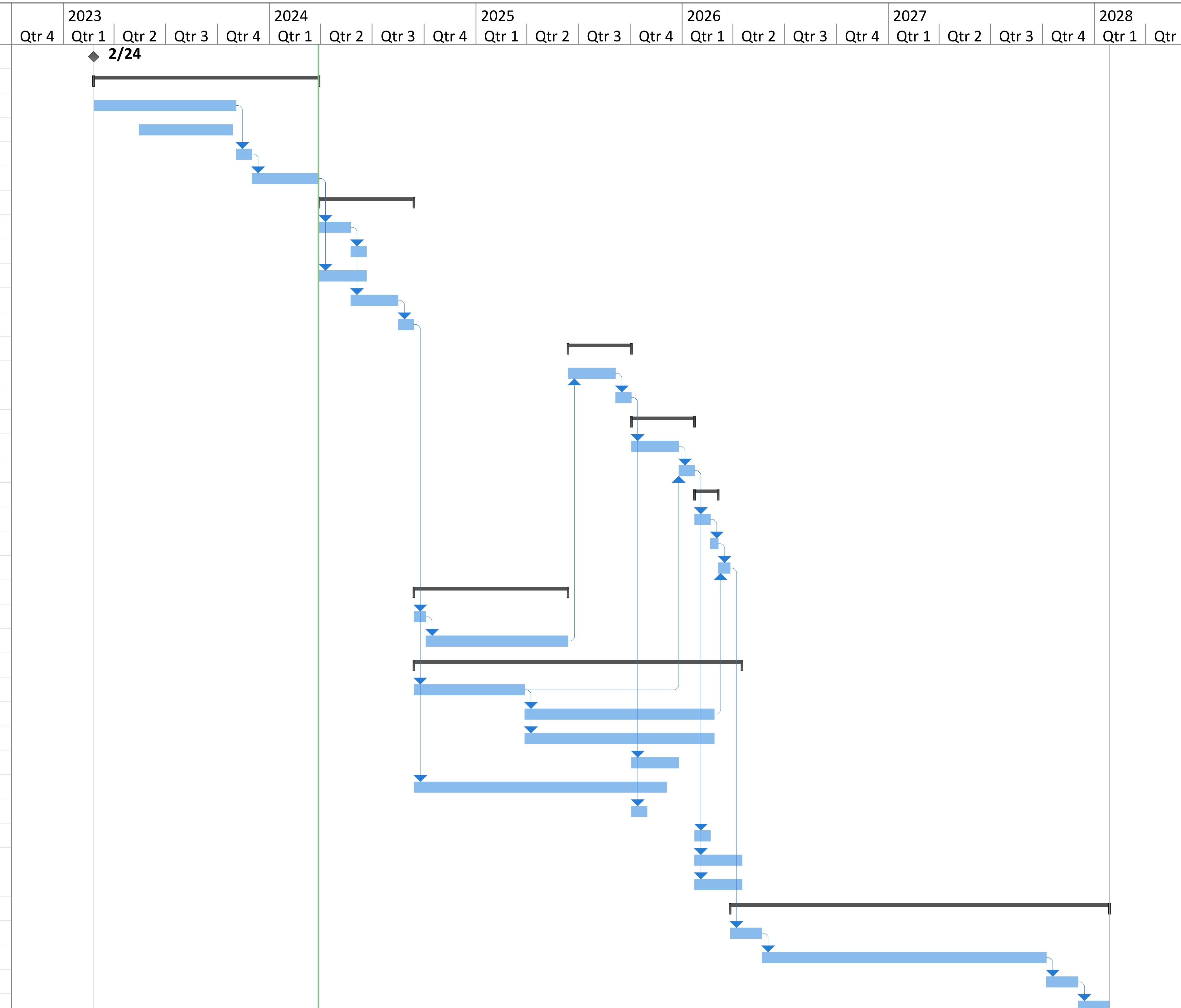
Months to Midpoint of Construction: 36

Item No.	Description	Qty.	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-Contractor $/Unit	Sub-Contractor Total	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00	$15,000.00	$15,000.00			$20,000.00
2	Pajaro Remote Meter Upgrades	463	EA	$300.00	$138,900.00	$250.00	$115,750.00			$254,650.00
3	Sunny Mesa Remote Meter Upgrades	268	EA	$300.00	$80,400.00	$250.00	$67,000.00			$147,400.00
	Subtotals				$224,300.00		$197,750.00			$422,050.00
	Division 1 Costs	@	2.00%		$4,486.00		$3,955.00			$8,441.00
	Subtotals				$228,786.00		$201,705.00			$430,491.00
	Taxes - Materials Costs	@	7.75%		$17,730.92					$17,730.92
	Subtotals				$246,516.92		$201,705.00			$448,221.92
	Contractor Markup for Sub	@	12.00%							
	Subtotals				$246,516.92		$201,705.00			$448,221.92
	Contractor OH&P	@	15.00%		$36,977.54		$30,255.75			$67,233.29
	Subtotals				$283,494.45		$231,960.75			$515,455.20
	Estimate Contingency	@	30.00%		$85,048.34		$69,588.23			$154,636.56
	Subtotals				$368,542.79		$301,548.98			$670,091.76
	Escalate to Midpoint of Construct (4% per Year)	@	12.5%		$46,017.73		$37,652.61			$83,670.34
	Estimated Bid Cost				$414,560.51		$339,201.59			$753,762.10
	Total Estimate									**$750,000.00**

11.9. Appendix J – Proposed Schedule

Community Water Center
North of Moss Landing Project
Implementation Schedule

ID	Task Name	Duration	Start	Finish
1	Notice to proceed	0 days	Fri 2/24/23	Fri 2/24/23
2	**Engineering Report**	**285 day**	**Fri 2/24/23**	**Thu 3/28/24**
3	Draft Engineering Report	36 wks	Fri 2/24/23	Thu 11/2/23
4	Environmental Alternatives Assessment	24 wks	Mon 5/15/23	Fri 10/27/23
5	CWC/District Review	4 wks	Fri 11/3/23	Thu 11/30/23
6	Final Engineering Report	17 wks	Fri 12/1/23	Thu 3/28/24
7	**30% Design**	**120 day**	**Fri 3/29/24**	**Thu 9/12/24**
8	Topographic Survey	2 mons	Fri 3/29/24	Thu 5/23/24
9	Boundry Survey	1 mon	Fri 5/24/24	Thu 6/20/24
10	Geotechnical Engineering	3 mons	Fri 3/29/24	Thu 6/20/24
11	30% Design Development	3 mons	Fri 5/24/24	Thu 8/15/24
12	30% Design District/CWC Review	1 mon	Fri 8/16/24	Thu 9/12/24
13	**60% Design**	**80 days**	**Fri 6/13/25**	**Thu 10/2/25**
14	60% Design Development	3 mons	Fri 6/13/25	Thu 9/4/25
15	60% Design District/CWC Review	1 mon	Fri 9/5/25	Thu 10/2/25
16	**90% Design**	**80 days**	**Fri 10/3/25**	**Thu 1/22/26**
17	90% Design Development	3 mons	Fri 10/3/25	Thu 12/25/25
18	90% Design District/CWC Review	1 mon	Fri 12/26/25	Thu 1/22/26
19	**100% Design**	**30 days**	**Fri 1/23/26**	**Thu 3/5/26**
20	100% Design Development	1 mon	Fri 1/23/26	Thu 2/19/26
21	100% Design District/CWC Review	2 wks	Fri 2/20/26	Thu 3/5/26
22	Final Design	3 wks	Fri 3/6/26	Thu 3/26/26
23	**Real Property Acquisition**	**195 day**	**Fri 9/13/24**	**Thu 6/12/25**
24	Prepare Plat Maps and Legal Descriptions	3 wks	Fri 9/13/24	Thu 10/3/24
25	Easement/Land Purchase Acquisition	9 mons	Fri 10/4/24	Thu 6/12/25
26	**Permitting**	**415 day**	**Fri 9/13/24**	**Thu 4/16/26**
27	CEQA/NEPA Compliance (IS/MND)	7 mons	Fri 9/13/24	Thu 3/27/25
28	Coastal Development Permit	12 mon:	Fri 3/28/25	Thu 2/26/26
29	Jurisdictional Permits	12 mon:	Fri 3/28/25	Thu 2/26/26
30	Caltrans Encroachment Permit	3 mons	Fri 10/3/25	Thu 12/25/25
31	County of Monterey Encroachment Permi	16 mon:	Fri 9/13/24	Thu 12/4/25
32	MBARB Permit to Construct/Operate	1 mon	Fri 10/3/25	Thu 10/30/25
33	SWPPP	1 mon	Fri 1/23/26	Thu 2/19/26
34	Potable Water System Permit Amendmen	3 mons	Fri 1/23/26	Thu 4/16/26
35	Fe/Mn Treatment Plant Operating Permit	3 mons	Fri 1/23/26	Thu 4/16/26
36	**Bidding and Construction**	**480 day**	**Fri 3/27/26**	**Thu 1/27/28**
37	Bidding	2 mons	Fri 3/27/26	Thu 5/21/26
38	Construction	18 mon:	Fri 5/22/26	Thu 10/7/27
39	Start-up and Testing	2 mons	Fri 10/8/27	Thu 12/2/27
40	Project Closeout	2 mons	Fri 12/3/27	Thu 1/27/28



Project: msproj11
Date: Thu 3/28/24

Task Summary