OU2-728A
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Operable Unit 2
Groundwater Treatment System
Evaluation
and Optimization Report

Former Fort Ord, California

Prepared for:

U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814-2922

On behalf of:

U.S. Department of the Army
Fort Ord Base Realignment and Closure
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USACE Contract No. W91238-19-C-0027

Task No. 4.4

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Report Date: **September 2021**
Report Version: **Draft Final**

Report Approval

Report Title:	**Operable Unit 2** **Groundwater Treatment System** **Evaluation and Optimization Report** **Former Fort Ord, California**
Prime Contractor:	Ahtna Global, LLC
USACE Contract No.:	W91238-19-C-0027
Task No.:	4.4

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Acronyms and Abbreviations

µg/L	micrograms per liter
1,1-DCA	1,1-dichloroethane
cis-1,2-DCE	cis-1,2-dichloroethene
ACL	aquifer cleanup level
Army	U.S. Department of the Army
ARV	air release valve
ARVR	combination air release/vacuum relief valve
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
CSUMB	California State University Monterey Bay
ESD	Explanation of Significant Differences
EW	extraction well
FO-SVA	Fort Ord-Salinas Valley Aquitard
GAC	granular activated carbon
gpm	gallons per minute
GWMP	groundwater monitoring program
GWTA	groundwater treatment area
GWTP	groundwater treatment plant
GWTS	groundwater treatment system
HDPE	high-density polyethylene
HOA	hand-off-auto
HMI	human-machine interface
INF	infiltration gallery
IW	injection well
JV	RORE Innovative Solutions Joint Venture
LED	light-emitting diode
LFG	landfill gas
MCWD	Marina Coast Water District
MSB	main switchboard
O&M	operations and maintenance
OS&Y	open stem and yoke
OU2	Operable Unit 2
OUCTP	Operable Unit Carbon Tetrachloride Plume
PCE	tetrachloroethene
PG&E	Pacific Gas & Electric
PLC	programmable logic controller
psi	pounds per square inch
psig	pounds per square inch gauge
QAPP	Quality Assurance Project Plan
RAO	remedial action objective
ROD	Record of Decision
SCADA	supervisory control and data acquisition
Shaw	Shaw Environmental, Inc.
Sites 2/12	Sites 2 and 12
TCE	trichloroethene

TMX	Telemetrix Integrated Services
TW	treated water
USACE	U. S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VFD	variable frequency drive

1.0 Introduction

Ahtna Global, LLC prepared this *Operable Unit 2 Groundwater Treatment System Evaluation and Optimization Report* on behalf of the U.S. Army Corps of Engineers (USACE) Sacramento District, per Contract W91238-19-C-0027. Operation of a new Operable Unit 2 (OU2) groundwater treatment plant (GWTP) and eight new extraction wells (EWs) began in November 2018, with a ninth new EW becoming operational in July 2019.

1.1 Purpose

The purpose of this report is to determine whether operations and maintenance (O&M) procedures need to be modified or if additional treatment components are required to ensure the new GWTP is operating efficiently and in accordance with OU2 decision documents. For the purposes of this evaluation, some text, tables, and figures were excerpted from the *Operations and Maintenance Manual, Operable Unit 2 (OU2) Groundwater Treatment Plant, Former Fort Ord, 11000 Engineering Equipment Road, Marina, California 93933* (O&M Manual) prepared by the RORE Innovative Solutions Joint Venture (JV).

This report documents groundwater treatment system (GWTS) evaluation and optimization activities conducted at OU2 at the former Fort Ord, California (Figure 1) from November 30, 2018 through January 31, 2021 (the “reporting period”). The guidance contained in the *Optimization Strategies for Long-Term Groundwater Remedies (with Particular Emphasis on Pump and Treat Systems)* (USEPA, 2007) was utilized in preparing this report.

This GWTS evaluation and optimization report presents:

- A brief site history and summary of major site features.
- A description of the OU2 GWTS.[1]
- A summary of remedial action objectives (RAOs) for OU2 and associated cleanup and discharge standards.
- Findings and observations, including a summary of O&M data.
- An evaluation of GWTS effectiveness, including energy/power usage.
- Recommendations for system modifications to improve performance, reduce costs, and increase the likelihood of site closeout.

1.2 Documents Reviewed

The documents listed below were referenced for this GWTS evaluation and optimization report:

- *Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix A, Final Revision 8, Groundwater Remedies and Monitoring at Operable Unit 2, Sites 2 and 12, and Operable Unit Carbon Tetrachloride Plume* (QAPP; Ahtna, 2021)

[1] The GWTS is comprised of the groundwater extraction system (EWs and conveyance), the GWTP including controls and treatment equipment, and the treated groundwater conveyance and aquifer recharge systems.

- *Design Analysis Report, Design-Build Groundwater Treatment Plant Relocation and System Improvements, Former Fort Ord, Seaside, California, Design Package #4: Ready for Construction Submittal* (JV, 2016)
- O&M Manual (JV, 2019)
- *Report of the Remediation System Evaluation, Selma Pressure Treating Superfund Site, Selma, California* (USEPA, 2002a)
- *Report of the Remediation System Evaluation, Modesto Groundwater Contamination Superfund Site, Modesto, California* (USEPA, 2002b)

1.3 Site Description

1.3.1 Location and History

The former Fort Ord is located in Monterey County, California, along the southern edge of Monterey Bay on central California's Pacific coast (Figure 1). The facility comprised approximately 28,000 acres and was used for military-related activities, including artillery training, since World War I. During World War II, Fort Ord served as the home of the 7th Infantry Division of the U.S. Department of the Army (Army). After the war, Fort Ord was used for infantry training and staging units departing for duty in the Far East. During the 1970s, as many as 50,000 troops were stationed at Fort Ord. In 1976, the training area was deactivated, and Fort Ord again became the home of the 7th Infantry Division. Fort Ord was placed on the Base Realignment and Closure list in 1991 and the post officially closed as an active Army facility in September 1994.

In 1990, the U.S. Environmental Protection Agency (USEPA) placed Fort Ord on the National Priorities List primarily due to groundwater contamination discovered beneath the Fort Ord Landfills area. With this designation, the Army assumed the lead responsibility for site cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. Later in 1990, a Federal Facility Agreement for Fort Ord was signed by the USEPA, the California Department of Health Services, the California Central Coast Regional Water Quality Control Board (CCRWQCB), and the Army (USEPA, 1990). Cleanup activities and property transfer for civilian reuse have been ongoing since that time. Notable reuses of former Fort Ord property include the California State University Monterey Bay (CSUMB) campus, Fort Ord National Monument, and Fort Ord Dunes State Park.

1.3.2 Potential Sources – Fort Ord Landfills

The Army used two areas at the former Fort Ord for disposal of residential and commercial wastes: the north landfill (referred to as Area A) was located north of Imjin Parkway and operated from 1956 to 1966. The main landfill, located south of Imjin Parkway (Areas B, C, D, E, and F), operated from 1960 to 1987 (Figure 2). Waste was placed in parallel trenches 10 to 30 feet deep and then covered over with the native dune sand excavated during trenching operations. Detailed disposal records are not available; however, information gathered during field activities and from other sources indicates household and on-base commercial refuse, dried sewage sludge, construction debris, and small amounts of chemical waste (paint, oil, pesticides, electrical equipment, ink, and epoxy adhesive) were placed in the Fort Ord Landfills (Shaw, 2005). These activities led to the release of contaminants to underlying groundwater.

There are two impacted water-bearing zones at OU2: the A-Aquifer and the Upper 180-Foot Aquifer (Figure 3). The Fort Ord Landfills and the associated impacted groundwater became OU2, as described in the *Record of Decision, Operable Unit 2, Fort Ord Landfills* (OU2 ROD; Army, 1994).

1.3.3 Geology and Hydrogeology

OU2 is underlain by fine- to medium-grained well-sorted dune sand deposits. These sand deposits sit on top of a layer of marine clay, consisting primarily of blue-gray plastic clay with interbedded fine sand units and is referred to as the Fort Ord-Salinas Valley Aquitard (FO-SVA). This aquitard layer is up to 50 feet in thickness and effectively isolates the A-Aquifer from the Upper 180-Foot Aquifer. West of OU2, the thickness of the FO-SVA decreases gradually toward the coastline of the Pacific Ocean, where it pinches out completely. The Upper 180-Foot Aquifer lithology consists primarily of sandy deposits with some gravel approximately 60 feet thick and is separated from the Lower 180-Foot Aquifer by the Intermediate 180-Foot Aquitard, which consists primarily of silt and clay units (Figure 3).

Depth to groundwater in the unconfined A-Aquifer is between 24 feet to 180 feet below ground surface (bgs) across the northern part of the former Fort Ord and between 65 and 180 feet bgs in the OU2 area. Groundwater in the A-Aquifer flows radially from the south to the north and deviates to the west and east along a north to northeast-trending groundwater divide, which extends from the eastern portion of the Fort Ord Landfills to the former Fritzsche Army Airfield (now the Marina Municipal Airport). Groundwater west of the A-Aquifer divide flows toward the western edge of the FO-SVA where it enters the unconfined portion of the Upper 180-Foot Aquifer. Groundwater flowing east of the A-Aquifer divide eventually discharges to the Salinas River (Ahtna, 2020c).

Depth to groundwater in the Upper 180-Foot Aquifer is between 45 feet and 265 feet bgs across the northern part of the former Fort Ord and between 60 and 265 feet bgs in the OU2 area. To the west where the FO-SVA pinches out, the unconfined A-Aquifer and confined Upper 180-Foot Aquifer combine to form a continuous, unconfined hydrostratigraphic unit (identified as the unconfined Upper 180-Foot Aquifer). A north-trending groundwater divide in the unconfined Upper 180-Foot Aquifer exists midway between the FO-SVA and Monterey Bay. Groundwater in the unconfined Upper 180-Foot Aquifer west of the divide flows west and discharges to the Monterey Bay. Groundwater in the unconfined Upper 180-Foot Aquifer east of the divide flows under the FO-SVA (becoming confined) toward the Salinas Valley (Ahtna, 2020c).

1.3.4 Groundwater Plume Extent

The OU2 plume, identified by eleven chemicals of concern (COCs), migrated west to the edge of the FO-SVA where it entered the Upper 180-Foot Aquifer and migrated east and then down into the Lower 180-Foot Aquifer through a natural discontinuity in the Intermediate 180-Foot Aquitard (HLA, 1995 and MACTEC, 2006). Low concentrations of COCs associated with OU2 co-mingle in the Lower 180-Foot Aquifer with the Operable Unit Carbon Tetrachloride Plume (OUCTP)-associated plume west of Reservation Road (see Ahtna, 2020a and Ahtna, 2020c for more information). Table 1 lists the ACLs for OU2 COCs as stated in the OU2 ROD (Army, 1994) and the 1995 OU2 ESD (Army, 1995). There are no ACLs for OU2 in the Lower 180-Foot Aquifer and there is no active remediation occurring in this aquifer;

however, the presence of OU2 COCs in the Lower 180-Foot Aquifer will be addressed in the 5th Five-Year Review Report for Fort Ord Superfund Site, which is scheduled to be complete in September 2022.

2.0 Remedy Description

2.1 Remedy Overview

The OU2 groundwater remedy is defined by the OU2 ROD (Army, 1994) and the *Explanation of Significant Differences, Operable Unit 2, Fort Ord Landfills, Fort Ord, California* (1995 OU2 ESD; Army, 1995), and consists of a groundwater pump and treatment system designed to remediate groundwater containing COCs above ACLs. Construction of the original OU2 groundwater remedy is documented in the *Operations and Maintenance Manual* (IT, 1996). The OU2 GWTS has been in operation since October 1995 to remediate the OU2 A-Aquifer, OU2 Upper 180-Foot Aquifer, and OUCTP Upper 180-Foot Aquifer. The GWTS extracts groundwater from these aquifers and treats it with granular activated carbon (GAC) at the OU2 GWTP. In a letter dated January 4, 1996 the USEPA concurred with the Army's determination that the OU2 groundwater remedy is "operating properly and successfully" (USEPA, 1996). Diversion of treated effluent water from the OU2 GWTP to the Sites 2 and 12 (Sites 2/12) aquifer recharge structures began on June 23, 1999.

On October 12, 2018, the original OU2 GWTP located at 296 12th Street in Marina, California was shut down permanently to transition to the new OU2 GWTP located at the Fort Ord Landfills at 11000 Engineering Equipment Road in Marina, California (Figure 4).[2] Full-time operation of the new OU2 GWTP began on November 30, 2018 and the OU2 groundwater remedy currently consists of the GWTP, seven EW networks (30 EWs total), four injection wells (IWs), and two infiltration galleries (INFs) (Figure 4). Improvements included constructing:

- New EWs north of the Fort Ord Landfills (see Section 2.2).
- A new OU2 GWTP near the Fort Ord Landfills to replace the original GWTP, which was located near the western EW network (see Section 2.3).
- Two new IWs southeast of the Fort Ord Landfills (IW-OU2-04-180 and IW-OU2-05-180) (see Section 2.4).

2.2 Groundwater Extraction System

The groundwater extraction system includes several networks of EWs that intercept the COC plumes in the A-Aquifer and the Upper 180-Foot Aquifer. Figure 4 shows a layout of the OU2 groundwater remedy and Figure 5 shows a schematic of groundwater extraction system. Fourteen EWs, twelve in the A-Aquifer (EW-OU2-01-A through EW-OU2-13-A) and two in the Upper 180-Foot Aquifer (EW-OU2-01-180 and EW-OU2-02-180R), are part of the Eastern Network and Western Network comprising the original EW network.[3]

Seven EWs (EW-OU2-14-A through EW-OU2-16-A and EW-OU2-03-180 through EW-OU2-06-180) were installed as part of the OU2 groundwater remedy Phase I expansion and are located to the south (Landfills Network) and east (CSUMB and Shoppette [Abrams/Imjin] Networks) of the original EW

[2] The original OU2 GWTP was decommissioned in April 2019.

[3] EW-OU2-08-A was decommissioned in June 2018.

network.[4,5] Installation of the seven additional EWs was completed during March 2000 and continuous operation of the seven additional EWs began during the latter half of September 2000. System operation at increased flow rates began on April 23, 2001 following completion of the Phase I expansion activities. Phase I construction is documented in the *Construction Completion Report* (IT, 2001).

Two EWs (EW-OU2-07-180 and EW-OU2-08-180) were installed as part of the OU2 groundwater remedy Phase II expansion and comprise the Bunker Hill Network east of the original EW network. Installation of EW-OU2-07-180 was completed during January 2005. However, testing indicated EW-OU2-07-180 was ineffective in capturing the plume within the Upper 180-Foot Aquifer and a pump was not installed. Installation of EW-OU2-08-180 was completed in March 2006 and began continuous operation in July 2007 (Shaw, 2008).

The OU2 GWTS also includes the remedy for the OUCTP Upper 180-Foot Aquifer as described in the *Record of Decision, Operable Unit Carbon Tetrachloride Plume, Former Fort Ord, California* (OUCTP ROD; Army, 2008). The OUCTP Upper 180-Foot Aquifer remedy consists of one EW (EW-OU2-09-180) installed in 2010 and connected to the existing OU2 GWTS in the Bunker Hill Network (Figure 4 and Figure 5). Normal operations of EW-OU2-09-180 started in September 2011 as detailed in the *Upper 180-Foot Aquifer Remedial Action Construction Completion Report* (Shaw, 2012).

In 2016, the JV installed new EWs in the Abrams/Imjin Network and the GWTP Network north of the Fort Ord Landfills (four in the A-Aquifer [EW-OU2-17-A through EW-OU2-20-A] and three in the Upper 180-Foot Aquifer [EW-OU2-10-180 through EW-OU2-12-180]). Additionally, the JV installed larger submersible pumps to replace smaller pumps at existing or replacement EWs (EW-OU2-02-A, -05-A, -06-A, -09-A, -10-A, -11-AR, -12-A, -13-A, -16-A, -02-180R, -03-180, -05-180, -06-180, and -09-180) because the elevation of the new GWTP is approximately 120 feet higher than the elevation of the old GWTP. These EWs began continuous operation in November 2018; however, the leak detection system associated with existing EWs in the Western Network required upgrading. Therefore, for most of the reporting period, five previously operating EWs (EW-OU2-02-A, EW-OU2-04-A, EW-OU2-05-A, EW-OU2-06-A, and EW-OU2-09-A) were offline.[6] The JV completed work on the leak detection system and EW-OU2-04-A and EW-OU2-09-A were brought online on October 5, 2020 and September 1, 2020, respectively. Performance testing for EW-OU2-05-A and EW-OU2-06-A will be completed after the reporting period.

The EW networks feed two main pipelines that lead to the GWTP. EWs in the Abrams/Imjin Network, the Bunker Hill Network, CSUMB Network, and the GWTP Network feed into the Eastern Main pipeline, and EWs in the Western Network, Eastern Network, and Landfills Network feed into the Western Main pipeline. Table 2 lists construction data for the Eastern Main EWs and Table 3 lists construction data for the Western Main EWs. Figure 6 includes a schematic of a typical EW and well construction logs are included in the O&M Manual (JV, 2019).

[4] EW-OU2-15-A was disconnected from the OU2 GWTS and converted into a monitoring well in 2018.

[5] The “Shoppette Network” and the “Abram/Imjin Network” are synonymous.

[6] EW-OU2-09-A is part of the eastern EW network; however, the groundwater collection pipeline valve that isolates the western EW network is downstream of EW-OU2-09-A.

Wellhead appurtenances at each EW include air release/vacuum relief valves (ARVR), check valve, sample port, pressure transmitter, pressure switch, pulse dampener, flow meter, and globe valve (for flow control). Because of the potential pressure induced by the well pump, the globe valve and all components between the well cap and globe valve are rated at a maximum pressure of 250 pounds per square inch (psi). Components downstream of the globe valve are rated at 160 psi.

The conveyance pipe material is double wall (carrier pipe inside a containment pipe) high-density polyethylene (HDPE). There are several combination air release/vacuum relief valves (ARVRs) in both the Eastern Main and Western Main pipe systems that are crucial to successful pipeline operations.

A leak detection system is provided to monitor possible releases of contaminated groundwater. At each EW vault and several valve vaults, a level switch is mounted on the interior vault wall to shut off the pump if a pipeline failure occurs and the vault starts to fill with water. Additionally, both the Eastern Main and Western Main pipe networks have capacitance-type leak detection sensors in the containment pipes at various low points in the pipe alignments; therefore, if the carrier (inner) pipe leaks, then water will be detected in the containment (outer) pipe, triggering a system alarm and a shutdown of upstream EWs.

The leak detectors are wired to isolation relays that connect to the programmable logic controller (PLC) at each well network. Upon detecting a leak, the local network PLC will shut down the upstream EWs; other EWs will remain in operation. To restart the affected network EWs, the leak detection alarm must be cleared before restarting the PLC.

If a leak occurs, the supervisory control and data acquisition (SCADA) screen at the GWTP will indicate the location of the alarmed leak detector and will shut down pumps in the EWs located upstream of the detector.

2.3 Groundwater Treatment Plant

The new GWTP facility includes a Control Building and a Groundwater Treatment Area (GWTA). The Control Building houses an office, a communications room, a lavatory with toilet and sink, a shop area, a ground-floor storage area, and a second-floor mezzanine where additional storage space is available. The office area, communications room, and lavatory are fully air-conditioned spaces (heated and cooled); the shop area and storage areas are heated but not cooled. The GWTA is where groundwater process equipment is located. It is covered by a canopy roof but is otherwise open to the environment. The GWTA has a sunken containment area to capture possible spillage of untreated groundwater. The containment area is sloped to a sump with a permanent sump pump. Figure 7 shows a schematic of the GWTP and Figure 8 shows the GWTP site plan.

The Eastern Main and the Western Main conveyance pipes daylight inside the containment area at the northwest portion of the GWTA. At this location, the pipe material transitions from double-wall HDPE to single-wall carbon steel. A mixing manifold allows the extracted raw groundwater from the two main pipelines to be blended ahead of the GAC system. An influent manifold allows for directing the water streams from either main into a single GAC vessel train (Figure 7 and Figure 9).

Under normal operation, influent flow is evenly split into the two parallel GAC vessel trains (GAC Train #1 with vessels 1A, 1B, and 1C, and GAC Train #2 with vessels 2A, 2B, and 2C). Each train has three GAC vessels in series and was designed to accept half of the design maximum flow rate of 1,750 gallons per minute (gpm) (875 gpm per train); however, the design average flow rate is 1,600 gpm (800 gpm per train), which is the practical maximum flow rate at which the inlet pressure to the GAC vessels does not exceed the allowable operating limit. The nominal capacity of dry GAC media in each vessel is 20,000 pounds. The motive force for water flow through the GAC system is provided by the submersible pumps at the EWs; there is no influent flow equalization tank. Each GAC vessel is equipped with appurtenances including a pressure relief valve, an ARV, a manway, and three sample ports. There are also pipes for loading and unloading GAC media and for pressurizing the tank with compressed air. Table 4 presents a summary of GAC system data.

Treated water from the GAC system is conveyed to an HDPE effluent tank (Figure 7 and Figure 9). This tank is equipped with two pressure transmitters (active and backup units). The active transmitter sends a signal to two effluent pumps, each with a dedicated variable frequency drive (VFD). The effluent pumps transfer treated water from the effluent tank to the aquifer recharge facilities. The VFDs use the pressure signal (converted to water level signal) from the effluent tank to modulate the speed of the pump motors. On the downstream (effluent) side of the effluent pumps, a high-pressure switch, if triggered, will cause the pumps to shut down.

Treated water from the GWTP is used to recharge the Upper 180-Foot Aquifer underlying the former Fort Ord through IWs and INFs. The motive force for water flow to the recharge facilities is provided by the effluent pumps at the GWTP (Figure 7 and Figure 9). The water level in the effluent tank provides a signal to the VFDs that control the effluent pumps. This arrangement allows for steady-state system operation, where the GWTP outflow of treated water matches the GWTP inflow of untreated groundwater. Surge tanks are provided in the piping systems at the GWTA inlet and outlet to mitigate hydraulic pressure waves (Figure 9).

Over time, the primary GAC media bed (in the first vessel in line at each train) will become spent (i.e., no adsorptive capacity is available to remove COCs). Spent GAC beds are changed out as conditions warrant. The approach for sampling the GAC system and making decisions for changing out a GAC bed is presented in the QAPP (Ahtna, 2021).

Following replacement of the bed of spent GAC media, the newly placed bed requires backwashing before bringing the vessel back online. The GAC bed placement procedure is conducted by the GAC vendor using its proprietary step-by-step protocol (JV, 2019).

2.4 Treated Water Aquifer Recharge System

Treated water from both the A-Aquifer (OU2) and the Upper 180-Foot Aquifer (OU2 and OUCTP) is discharged into the Upper 180-Foot Aquifer at five locations: four OU2 IWs, two OU2 INFs (each collocated with an IW), and the Site 2 recharge structures (Figure 4). The original OU2 recharge locations (IW-OU2-01-180, INF-OU2-01-180, IW-OU2-02-180, and INF-OU2-02-180) are west of the western edge of the plume. The newly operational (since November 2018) OU2 IWs (IW-OU2-04-180 and IW-OU2-05-

180) are southeast of the plume and the Fort Ord Landfills.[7] Figure 10 shows a schematic of the aquifer recharge system.

The GWTP treated water (TW) effluent reaches the aquifer recharge facilities from the GWTP through underground pipelines: an Eastern Main and a Western Main. The Eastern Main delivers water to IW-OU2-04-180 and IW-OU2-05-180. The Western Main consists of two adjacent pipes and delivers TW to a location near the Western Network PLC compound (formerly the location of the original OU2 GWTP). At that location, the water flow is divided into three branch mains, each with a flow meter and manual control valve:

- One pipe conveys water to a tie-in to the effluent pipe at the Sites 2/12 GWTP. From there, the TW is distributed to a network of aquifer recharge facilities at the Fort Ord Dunes State Park on the west side of California State Route 1.
- One pipe conveys water to IW-OU2-01-180 (currently offline) and INF-OU2-01-180. These facilities are located north of the Western Network PLC compound.
- One pipe conveys water to IW-OU2-02-180 (currently offline) and INF-OU2-02-180. These facilities are located south of the Western Network PLC compound.

The pipe material for the TW mains is single-wall HDPE. There are ARVs and gate valves within the pipe network. Table 5 presents construction details and design flow rates for the aquifer recharge facilities. Figure 6 includes a schematic of a typical IW.

2.5 Monitoring System (SCADA Control)

Continuous operations are automated through a SCADA system and several PLCs, including the main PLC located at the Control Building and EW network PLCs (Figure 11). The level of automation allows the extraction system, GWTP, and aquifer recharge system to run continuously without constant operator attendance. VFDs installed at several EWs help to automatically modulate the motor speeds of the submersible pumps and the resulting flow rates. A VFD control system at the GWTP effluent tank controls effluent pumps P-1 and P-2, and balances GWTP outflow with GWTP inflow.

Appendix A contains control system information, including screenshots of the SCADA system and layouts for PLC panels. There is a screenshot for the main water treatment process, plus a screenshot for each EW network.

Each pump (including submersible pumps at the EWs and process pumps at the GWTP) has a local hand-off-auto (HOA) switch, and each pump may also be controlled through a "virtual" HOA switch in the SCADA human-machine interface (HMI) at the Control Building. The basic hierarchy of pump controls is indicated below.

Basic Hierarchy of Pump Controls

Field HOA position	***HMI HOA position[1]***	***Result***
Off	Off	Pump does not operate.
Hand	Off	Pump operates WITHOUT SCADA control.

[7] IW-OU2-03-180, located north of the plume, had not received treated water since 2000 and was decommissioned in 2014.

Field HOA position	HMI HOA position[1]	Result
Auto	Off	Pump does not operate; SCADA is in standby.
Off	Hand	Pump does not operate.
Hand	Hand[2]	Pump operates WITHOUT SCADA control.
Auto	Hand[2]	Pump operates WITHOUT SCADA control.
Off	Auto	Pump does not operate.
Hand	Auto	Pump operates WITHOUT SCADA control.
Auto	Auto	Pump operates under SCADA control.

Notes:

[1] HMI HOA switches are accessed through SCADA at the Control Building.

[2] The pump-off signal (low water level alarm) does not function if the HMI HOA switch is in HAND mode.

2.5.1 Control of Extraction Rate (GWTP Influent)

The rate of influent water to the GWTP is governed by the extraction flow rate from the individual EWs. Tables 2 and 3 list the type of pump motor control for each EW. Flow control for the well pumps is further described below.

For well pumps with motor starters, the GWTP operator establishes pump-on and pump-off set points from the PLC that governs the network for the particular well. To adjust the flow rate from an EW, the operator uses the manual globe valve at the wellhead.

For well pumps with VFDs and partial SCADA control capability, the GWTP operator adjusts the speed of the well pump motor from the PLC that governs the network for the particular well to obtain the desired flow rate. The operator is able to turn the well pump on and off from the SCADA HMI at the Control Building.

Each EW network has a separate panel display in the SCADA HMI. On the network screen, each well has a schematic display showing:

- Depth to water (in feet below top of well casing)
- Flow rate (in gpm)
- Cumulative gallons pumped
- Pressure at the wellhead piping (in psi)
- A graphic display of the water level in the well

2.5.2 Control of GWTP Effluent

A critical control loop at the GWTA is the control of effluent pumps P-1 and P-2 based on the water level in the effluent tank. The main HMI panel for the GWTP allows the system operator to select which level sensor in the effluent tank is operational. The selected sensor sends a signal to each of two VFDs that control the motor speed of effluent pumps P-1 and P-2. The critical feedback loop allows for maintaining a near-constant level in the effluent tank, even with varying inflow to the GWTP.

2.6 Utility Systems

Several utility systems support the operations of the OU2 groundwater remedy: potable water, fire sprinkler water, septic system, electrical power (at several service locations), telecommunications via fiber optic cable, and fire alarm. USACE holds the accounts for water, electricity, and fire alarm services, and the O&M contractor holds the account for telecommunications. The utilities are briefly described below.

2.6.1 Potable Water Service

There is a potable water pipeline to the Control Building that serves emergency showers and eyewashes and the lavatory sink and toilet. The water company is the Marina Coast Water District. The 1-inch meter for the potable service is located near the corner of Inter-Garrison Road and 8th Street (Figure 4).

2.6.2 Fire Sprinkler Supply

Adjacent to the potable water tie-in to the MCWD service pipe near Inter-Garrison Road, there is a tie-in for fire sprinkler water to supply the GWTP. This pipeline has a backflow preventer with an open stem and yoke (OS&Y) valve on the backflow preventer inlet and outlet. Each OS&Y valve has a tamper switch so that, if someone tries to close the valves, an alarm signal will be sent to the GWTP, which is visible on the fire alarm display at the GWTP, and to the fire alarm monitoring company (Telemetrix Integrated Systems [TMX], not the fire department). TMX then calls back the GWTP operator to confirm the alarm signal. The supply pipe for fire sprinkler service is unmetered.

2.6.3 Electrical Power

For operating the OU2 groundwater remedy, there are several locations where Pacific Gas & Electric (PG&E) provides an electrical connection. Table 6 lists the PG&E services for the OU2 groundwater remedy along with meter numbers and transformer numbers. No power is currently required for the recharge facilities and PG&E removed the meter associated with these facilities. All PG&E services for OU2 are 480Y/277 V, 3-phase services.

Service at the GWTP, 11000 Engineering Equipment Road, Marina, California 93933 – The primary service at the GWTP was installed by PG&E via an overhead distribution system and a transformer located at the GWTP. The PG&E meter is located at the main switchboard (MSB) in the Control Building shop area. The MSB directly feeds a secondary panel (1HA) that primarily powers the GWTP facility lights. The MSB also feeds a stepdown transformer that feeds a secondary panel (1LA) that serves the 120-volt receptacles and other low-voltage equipment throughout the GWTP facility. Power is also provided to the GWTP Network PLC that controls wells EW-OU2-10-180, IW-OU2-04-180, and IW-OU2-05-180.

Service at the Western Network, 296 12th Street, Marina, California 93933 – This service provides power to an MSB in the fenced PLC enclosure located at the former location of the OU2 GWTP on the Monterey Peninsula College Education Center at Marina campus. The PLC serves several Western Network EWs, INFs, and IWs.

Service at the Eastern Network, Abrams Drive, Marina, California 93933 – PG&E service is located in the new Sea Haven residential development and provides power to a local MSB, which powers the main Eastern Network PLC and EWs.

Service at the Abrams/Imjin Network, 2700 Imjin Parkway, Marina, California 93933 – PG&E service is located at the Ord Market at the southwest corner of Imjin Parkway and Abrams Drive. This facility provides power to an MSB in the fenced PLC enclosure. The PLC serves several EWs in the Abrams/Imjin Network.

Service at the Bunker Hill Network – This service provides electrical power to an MSB in a fenced compound located in the Bunker Hill housing development. The MSB powers a local PLC and wells EW-OU2-07-180, EW-OU2-08-180, and EW-OU2-09-180. EW-OU2-07-180 and EW-OU2-08-180 are currently offline; however, operational requirements may change in the future.

Service at the CSUMB Network – This service provides electrical power to a local MSB in the CSUMB housing area east of the Fort Ord Landfills. The MSB provides power to a PLC and to well EW-OU2-14-A. The PLC and EW are currently offline; however, operational requirements may change in the future.

Service at the Landfills Network – This service provides electrical power to an MSB that powers a PLC and wells EW-OU2-03-180 and EW-OU2-04-180 located southwest of Fort Ord Landfills Area C. EW-OU2-04-180 is currently offline; however, operational requirements may change in the future.

2.6.4 Telecommunications

The GWTP telecommunication system includes a 12-strand fiber optic cable originating at a cell tower building on CSUMB property at A Street and 8th Avenue, about 1 mile south of the GWTP facility. The fiber optic cable terminates in a wall-mounted communication rack in the Control Building communications room with a 12-strand fiber shelf. The shelf connects to a router/Ethernet switch/patch panel. The GWTP telephones and computer data ports are connected to the patch panel. An uninterruptable power supply provides electricity to the telephone equipment in the event of a power outage.

2.6.5 Lightning Protection System

A lightning protection system is installed at the Control Building and GWTA canopy. The system consists of roof-mounted air terminals connected to roof conductors that use the building steel to connect to a system of interconnected ground rods, forming an electrical low-impedance path to ground.

2.6.6 Landfill Gas Monitoring System

There are three landfill gas (LFG) detectors (methane detectors) to monitor ambient indoor air in the Control Building. Additionally, there is a passive vapor mitigation system consisting of a network of slotted pipes underneath the Control Building slab that connects to a main header pipe. The header pipe enters a vault and connects to a venting riser with a non-powered wind turbine above the roofline. The wind turbine provides slight depressurization of the sub-slab area, which prevents buildup of methane under the Control Building, and keeps precipitation out of the venting riser. In the vault is an LFG detector that monitors the vapor stream in the pipe. Each LFG detector is intended to provide continuous real-time gas readings on its light-emitting diode (LED) display.

Each detector has user input functions to allow adjustments in operating parameters, including a threshold alarm concentration. The detectors are connected to the SCADA system so that, when the predetermined limit is detected, an alarm light will flash on the HMI screen.

2.6.7 Fire Alarm

There is an addressable fire alarm system for the GWTP facility. The system consists of:

- A heat detector to protect the fire alarm control panel (FACP) in the storage area inside the Control Building;
- Pull stations at the exit doors of the Control Building;
- Horn strobes throughout the Control Building interior;
- Water flow monitoring of the emergency showers;
- Monitoring of the fire sprinkler riser systems; and
- Monitoring of the OS&Y valves at the tie-in to MCWD service at Inter-Garrison Road.

The fire alarm will be triggered by any one of the following:

- Water flow at the riser pipe feeding the wet-pipe sprinkler system in the Control Building;
- Water flow at the riser pipe feeding the dry-pipe sprinkler system at the GWTA canopy;
- Water flow at either of two emergency showers;
- Heat detection at the FACP;
- Activation of any pull station; and
- Tampering of the OS&Y valve at the MCWD tie-in.

Any of these conditions will activate the fire alarms (horns and strobes) and will notify TMX, the off-site monitoring service. It is recommended that the supervisor station be notified in advance before emergency shower testing. Additionally, a closed valve or trouble signal in either fire sprinkler system will activate a trouble/supervisory display on the FACP and send a notification to TMX. The fire alarm system can be quieted/reset at the FACP. The fire alarm system is equipped with battery backup for 48 hours of supervisory conditions and 15 minutes of alarm conditions.

2.7 Groundwater Monitoring Program

The quarterly groundwater monitoring program (GWMP) includes measuring depth to water and collecting groundwater samples for chemical analysis from monitoring wells and EWs at OU2. The presence and concentration of COCs in wells associated with OU2 are compared with each COC's Aquifer Cleanup Level (ACL) to determine their horizontal and vertical distribution in the aquifers. Table 1 lists the ACLs for OU2 COCs as stated in the OU2 ROD (Army, 1994) and the 1995 OU2 ESD (Army, 1995). Groundwater elevations and flow directions are determined using depth to water measurements collected during the GWMP quarterly events. The GWMP data and data evaluation are presented in quarterly GWMP reports. GWMP modifications are made by comparing analytical results to QAPP decision rules (Ahtna, 2021).

2.8 Other Remedy Components

As specified in the OU2 ROD (Army, 1994) and the subsequent 1995 OU2 ESD (Army, 1995), the remedy includes institutional controls (i.e., deed restrictions) to prevent the use of groundwater within the contaminant plume for domestic or agricultural purposes. The OUCTP ROD (Army, 2008) specifies institutional controls to prevent access to or use of the groundwater within the OUCTP area for any purpose until cleanup levels are met and to maintain the integrity of any current or future remedial or monitoring system including monitoring, extraction, and injection wells. Additionally, in accordance with the *Explanation of Significant Differences, No Further Action for Munitions and Explosives of Concern, Landfill Gas Control, Reuse of Treated Groundwater, Designation of Corrective Action Management Unit (CAMU) Requirements as Applicable or Relevant and Appropriate Requirements (ARARs)* (2006 OU2 ESD; Army, 2006), treated water discharged from the OU2 GWTP may be used for non-potable construction purposes including, but not limited to, dust control and soil compaction.

3.0 Remedy Goals and Conditions for Terminating Groundwater Remedy

3.1 Remedial Action Objectives

Groundwater at OU2 and OUCTP is considered a potential drinking water, industrial water, and agricultural water source under the *Water Quality Control Plan for the Central Coastal Basin* (CCRWQCB, 2019), although the water is not currently being used for these purposes. Accordingly, the OU2 groundwater remedy goals are to protect human health and comply with Federal and State law by returning groundwater to a condition that will allow beneficial use, including potential future use as a drinking water source as described in the OU2 ROD (Army, 1994) and the subsequent OU2 ESD (Army, 1995). Specifically, the RAO is to remediate COCs in the A-Aquifer and Upper 180-Foot Aquifer to Federal or State drinking water Maximum Contaminant Levels (MCLs), whichever is lower, and risk-based levels that are lower than MCLs for chloroform, 1,2-dichloropropane, tetrachloroethene (PCE), and vinyl chloride (Army, 1994). These goals are accomplished through hydraulic control and containment of contaminated groundwater and extraction and treatment of groundwater with COC concentrations exceeding ACLs. It is further stated in the OU2 and OUCTP RODs that 1) the achievement of the RAO would restore the beneficial uses of groundwater within and adjacent to OU2 and OUCTP, and 2) the ACLs are acceptable contaminant concentrations that, when achieved within a site, would reduce potential risks and comply with applicable or relevant and appropriate requirements.

3.2 Closure Criteria

Criteria for terminating the groundwater remedy are based on decision rules identified in the QAPP (Ahtna, 2021). Groundwater monitoring wells and EWs are sampled quarterly during the remediation monitoring phase. The remediation monitoring phase is complete and the attainment monitoring phase begins when four consecutive quarters of monitoring data show concentrations of all COCs in a well are less than or equal to their respective ACLs.[8] The attainment monitoring phase for a well is complete when concentrations of all COCs in the well are:

- Less than or equal to their respective ACLs in eight consecutive monitoring events and data analysis indicates COC concentrations are stable or declining, or
- Below their respective limits of quantitation or below 10 percent of their respective ACLs, whichever is greater, in six consecutive monitoring events.

When the attainment monitoring phase for a well is complete, the well may be removed from the sampling program. If the well is no longer needed for groundwater elevation data, it will be proposed for decommissioning. The groundwater remedy termination metric to be evaluated will be whether the attainment monitoring phase is complete for all wells within each hydraulic zone at OU2,[9] at which point operation of EWs within the hydraulic zone may be terminated. This approach recognizes the

[8] The remediation monitoring phase and the attainment monitoring phase are defined in the *Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well* (USEPA, 2014).

[9] See the *Final Technical Memorandum, Groundwater Remediation Exit Strategy, Sites 2 and 12 and OU2, Former Fort Ord, California* (MACTEC, 2009) and QAPP (Ahtna, 2021) for descriptions of OU2 hydraulic zones.

termination metric will likely be met zone by zone and not simultaneously throughout the plume. Thus, the operation of EWs within individual hydraulic zones will progressively cease until operation of the OU2 GWTS is terminated and closure of the OU2 groundwater remedy will be proposed in a remedial action completion report.

3.3 Cleanup Levels and Discharge Standards

The OU2 groundwater plume is characterized by the presence of eleven COCs in groundwater in the A-Aquifer and Upper 180-Foot Aquifer at concentrations above their respective ACLs. Carbon tetrachloride is the only COC for OUCTP in the Upper 180-Foot Aquifer with an ACL of 0.5 micrograms per liter (µg/L) and a treated water discharge limit of 0.5 µg/L, which are the same limits for OU2. Table 1 presents the ACLs and treated water discharge limits in effect for the OU2 GWTP.

Operational data since startup of the OU2 GWTS in 1995 indicated low carbon affinity COCs, such as chloroform, 1,1-dichloroethane (1,1-DCA), and cis-1,2-dichloroethene (cis-1,2-DCE), were the first compounds breaking through the GAC, resulting in bed change-outs every five to six weeks. This indicated GAC usage was not optimal for the high carbon affinity compounds, such as trichloroethene (TCE) and PCE, which were not reaching their retention capacity before a change-out; therefore, discharge limits for three low carbon affinity COCs (chloroform, 1,1-DCA, and cis-1,2-DCE) were revised from those listed in the OU2 ROD (Army, 1994) to their respective ACLs for treated water discharged within the historical boundaries of the OU2 plume area (HLA, 1999).

4.0 Findings and Observations

The following sections discuss GWTS and component performance, recurring problems, COC delineation, and COC concentration trends.

4.1 Groundwater Extraction System Performance

As described in Section 2.2, the groundwater extraction system includes several EWs that intercept the COC plumes in the A-Aquifer and the Upper 180-Foot Aquifer. Figure 4 shows locations of EWs, and Figure 5 is a schematic of the extraction system. Findings and observations related to groundwater extraction system performance include:

- Operation of EW vault lids was causing breakage to the ARVR on the new Upper 180-Foot Aquifer EWs installed by the JV. The JV replaced the ARVRs on all new Upper 180-Foot Aquifer EWs to remedy breakage caused by vault lids.
- The new EWs installed in 2016 have sand filters in the EW vault plumbing. The previously existing EWs do not have these filters. For EWs where the submersible pump cycles frequently, additional torque is applied to the piping that may be causing the plastic housing on the sand filter to crack and leak.
- At the Eastern Main pipeline, the pressure indicator "PIT 400"reads negative values.[10] During non-normal operations,[11] this causes difficulty restarting the GWTP after a shutdown. Relocation and modification of PIT 400 is recommended, likely to a location on a horizontal or vertical pipe with the flow going up. The PIT 400 pressure indicator and flow meter may also be relocated upstream of the surge tank if feasible. This would involve welding in a new adaptor pipe for the instrument, plugging the existing pipe, and re-wiring to the new location.
- VFDs are working as designed and within operational parameters.
- EW network PLCs are working as designed and within operational parameters.
- Most EWs are underperforming compared to their design flow rates (Tables 2 and 3). Specifically:
    - The Western Network has been offline for extended periods during transition from the old GWTP to the new GWTP, except EW-OU2-04-A, which was restarted on October 5, 2020 but experienced submersible pump failure on January 21, 2021. The JV did not install a larger submersible pump in EW-OU2-04-A, so it was operating at a lower flow rate than it had been historically. A larger submersible pump should be installed and EW-OU2-04-A restarted.
    - EW-OU2-09-A had been offline for extended periods during transition from the old GWTP to the new GWTP but was restarted on September 1, 2020. The JV installed a larger submersible pump in EW-OU2-09-A, but it was controlled by a motor starter,

[10] PIT 400 is shown on Sheet EI603 of the as-built drawings and in the O&M Manual (JV, 2019).

[11] Non-normal operations include operating without one EW network due to communications loss, maintenance on EWs or other networks components, etc., that significantly reduce flow to the GWTP.

which caused the pump to cycle frequently. The motor starter was replaced with a VFD in January 2021.

- EW-OU2-01-180 is not operable due to a failed well screen; however, COC concentrations have been below ACLs since 2018 and there are no plans to rehabilitate or replace this EW.
- EW-OU2-12-180 is not operable due to a failed submersible pump and sediment accumulation in the well (this well will be rehabilitated in 2021).
- On average, new A-Aquifer EWs installed in 2016 produce only 30 percent of the design flow rate (the design flow rate was the basis for specifying submersible pump sizes). Additional development of A-Aquifer EWs may be required and, as old pumps fail and require replacement, new submersible pumps should be specified based on actual EW performance, which could result in downsizing of pumps.
- On average, new Upper 180-Foot Aquifer EWs installed in 2016 produce only 42 percent of the design flow rate (the design flow rate was the basis for specifying submersible pump sizes). Additional development of Upper 180-Foot Aquifer EWs may be required and, as old pumps fail and require replacement, new submersible pumps should be specified based on actual EW performance, which could result in downsizing of pumps.

- The flowmeter for EW-OU2-02-180R indicated correct flow rates (approximately 90 gpm) in the EW vault, but the SCADA interface constantly showed 314 gpm. The JV replaced the flowmeter body on January 19, 2021; however, but the SCADA interface constantly showed 90 gpm, indicating the milliamp (mA) signal being sent to SCADA from the flowmeter still requires calibration.
- The flowmeter for EW-OU2-12-180 was not functional and needs to be replaced and calibrated after a new submersible pump is installed in this EW.
- Frequent communications failures between EW networks and GWTP were identified. In January 2021, the radios were upgraded and an antenna mast installed at the new GWTP, after which communication failures became much less frequent.
- A calibration survey completed in July 2020 indicated the leak detection system is not fully functional. When tested, several leak detectors did not show an alarm in the SCADA system or did not shut down an associated EW or the GWTP, or both. Corrective measures are in progress and include programming the leak detector alarm into SCADA and adding the leak detector to the line of SCADA programming that controls a submersible pump for a specific EW.

4.2 Groundwater Treatment Plant Performance

A review and evaluation of GWTP performance to date indicates it is generally working as designed and within the operational parameters. Discussion of specific components is provided below.

4.2.1 Liquid Phase GAC System

The HP1220 Triplex Carbon System is designed to remove dissolved organic compounds from contaminated feed water using a GAC system. The feed water to be treated may be pumped at a controlled rate through the adsorbers in a series or parallel configuration.

A pre-filter may be installed to remove any suspended solids from the water prior to entering the GAC system; however, no pre-filter was provided by the manufacturer and historical water quality data for OU2 indicate a pre-filter is not required. Each vessel contains 20,000 pounds of GAC, which provides sufficient contact time at the design flow rate to remove the organics in the water. Water enters the adsorber from the top and flows down through the GAC bed and the treated water is collected in the underdrain system.

When piped in the series configuration and the lead adsorber becomes saturated (spent), it is taken offline for replacement of the spent GAC. The feed water is directed to the second adsorber, allowing the system to remain in service. The lead adsorber is then pressurized up to 30 pounds per square inch gauge (psig) with air. With the addition of utility water, the spent GAC is pneumatically displaced as slurry to a bulk transport trailer. The dewatered spent GAC is then transported to a reactivation facility where it is reactivated. To refill the adsorber with fresh GAC, the GAC in the trailer is wetted using clean water and pressurized up to 15 psig. The fresh GAC is then transferred as a slurry to the empty adsorber. Once the fresh GAC is placed in the vessel, it must be soaked and backwashed before the appropriate valves will be opened, placing the vessel with the fresh GAC in the polishing (third) position, if operated in series configuration. Findings and observations related to GAC system performance include:

- Currently, the only option to supply water for a GAC change-out at the GWTP is through a hydrant near the driveway adjacent to the GWTA, which was the supply water used for the first GAC change-out at the new GWTP on September 16, 2020. During this GAC change-out, it was determined that the GWTP can continue operating with four GAC vessels online during change-out procedures. Additionally, a pipeline for accessing treated water for construction and irrigation purposes was installed that could potentially allow use of treated water for GAC change-outs instead of potable water.
- Some of the valves in the GAC trains are in positions where the GWTP operator cannot see the open/closed indicator, and others were painted over and are difficult to see. Adding new or different indicators would help the operator adjust the valves for backwash and other normal operations.
- When discharging a significant volume of water into the containment area during GAC change-outs or other planned operations, the “high alarm” in the containment area sump activates before the water rises out of the sump. The alarm float switch is currently set at a level that is too low for the volume of water that a GAC change-out generates. This is an audible alarm only and is ear-piercingly loud. During the GAC change-out on September 16, 2020, the water level in the containment area was 2 inches to 4 inches above the sump level most of the time.
- The GWTA is open to the environment and small birds are residing above the GAC trains under the canopy. This creates additional maintenance time for cleaning the GAC system and there are places on top of the GAC vessels that are difficult to reach.
- The GWTA is not configured to allow for sediment filtering or sediment removal during discharge of water from planned operations (e.g., GAC change-outs and well development activities).
- Vinyl chloride is a COC for OU2 and is detected in several EWs. GAC is not efficient at removing vinyl chloride; however, the GWTP was designed and constructed to allow for future expansion

with additional treatment technologies (e.g., an air stripper or ultraviolet light/oxidation) if vinyl chloride is detected at the GWTP influent at concentrations that would significantly reduce the adsorptive capacity of the GAC for other COCs. However, vinyl chloride has not been detected at the GWTP influent to date (Ahtna, 2020c) and is not expected to be in the future based on current concentration trends (Ahtna, 2020c).

Review and evaluation of GAC system performance to date indicates it is generally working as designed and within operational parameters and no changes to the components or the GAC vessel trains are needed at this time, though there are recommendations for optimization (see Section 6.0).

4.2.2 Effluent Tank and Pumps

Treated water from the GWTP is used to recharge the Upper 180-Foot Aquifer underlying the former Fort Ord through IWs and INFs. The motive force for water flow to the recharge facilities is provided by effluent pumps P-1 and P-2 at the GWTP (Figure 7 and Figure 9). The water level in the effluent tank provides a signal to the VFDs that control the effluent pumps. This arrangement allows for steady-state system operation, where the GWTP outflow of treated water matches the GWTP inflow of untreated groundwater.

Effluent pumps P-1 and P-2 had issues with air lock, which the JV addressed by raising the water level in the effluent tank required to turn on the effluent pumps from 8 feet to 10 feet so there is sufficient head pressure above the effluent pumps to ensure entrained air does not form air pockets in the pumps. This adjustment appeared to correct the air-lock issue; however, both pumps had to have their seals replaced and both pumps are already showing signs of bearing wear.[12] These are issues that can result from air-lock and the pump running dry, even if only briefly. Additional quarterly maintenance, including more frequent lubrication with less grease, was also added to help correct this issue.

The JV scope of work included removal of the potable water source from the Fort Ord Landfills that was used for construction purposes. The 2006 OU2 ESD (Army, 2006) allows for use of treated OU2 groundwater for non-potable purposes; however, the new GWTP was configured only for aquifer recharge with treated water and did not allow access for other purposes (e.g., construction or irrigation purposes at the Fort Ord Landfills). Using an existing 4-inch butterfly valve on the effluent pipeline, a 4-inch polyvinyl chloride pipe was installed that extends from the effluent pipeline to a 2½-inch ball valve at the south edge of the containment area near surge tank ST-4 (Figure 9). This ball valve can be used to fill water tanks or trucks at approximately 200 gpm for construction purposes, dust control, or irrigation.

Review and evaluation of effluent tank and pump performance to date indicates that, after the modifications described above, they are working as designed and within operational parameters and no additional changes to the effluent tank and the pumps are needed at this time.

4.2.3 Backwash Tank

Review and evaluation of backwash tank and other component performance to date indicates they are working as designed and within operational parameters. However, the backwash transfer pump (P-4)

[12] The P-2 seal was replaced on November 12, 2020 and the P-1 seal will be replaced in 2021.

does not have a safety shut off, which would potentially allow it to run dry and cause damage to the pump, and there are recommendations for optimization (see Section 6.0).

4.2.4 Surge Tanks

There are four surge tanks located in the containment area. Surge tank ST-1 is located on the influent Eastern Main, surge tank ST-2 is located on the influent Western Main, and surge tanks ST-3 and ST-4 are located on the effluent pipeline downstream of effluent pumps P-1 and P-2 (Figure 9). Review and evaluation of surge tank performance to date indicates they are working as designed and within operational parameters and no changes to the surge tanks are needed at this time.

4.2.5 Programmable Logic Controller

Review and evaluation of performance of the main PLC at the GWTP Control Building to date indicate it is working as designed and within operational parameters. No changes to the PLC are needed at this time.

4.2.6 Communications Components

Intermittent communication disruptions between the OU2 GWTP and the EW networks, the Western Network in particular, are a known issue. Radio transceivers and ancillary antennae are located at the PLC panels for each EW network to transmit data between the EWs and the OU2 GWTP. Development at the former Fort Ord over the last several years has narrowed lines of sight between transceivers, and variations in atmospheric conditions more easily disrupt communications. This problem is being addressed by 1) conducting a radio survey to optimize transceiver and antenna positions, 2) upgrading existing radios, and 3) making minor infrastructure modifications to minimize movement and secure lines of sight (see Section 6.0).

Review and evaluation of other GWTP communications components to date indicates they are working as designed and within operational parameters. No changes to other communications components are needed at this time.

4.2.7 Lighting Components

The current lighting system at the GWTP, specifically in the GWTA under the canopy, is corroding due to exposure to the outdoor environment. Also, changing the fluorescent tubes in the current light fixtures is labor-intensive and requires specialized equipment in the restricted workspace under the canopy. Therefore, optimization of the lighting system in the GWTA is recommended (see Section 6.0).

Review and evaluation of other GWTP lighting components indicate they are working as designed and within operational parameters. No changes to the other lighting components are needed at this time.

4.2.8 System Controls

Currently, remote and local host and HMI SCADA screens are configured differently across all tabs. Figure 11 shows basic PLC-SCADA architecture. The local and remote interfaces are web-based and the HMI is direct control at the GWTP, but all three have different interfaces. There are also several different well interface menus, which should all be uniform for consistent operator interaction with individual wells (examples are shown in Appendix A, Figure A1). These differences result in the operator:

- Not knowing exactly what controls will function for each well in each interface (i.e., the well control is dependent on the interface being used).
- Not having full operational control over certain wells in each interface.
- Not having the same alarms visible for each well in each interface.

The well “Flow Trends” screen is unusable when opened due to the screen being cluttered with too much data. Examples of the Flow Trends screen showing the default screen (all EWs) and only a single EW (EW-OU2-10-A) are included in Appendix A, Figure A2 and Figure A3. Programming the default screen to no well bubbles checked (as opposed to all bubbles checked), so the operator may select individual wells as needed, would allow for quicker and easier operations. Additionally, there are EWs on the Flow Trends that are no longer functioning or were decommissioned and could be removed to reduce clutter, and a few EWs that are functioning but are not shown on the Flow Trends screen.

Review and evaluation of other GWTP system controls indicate they are working as designed and within the operational parameters. No changes to other system controls are needed at this time.

4.3 Treated Water Aquifer Recharge System Performance

Review and evaluation of treated water aquifer recharge system performance to date indicates it is generally working as designed and within operational parameters. However, the total recharge design flow is 1,511 gpm (JV, 2016) and current total operational flow is approximately 1,200 gpm, which may be a limiting factor if groundwater extraction capacity is added to the GWTS in the future, in which case new injection wells, additional infiltration galleries, or existing stormwater infiltration basins may be added to the treated water aquifer recharge system.

4.4 Power Usage for Former and New GWTS

A comparative summary of electrical usage at the former and new OU2 GWTS is presented in Table 8. Energy usage of the new GWTS is more than double the energy usage of the original GWTS primarily due to:

- A 150-ampere increase in electrical usage at the Abrams/Imjin Network due to operation of submersible pumps in six new EWs and an increase in horsepower for submersible pumps in three existing EWs.
- A 30-ampere increase in electrical usage at the Eastern Network because of an increase in horsepower for submersible pumps in four existing EWs.
- A 75-ampere increase in electrical usage between the original and new OU2 GWTPs because of an increase in horsepower for two effluent pumps.

As expected, an increase in energy use results in a correlating increase in energy costs (Figure 12), though the increase in total costs may be partly attributable to an increase in per unit energy costs (dollars per kilowatt-hour) that occurred over the last 3 to 4 years, mainly between the beginning of 2017 and 2020. Based on the review of energy usage at the original GWTS and new GWTS, the increase in usage and associated costs is an expected outcome of GWTS expansion; however, measures could be considered to reduce energy costs over the long term (see Section 6.0).

4.5 OU2 GWTP and Groundwater Remedy Sampling

Water sampling is a critical activity for the OU2 groundwater remedy. The sampling programs are in place to:

- Ensure compliance with discharge limits (i.e., sampling the GWTP effluent)
- Provide data to make operational decisions, including when to change out a GAC media bed
- Assess OU2 COC plume status (i.e., performance of the OU2 remedy regarding plume containment and attainment of ACLs).

The current O&M Manual (JV, 2019) describes recommended sampling programs, which are summarized in Table 7; however, these programs are insufficient for achieving data quality objectives for OU2 that are consistent with the *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4 (USEPA, 2006) and OU2 decision documents. Accordingly, the QAPP (Ahtna, 2021) is the governing document for groundwater monitoring at the former Fort Ord and describes the current sampling program for the GWTS and GWMP.

5.0 Evaluation of System Effectiveness to Protect Human Health and the Environment

The technical assessment of the remedies for OU2 completed for the *4th Five-Year Review for the Fort Ord Superfund Site* identified no issues for OU2. The OU2 remedies were deemed to be protective of human health and the environment, and the ongoing remedial activities continue to adequately address all exposure pathways that could result in unacceptable risks (Army, 2017).

5.1 Groundwater

Fort Ord supply wells FO-29, FO-30, and FO-31, which are owned and operated by the Marina Coast Water District, are located downgradient of COC plumes associated with OU2 in the Upper 180-Foot Aquifer. These supply wells are partly screened in the Lower 180-Foot Aquifer and there is increased hydraulic communication between the Upper and Lower 180-Foot Aquifers where there is an apparent gap or area of higher conductivity through the Intermediate 180-Foot Aquitard. This complicates potential groundwater flow patterns (both horizontal and vertical) in the area east of the OU2 Upper-180 Foot Aquifer TCE plume. TCE has not been detected at the supply wells at concentrations exceeding the MCL of 5.0 µg/L, though the supply wells could become further impacted if the OU2 COC plume in the Upper 180-Foot Aquifer is not adequately contained. However, since operation of new EWs screen in the Upper 180-Foot Aquifer was initiated in November 2018, concentrations of TCE in downgradient Upper 180-Foot Aquifer monitoring well MW-OU2-62-180 have exhibited a declining trend (Figure 13), which indicates the current Upper 180-Foot Aquifer EW network may be effective at preventing further migration of TCE into the of hydraulic communication between the Upper and Lower 180-Foot Aquifers.

The capture zones for the existing EW networks are analyzed annually. The encapsulation of the COC plumes by backward-tracking particle pathlines emanating from A-Aquifer EWs illustrates successful capture of a portion of the OU2 A-Aquifer COC plumes (Figure 14). Additionally, the long-term reduction of the TCE plume footprint in the A-Aquifer (Figure 15) indicates the current EW configuration has effectively removed TCE mass from this aquifer (see Appendix C to the Operable Unit 2 Annual Report Volume II [Ahtna, 2020c]).

However, it is questionable if the current A-Aquifer EW network design adequately addresses capture of the OU2 plume in the A-Aquifer due to the persistence of TCE and other COCs downgradient of the Fort Ord Landfills and to the north of the Eastern Network and the Imjin/Abrams Network. Four new A-Aquifer EWs were installed in the Abrams/Imjin Network north of the Fort Ord Landfills (EW-OU2-17-A through EW-OU2-20-A) in 2016 and began continuous operation in November 2018; however, these EWs were located based on the OU2 plume extent in the A-Aquifer in 2010 and they do not appear to capture the current plume extent effectively. Regardless, the A-Aquifer is not used for drinking water supply and any uncaptured portions of the OU2 plume in the A-Aquifer will eventually migrate to the edge of the SVA and into the Upper 180-Foot Aquifer, and the encapsulation of the TCE plume by backward-tracking particle pathlines emanating from Upper 180-Foot Aquifer EWs illustrates successful capture conditions (Figure 16). Additionally, the long-term reduction of the TCE plume footprint in the Upper 180-Foot Aquifer (Figure 17) indicates the current EW configuration has effectively removed TCE mass from this aquifer (see Appendix C to the Operable Unit 2 Annual Report Volume II [Ahtna, 2020c]).

However, groundwater quality in the Lower 180-Foot Aquifer and nearby supply wells will continue to determine future modification of the OU2 and OUCTP groundwater remedies to prevent degradation of water quality in the deeper aquifer units.

At this time, expansion of the EW Eastern Network in the OU2 area with the addition of up eight new A-Aquifer extraction wells is recommended to capture COC plumes migrating to the north of the Eastern Network (Ahtna, 2020c) and modifications to the EW network in the OUCTP area are recommended to mitigate migration of COCs into the Lower 180-Foot Aquifer (Ahtna, 2020a).

5.2 Surface Water

The Salinas River is approximately 3 miles east of OU2 and the Monterey Bay is approximately 2 miles west of OU2. As described in Section 1.3.4, the OU2 plume migrated west to the edge of the FO-SVA, where it entered the Upper 180-Foot Aquifer and migrated east and then down into the Lower 180-Foot Aquifer through a natural discontinuity in the Intermediate 180-Foot Aquitard. This is confirmed by historical and current groundwater monitoring data, which indicate the OU2 plume primarily migrates to the west in the A-Aquifer and away from the Salinas River and then enters the Upper 180-Foot Aquifer at the edge of the FO-SVA and migrates back to the east and away from Monterey Bay. Therefore, no surface waters are at risk from site-related contamination.

5.3 Air

No air emissions are notable from the OU2 GWTP.

5.4 Soils

The remedial actions for the debris and soil at the Fort Ord Landfills include a cover system and collection and removal of LFG to minimize rainwater infiltration and migration of contaminants to the underlying aquifers and protect the surrounding environment from exposure to landfill waste. The results of LFG monitoring indicate there is no LFG migration and the Fort Ord Landfills are in compliance with regulatory requirements. Inspections of the Fort Ord Landfills by a State of California Registered Civil Engineer concluded the Fort Ord Landfills are operating satisfactorily and functioning as designed. There was no evidence of rainfall infiltration through the landfill areas or exposure of sanitary waste in the Fort Ord Landfills to the surrounding environment (Ahtna, 2020b).

5.5 Wetlands and Sediments

No wetlands or sediments are at risk from site-related contamination.

6.0 Recommendations

To further optimize the OU2 GWTP performance, this section presents recommendations to improve remedy effectiveness, reduce life-cycle costs, improve technical operations, and speed progress toward site closure (some recommendations had been implemented already as of the date of this report, as noted).

6.1 Groundwater Extraction System

- Replace air/vacuum valves on all new Upper 180-Foot Aquifer EWs to remedy breakage caused by lids (JV completed in March 2020).
- Upgrade radio communications between the GWTP and EW networks to include:
    - A new antenna mast at the GWTP (completed January 2021).
    - A new antenna mast at the Western Network PLC panel (completed March 2021).
    - New radio transceivers at each EW network (completed January 2021).
- If indicated by COC data from monitoring wells downgradient of Fort Ord Landfills Area F, install one or more Upper 180-Foot Aquifer EWs east of Area F to prevent vertical migration of OU2 COCs into the Lower 180-Foot Aquifer. This recommendation is subject to the conclusions of the 5th Five-Year Review Report for the Fort Ord Superfund Site, which is scheduled to be complete in September 2022.
- In addition to current preventive maintenance activities, implement a long-term preventive maintenance schedule per Engineer Pamphlet (EP) 1110-1-27 (USACE, 2000) to include:
    - Video logging of the EW casing and screen at each major EW rehabilitation or every 5 years, whichever is sooner.
    - Specific capacity and pump performance testing annually.
    - Field parameter measurements quarterly (e.g., pH, temperature, turbidity).

  Redevelop/rehabilitate operating EWs if indicated by video log results or specific capacity drops below 90 percent. At a minimum, redevelop/rehabilitate operating EWs if the relative yield or specific capacity declines more than 15-20 percent from its original condition, or at least every 6-8 years (Butts, 2017).
- Expand EW networks to capture portions of A-Aquifer COC plumes migrating to the north of the Eastern Network.[13]
- Add one new EW to the Bunker Hill Network to enhance containment and control of the OUCTP in the Upper 180-Foot Aquifer.
- If indicated by COC concentrations that are asymptotic or rebounding above ACLs, implement a pulse pumping strategy to allow aquifer equilibrium and allow COCs to partition into groundwater from the soil matrix. Pulsed operation of hydraulic systems is the cycling of EWs in active and resting phases. The resting phase of a pulse pumping operation may allow sufficient

[13] If recommendations for new wells or additional remediation are implemented, a work plan will be prepared describing the proposed well locations, well construction details, and procedures for well borehole logging, development, and initial sampling.

time for COCs to diffuse out of low-permeability zones into adjacent high-permeability zones and allow sorbed COC residuals sufficient time to reach equilibrium. Subsequent pumping then removes maximum COC mass in a minimum volume. Pulse pumping will also bring zones of stagnation into active flowpaths. Groundwater modeling may be performed to determine the appropriate length of time for active and resting phases for individual EWs or groups of EWs, and to assess the impact of pulse pumping on the groundwater flow regime and capture of the COC plume. However, pulse pumping would require potentially significant additional O&M effort because system-wide adjustments would have to be made to compensate for changes in pipeline pressures each time operations cycle through active and resting phases, and this process can take several days. Additionally, enough EWs must remain online to generate a minimum of 500 gpm for efficient and stable operation of the GWTP and, during backwashing of GAC vessels, 900 gpm is needed.

6.2 Groundwater Treatment Plant

- Program the backwash transfer pump (P-4) to shut off when the water level in the backwash tank reaches 2.5 feet. There is currently no safety shutoff in the backwash tank.
- In the SCADA display, program the Flow Trend screen to default to no EW bubbles checked (as opposed to all bubbles checked) so the operator may select individual EWs.
- Add “open/closed” indicators to valves on GAC vessel pipelines, where feasible.
- Raise the sump alarm out of the sump and into the containment area to approximately 2 inches above the sump inlet grating. This will alleviate alarm situations while discharging water into the containment area during planned operations (e.g., GAC change-outs). In addition, an alarm approximately 12 inches below the top of the containment area wall that would shut down the GWTP is recommended. The “high alarm” that is audible and reports to SCADA for the sump will act as a warning and addition of a “high-high alarm” that shuts down the GWTP automatically would be a safety precaution.
- Change lighting in GWTA from fluorescent bulbs to LED lights (rated for outdoor use) mounted on girders under the GWTA canopy, with at least two light fixtures facing down the catwalk from both ends.
- Install pipe or hose at P-1 and P-2 effluent pump discharge to utilize process water for dust control and other uses consistent with the 2006 OU2 ESD (Army, 2006). This was completed in October 2020.
- Use of treated water for GAC change-outs instead of potable water as needed; however, a flow meter should be installed on the hydrant in the driveway by the GWTA as needed.
- Install cameras on the Landfills entrance gate and thermal treatment unit to prevent vandalism and identify vandals.
- Implement bird control measures in the GWTA, such as wind driven scare devices, bird spike strips, and bird netting.
- Implement a method for dumping/emptying water into the containment area while allowing for sediment removal. Potential options include:

  - Placement of a concrete pad on the east side of the containment area that is large enough for a typical water trailer used for well development and can support a GAC change-out supply truck (a maximum of 35 feet wide by 50 feet long).
  - Construction of a smaller containment area inside the current containment area with sandbags or concrete that will act as a settling area.
- Move or modify pressure indicator PIT 400 for the Eastern Main to correct negative pressure values and issues during non-normal operations causing difficulty restarting the GWTP. However, the pressure range at which the GWTP shuts down (-.01 psi to -10 psi) was adjusted in January 2021, which appeared to resolve this issue.
- Adjust the local, remote, and HMI SCADA interfaces/screens to be uniform.

The maximum COC concentrations used for the GWTP process design are from the Design Analysis Report (JV, 2016). The actual COC concentrations at the GWTP influent are consistently lower than the design concentrations (Ahtna, 2020c). Vinyl chloride is of particular interest because new EWs were installed within the vinyl chloride plume center of mass, and vinyl chloride is not efficiently removed using GAC (JV, 2016). However, vinyl chloride has not been detected at the GWTP influent (Ahtna, 2020c). Additionally, GAC adsorption modeling predicted vinyl chloride would be the first COC to break through the GAC and it would exceed its discharge limit in 53 days. However, the first GAC change occurred in September 2020, 22 months after startup in November 2018, and this was due to breakthrough of TCE, not vinyl chloride. Based on this information, no treatment process modification (such as adding an air stripper for polishing treatment) is recommended.

6.3 Treated Water Aquifer Recharge System

Review and evaluation of treated water aquifer recharge system performance to date indicates it is generally working as designed and within operational parameters; therefore, no changes are recommended at this time. However, the total recharge design flow is 1,511 gpm (JV, 2016), so additional treated water disposal alternatives, such as additional infiltration galleries, new injection wells, or existing stormwater infiltration basins, should be evaluated if groundwater extraction capacity is expanded in the future.

6.4 Power Usage for New GWTS

Based on the review of energy usage at the original GWTS and new GWTS, the increase in usage and associated costs is an expected outcome of GWTS expansion (see Section 4.4); however, there are options available that could reduce energy costs over the long term:

- Evaluate energy/power usage for specific GWTS components and modifications to GWTS components to reduce energy utilization and associated costs.
- When replacement of submersible pumps is necessary in EWs (e.g., after pump failure), size the new pump based on predicted EW performance, which may result in greater energy efficiency.
- Alternate pumping at EWs with overlapping capture areas. This could be an element of the pulse pumping strategy described in Section 6.1 but presents similar issues.
- Minimizing operations during peak or partial-peak energy usage hours. This could be an element of the pulse pumping strategy described in Section 6.1 but presents similar issues.

   - **Peak energy charges:** charges for electric usage during the highest usage times of day when prices are highest. As of March 2021, new peak hours are 4 PM to 9 PM every day. It would be impractical to shut down and restart the GWTS or portions of the GWTS on a daily basis during off hours and repeated shutdowns and startups would likely reduce the life cycle of GWTS components; however, routine or non-routine maintenance tasks that require shutdowns could be scheduled to occur during peak hours.
   - **Partial-peak energy charges:** charges for electric usage during times of day when demand is going up or down. As of March 2021, partial-peak hours are 2 PM to 4 PM and 9 PM to 11 PM every day, June through September. Similar to peak hours, regular shutdowns and startups during partial-peak hours would be impractical and inefficient.
   - **Peak Day Pricing:** a voluntary PG&E rate plan that lowers the electric rate per kilowatt hour for most hours from May 1 to October 31 in return for charging much higher rates during peak hours during nine to 15 Peak Pricing Event Days per year, typically occurring on the hottest days of the summer (i.e., the GWTS could be shut down during Peak Pricing Event Days). This would appear to be the most practical option for reducing PG&E energy costs; however, GWTS facilities receive power from both PG&E and Monterey Bay Community Power, a Community Choice Aggregation program, which may make these facilities ineligible for Peak Day Pricing. Regardless, it may still be possible for USACE to receive Event Day alerts from PG&E, which can be set up by visiting the USACE PG&E account online, and schedule shutdowns accordingly.
- There are currently seven PG&E meters for electrical service to the OU2 GWTS and four different PG&E rate plans associated with these meters. It is recommended USACE sign in to its PG&E account online to compare plans and determine whether the current rate plans for each meter are the most cost effective or if all the meters should be consolidated under a single rate plan.
- PG&E offers various rebates and incentives for energy-efficiency upgrades, such as VFDs. These appear to be focused on agriculture and heavy industry but are potentially applicable to the GWTS and other remedial operations.
- Evaluate the return on investment for use of solar panels to power some GWTP components and reduce energy costs.

Ahtna could not evaluate Peak Day Pricing, rate plans, or rebates and incentives further because this can only be accomplished by the PG&E customer logging in to its own PG&E account.

6.5 OU2 GWTP and Groundwater Remedy Sampling

The current O&M Manual (JV, 2019) describes recommended sampling programs, which are summarized in Table 7; however, these programs are insufficient for achieving data quality objectives for OU2 that are consistent with the *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4 (USEPA, 2006) and OU2 decision documents. Accordingly, the QAPP (Ahtna, 2021) should continue to be the governing document for groundwater monitoring at the former Fort Ord and the O&M Manual should be revised for consistency.

7.0 References[14]

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[14] At the end of references included in the Fort Ord Administrative Record are the Administrative Record Numbers (AR#s) (e.g. BW-1234). To find the referenced document, this number may be typed into the Online Search tool at: http://www.fortordcleanup.com/documents/search/. Please note the referenced documents were available in the Fort Ord Administrative Record at the time this document was issued; however, some may have been superseded by more current versions and were subsequently withdrawn. TBD: to be determined.

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TABLES

Table 1 - Chemicals of Concern, Aquifer Cleanup Levels, and Discharge Limits
OU 2 GWTP Evaluation and Optimization Report
11000 Engineering Equipment Road
Marina, California 93933

Chemical of concern	***Estimated maximum concentration in extracted groundwater***	***Aquifer cleanup level***	***Discharge limit for treated water***
Benzene	0.6	1.0	0.5
Carbon tetrachloride (CT)	0.5	0.5	0.5
Chloroform	6	2.0	2.0
1,1-Dichloroethane (1,1-DCA)	40	5.0	5.0
1,2-Dichloroethane (1,2-DCA)	5	0.5	0.5
cis-1,2-Dichloroethene (cis-1,2-DCE)	17	6.0	6.0
1,2-Dichloropropane (1,2-DCP)	1	1.0	0.5
Methylene chloride (MC)	3	5.0	0.5
Tetrachloroethene (PCE)	15	3.0	0.5
Trichloroethene (TCE)	17	5.0	0.5
Vinyl chloride (VC)	11	0.1	0.1

Notes

1. Estimated maximum concentrations, aquifer cleanup levels, and discharge limits are in micrograms per liter (µg/L) = parts per billion (ppb).

2. Estimated maximum concentrations are based on those presented in the design analysis report for the 2016-2018 GWTP relocation project (Rore Innovative Solutions JV, 2016) and the OU2 3Q 2019 Monitoring Report (Ahtna, 2020c; AR# OU2-724B)

3. Aquifer cleanup levels and discharge limits for the A-aquifer were first presented in the *Record of Decision, Operable Unit 2, Fort Ord Landfills, Fort Ord, California* (Army, 1994; AR# OU2-480).

4. The 1995 explanation of significant differences adopted the A-aquifer cleanup levels for the Upper 180-foot aquifer (Army, 1995; AR# OU2-406).

5. Discharge limits for chloroform, 1,1-DCA, and cis-1,2-DCE were initially set at 0.5 µg/L. Those limits were revised per the Draft Final Revised Treatment System Plan, OU2 Groundwater Remedy (HLA, 1999; AR# OU2-584).

Table 2- Data for Eastern Main Extraction Wells
Operations and Maintenance
OU 2 GWTP
11000 Engineering Equipment Road
Marina, California 93933

Welll ID	Year constructed	Total casing depth (ft bgs)	BOS depth (ft btoc)	Depth to WC (ft bgs)	Approx. height of WC above BOS (ft)	Depth to top of pump (ft btoc)	Pump model (Franklin EC UON)	Pump #	Length of pump unit w/o motor (ft)	Depth of pump intake (ft bgs)	Downhole length of water level transmitter (ft btoc)	Low-level alarm (ft btoc)	TOS depth (ft btoc)	TOC elevation (msl)	TOS elevation (msl)	Pump intake elevation (msl)	Design Q (gpm)	Operational Flows (gpm)	Type of pump motor control
EASTERN MAIN																			
ABRAMS/IMJIN NETWORK																			
EW-OU2-16-A	2000	114.4	107.5	_78_	_30_	_100_	35FA5S4	P-730	2.9	_102.9_	_100_	_98_	77.5	165.43	87.93	_62.5_	27	10	_VFD-LC*_
EW-OU2-17-A	2016	117.3	114.6	90	24	101	60FA5S4-PE	P-940	3.1	104.1	_114.6_	102.1	74.6	170.49	95.91	66.4	30	21	VFD-SC
EW-OU2-18-A	2016	107.3	104.6	84	21	101	60FA5S4-PE	P-930	3.1	104.1	_104.6_	102.1	64.6	163.80	99.22	59.7	30	15	VFD-SC
EW-OU2-19-A	2016	112.3	109.7	88	22	101	60FA5S4-PE	P-920	3.1	104.1	_109.7_	102.1	69.7	168.05	98.39	64.0	30	25	VFD-SC
EW-OU2-20-A	2016	124.7	122.0	100	22	116	60FA5S4-PE	P-910	3.1	119.1	_122.0_	117.1	82.0	180.61	98.61	61.5	30	1.5	VFD-SC
EW-OU2-05-180	2000	245	237.5	_179_	_59_	_226_	175STS30D6X-1064	P-410	3.0	_229.0_	_237_	_227_	177.5	170.72	-6.78	_-58.3_	160	0	_VFD-LC*_
EW-OU2-06-180	2000	238	230.5	_175_	_56_	_218_	150STS25DA-0964	P-810	2.8	_220.8_	_225_	_219_	170.5	166.96	-3.54	_-53.8_	135	124	_VFD-LC*_
EW-OU2-11-180	2016	240.9	238.2	179	59	228	150SR25F66-1163	P-950	2.6	230.6	_238.2_	228.6	178.2	169.96	-8.28	-60.6	130	2.2	VFD-SC
EW-OU2-12-180	2016	231.5	228.8	171	58	217	150STS25DA-0964	P-960	4.9	221.9	_228.8_	219.9	168.8	163.38	-5.45	-58.5	130	80	VFD-SC
BUNKER HILL NETWORK																			
EW-OU2-07-180	2005	265	260.0	_176_	_84_	_NA_	_NA_	_NA_	_NA_	_NA_	_NA_	_NA_	_207.3_	_163.39_	_-43.91_	_NA_	0	0	_NA_
EW-OU2-08-180	2006	220	215.0	_200_	_15_	_195_	_85S150-13 (Grundfos)_	_P-850_	_3.5_	_198.0_	_200.0_	_200_	_171.45_	_162.31_	_-9.14_	_-35.7_	0	0	_NA_
EW-OU2-09-180	2010	219.68	_211.5_	_174_	_37_	_204_	35FA5S4	P-870	2.3	TBD	_201.0_	_198_	_171.79_	149.55	_-22.24_	_NA_	55	42	_VFD-LC*_
CSUMB NETWORK																			
EW-OU2-14-A	2000	_136.75_	132.3	_106_	_26_	_124_	_25S30-15 (230V, Grundfos)_	_P-720_	_1.5_	_125.6_	_NA_	_NA_	_89.5_	185.85	_96.35_	_60.2_	_18_	0	_NA_
GWTP NETWORK																			
EW-OU2-10-180	2016	305.0	302.3	234	69	292.5	150SR20F66-0963	P-970	2.3	294.8	302.3	292.8	242.3	224.72	_NA_	_-70.1_	130	110	VFD-SC
TOTAL DESIGN FLOW FROM EASTERN MAIN (GPM)																	**_850_**	**_431_**	

Abbrevations

bgs - Below ground surface
BOS - Bottom of screen
btoc - Below top of casing
EWs - Extraction wells
Franklin EC - Franklin Electric Company
ft - Feet

gpm - Gallons per minute
HMI - Human-machine interface
MS - Motor starter
MSL - Mean sea level
NA - Not available
Q - Flow rate

SCADA - Supervisory control and data acquisition
TOC - Top of casing
TOS - Top of screen
UON - Unless otherwise noted
VFD - Variable frequency drive
VFD-LC - Variable frequency drive w/ local control
VFD-LC*-Variable frequency drive/w local control installed by Ahtna

VFD-SC - VFD with full SCADA control
WC - Water column

Notes

1. EWs with a design flowrate of zero were not included or retrofitted in the 2014-2018 GWTP project. Pump upgrades would be required to bring these wells online.
2. Depth to water column was noted at the time of well construction.
3. Well EW-OU2-15-A in the CSUMB Network was converted to a monitoring well in 2017 and is not listed here. The government has assumed possession of the salvaged submersible pump.
4. _The low level alarm will turn off the well pump and trigger an alarm condition at the SCADA HMI._
5. _Italic redlined_ values were provided by Ahthna through USACE on 6-1-2018
6. The operating flow rates for the new wells are based on the preliminary pumping test report provided by RORE and the average flow rates for the existing wells are based on AHTNA's OU2 1st Q-2018 Report

Table 3 - Data for Western Main Extraction Wells
Operations and Maintenance
OU 2 GWTP
11000 Engineering Equipment Road
Marina, California 93933

Welll ID	*Year constructed*	*Total casing depth (ft bgs)*	*BOS depth (ft btoc)*	*Depth to WC (ft bgs)*	*Approx. height of WC above BOS (ft)*	*Depth to top of pump (ft btoc)*	*Pump model (Franklin EC UON)*	*Pump #*	*Length of pump unit w/o motor (ft)*	*Depth of pump intake (ft bgs)*	*Downhole length of water level transmitter (ft btoc)*	*Low-level alarm (ft btoc)*	*TOS depth (ft btoc)*	*TOC elevation (msl)*	*TOS elevation (msl)*	*Pump intake elevation (msl)*	*Design Q (gpm)*	*Operational Flows (gpm)*	*Type of pump motor control*
WESTERN MAIN																			
WESTERN NETWORK																			
EW-OU2-01-A	1995	144	*139*	121	*18*	*NA*	*NA*	*P-220*	*NA*	*NA*	*NA*	*NA*	*109*	109.98	*0.98*	*NA*	0	0	*NA*
EW-OU2-02-A	1994	141.5	*136.6*	*111.32*	*25*	*129.5*	*40S50-15 (Grundfos)*	*P-230*	*2.72*	*132.2*	*122.4*	*122.4*	*106.6*	116.26	*9.66*	*6.94*	*30*	54	*MS*
EW-OU2-03-A	1995	116	*111*	95	*16*	*NA*	*NA*	*P-210*	*NA*	*NA*	*NA*	*NA*	*71*	84.33	*13.33*	*NA*	0	0	*NA*
EW-OU2-04-A	1995	136	*131*	97	*34*	*124.5*	*40S50-15 (Grundfos)*	*P-270*	*2.72*	*127.2*	*117.3*	*117.3*	*91*	109.47	*18.47*	*15.75*	*35*	50	*MS*
EW-OU2-05-A	1995	131	*126*	*106*	*20*		90FA10S4-PE	P-260	6.6		*119.6*	*119.6*	*96*	108.99	*12.99*	*6.39*	50	37	*MS*
EW-OU2-06-A	1995	131	*126*	*106*	*20*		90FA10S4-PE	P-250	6.6		*125.0*	*125*	*96*	105.57	*9.57*	*2.97*	50	34	*MS*
EASTERN NETWORK																			
EW-OU2-07-A	1995	129	*124*	106.5	*18*	*118*	*25S30-15 (Grundfos)*	*P-180*	*1.54*	*119.5*	*123.2*	*116.5*	*99*	156.56	*57.56*	*56.02*	0	0	*MS*
EW-OU2-09-A	1995	137	*132*	NA	NA		35FA5S4-PE	P-160	2.9		*127.0*	*126*	*102*	162.91	*60.91*	*58.01*	30	11	MS
EW-OU2-10-A	1995	142	*137*	NA	NA		35FA5S4-PE	P-150	2.9		*135.8*	*132.5*	*107*	167.58	*60.58*	*57.68*	30	12	*MS/VFD-LC**
EW-OU2-11-AR	2016	142.3	139.6	125	15	126	90FA7S4-PE	P-130	5.4	*131.4*	*132.4*	*128.5*	99.6	174.07	74.49	69.09	30	20	VFD-SC
EW-OU2-12-A	1995	*142*	*137*	NA	NA		60FA5S4-PE	P-120	3.1		*132.0*	*131*	*102*	175.39	*73.39*	*70.29*	30	15	VFD-LC
EW-OU2-13-A	1995	147	*142*	NA	NA		25FA3S4-PE	P-110	2.0		*144.3*	*139*	*112*	180.15	*68.15*	*66.15*	25	12	VFD-LC
EW-OU2-02-180R	2016	267.3	264.6	177	88	252	175STS30D6X-1064	P-140	5.3	*257.3*	*190.0*	*190.0*	204.6	170.06	-34.52	-39.82	130	100	VFD-SC
LANDFILL NETWORK																			
EW-OU2-03-180	2000	265	257.5	*216.75*	*41*		150SR25F66-1163	P-830	2.6		*237*	*237*	207	188.39	-18.61	-18.61	150	163	*VFD-LC*
EW-OU2-04-180	*2000*	*302*	*294.5*	*264.14*	*30*	*283*	*150S200-10 (Grundfos)*	*P-820*	*4.03*	*287.0*	*250*	*246*	*240.1*	*238.55*	*-1.55*	*-5.58*	*0*	0	*MS*
TOTAL DESIGN FLOW FROM WESTERN MAIN (GPM)																	***590***	***508***	

Abbrevations

bgs - Below ground surface
BOS - Bottom of screen
btoc - Below top of casing
EWs - Extraction wells
Franklin EC - Franklin Electric Company
ft - Feet
gpm - Gallons per minute
HMI - Human-machine interface
MS - Motor starter
MSL - Mean sea level
NA - Not available
Q - Flow rate
SCADA - Supervisory control and data acquisition
TOC - Top of casing
TOS - Top of screen
UON - Unless otherwise noted
VFD - Variable frequency drive
VFD-LC - Variable frequency drive w/ local control
VFD-LC-Variable frequency drive/w local control installed by Ahtna*
VFD-SC - VFD with full SCADA control
WC - Water column

Notes

1. EWs with a design flowrate of zero were not included or retrofitted in the 2014-2018 GWTP project. Pump upgrades would be required to bring these wells online.
2. Depth to water column was noted at the time of well construction.
3. Well EW-OU2-01-180 in the Western Network is not currently operable and is not listed here. The government has assumed possession of the submersible pump.
4. *The low level alarm will turn off the well pump and trigger an alarm condition at the SCADA HMI.*
5. *Italic redlined* values were provided by Ahthna through USACE on 6-1-2018
6. The operating flow rates for the new wells are based on the preliminary pumping test report provided by RORE and the average flow rates for the existing wells are based on AHTNA's OU2 1st Q-2018 Report

Table -4 - GAC System Data
OU 2 GWTP
11000 Engineering Equipment Road
Marina, California 93933

Component	***Value***	***Comments***
Piping and vessels		
Manufacturer	Evoqua Water Technologies, Pittsburgh, Pennsylvania	
Year of manufacture	2016	
Carbon unit type	Downflow	
Number of carbon units	6 vessels	
Total design flow rate (gpm)	1,750	
Total design flow rate per train (gpm)	875	
Weight of carbon per unit (lbs)	20,000	
Diameter per vessel (feet)	12	
Bed area (SF)	113	
Minimum bed depth (feet)	6	
Carbon volume per unit (ft^3)	714	
Minimun EBCT	6.7 minutes	
Vessel nominal height (feet)	16	
Carbon unit shipping weight (per vessel; lbs)	45,000	
Carbon unit operating weight (per vessel, lbs)	185,000	
Connections	8-inch pipe flange	
Carbon unit pressure rating (psig)	125	
Unit material	Carbon steel	
External coatings	Carbogaurd 890 VOC primer, Carbothane 134 VOC top coat	
Internal coating	Plasite 4110	
Piping material	CS	
Carbon media		
Service provider	Evoqua Water Technologies, Pittsburgh, Pennsylvania	
Type	Reactivated ACNS	
Estimated time to bed breakthrough (days)	180	
Apparent density (lb/ft^3)		
Pore volume (cm^3/g)		
Nominal sieve size	12 x 30	
Iodine number (AWWA)		
Abrasion number, minimum		
Uniformity coefficient, maximum		

Abbreviations

ACNS - Activated coconut shell
AWWA - American Water Works Association
cm^3/g - Cubic centimeters per gram
CS - Carbon steel
EBCT - Empty bed contact time
= total bed volume/flow rate
ft^3 - Cubic foot
GAC - Granular activated carbon
g/ft^3 = Grams per cubic foot
gpm - Gallons per minute
lbs - Pounds
lbs/ft^3 - Pounds per cubic foot
min - Minutes
mm - Millimeters
psig - Pounds per square inch (gauge)
SF - Square feet

Table -5 - Data on Aquifer Recharge Facilities
OU 2 GWTP
11000 Engineering Equipment Road
Marina, California 93933

Schedule of injection wells							
	Well ID	***Total casing depth* (ft bgs)**	***TOS depth* (ft btoc)**	***BOS depth* (ft btoc)**	***Nominal casing diameter* (inches)**	***Design Q* (gpm)**	***Comment***
OU 2							
1	IW-OU2-01-180	*158*	*115*	*155*	10	*70*	Located northwest of Western Network PLC Compound. Well is not operational.
2	IW-OU2-02-180	*158*	*115*	*155*	*10*	*70*	Located south of Western Network PLC Compound. Well is not operational.
3	IW-OU2-03-180	247	*169*	*244*	10	*60*	*Decommissioned in 2014 (see Administrative Record No. OU1-611A).*
4	IW-OU2-04-180	297.5	214.8	294.8	10	120	Located on eastern portion of OU 2 landfill (east of GWTP). 1.5" diameter sch80 PVC sounding tube casing: 0' -215'.Obstructed at at 62' below grade, replacement sounding tube installed inside 10" diameter well casing
5	IW-OU2-05-180	337.7	255	335	10	120	Located on eastern portion of OU 2 landfill (east of GWTP). Well is equipped with a drop pipe and a level sensor that extend 267.5 ft btoc.
Fort Ord Dunes State Park							
5	IW-02-01-180	109	*40.5*	*103.5*	6	*60*	Located at Fort Ord Dunes State Park west of Sites 2/12 GWTP. Well is not operational.
6	IW-02-02-180	111	*41.5*	*104.5*	6	*60*	Located at Fort Ord Dunes State Park west of Sites 2/12 GWTP. Well is not operational.

Schedule of infiltration galleries							
	Gallery ID	***Horizontal pipe depth* (ft bgs)**	***Nominal pipe diameter* (inches)**	***Slotted screen length* (ft)**	***Operational Q* (gpm)**	***Design Q* (gpm)**	***Comment***
OU 2							
1	INF-OU2-01-180	*10*	4	12	*300*	*275*	*Located northwest of Western Network PLC Compound. Includes four 16-inch diameter infiltration boreholes to 97 ft bgs filled with 3/4-inch minus gravel pack.*
2	INF-OU2-02-180	*10*	4	12	*270*	*275*	*Located south of Western Network PLC Compound. Includes four 16-inch diameter infiltration boreholes to 137 ft bgs filled with 3/4-inch minus gravel pack.*
Fort Ord Dunes State Park							
3	INF-02-01-180	*7*	4	*12*	*250*	*375*	*Located at Fort Ord Dunes State Park west of Sites 2/12 GWTP. Includes six 16-inch diameter infiltration boreholes to 49 ft bgs filled with 3/4-inch minus gravel pack.*
4	INF-02-02-180	*7*	4	*6*	*115*	*173*	*Located at Fort Ord Dunes State Park west of Sites 2/12 GWTP. Includes four 16-inch diameter infiltration boreholes to 43 ft bgs filled with 3/4-inch minus gravel pack.*
5	INF-02-03-180	*7*	4	*6*	*115*	*173*	*Located at Fort Ord Dunes State Park west of Sites 2/12 GWTP. Includes four 16-inch diameter infiltration boreholes to 60 ft bgs filled with 3/4-inch minus gravel pack.*
TOTAL RECHARGE DESIGN FLOW (GPM)						**1,511**	

Abbreviations

bgs - Below ground surface
BOS - Bottom of screen
ft - Feet
ft bgs - Feet below ground surface
ft btoc - Feet below top of casing
gpm - Gallons per minute
GWTP - Groundwater treatment plant
Q - flow rate
TM - Technical memorandum
TOS - Top of screen

Notes

1.Several injection wells at OU 2 are not operational per discussions with current GWTP operators. Injection wells at Sites 2/12 are not operational (Ahtna, 2009).
2. Operational Q is based on inflitration TM (AMEC, 2013).
3. For IW-OU2-04-180, depth to static water in fall 2016 was 228 ft, for a total well water column above BOS of 67 ft.
4. For IW-OU2-05-180, depth to static water in fall 2016 was 266 ft, for a total well water column above BOS of 69 ft.
5. *Italic redlined* values were provided by Ahthna through USACE on 6-1-2018

Table-6 - List of PG&E Meters and Transformers
OU 2 GWTP
11000 Engineering Equipment Road
Marina, California 93933

Old PG&E Meter No.:	New PG&E SmartMeter No.:	PG&E Transformer No.	Associated Wells:
Operable Unit 2 Groundwater Treatment System			
X11306	5000032313	T-2430	**Ord Market:**
			EW-OU2-05-180
			EW-OU2-06-180
			EW-OU2-16-A
X11305	1008832900	T-2429	**Landfills:**
			EW-OU2-03-180
			EW-OU2-04-180
876R85	1009511943	T-2078	**Eastern:**
			EW-OU2-07-A
			EW-OU2-09-A
			EW-OU2-10-A
			EW-OU2-11-AR
			EW-OU2-12-A
			EW-OU2-13-A
			EW-OU2-02-180R
1716R3	1009537836	T-2094	**Western:**
			EW-OU2-01-A
			EW-OU2-02-A
			EW-OU2-03-A
			EW-OU2-04-A
			EW-OU2-05-A
			EW-OU2-06-A
			EW-OU2-01-180
X15907	NA	T-2012	**CSUMB:**
			EW-OU2-14-A
			EW-OU2-15-A
1P9350	1009449924	T-2971	**Bunker Hill:**
			EW-OU2-08-180
			EW-OU2-09-180
Sites 2/12 Groundwater Treatment System			
98R797	1009539618	T-2289	Extraction Wells-
			EW-12-05-180M
			EW-12-06-180M
			EW-12-07-180M
			EW-12-08-180U
			EW-12-03-180U
			EW-12-03-180M
			EW-12-04-180U
			EW-12-04-180M
2K6927	1008680339	Unknown, 25KV-amp pole mounted	Injection Wells-
			IW-02-01-180
			IW-02-02-180
			Infiltration Galleries-
			INF-02-01-180
			INF-02-02-180
			INF-02-03-180

Note: This information was provided by Ahtna on 26 April 2018.

Table -7 - Recommended Sampling for the OU 2 Groundwater Remedy
OU 2 GWTP
11000 Engineering Equipment Road, Marina, California 93933

Sampling objective/location	*Sample port name*	*Frequency*	*Number of samples per year*	*Comment*
Compliance with OU 2 discharge limits				
GWTP effluent	SP-EF-01	Monthly	12	
GAC operation				
Upstream of last vessel in series in GAC Train #1	SP-1B-EF	See Note 8	6	Listed sample port is for vessel order A-B-C
Upstream of last vessel in series in GAC Train #2	SP-2B-EF	See Note 8	6	Listed sample port is for vessel order A-B-C
Compliance with OU 2 remedy goals (ACLs)				
EWs screened in the Upper 180-foot aquifer	-	Annual	12	See Table 2
EWs screened in the Upper 180-foot aquifer	-	Annual	9	See Table 2
MWs screened in the A-aquifer	-	Annual	TBD	List of A-aquifer wells to be sampled will be provided by the Army.
MWs screened in the Upper 180-foot aquifer	-	Annual	TBD	List of Upper 180-foot aquifer wells to be sampled will be provided by the Army.

Abbreviations

ACLs - Aquifer cleanup levels
COCs - Chemicals of concern
EWs - Extraction wells
GAC - Granular activated carbon
MWs - Monitoring wells

Notes

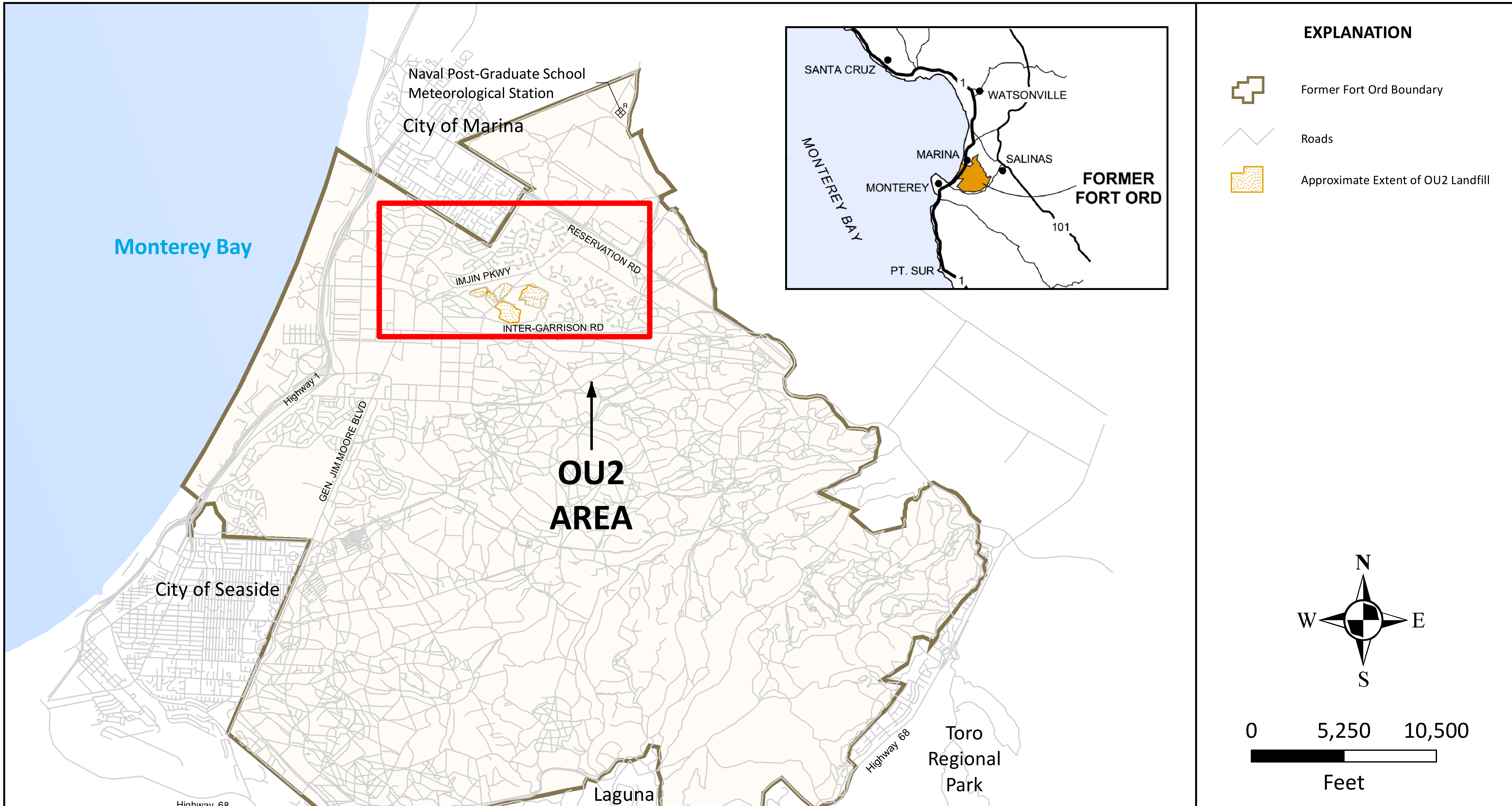
1. Table 7 lists the Recommended Sampling for the OU 2 Groundwater Remedy. The Groundwater QAPP (AR# BW-2785E) is the governing document for groundwater monitoring at the former Fort Ord and describes the current sampling program for the GWTS. The QAPP undergoes annual updates and the current version of the QAPP (expected to be finalized in 2019) will be modified to be specific to the new GWTP based on data collected during the startup period.
2. ACLs and GWTP discharge limits are presented in Table 1.
3. The analyte list for all sampling is the list of COCs presented in Table 1.
4. It is recommeded that tests of general (inorganics) water chemistry of samples of EWs and GWTP effluent be conducted on an annual basis.
5. It is recommended that the testing laboratories analyzing compliance samples for COCs achieve reporting limits less than the applicable cleanup criteria, wherever practical.
6. Operations of the GAC system are described in Section 3.0 and Section 4.0.
7. Quality assurance/quality control samples are not included in the number of samples per year.
8. *Based on the draft QAPP (Jan 25, 2019), Volume I, Appendix A, Revision 7, Section 4.1.4, the GAC samples will be collected weekly for the first month, and on the 16th, 19th, 22nd, 24th, and 26th week for the lead GAC vessels after GAC change-out and on the 16th, 22nd, and 26th week for the remainder GAC vessels. If GAC change-out is not indicated by Week 26, further sampling will be performed weekly or at a frequency determined by the direction of the Project Manager. The sampling frequency is determined based on historical COC breakthrough rates at the old OU2 GWTP; however, the sampling frequency may be altered at the discretion of the Project Manager if there are significant differences in operational conditions at the new OU2 GWTP. After the QAPP is finalized (expected to be in 2019), the plant operator will be following the sampling procedures in the finalized QAPP.*

Table 8. Former and New OU2 GWTS Power Usage Comparison by Network and System Components

	Pre-Transition		Post-Transition	
Equipment	Equipment HP	Electrical Usage (amperes)	Equipment HP	Electrical Usage (amperes)
Abrams/Imjin Network - PG&E Meter No. 5000032312				
EW-OU2-16-A	3	4.9	5	8
EW-OU2-17-A	-	0	5	8
EW-OU2-18-A	-	0	5	8
EW-OU2-19-A	-	0	5	8
EW-OU2-20-A	-	0	5	8
EW-OU2-05-180	-	0	30	39.5
EW-OU2-06-180	20	26.9	25	33.5
EW-OU2-11-180	-	0	25	33.5
EW-OU2-12-180	-	0	25	33.5
Landfills Network - PG&E Meter No. 1008832900				
EW-OU2-03-180	20	26.9	25	33.5
EW-OU2-04-180	-	0	-	0
Eastern Network - PG&E Meter No. 1009511943:				
EW-OU2-07-A	-	0	-	0
EW-OU2-09-A	3	4.9	5	8
EW-OU2-10-A	3	4.9	5	8
EW-OU2-11-AR	3	4.9	7.5	11.8
EW-OU2-12-A	5	8	5	8
EW-OU2-13-A	5	8	3	4.9
EW-OU2-02-180R	15	20.8	30	39.5
Western Network - PG&E Meter No. 1009537836				
EW-OU2-01-A	-	0	-	0
EW-OU2-02-A	-	0	-	0
EW-OU2-03-A	-	0	-	0
EW-OU2-04-A	-	0	-	0
EW-OU2-05-A	10	17	10	17
EW-OU2-06-A	10	17	10	17
EW-OU2-01-180	-	0	-	0
CSUMB Network - PG&E Meter No. X15907				
EW-OU2-14-A	-	0	-	0
Bunker Hill Network - PG&E Meter No. 1009449924				
EW-OU2-07-180	-	0	-	0
EW-OU2-08-180	-	0	-	0
EW-OU2-09-180	7.5	11.8	15	20.8
Old GWTP - PG&E Meter No. 1009537836				
Effluent Pump P-410	40	48	-	0
Effluent Pump P-510	10	12.2	-	0
Lighting	-	15	-	0
New GWTP - PG&E Meter No. 1010126799				
Effluent Pump P-1	-	0	60	67.8
Effluent Pump P-2	-	0	60	67.8
Lighting	-	0	-	10
Water Heater	-	0	-	7
Methane Pump	-	0	-	1
HVAC	-	0	-	25
CCTV	-	0	-	7
EW-OU2-10-180	-	0	20	26.9
Total Electrical Usage (amperes)		**231**		**561**

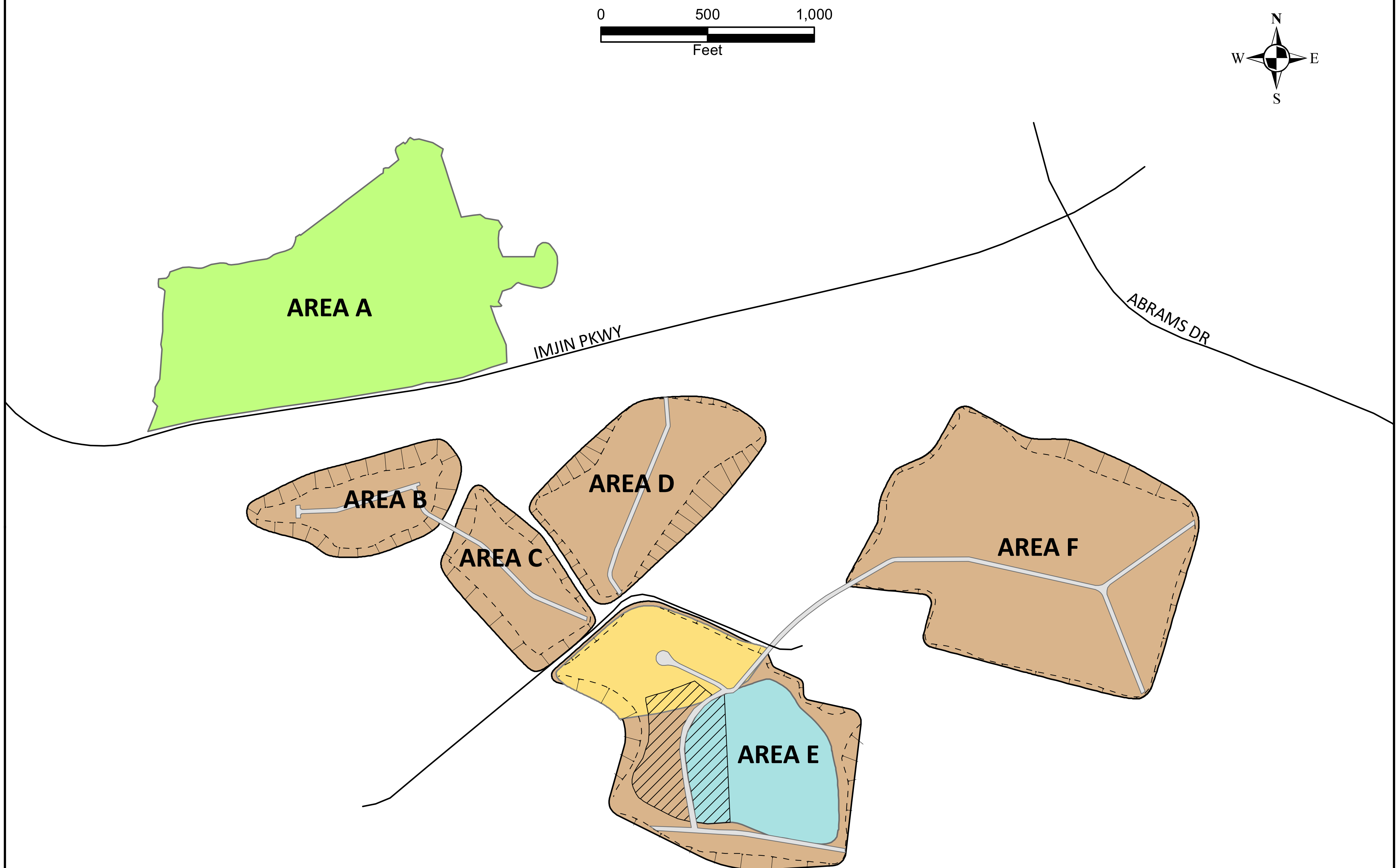
Notes:
Extraction well submersible pump electrical usage approximation from "Submersible Motors Application, Installation, Maintenance, 60 Hz, Single and Three Phase Motors," Franklin Electric, 2000 (https://www.fs.fed.us/database/acad/elec/greenbook/fullAIM.pdf).
For comparative purposes, electrical usage assumes full load (not all equipment operates at full capacity at all times).
Effluent Pumps P-410 and P-510 electrical usage from Baldor.com.
Effluent Pumps P-1 and P-2 electrical usage from motor name plate.
Old GWTP lighting electrical usage estimated based on professional judgement.
Other New GWTP equipment electrical usage from product manuals, labels, or tags.

FIGURES



LOCATION MAP
OPERABLE UNIT 2
Operable Unit 2 GWTS Evaluation and
Optimization Report Fort Ord, California

Ahtna | 11/22/2020 | Figure: 1



EXPLANATION

- Access Road
- Areas Covered 1997 to 1998
- Clean Closed 2001
- Area Covered December 2002
- Vertical Expansion (Phase I) 2013
- Phase II TBD

SITE PLAN
OPERABLE UNIT 2 LANDFILLS
Operable Unit 2 GWTS Evaluation and
Optimization Report, Former Fort Ord, California

Ahtna | Date: 12/01/2020 | Figure: 2

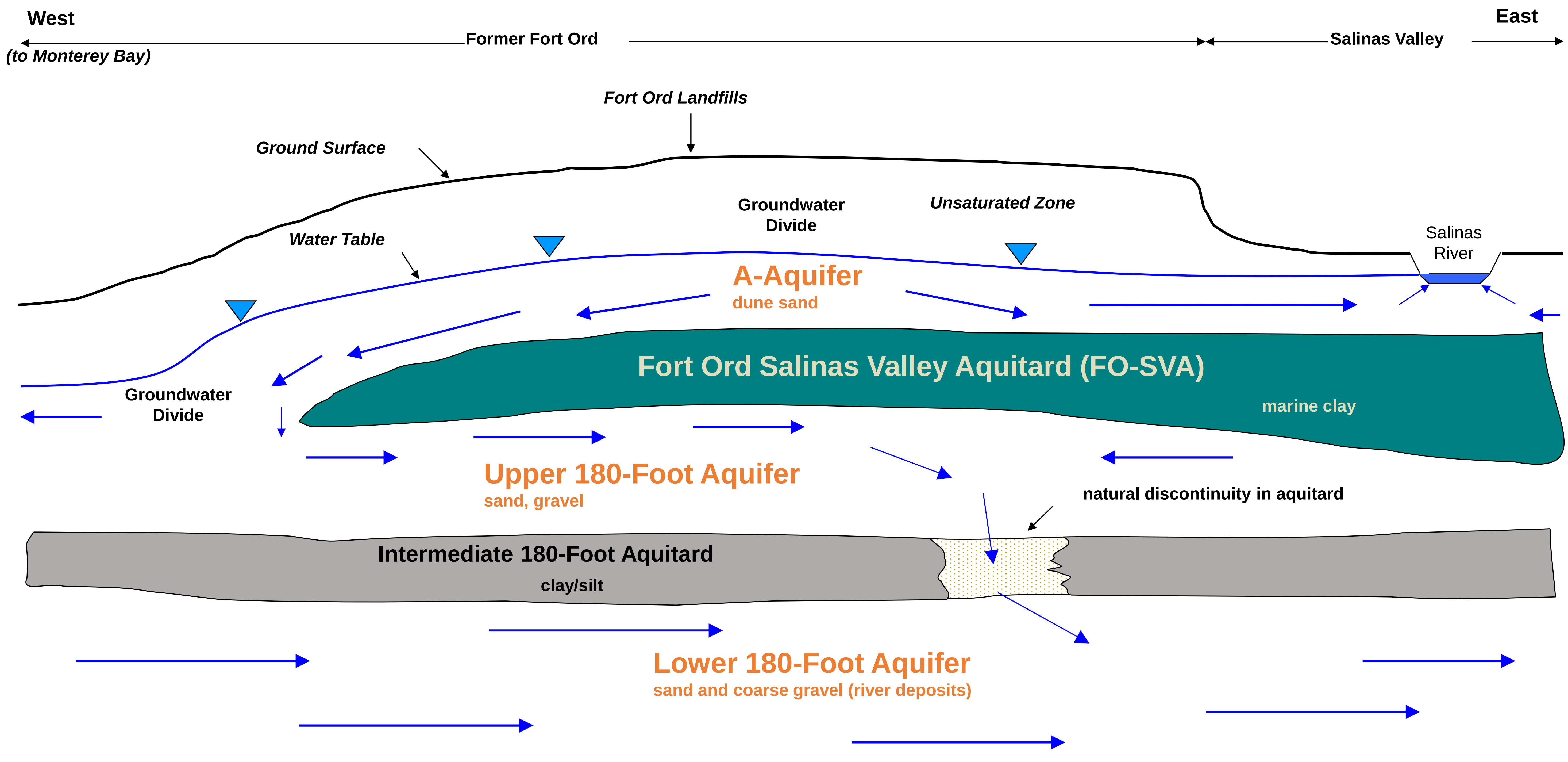
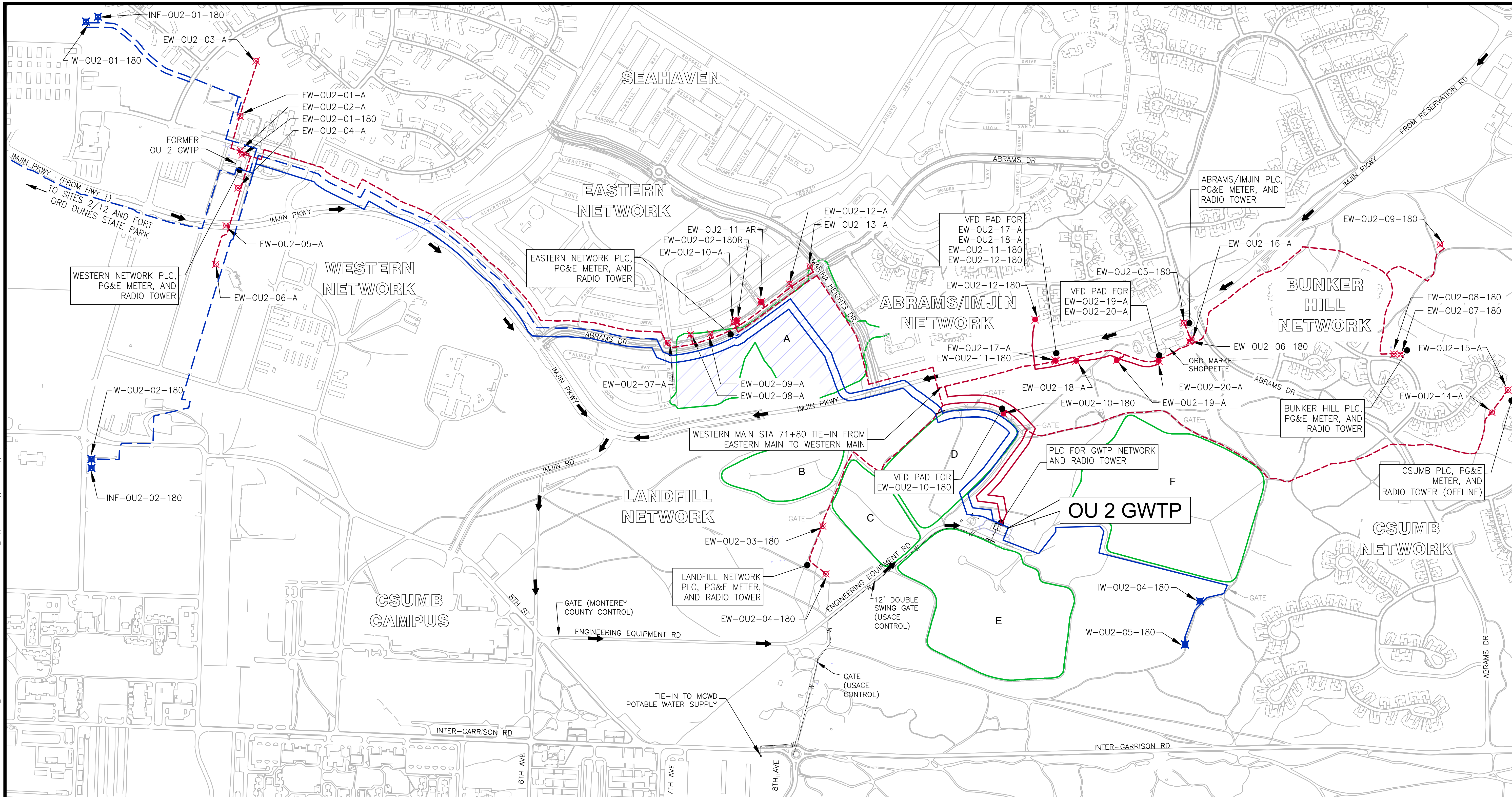


*Figure not to scale.

SCHEMATIC CROSS SECTION, FORT ORD HYDROSTRATIGRAPHY
Operable Unit 2 GWTS Evaluation and Optimization Report
Former Fort Ord, California

Ahtna | Date: 8/20/2021 | Figure: 3



ABBREVIATIONS

CSUMB	CALIFORNIA STATE UNIVERSITY MONTEREY BAY
EW	EXTRACTION WELL
GW	GROUNDWATER
GWTP	GROUNDWATER TREATMENT PLANT
INF	INFILTRATION GALLERY
IW	INJECTION WELL
MCWD	MARINA COAST WATER DISTRICT
OU	OPERABLE UNIT
PLC	PROGRAMMABLE LOGIC CONTROLLER
TW	TREATED WATER
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
VFD	VARIABLE FREQUENCY DRIVE

LEGEND

- GW EXTRACTION PIPE (PRE-2018)
- TW PIPE (PRE-2018)
- GW EXTRACTION PIPE (2018)
- TW PIPE (2018)
- W — POTABLE WATER PIPE
- EW (PRE-2018)
- INF/IW (PRE-2018)
- EW (2018)
- IW (2018)
- BOUNDARIES OF OU 2 LANDFILL AREAS (A – F)
- DIRECTION OF SITE ACCESS
- PLC AND/OR VFD

NOTES

1. SEVERAL EWS ARE OFFLINE. SEE FIGURE 2-1.
2. SEVERAL IWS ARE OFFLINE. SEE FIGURE 2-6.
3. WELL EW-OU2-15-A, FORMERLY PART OF THE CSUMB NETWORK, HAS BEEN CONVERTED TO A MONITORING WELL AS OF 2017.
4. PIPELINE LOCATIONS AS INDICATED ARE APPROXIMATE. SEE RECORD DRAWINGS FOR PRECISE PIPELINE ALIGNMENTS AS CONSTRUCTED.
5. EW-OU2-10-180, IW-OU2-04-180, AND IW-OU2-05-180 ARE CONTROLLED BY A PLC AT THE GWTP (GWTP NETWORK).
6. SEE APPENDIX C FOR MAPS OF SITES 2/12 AND FORT ORD DUNES STATE PARK.

N

400 200 0 400 800
GRAPHIC SCALE IN FEET

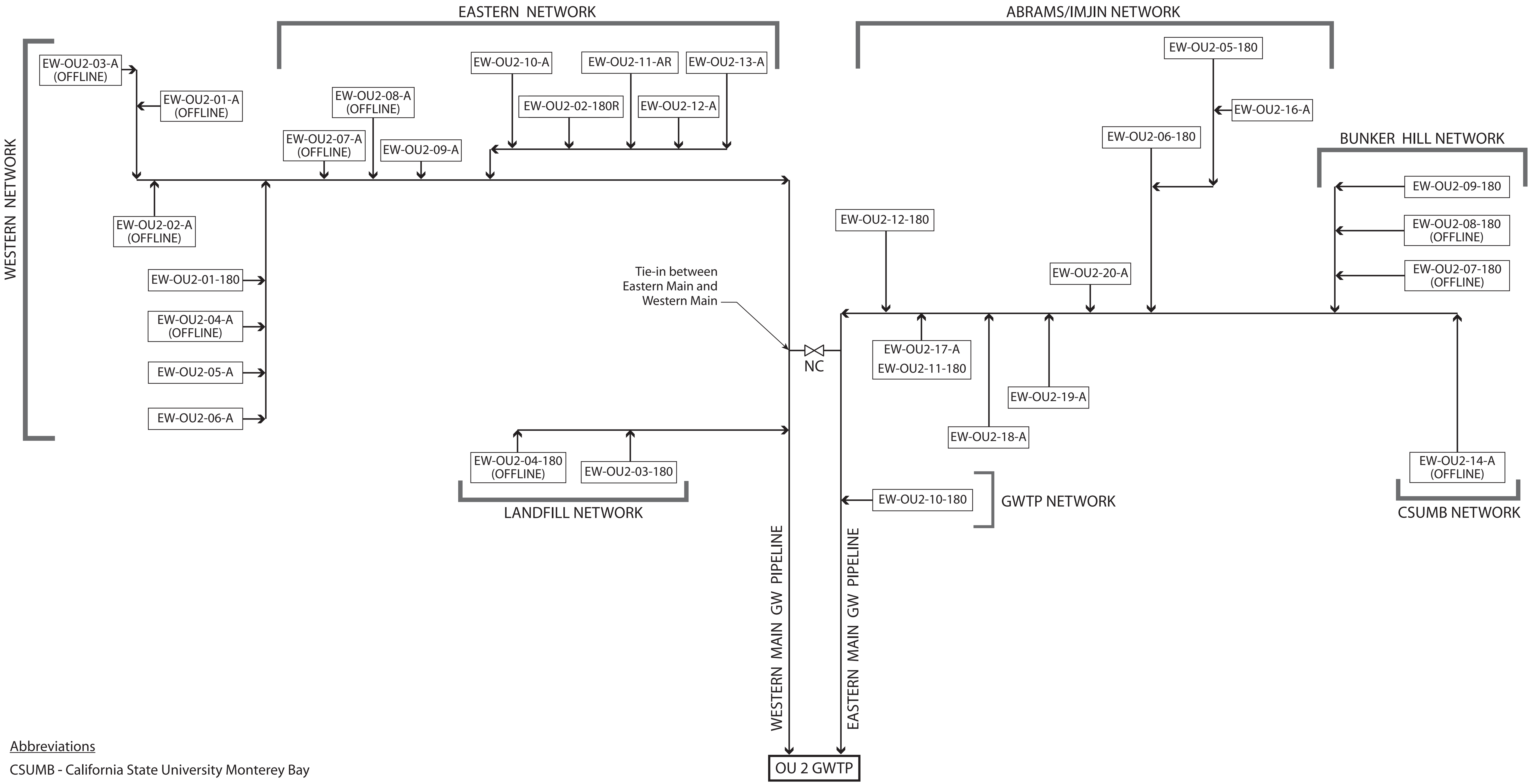
FIGURE-4
Layout of the OU 2 Groundwater Remedy

OPERATIONS AND MAINTENANCE OU 2 GWTP
Former Fort Ord, California

ITSI
RORE

FILENAME: P:\Projects\JRGF JV0001RORE JV GWTP Fort Ord\10.0 CADD\400_CADD Current Drawings\26.0 DandM _Figures\Fig 1-2.dwg

SAVED: Thursday, 10 May 2018 - 9:17AM PRINTED: 10-MAY-2018



Abbreviations

CSUMB - California State University Monterey Bay
GW - Groundwater
GWTP - Groundwater treatment plant
HDPE - High density polyethylene
NC - Normally closed
OU - Operable Unit

Legend

⋈ Gate valve
→ GW pipeline

Notes

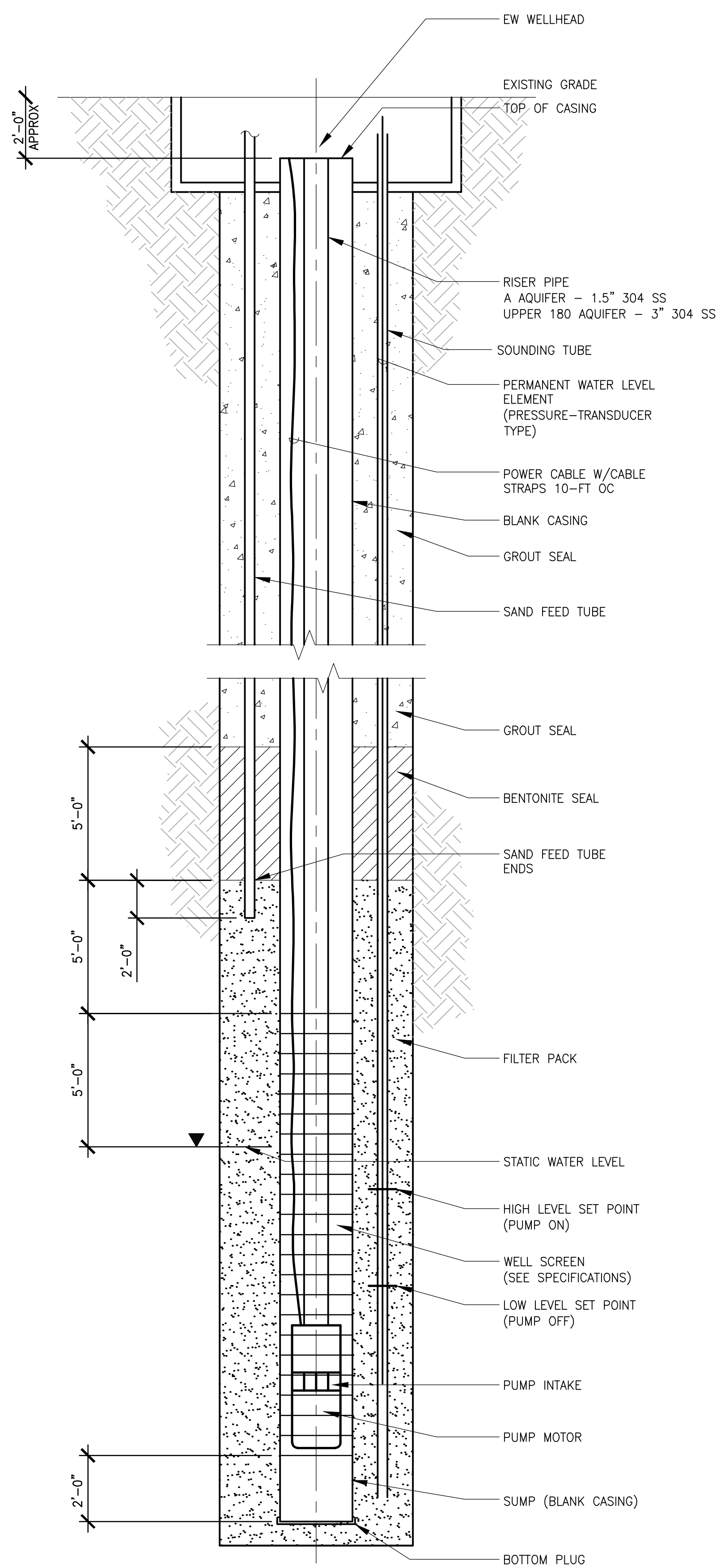
1. Buried pipelines for conveying extracted groundwater are double wall HDPE.

FIGURE 5
Schematic of the Groundwater Extraction System

OPERATIONS AND MAINTENANCE
OU 2 GWTP
Former Fort Ord, California

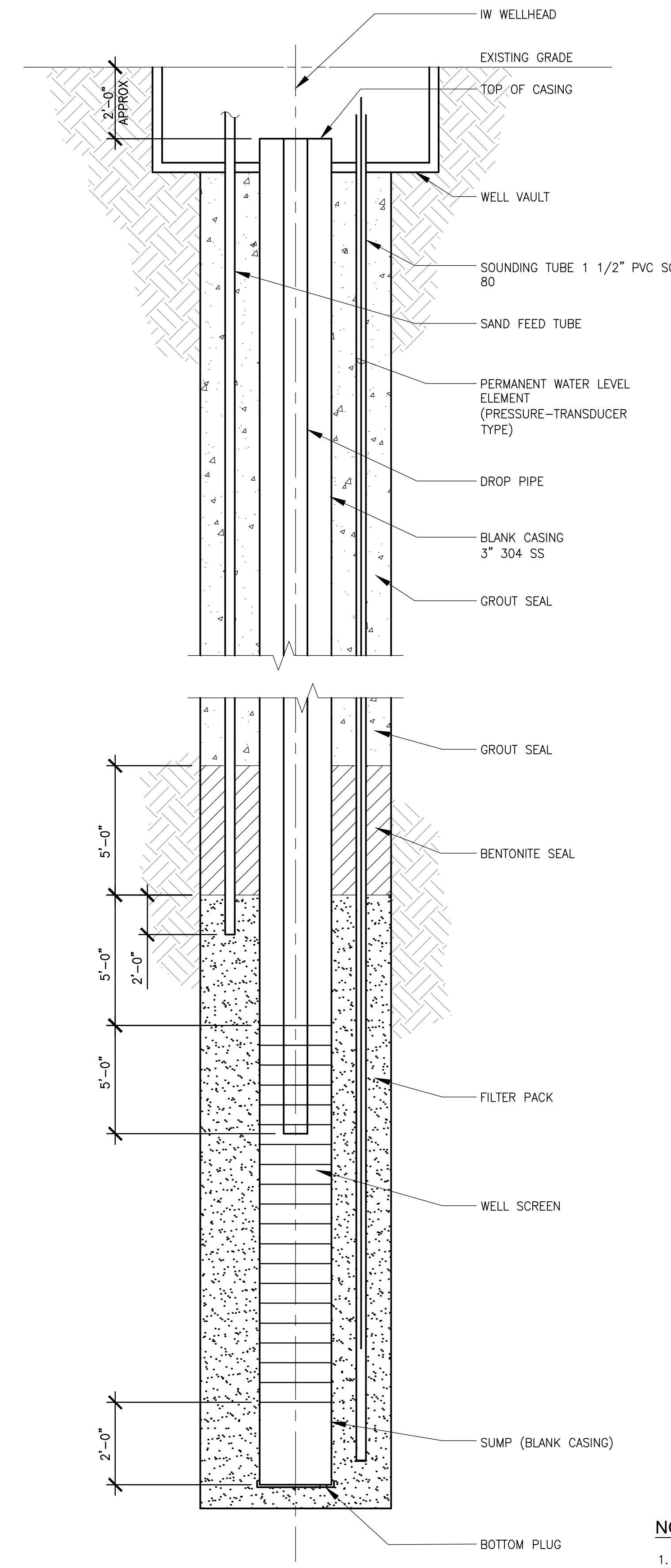
ITSI RORE

P:\Projects\RGF\V0001 RORE JV GWTP Fort Ord\7.0 Graphics\GW_Extraction_Sys.ai 02/22/2018



TYPICAL EXTRACTION WELL

NOT TO SCALE



TYPICAL INJECTION WELL

NOT TO SCALE

NOTES

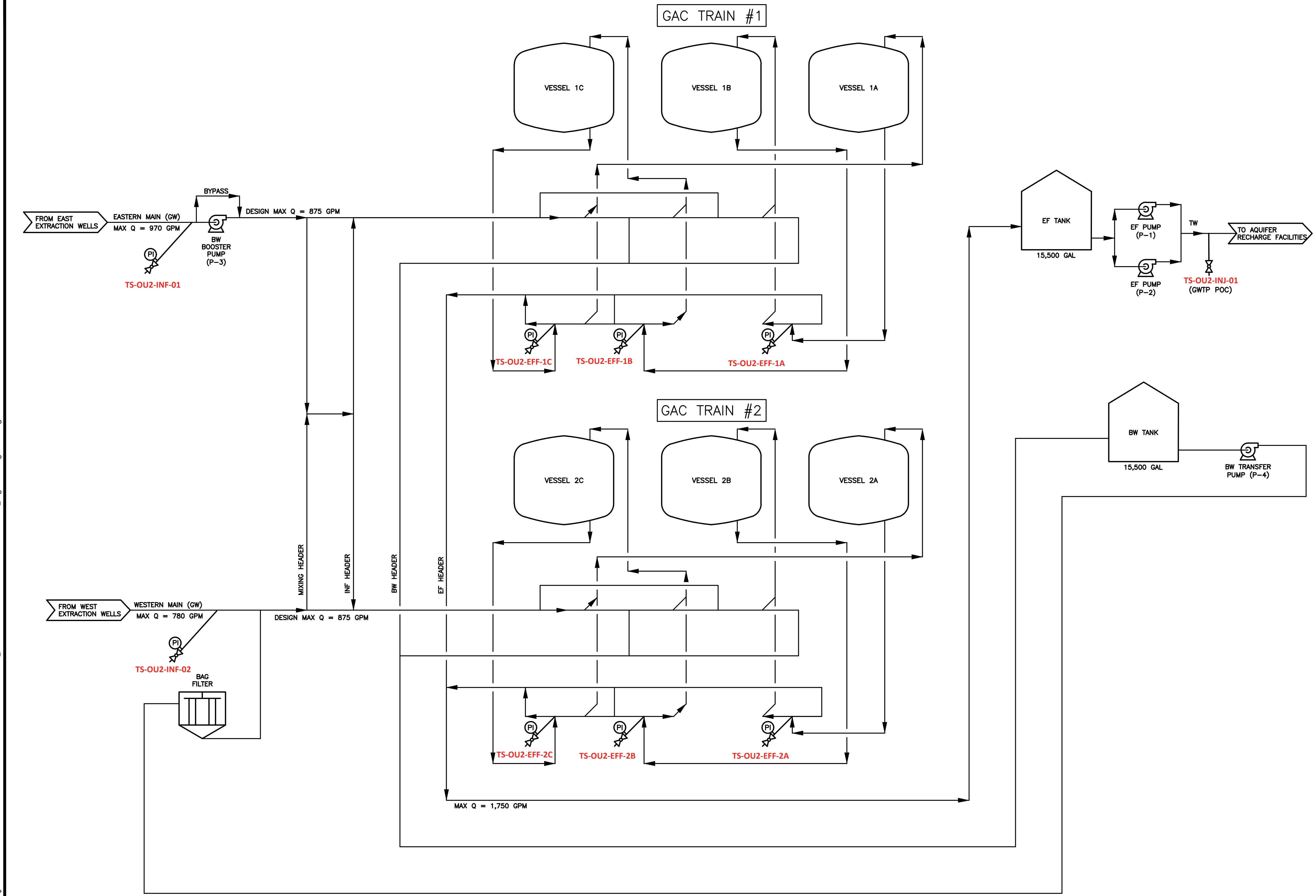
1. FOR IW-OU2-04-180, A REPLACEMENT SOUNDING TUBE WAS INSTALLED INSIDE THE 10" DIAMETER WELL CASING, DUE TO AN OBSTRUCTION IN THE INITIAL SOUNDING TUBE AT ABOUT 62 FEET BELOW GRADE.

FIGURE 6
Schematics of Extraction Wells and Injection Wells

OPERATIONS AND MAINTENANCE OU 2 GWTP
Former Fort Ord, California

ITSI RORE

FILENAME: P:\Projects\JRGFJV0001RORE JV GWTP Fort Ord\10.0 CADD\400_CADD Current Drawins\26.0 DandM _Figures\Fig 2-2.dwg



Legend

ABBREVIATIONS

BW	BACKWASH
EF	EFFLUENT
GAC	GRANULAR ACTIVATED C
GAL	GALLONS
GPM	GALLONS PER MINUTE
GW	GROUNDWATER (UNTREA
GWTP	GROUNDWATER TREATME
MAX	MAXIMUM
PI	PRESSURE INDICATOR
POC	POINT OF COMPLIANCE
Q	FLOW RATE
SP	SAMPLE PORT
TW	TREATED WATER

NOTES

1. VALVES ARE NOT INDICATED.
2. FLOW ARROWS INDICATE NORI OPERATION, WITH VESSEL SE(A–B–C IN EACH GAC TRAIN.

Locations in red font are sample locations

Note: The lead GAC vessel effluent will be sampled at the time of the sampling event

OU2 Groundwater Treatment Plant Schematic

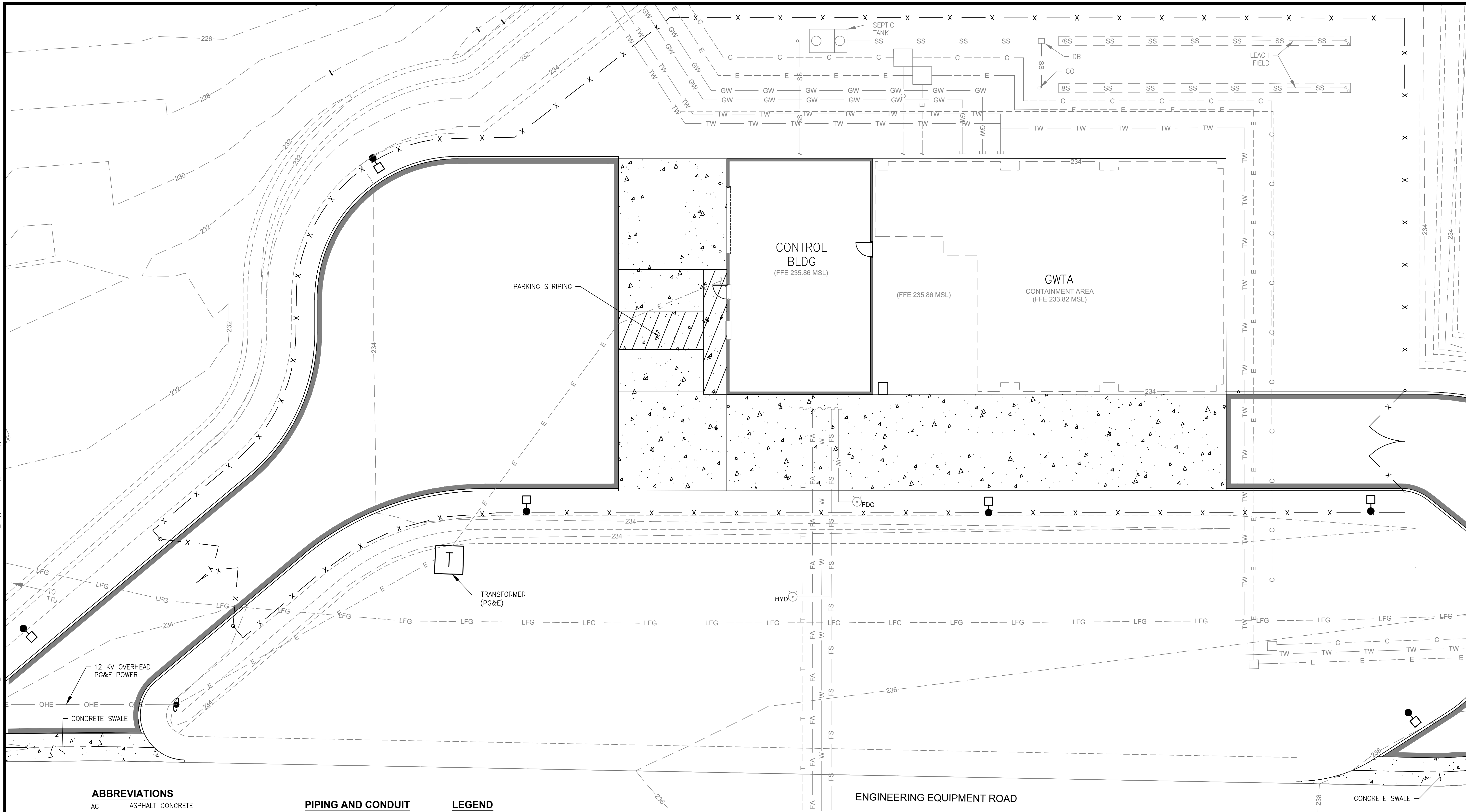
OU2 GWTS Evaluation and Optimization Report, Former Fort Ord, California

Figure

7

FILENAME: P:\Projects\JRGF JV0001RORE JV GWTP Fort Ord\10.0 CADD\400_CADD Current Drawings\26.0 DandM _Figures\Fig 2-5.dwg

SAVED: Monday, 26 February 2018 - 9:54AM PRINTED: 26-FEB-2018



ABBREVIATIONS

AC	ASPHALT CONCRETE
BLDG	BUILDING
CO	CLEAN OUT
DB	DISTRIBUTION BOX
FDC	FIRE DEPARTMENT CONNECTION
FFE	FINISHED FLOOR ELEVATION
GWTA	GROUNDWATER TREATMENT AREA
HYD	HYDRANT
LFG	LANDFILL GAS
MSL	MEAN SEA LEVEL
OHE	OVERHEAD ELECTRICAL
OU	OPERABLE UNIT
PCC	PORTLAND CEMENT CONCRETE
TTU	THERMAL TREATMENT UNIT
USACE	UNITED STATES ARMY CORPS OF ENGINEERS

PIPING AND CONDUIT

C	CONTROL
E	ELECTRICAL
FA	FIRE ALARM
FS	FIRE SPRINKLER
GW	GROUNDWATER (UNTREATED)
LFG	LANDFILL GAS
SS	SANITARY SEWER
T	TELECOMMUNICATIONS
TW	TREATED WATER
W	POTABLE WATER

LEGEND

CHAINLINK FENCE
PCC
FIELD LIGHT
AC
UTILITY POLE
236 TOPOGRAPHIC CONTOUR (MSL)

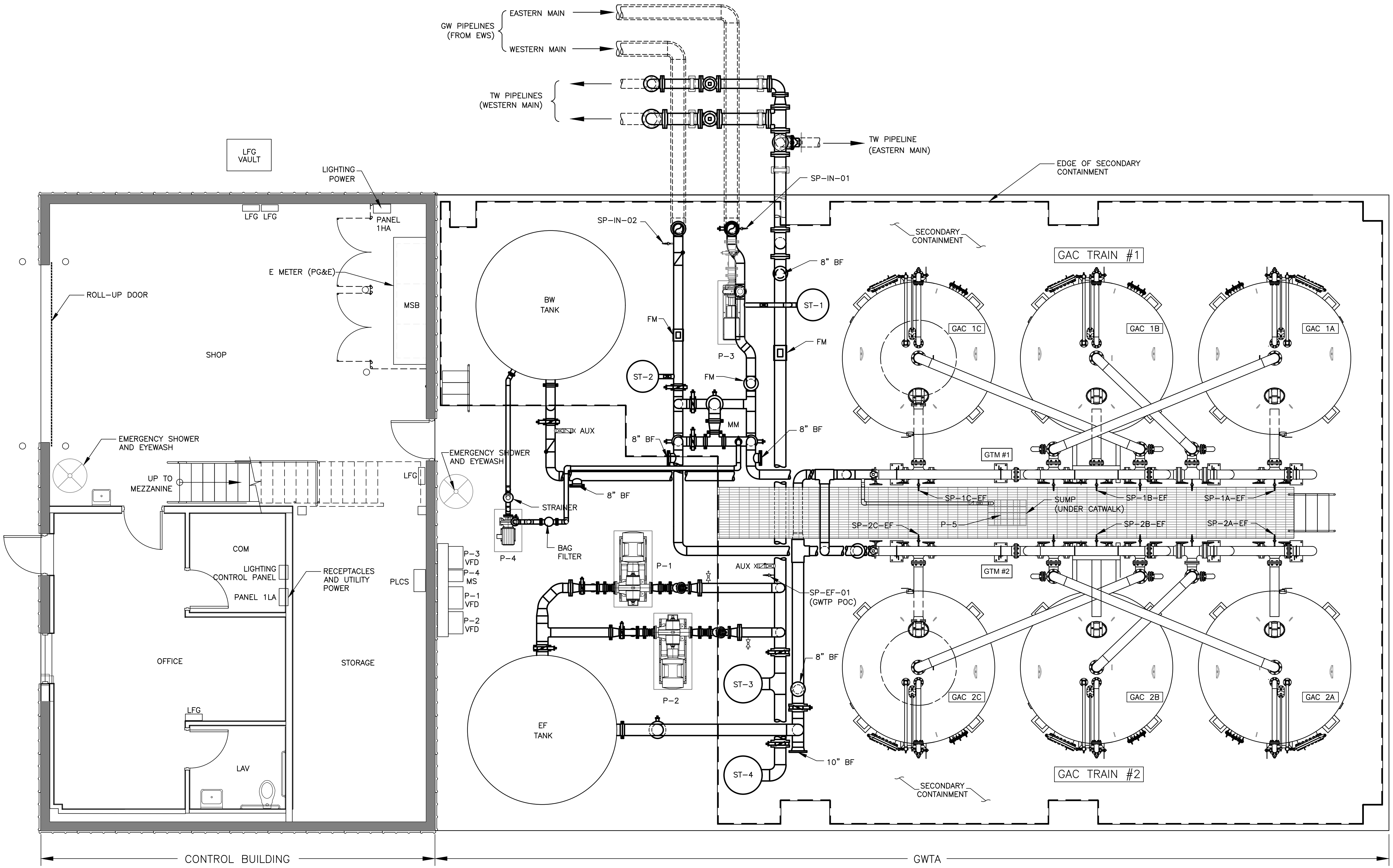
FIGURE 8
GWTP Site Plan

OPERATIONS AND MAINTENANCE
OU 2 GWTP
Former Fort Ord, California

ITSI
RORE

FILENAME: P:\Projects\JRGFJV0001RORE JV GWTP Fort Ord\10.0 CADD\400_CADD Current Drawings\26.0 O and M _Figures\Fig 2-3.dwg

SAVED: Wednesday, 21 February 2018 - 3:01PM PRINTED: 21-FEB-2018



ABBREVIATIONS

AUX	AUXILIARY INLET/OUTLET	GW	GROUNDWATER	PLCS	PROGRAMMABLE LOGIC CONTROLLERS
BF	BLIND FLANGE	GWTA	GROUNDWATER TREATMENT AREA	POC	POINT OF COMPLIANCE
BW	BACKWASH	GWTP	GROUNDWATER TREATMENT PLANT	SP	SAMPLE PORT
COM	COMMUNICATIONS	IN	INFLUENT	SP-IN	INFLUENT SAMPLE PORT
E	ELECTRICAL	INF/INJ	INFILTRATION/INJECTION	SP-EF	EFFLUENT SAMPLE PORT
EF	EFFLUENT	IW	INJECTION WELL	ST	SURGE TANK
EWS	EXTRACTION WELLS	LAV	LAVATORY	TW	TREATED WATER
FM	FLOW METER	LFG	LANDFILL GAS MONITOR	VFD	VARIABLE FREQUENCY DRIVE
GAC	GRANULAR ACTIVATED CARBON	MM	MIXING MANIFOLD		
GTM	GAC TRAIN MANIFOLD	MS	MOTOR STARTER		
		MSB	MAIN SWITCHBOARD		

NOTES

1. IN CONTROL BUILDING, UPSTAIRS MEZZANINE FLOOR PLAN IS NOT SHOWN.

SCHEDULE OF PUMPS

P-1	EFFLUENT PUMP
P-2	EFFLUENT PUMP
P-3	BW BOOSTER PUMP
P-4	BW TRANSFER PUMP
P-5	SUMP PUMP

N

4' 2' 0 4' 8'
SCALE: 1/8" = 1'-0"
GRAPHIC SCALE

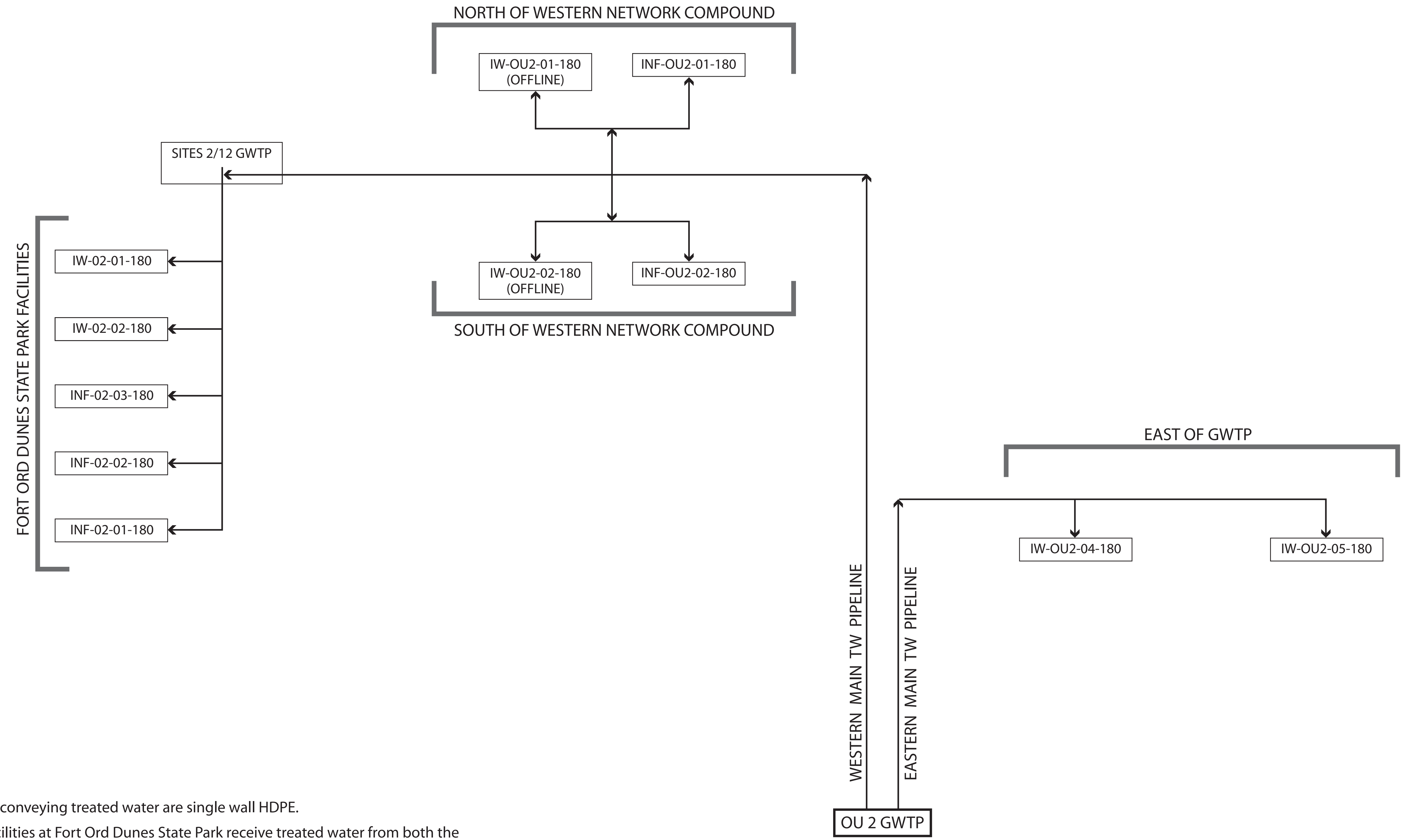
FIGURE 9
OU2 New
GWTP Layout

OPERATIONS AND MAINTENANCE
OU 2 GWTP
Former Fort Ord, California

ITSI
RORE

FILENAME:P:\Projects\JRGFJV0001RORE JV GWTP Fort Ord\10.0 CADD\400_CADD Current Drawins\26.0 OandM _Figures\Fig 2-4.dwg

SAVED: Friday, 15 June 2018 - 9:59AM PRINTED: 15-JUN-2018



Notes

1. Buried pipelines for conveying treated water are single wall HDPE.
2. Aquifer recharge facilities at Fort Ord Dunes State Park receive treated water from both the Sites 2/12 GWTP and the OU 2 GWTP. The tie-in is a wye fitting inside the Sites 2/12 GWTP building.
3. Infiltration galleries are denoted by "INF".
4. Injection wells are denoted by "IW".
5. Injection wells IW-OU2-04-180 and IW-OU2-05-180 each have a down-well drop pipe with submerged outlet.

Abbreviations

GWTP - Groundwater treatment plant

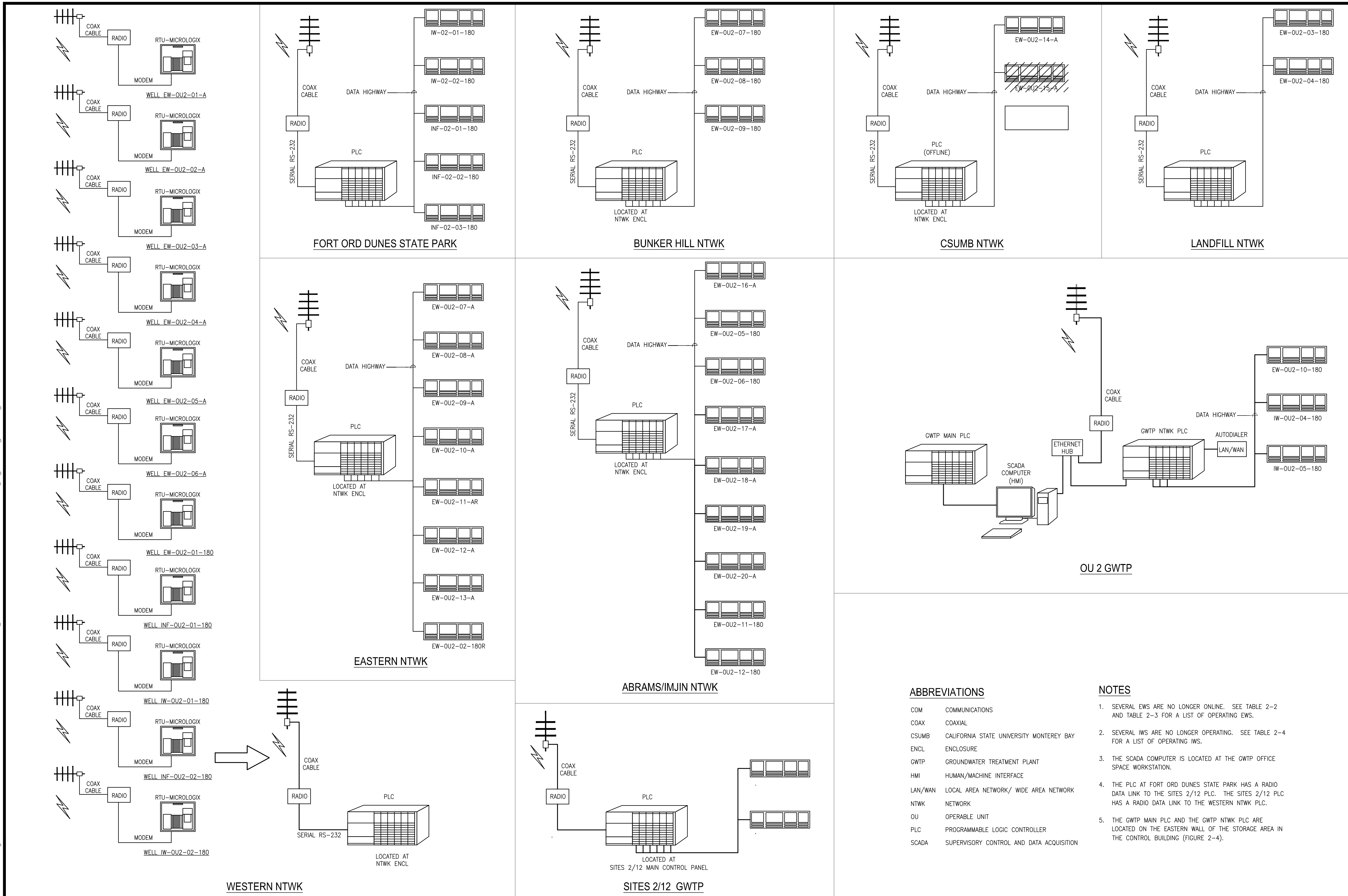
OU - Operable unit

TW - Treated water

FIGURE 10
Schematic of the
Aquifer Recharge System

OPERATIONS AND MAINTENANCE
OU 2 GWTP
Former Fort Ord, California

P:\Projects\URGFJV0001RORE JV GWTP Fort Ord\7.0 Graphics\Infiltration_Injection_Facilities.ai 02/22/2018



ABBREVIATIONS

COM	COMMUNICATIONS
COAX	COAXIAL
CSUMB	CALIFORNIA STATE UNIVERSITY MONTEREY BAY
ENCL	ENCLOSURE
GWTP	GROUNDWATER TREATMENT PLANT
HMI	HUMAN/MACHINE INTERFACE
LAN/WAN	LOCAL AREA NETWORK/ WIDE AREA NETWORK
NTWK	NETWORK
OU	OPERABLE UNIT
PLC	PROGRAMMABLE LOGIC CONTROLLER
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION

NOTES

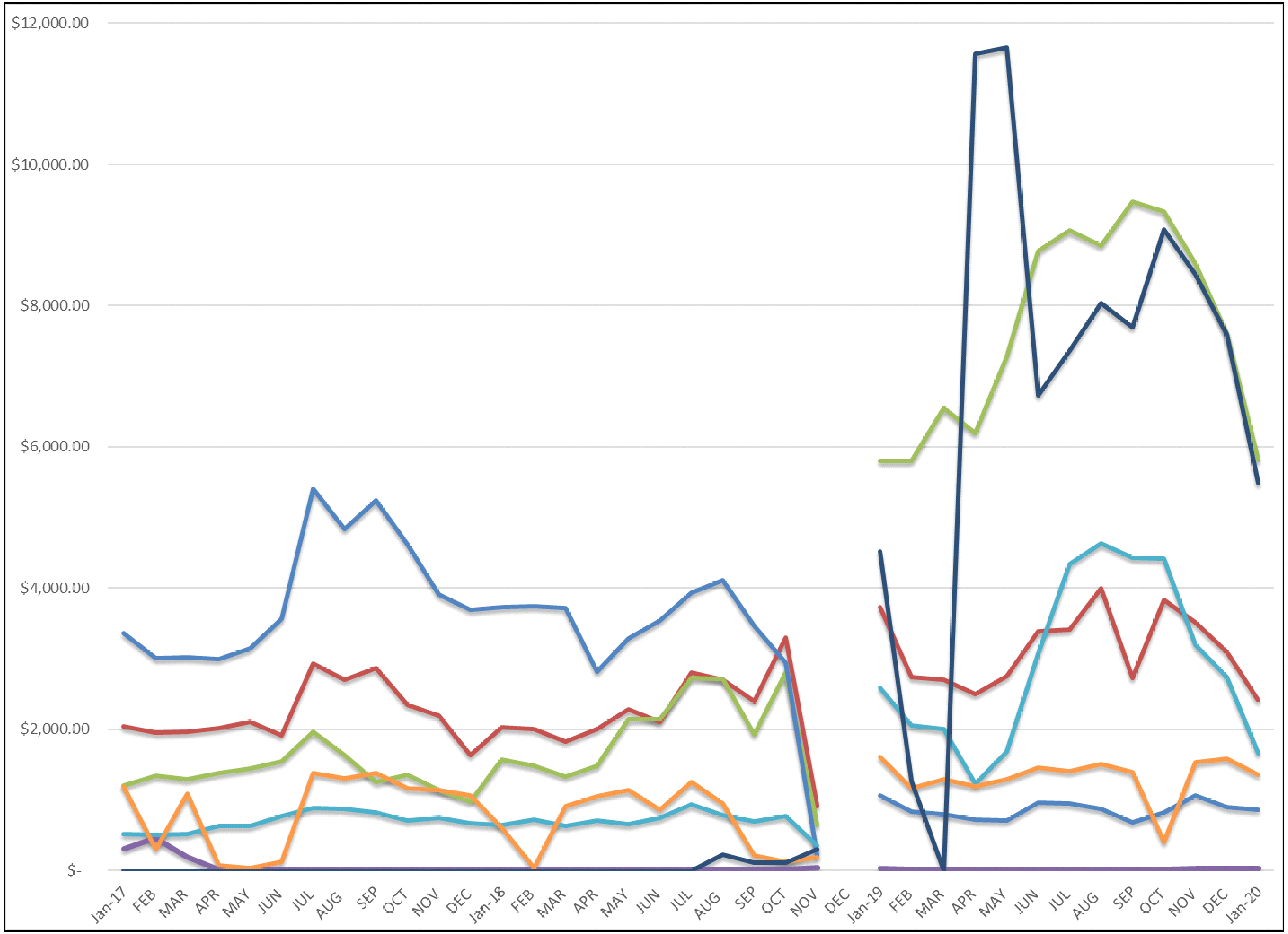
1. SEVERAL EWS ARE NO LONGER ONLINE. SEE TABLE 2–2 AND TABLE 2–3 FOR A LIST OF OPERATING EWS.
2. SEVERAL IWS ARE NO LONGER OPERATING. SEE TABLE 2–4 FOR A LIST OF OPERATING IWS.
3. THE SCADA COMPUTER IS LOCATED AT THE GWTP OFFICE SPACE WORKSTATION.
4. THE PLC AT FORT ORD DUNES STATE PARK HAS A RADIO DATA LINK TO THE SITES 2/12 PLC. THE SITES 2/12 PLC HAS A RADIO DATA LINK TO THE WESTERN NTWK PLC.
5. THE GWTP MAIN PLC AND THE GWTP NTWK PLC ARE LOCATED ON THE EASTERN WALL OF THE STORAGE AREA IN THE CONTROL BUILDING (FIGURE 2–4).

FIGURE 11
Basic PLC-SCADA Architecture

OPERATIONS AND MAINTENANCE
OU 2 GWTP
Former Fort Ord, California

FILENAME: P:\Projects\JRGFJV0001RORE JV GWTP Fort Ord\10.0 CADD\400_CADD Current Drawings\26.0 OandM _Figures\Fig 2–7.dwg

SAVED: Friday, 15 June 2018 – 10:30AM PRINTED: 15–JUN–2018



EXPLANATION

296 12th/3099 12th St (Western)

12th & Imjin Rd (Landfill)

2700 Imjin (Abrams & Imjin)

1 Bunker Hill Drive (Bunker Hill)

3rd Ave (Eastern)

1100 Engineering Equipment Rd (GWTP)

OU2 GWTS ENERGY COSTS

JANUARY 2017 - JANUARY 2020

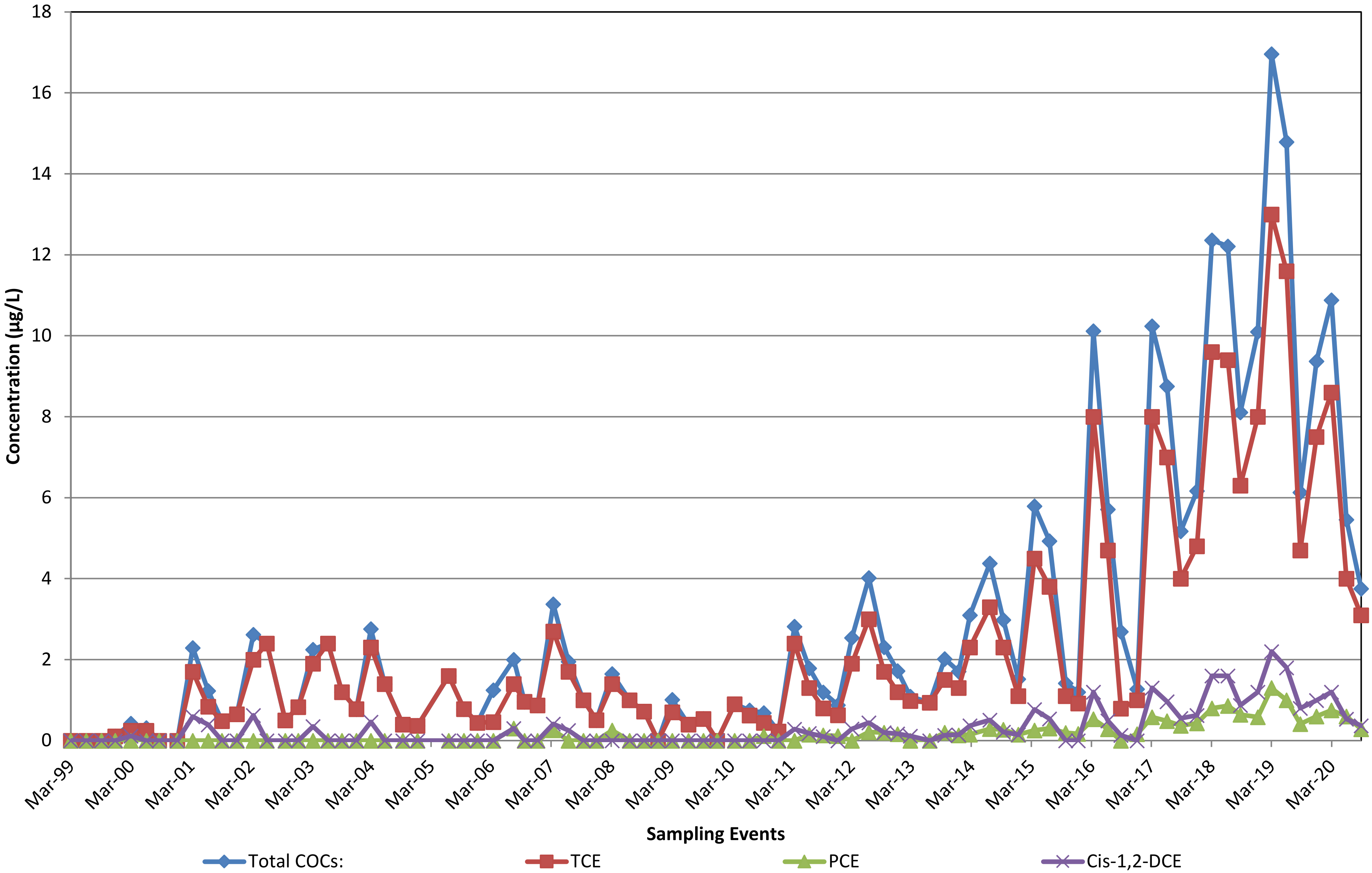
OU2 GWTS Evaluation and Optimization Report

Former Fort Ord, California

Ahtna

Date: 3/5/2021

Figure: 12



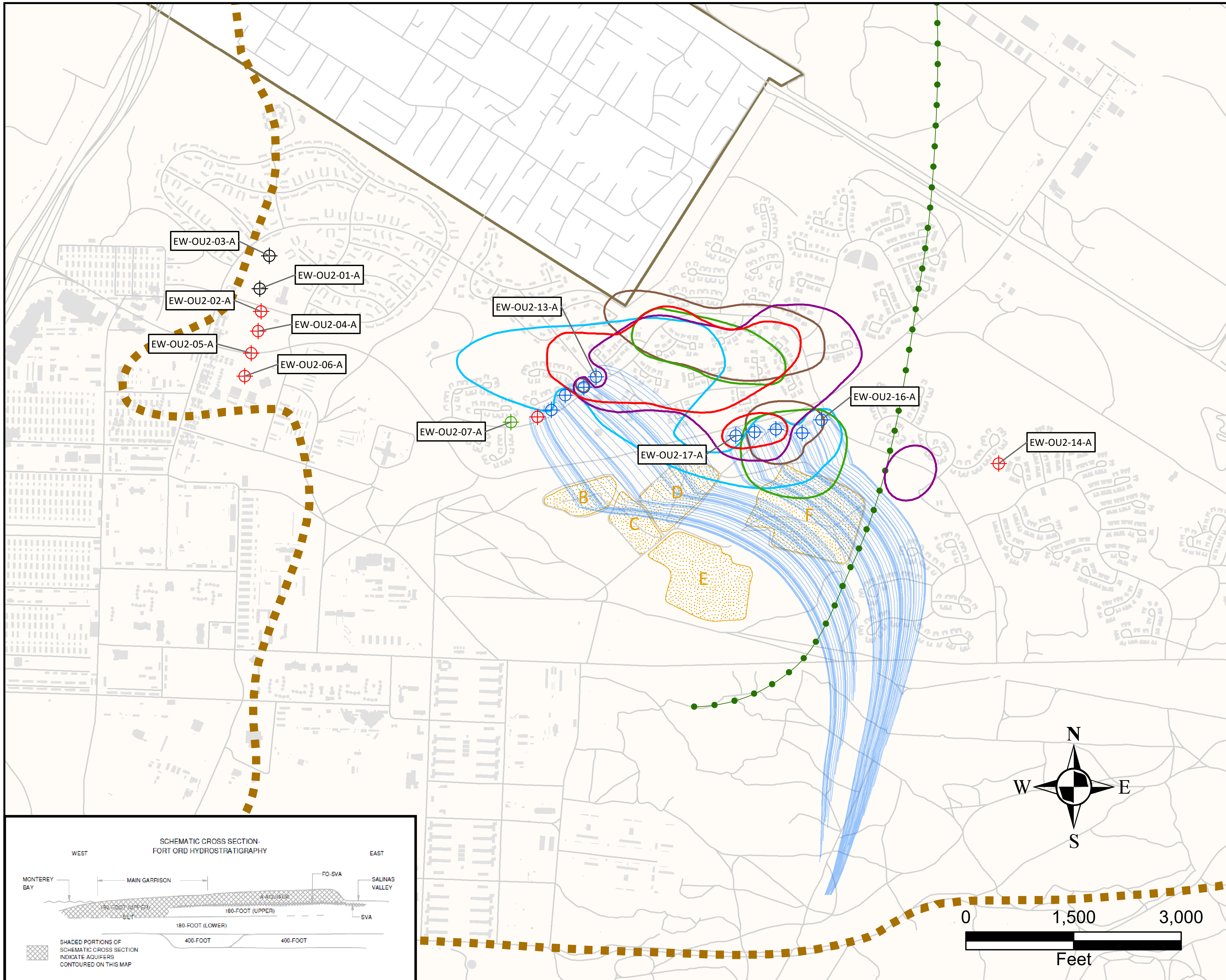
Ahtna

MW-OU2-62-180 COC Concentration Trends

Operable Unit 2 GWTS Evaluation and Optimization Report
Former Fort Ord, California

Figure:

13



EXPLANATION

No Pump - Low COCs

Not Operated - Low COCs

Not Operated - Not Connected

Operated

Chemical of Concern (COC) Aquifer Clenaup Level (ACL) Exceedance Countour in µg/L.

5 Trichloroethene (TCE)

3 Tetrachloroethene (PCE)

5 1,1-Dichloroethane (1,1-DCA)

0.5 1,2-Dichloroethane (1,2-DCA)

0.1 Vinyl Chloride (VC)

Simulated Groundwater Capture A - Aquifer

Approximate location of the A-Aquifer Groundwater Divide

Approximate Edge of the Fort Ord - Salinas Valley Aquitard

OU2 Landfill Areas B through F

Facilities

Roads

Former Fort Ord Boundary

NOTES:

(1) Groundwater samples were collected between August 31st, 2020 and September 23rd, 2020.

(2) Simulated Groundwater Capture A - Aquifer created by ACOE.

SIMULATED GROUNDWATER CAPTURE
A-AQUIFER

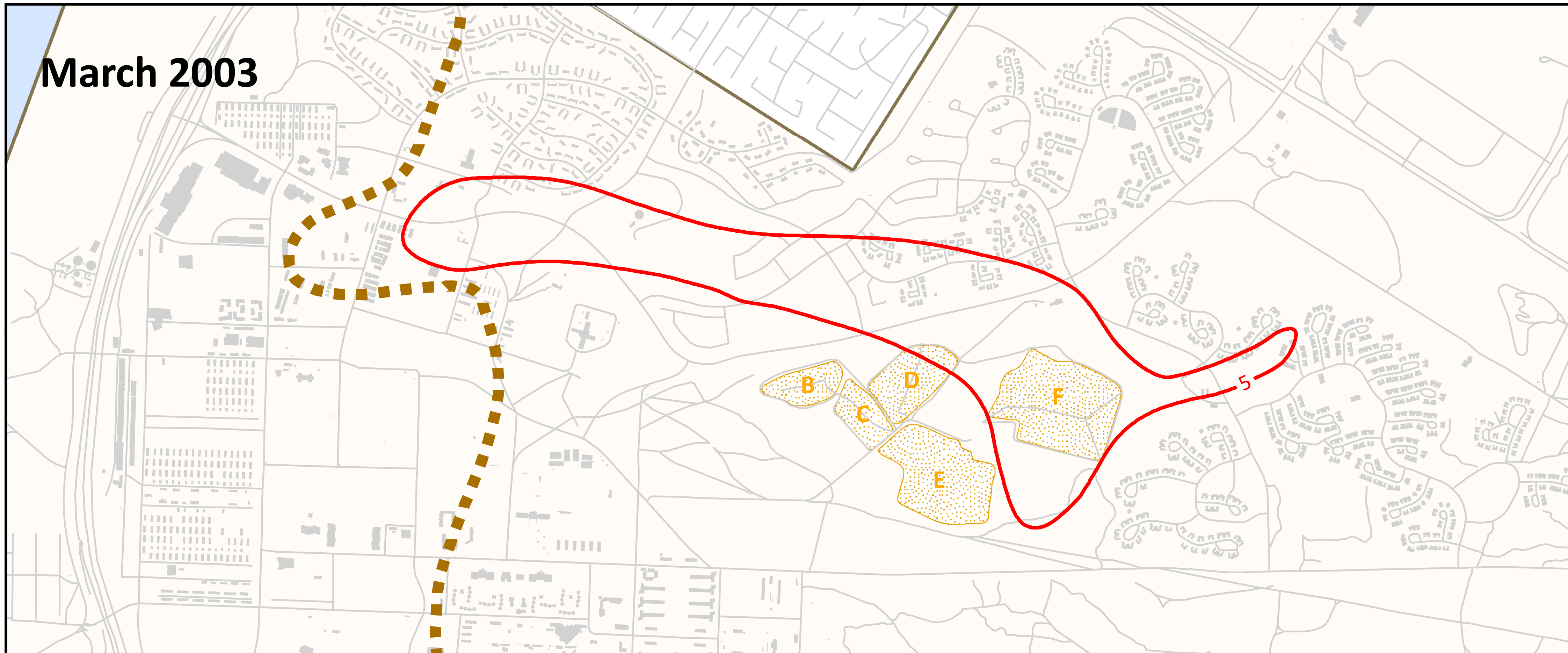
Third Quarter 2020

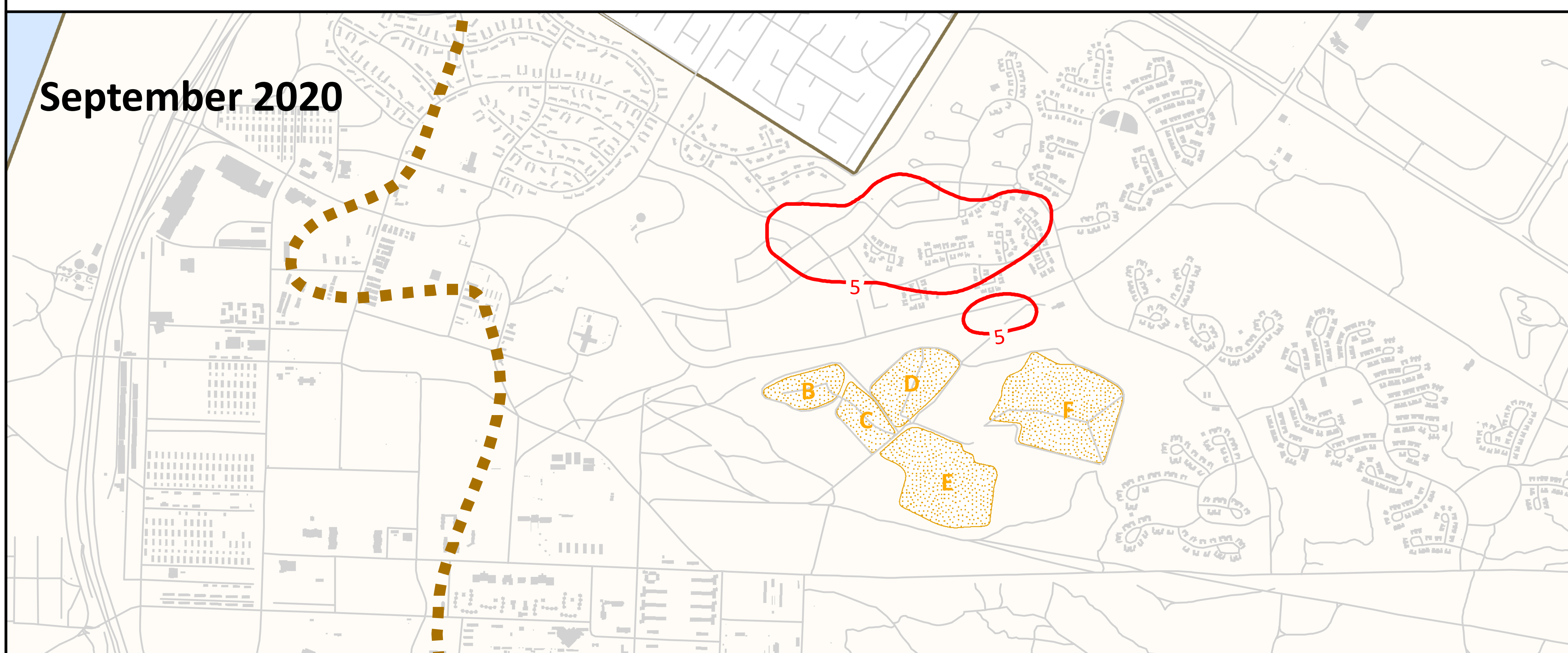
Operable Unit 2 GWTS Evaluation and Optimization Report, Former Fort Ord, California

Ahtna

Date: 12/16/2020

Figure: 14





EXPLANATION

Chemical of Concern (COC) Aquifer Cleanup Level (ACL) Exceedance Contour in µg/L.

5 — Trichloroethene (TCE) A - Aquifer (Concentration = 5)

Approximate edge of Fort Ord - Salinas Valley Aquitard (FO-SVA) Boundary

OU2 Landfill Areas B through F

Facilities

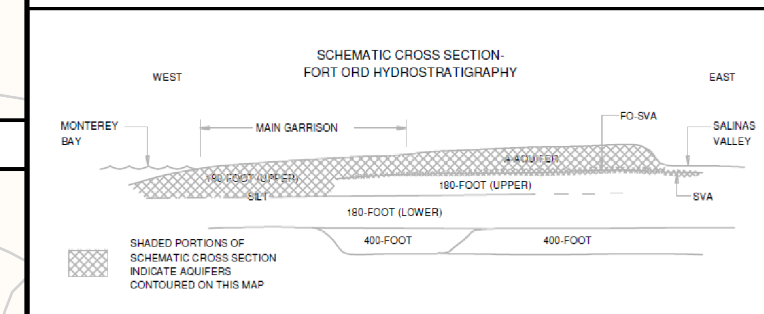
Roads

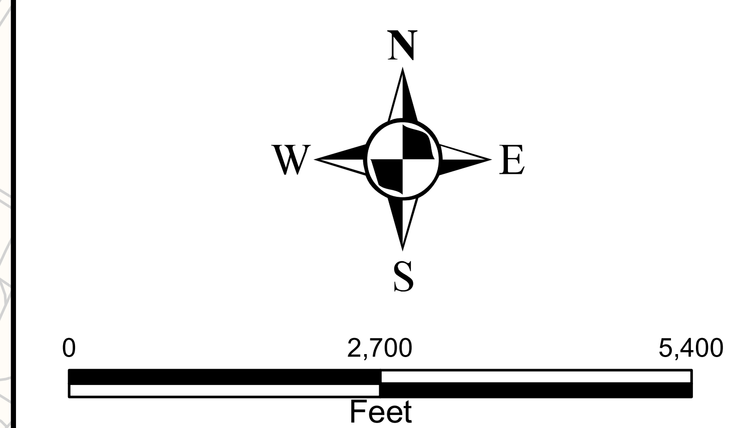
Former Fort Ord Boundary

NOTES:

(1) Contours are based on one interpretation of the data that were available at the time this report was prepared; other interpretations may be possible.

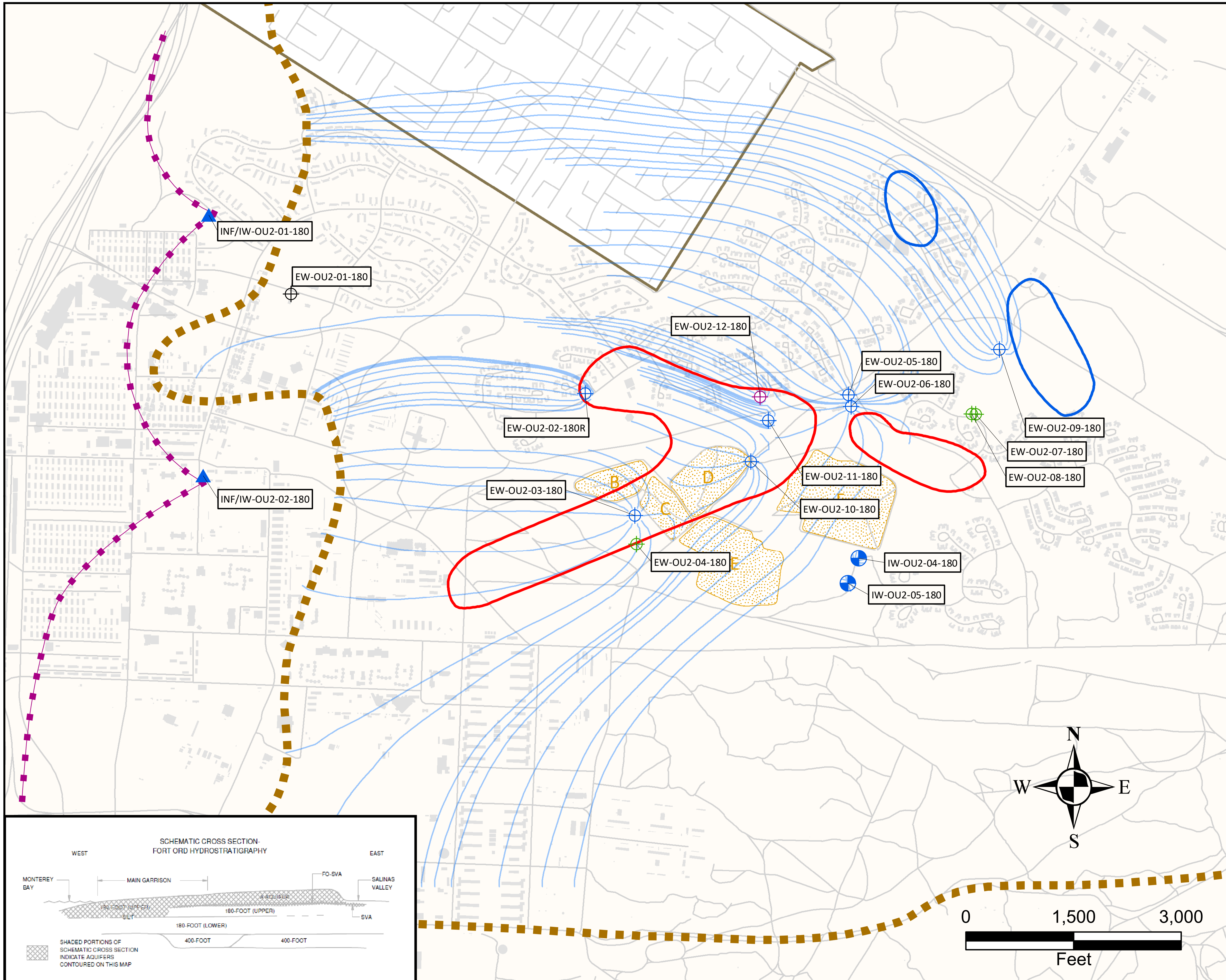
(2) March 2003 Contour is at maximum historical extent.





CURRENT AND HISTORICAL TCE ACL EXCEEDANCE CONTOURS
OU2 A-AQUIFER, MARCH 2003 AND SEPTEMBER 2020
Operable Unit 2 GWTS Evaluation and Optimization Report
Former Fort Ord, California

Ahtna	Date: 11/23/2020	Figure: 15



Explanation

No Pump - Low COCs

Not Operated - Low COCs

Not Operated - Not Connected

Operated

Infiltration Gallery/Injection Wells

Injection Wells

Chemical of Concern (COC) Aquifer Clenaup Level (ACL) Exceedance Countour in µg/L.

5 Trichloroethene (TCE)

0.5 Carbon Tetrachloride (CT)

Simulated Groundwater Capture Upper 180-Foot Aquifer

Approximate location of the Upper 180-Foot Aquifer Groundwater Divide

Approximate Edge of the Fort Ord - Salinas Valley Aquitard

OU2 Landfill Areas B through F

Facilities

Roads

Former Fort Ord Boundary

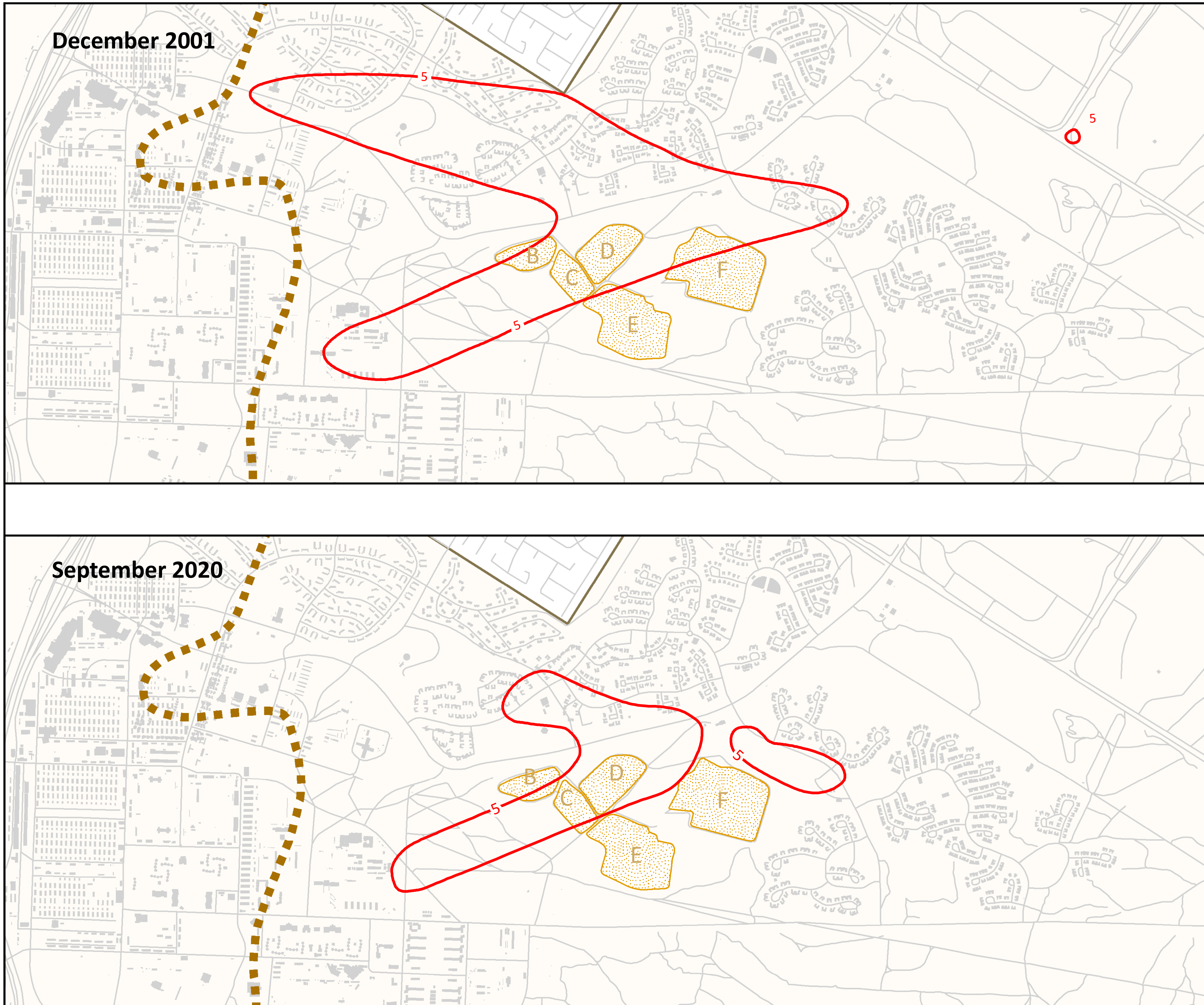
NOTES:

(1) Groundwater samples were collected between August 31st, 2020 and September 23rd, 2020.

(2) Simulated Groundwater Capture Upper 180 - Foot Aquifer created by ACOE.

SIMULATED GROUNDWATER CAPTURE
UPPER 180-FOOT AQUIFER
Third Quarter 2020
Operable Unit 2 GWTS Evaluation and Optimization Report, Former Fort Ord, California

Ahtna | Date: 12/16/2020 | Figure: 16



EXPLANATION

Chemical of Concern (COC) Aquifer Cleanup Level (ACL) Exceedance Contour in µg/L.

5 — Trichloroethene (TCE) (December 2001 Plume at Maximum Historical Extent)

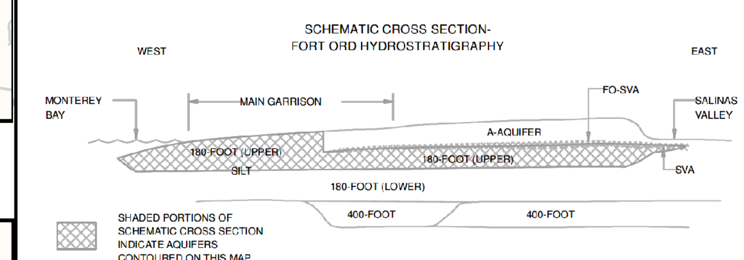
Approximate edge of Fort Ord - Salinas Valley Aquitard (FO-SVA) Boundary.

Approximate Extent of Landfill Areas

Roads

Facilities

Former Fort Ord Boundary



NOTES:

(1) Contours are based on one interpretation of the data that were available at the time this report was prepared; other interpretations may be possible.

(2) December 2001 Contour is at maximum historical extent.

0 2,000 4,000

Feet

N
W E
S

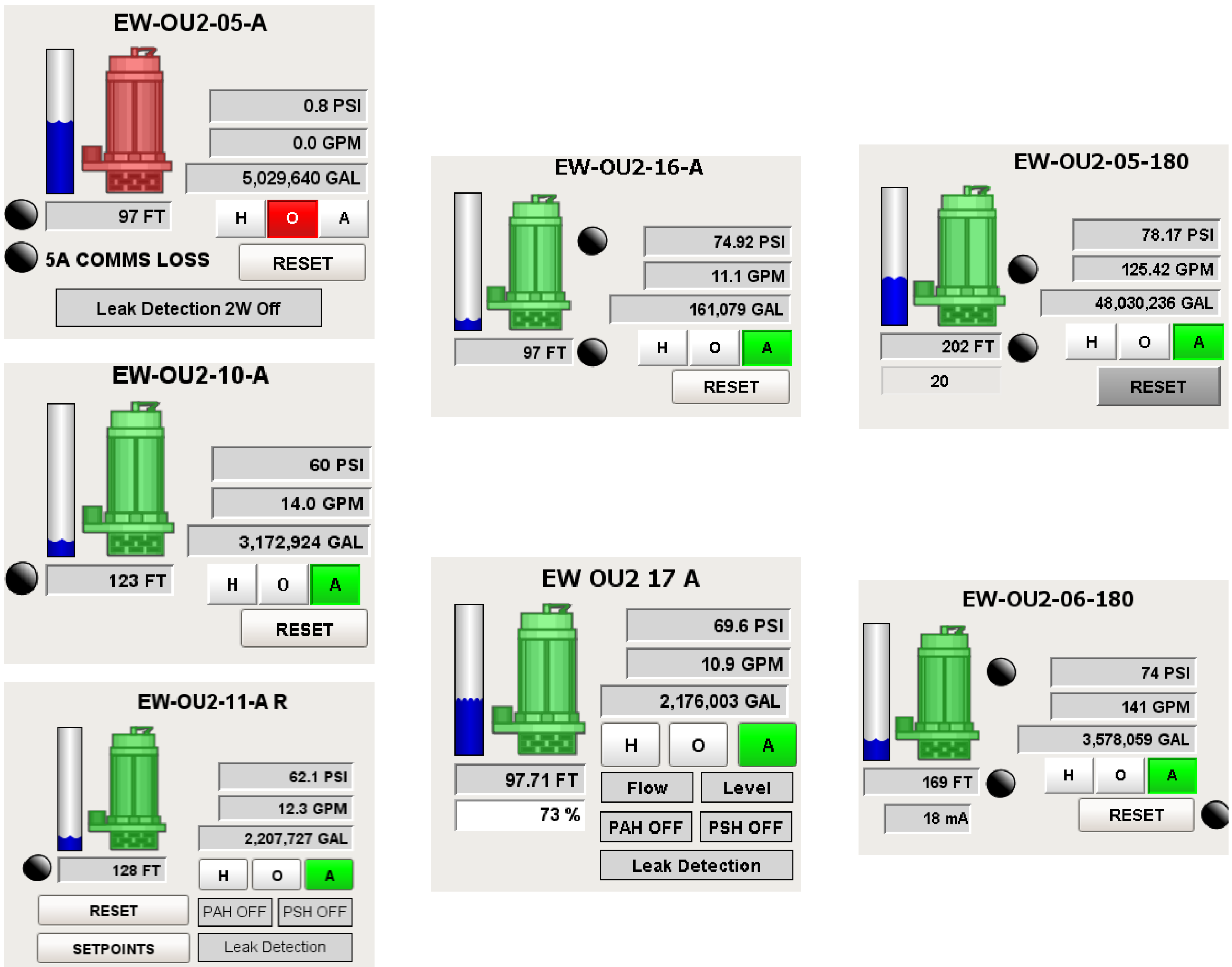
CURRENT AND HISTORICAL TCE ACL EXCEEDANCE CONTOURS
OU2 UPPER 180-FOOT AQUIFER
DECEMBER 2001 AND SEPTEMBER 2020
Operable Unit 2 GWTS Evaluation and Optimization Report
Former Fort Ord, California

Ahtna	Date: 11/23/2020	Figure: 17

APPENDICES

APPENDIX A

SCADA Screenshots (Ignition™ Software) and PLC Layouts



EXPLANATION

A green pump indicates that the pump is actively pumping.

A red pump indicates that the pump is not actively pumping.

Waterlevel indicator showing approximate level of water in the extraction well. Next to the indicator has current depth to water.

NOTES:

SCADA - Supervisory Control and Data Aquisition
mA - milliamps (0 - 20 mA or percent are used to control the Variable Frequency Drive that will determine the speed in which the pump operates.)
PSI - Pounds per Square Inch
GPM - Gallons Per Minute
GAL - Gallons reading from the totalizer at the well
FT - Feet
H - Pump is in Hand Operation
O - Pump is Off
A - Pump is in Automatic Operation
RESET - Button that allow the operator to reset the well when the well is in fault
SETPOINTS - Button to allow the operator to modify the operational parameters
Leak Detection 2W Off - No leaks are being detected in the double containment pipe
Leak Detection - Button changes when a leak is detected in the double containment piping
PAH OFF - Button changes when Pressure Alarm is High
PSH OFF - Button changes when Pressure Switch is high

SCADA WELL INTERFACE
OU2 Evaluation and Optimization Report

Ahtna | Date: 3/24/2021 | Figure: A-1

EXPLANATION

NOTES:

This screenshot shows the current default selection of that SCADA screen with all wells and alarm trends selected. This includes a well that no longer exists (EW-OU2-08-A), min/max trends of EW-OU2-05-180, and an alarm trend that i s not needed by the operators.

FLOW TREND

OU2 Evaluation and Optimization Report

Ahtna

Date: 3/24/2021

Figure: A-2

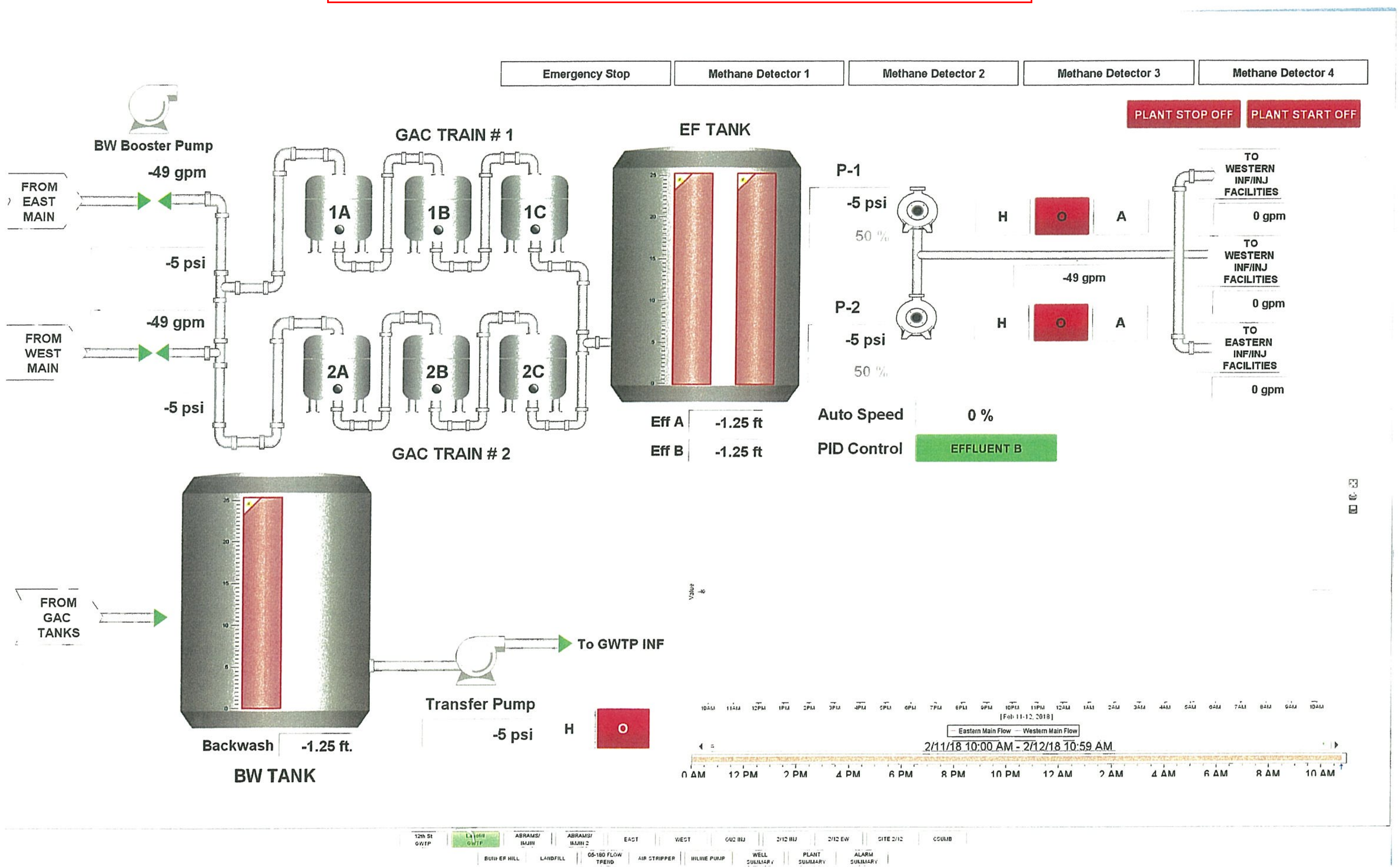
EXPLANATION

NOTES:
This screenshot shows one well trend selected (EW-OU2-10-180).

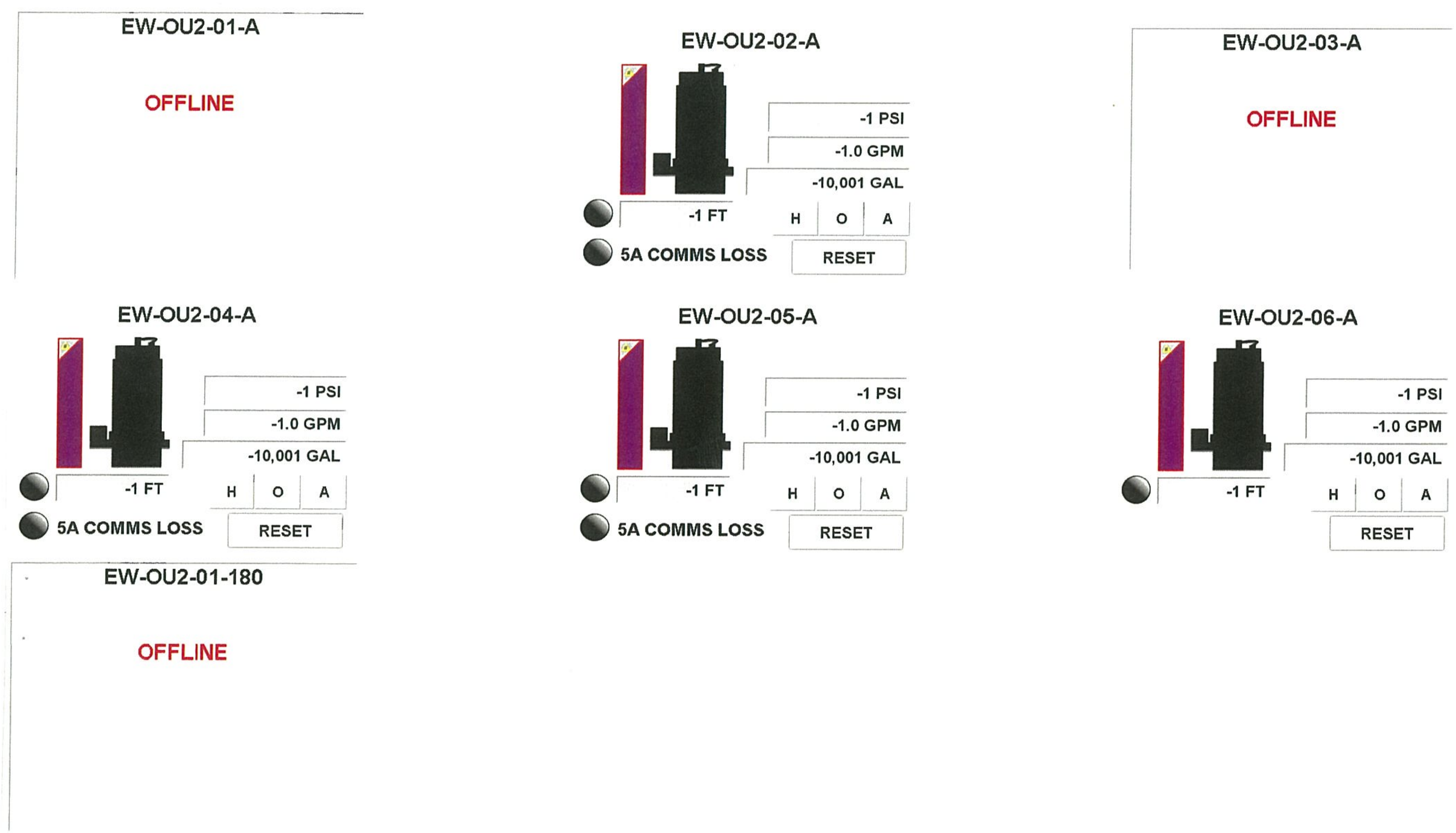
FLOW TREND
OU2 Evaluation and Optimization Report

Ahtna	Date: 3/24/2021	Figure: A-3

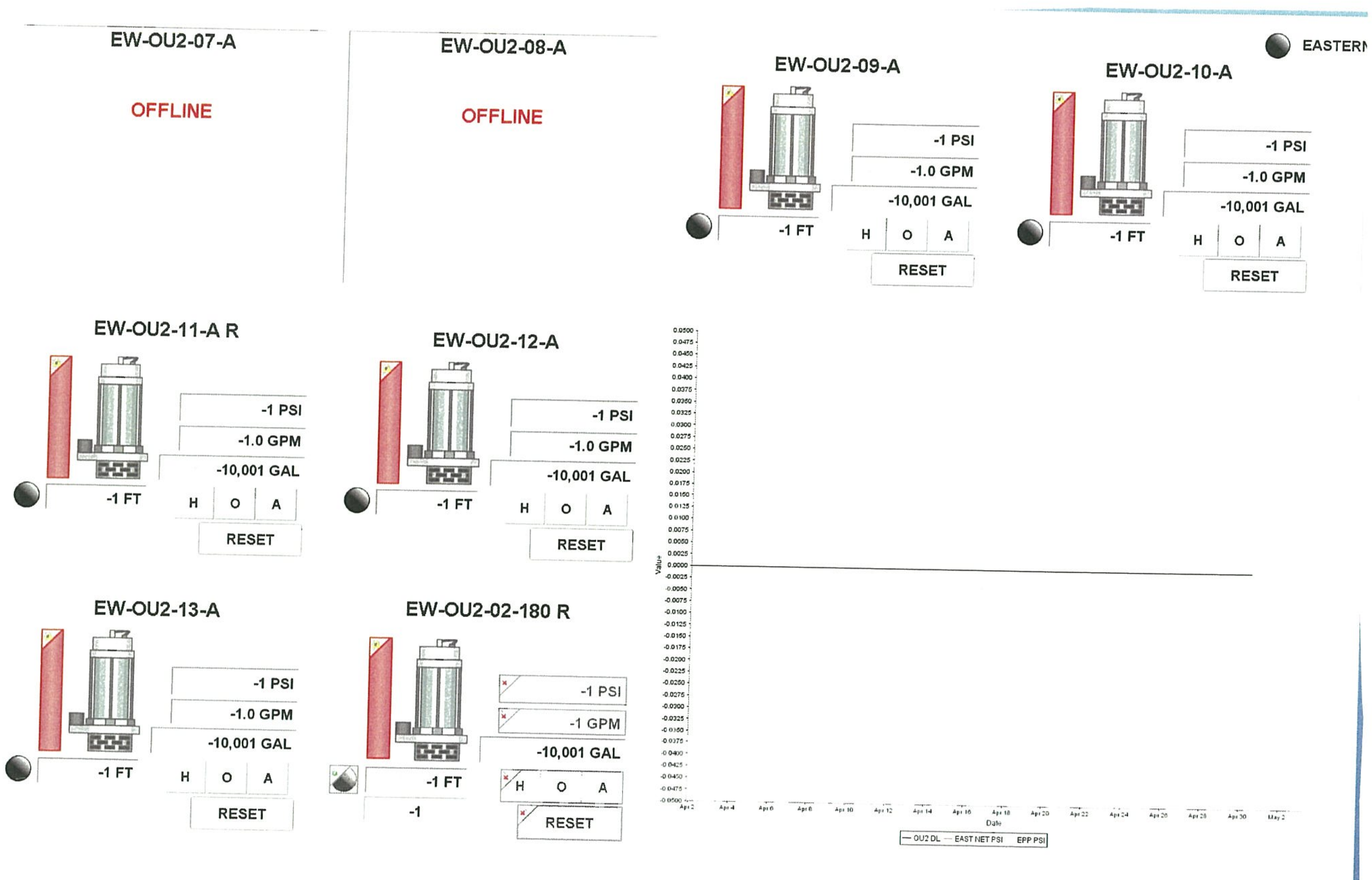
SCREEN SHOT OF MAIN PROCESS PANEL



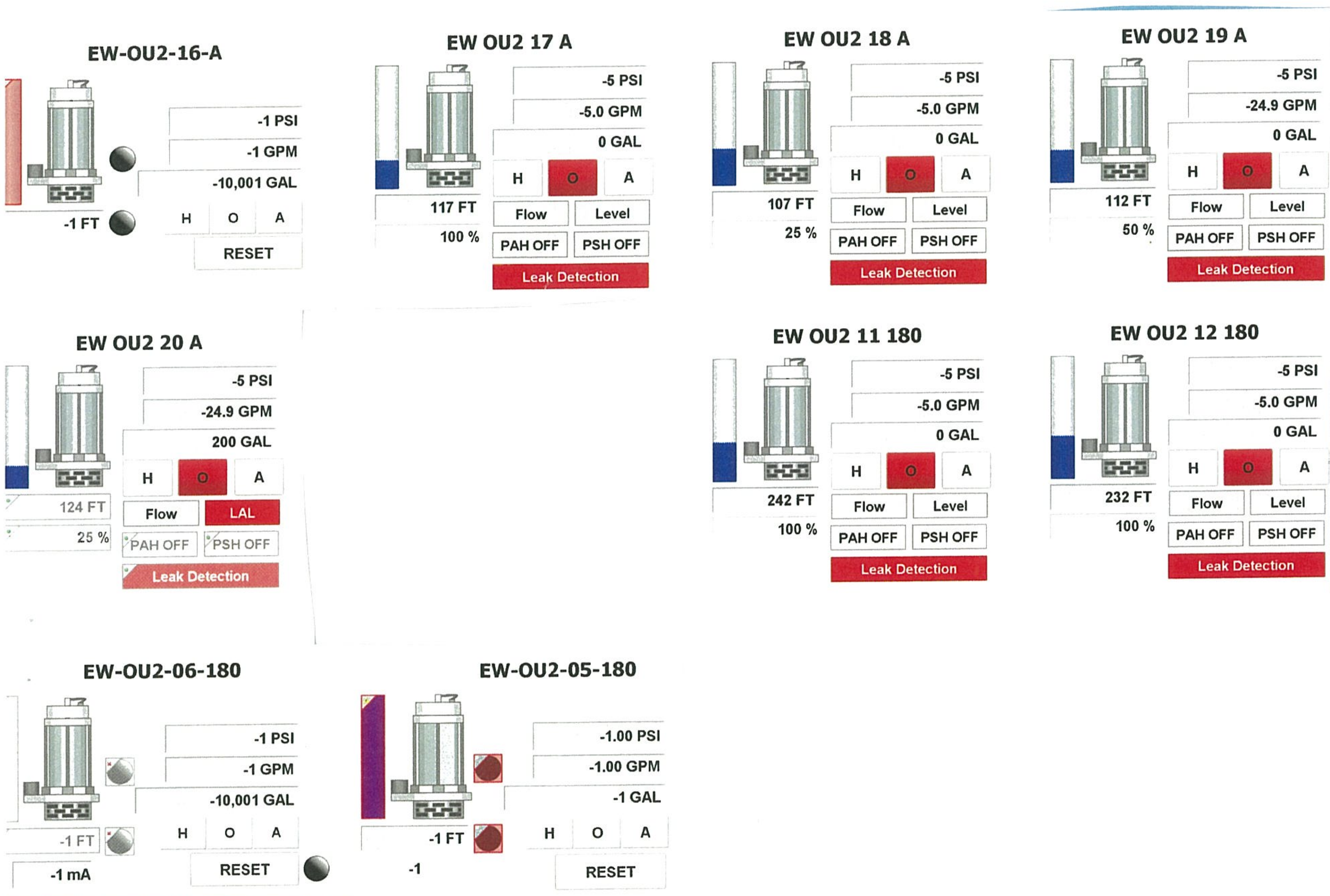
SCREEN SHOT FOR WESTERN WELL NETWORK



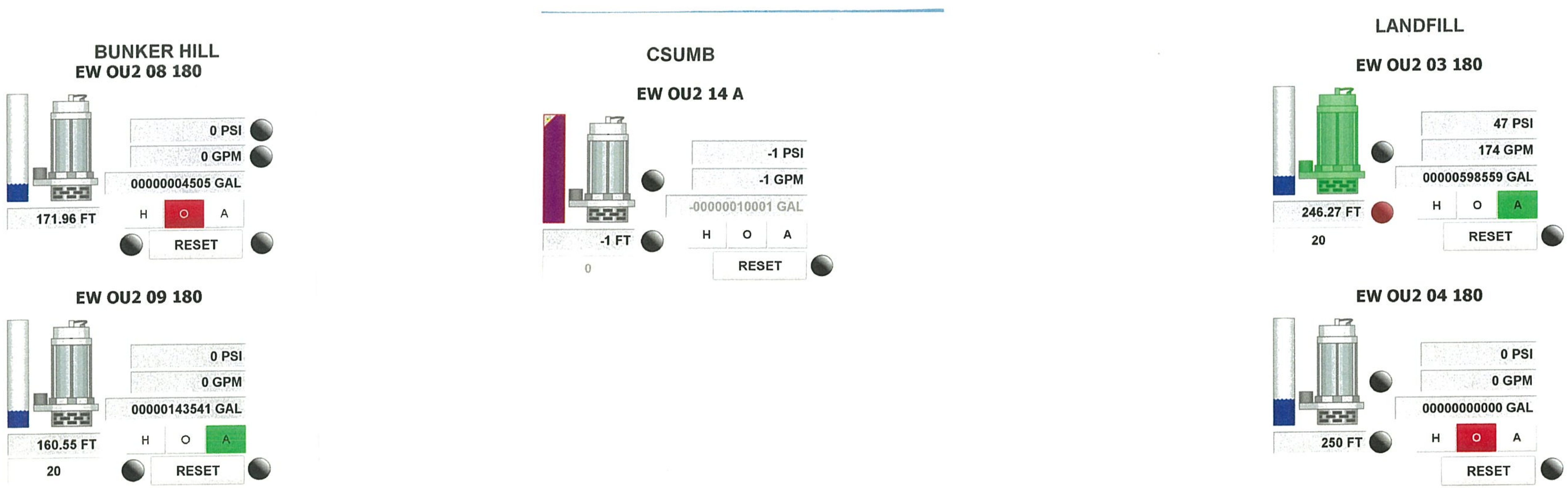
SCREEN SHOT FOR EASTERN WELL NETWORK



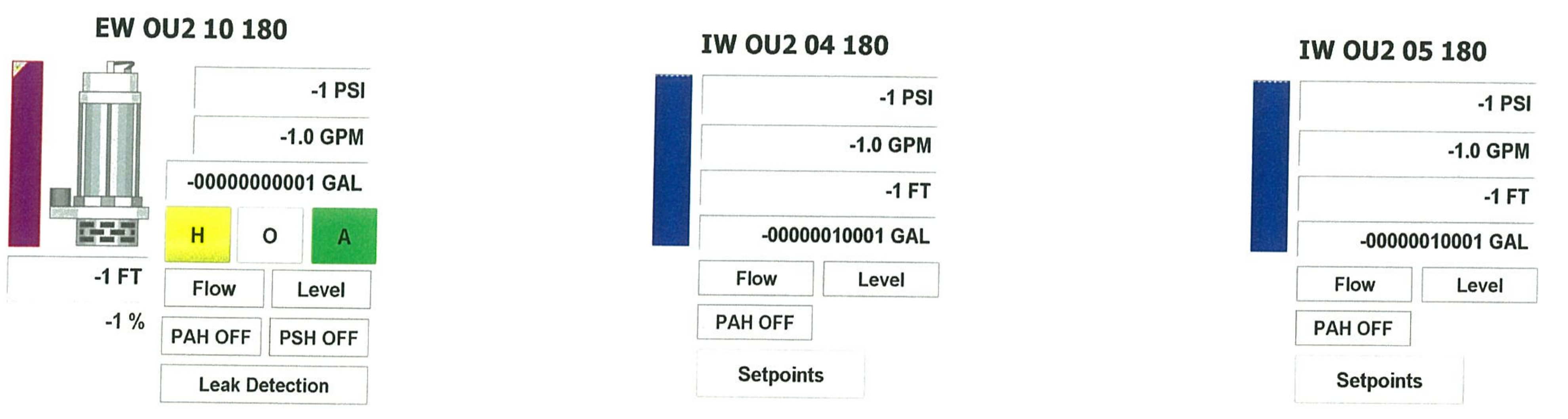
SCREEN SHOT FOR ABRAMS/IMJIN WELL NETWORK



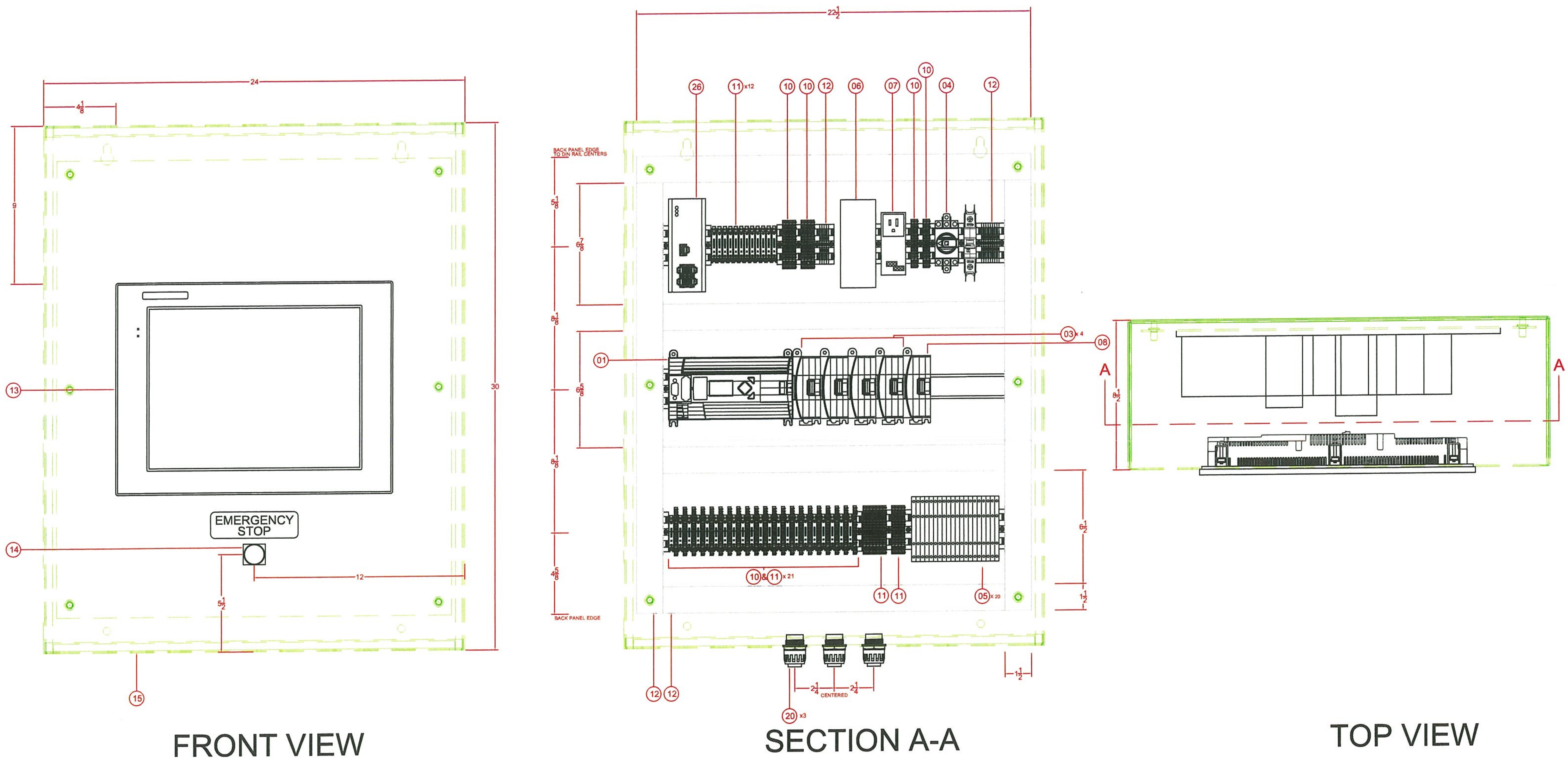
SCREEN SHOT FOR BUNKER HILL, CSUMB, AND LANDFILL WELL NETWORKS



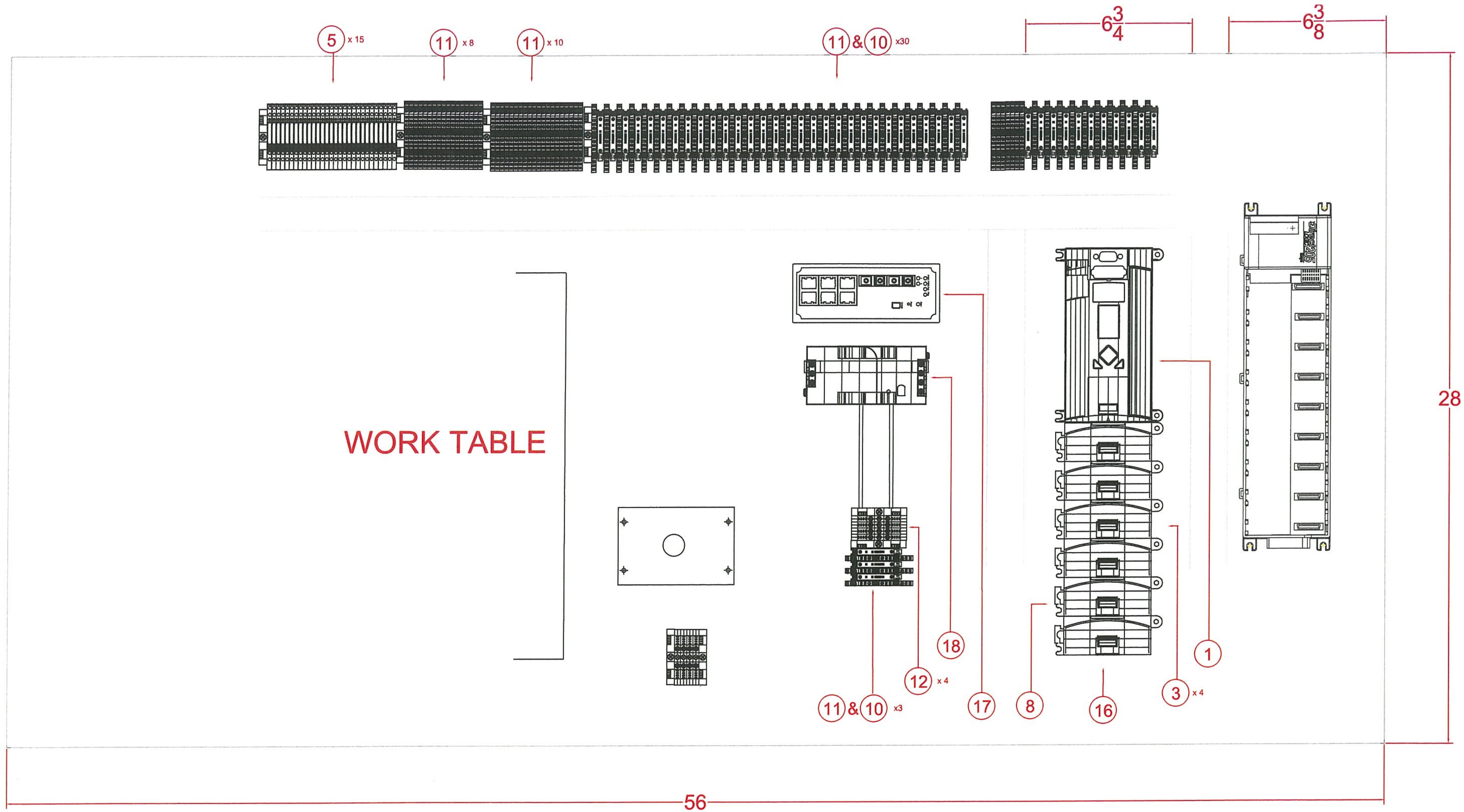
SCREEN SHOT FOR GWTP WELL NETWORK



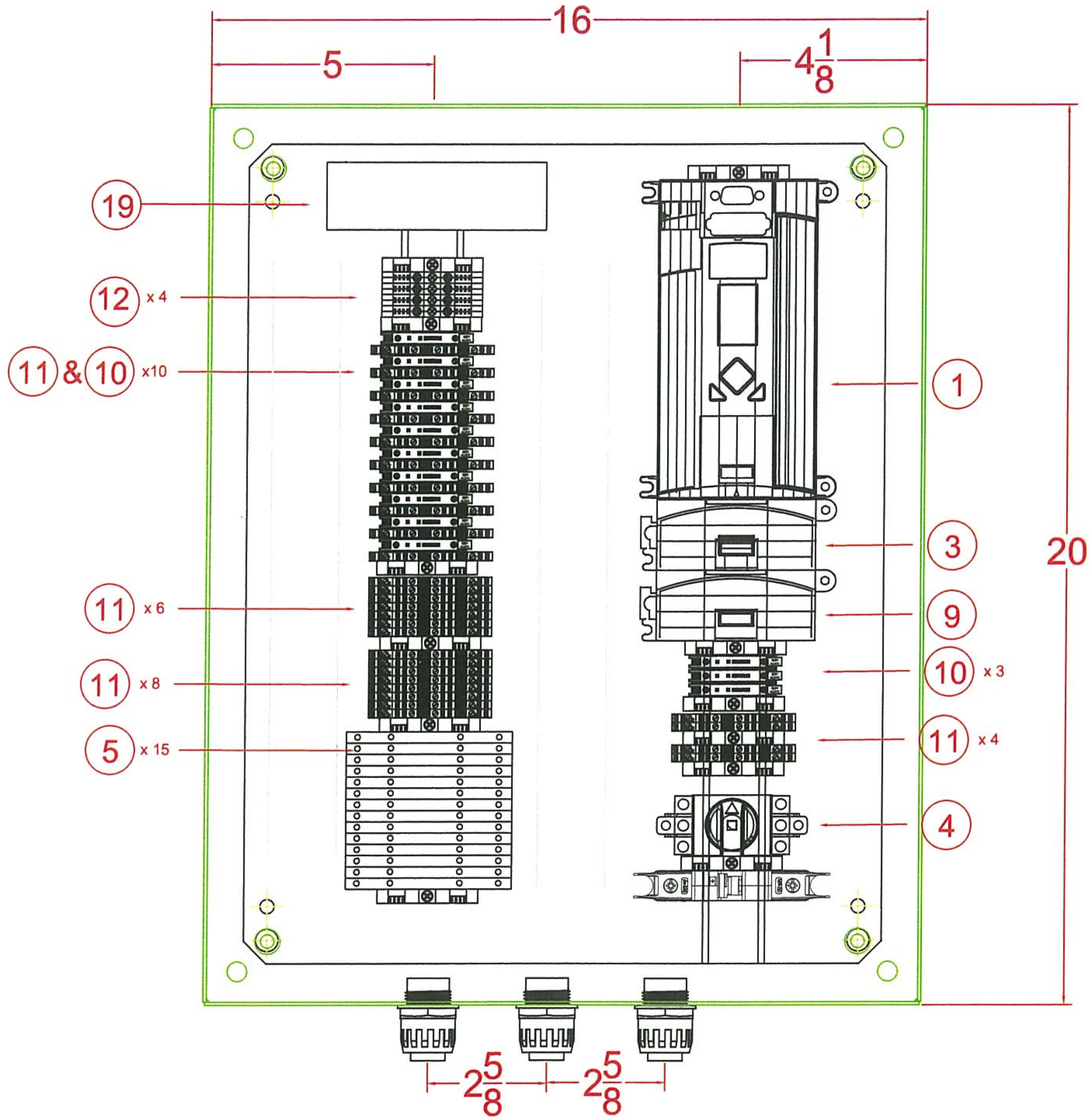
APPENDIX A
PLC LAYOUTS



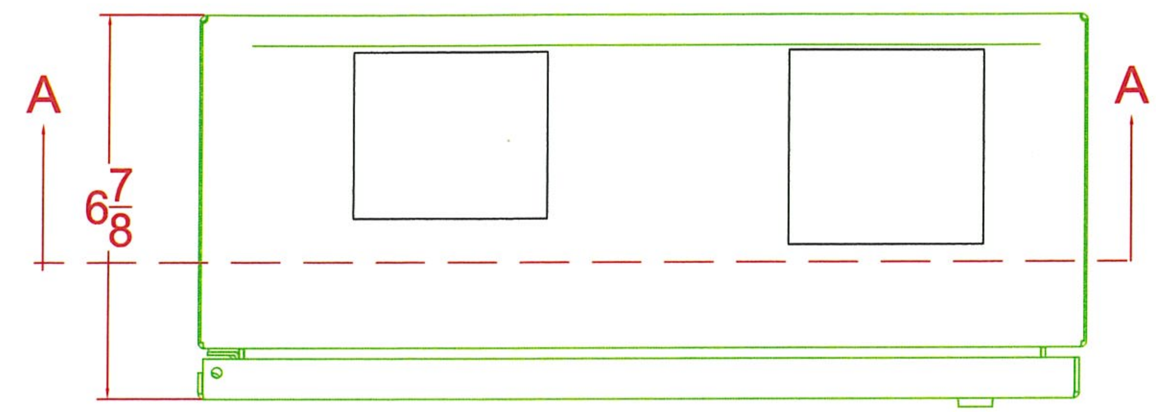
PLC LAYOUT FOR THE MAIN PLC (GWTP PROCESS)



PLC LAYOUT FOR THE ABRAMS-IMJIN WELL NETWORK



SECTION A-A

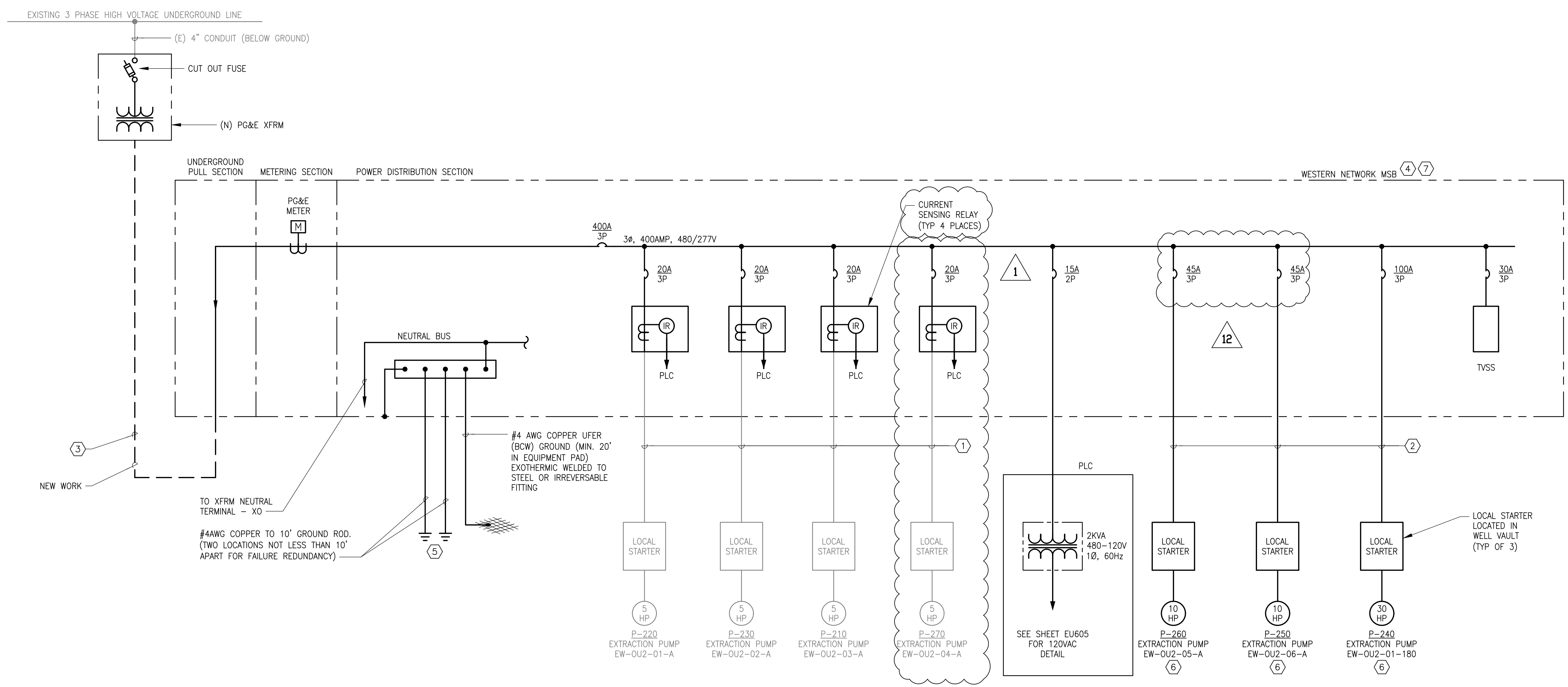


TOP VIEW

PLC LAYOUT FOR THE GWTP WELL NETWORK

Dwg ID	Device ID	Location	Description	Manufacturer/ Vendor	Part/Model #
M-100	1	GWTP-N	MicroLogix 1400 PLC w/ onboard I/O (20x24vdc in, 12x24vdc out, 4xAnalog in, 2xAnalog out)	Allen-Bradley	1766-L32BWAA
M-100	3	GWTP-N	MicroLogix Expansion I/O - 4-channel Analog Input	Allen-Bradley	1762-IF4
M-100	8	GWTP-N	MicroLogix Expansion I/O - 4-channel Analog Output	Allen-Bradley	1762-OF4
M-100	4	GWTP-N	Main Power Disconnect	Automation Direct	SD1-025-BR
M-100	5	GWTP-N	Socket, Relay; Terminal Block (6.2mm), (Input Voltage 24 VDC)	Allied Electronics	70207748
M-100	5.1	GWTP-N	Relay; E-Mech; Power; SPDT; Cur-Rtg 6A; Ctrl-V 24DC; Vol-Rtg 250AC/DC; PCB Mnt	Allied Electronics	70207754
M-100	6	GWTP-N	Power Supply; AC-DC; 24V@10A; 85-264V In; Enclosed; DIN Rail	Allied Electronics	70461226
M-100	13	GWTP-N	C-More Touch Panel (15in)	Automation Direct	EA9-T15CL
M-100	7	GWTP-N	Single-port NEMA 5-15 outlet, DIN mount	ASI-Automation	IMACP01
M-100	14	GWTP-N	Emergeny Stop Pushbutton	Automation Direct	ES-P-230001
M-100	15	GWTP-N	Wall Mount Steel Enclosure for Control Panel	Automation Direct	N412302408C
M-100		GWTP-N	Back Panel for Control Enclosure	Automation Direct	NP3024C
M-100	26	GWTP-N	8-Port Managed Ethernet Switch	Moxa	EDS-408A
M-100	11	GWTP-N	Double Level Screw-Type Terminal Blocks, DIN mount	Allied Electronics	70078326
M-100	10	GWTP-N	Fusible Terminal Blocks (30A, 20-6AWG)	Automation Direct	DN-F6
M-101	1	GWTP-N EW	MicroLogix 1400 PLC w/ onboard I/O (20x24vdc in, 12x24vdc out, 4xAnalog in, 2xAnalog out)	Allen-Bradley	1766-L32BWAA
M-101	3	GWTP-N EW	MicroLogix Expansion I/O - 4-channel Analog Input	Allen-Bradley	1762-IF4
M-101	9	GWTP-N EW	MicroLogix Expansion I/O - 4-channel Analog Input/2-channel Analog Output	Allen-Bradley	1762-IF2OF2
M-101	7	GWTP-N EW	Single-port NEMA 5-15 outlet, DIN mount	ASI-Automation	IMACP01
M-101	4	GWTP-N EW	Main Power Disconnect	Automation Direct	SD1-025-BR
M-101	19	GWTP-N EW	Power Supply; AC-DC; 24V@5A; 85-264V In; Enclosed; DIN Rail	Allied Electronics	70461225
M-101	29	GWTP-N EW	Wall Mount Steel Enclosure for GWTP-N EW Panel	Automation Direct	N412201606CLG
M-101	30	GWTP-N EW	Back Panel for Panel Enclosure	Automation Direct	NP2016C
M-101	11	GWTP-N EW	Double Level Screw-Type Terminal Blocks, DIN mount	Allen-Bradley	1492-JD3
M-101	10	GWTP-N EW	Fusible Terminal Blocks (30A, 20-6AWG)	Automation Direct	DN-F6
M-102	1	SHOPPETTE	MicroLogix 1400 PLC w/ onboard I/O (20x24vdc in, 12x24vdc out, 4xAnalog in, 2xAnalog out)	Allen-Bradley	1766-L32BWAA
M-102	3	SHOPPETTE	MicroLogix Expansion I/O - 4-channel Analog Input	Allen-Bradley	1762-IF4
M-102	8	SHOPPETTE	MicroLogix Expansion I/O - 4-channel Analog Output	Allen-Bradley	1762-OF4
M-102	16	SHOPPETTE	MicroLogix Expansion I/O - 32 channel Discrete Input	Allen-Bradley	1762-IQ32T
M-102	18	SHOPPETTE	24VDC Switched Mode Power Supply	Allen-Bradley	1606-XLS480EA
M-102	17	SHOPPETTE	Managed Ethernet switch, 8 ports, (6) RJ45 10/100 and (2) multi-mode SC 100FX fiber ports	Automation Direct	SE2-SW8M-2C1

LIST OF PLC COMPONENTS



Panel:Western Network MSB

	Enclosure Information:	**Circuit Information:**	**Main Service Information:**
	NEMA: Type 3R	Voltage: 480/277V	Conductor: Provided by PG&E
Source Information:	Mounting: Cabinet	Phase: 3	Neutral: Provided by PG&E
	Ground Bus: Yes	Hertz: 60	Ground: 1-#4 ga.
(N) T-1 XFRM 480/277V "Y" by PG&E	Neutral Bus: Yes	IAC: kA	Raceway:
	Main CB: 400A	Main Bus: 400A	

Ct#	Load Description	Load Type	Rway Size	Cdtr Size	OCPD Size	Load in VA AØ	BØ	CØ	L	Load in VA AØ	BØ	CØ	OCPD Size	Cdtr Size	Rway Size	Load Type	Load Description	Ct#
1	PLC XFRM (2k XFRM)	R	3/4"	(2) 12 ga.	15A /2	1,000			L1	2,100						M		2
3		R					1,000		L2		2,100		20A /3	(3) 8 ga.	2"	M	EW-OU2-01-A (existing 5hp motor)	4
5									L3			2,100				M		6
7		M				11,100			L1	2,100						M		8
9	EW-OU2-01-180 (30hp motor)	M	2"	(3) 6 ga.	100A /3		11,100		L2		2,100		20A /3	(3) 8 ga.	2"	M	EW-OU2-02-A (existing 5hp motor)	10
11		M		+ 10 ga G				11,100	L3			2,100				M		12
13		M				3,500			L1	2,100						M		14
15	EW-OU2-05-A (10hp motor)	M	2"	(3) 4 ga.	45A /3		3,500		L2		2,100		20A /3	(3) 8 ga.	2"	M	EW-OU2-03-A (existing 5hp motor)	16
17		M		+ 8 ga G				3,500	L3			2,100				M		18
19		M				3,500			L1	100						ME		20
21	EW-OU2-06-A (10hp motor)	M	2"	(3) 4 ga.	45A /3		3,500		L2		100		30A /3	(3) 10 ga.	1"	ME	TVSS	22
23		M		+ 8 ga G				3,500	L3			100		+ 10 ga G		ME		24
25									L1									26
27									L2									28
29									L3									30
31									L1									32
33									L2									34
35									L3									36
37									L1									38
39									L2									40
41									L3									42
	Phase Totals:					19,100	19,100	18,100		6,400	6400	6,400					Phase Totals:	

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Load Balance			Total Connected Load
Phase A:	Phase B:	Phase C:	VA
33.8%	33.8%	32.5%	75,500
Amps:	**Demand+Spare (85% pf) Watts**		**Demand + Spare @ 25% VA**
107.3	**89,064**		**104,781**

Load Type	Connected Load	Demand Factor	Demand Load
Lighting (L)		1.25	
Receptacles		1.0	0
Motors(M)+Largest	73,200	1.0 + 1.25	81,525
HVAC (H)		1.25	
Misc. Equipmt (ME)	2,300	1.0	2300
	Demand VA		83825

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KEYED NOTES

1. LOCATE AND RE-ROUTE (E) FEEDER CONDUITS/CONDUCTORS TO (N) MSB.
2. (N) CONDUCTORS IN (E) CONDUIT, VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.
3. CONTRACTOR SHALL PROVIDE AND INSTALL (2) 5" PVC CONDUITS PER PG&E SPECIFICATIONS. SERVICE CONDUCTORS SHALL BE INSTALLED, TERMINATED, AND CONNECTED BY PG&E.
4. FOR ARC FLASH LABEL, SEE DETAIL 6, E-503.
5. FOR ADDITIONAL GROUNDING INFORMATION SEE DETAILS 1 THROUGH 10 ON E-502.
6. EXTRACTION PUMP SHALL BE FITTED WITH A TEMPERATURE SENSOR, RUN SENSOR WIRES FROM LOCAL STARTER BOX TO VAULT LOW-VOLTAGE CONTROL ENCLOSURE AND WIRE TO MOTOR PROTECTION UNIT THAT IS ALSO INSTALLED IN ENCLOSURE, REFER TO PUMP MANUFACTURER INSTALLATION INSTRUCTIONS.
7. COORDINATE PG&E XFRM SIZE AND VERIFY MSB IAC RATING PRIOR TO ORDERING EQUIPMENT.

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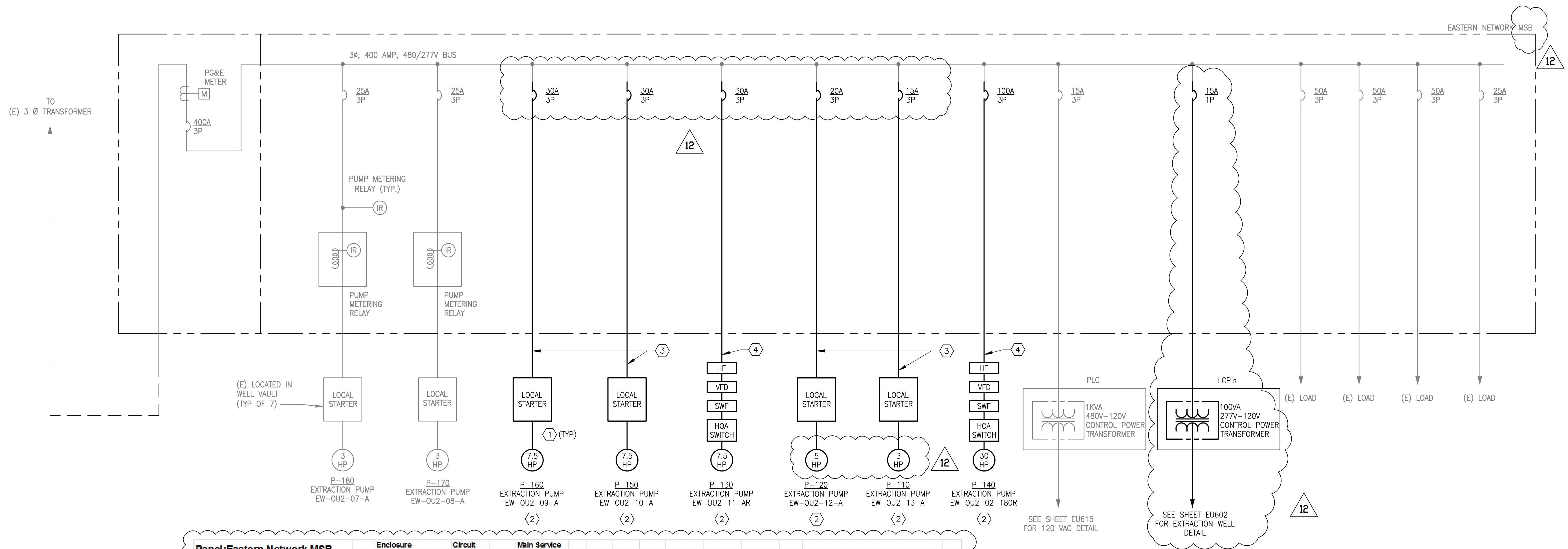

Panel:Eastern Network MSB

	Enclosure Information:	**Circuit Information:**	**Main Service Information:**
	NEMA: Type 3R	Voltage: 480/277V	Conductor: 3-600kcmil
Source Information:	Mounting: Surface	Phase: 3	Neutral: 1-600kcmil
	Ground Bus:	Hertz: 60	Ground: 1-#3 ga.
(E) 480V Electrical Cabinet (NEMA 3R cabinet)	Neutral Bus:	IAC: kA	Raceway:
(E) T-1 XFRM 480/277V "Y"	Main CB: 400A	Main Bus: 400A	

Ct#	Load Description	Load Type	Rway Size	Cdtr Size	OCPD Size	Load in VA AØ	BØ	CØ	L	Load in VA AØ	BØ	CØ	OCPD Size	Cdtr Size	Rway Size	Load Type	Load Description	Ct#
1		M				2,900			L1	1,350						M		2
3	EW-OU2-09-A (7.5hp motor)	M	2"	(3) 8 ga.	30A /3		2,900		L2		1,350		25A /3			M	Existing 3hp motor)	4
5		M		+10 ga G				2,900	L3			1,350				M		6
7		M				1,350			L1	2,100						M		8
9	EW-OU2-08-A (existing 3hp motor)	M	2"	(3) 6 ga.	25A /3		1,350		L2		2,100		20A /3	(3) 4 ga.	2"	M	EW-OU2-12-A (5hp motor)	10
11		M						1,350	L3			2,100		+8 ga G		M		12
13		M				1,350			L1	2,900						M		14
15	EW-OU2-07-A (existing 3hp motor)	M	2"	(3) 4 ga.	25A /3		1,350		L2		2,900		30A /3	(3) 6 ga.	2"	M	EW-OU2-11-AR (7.5hp motor)	16
17		M						1,350	L3			2,900		+10 ga G		M		18
19									L1	2,900						M		20
21	MAIN								L2		2,900		30A /3	(3) 8 ga.	2"	M	EW-OU2-10-A (7.5hp motor)	22
23	MAIN								L3			2,900		+10 ga G		M		24
25	MAIN				400A /3				L1	1,000						ME		26
27	MAIN								L2		1,000		15A /3	(3) 12 ga.	3/4"	ME	PLC XFRM (2k XFRM)	28
29	MAIN								L3			1,000				ME		30
31									L1	6,000						M		32
33									L2		6,000		50A /3			M	EXISTING LOAD	34
35									L3			6,000				M		36
37									L1	1,600						M		38
39									L2		1,600		15A /3	(3) 4 ga.	2"	M	EW-OU2-13-A (3hp motor)	40
41									L3			1,600		+8 ga G		M		42
43		M				6,000			L1	11,100						M		44
45	EXISTING LOAD	M			50A /3		6,000		L2		11,100		100A /3	(3) 3 ga.	2"	M	EW-OU2-02-180R (30hp motor)	46
47		M						6,000	L3			11,100		+8 ga G		M		48
49		M				6,000			L1									50
51	EXISTING LOAD	M			50A /3		6,000		L2									52
53		M						6,000	L3									54
55	LCP CONTROL XFRMS	ME	2"	(2) 10 ga.	15A /1	200			L1									56
57									L2									58
59									L3									60
61									L1									62
63									L2									64
65									L3									66
67									L1									68
69									L2									70
71									L3									72
	Phase Totals:					17,800	17,600	17,600		28,950	28,950	28,950					Phase Totals:	

Load Balance Phase A:	Phase B:	Phase C:	Total Connected Load VA
33.4%	33.3%	33.3%	139,850
Amps:	**Demand+Spare (85% pf) Watts**		**Demand + Spare @ 25% VA**
189.6	**157,436**		**185,219**

Load Type	Connected Load	Demand Factor	Demand Load
Lighting (L)		1.25	
Receptacles		1.0	0
Motors(M)+Largest	136,650	1.0 + 1.25	144,975
HVAC (H)		1.25	
Misc. Equipmt (ME)	3,200	1.0	3200
	Demand VA		148175

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KEY NOTE:

1. REPLACE (E) STARTER. SIZE PER PUMP MANUFACTURER.
2. EXTRACTION PUMP SHALL BE FITTED WITH TEMPERATURE SENSOR, RUN SENSOR WIRES FROM LOCAL STARTER/HOA SWITCH BOX TO VAULT LOW-VOLTAGE CONTROL ENCLOSURE AND WIRE TO MOTOR PROTECTION UNIT THAT IS ALSO INSTALLED IN ENCLOSURE, REFER TO PUMP MANUFACTURER INSTALLATION INSTRUCTIONS.
3. (N) CONDUCTORS IN (E) CONDUIT, VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.
4. VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.

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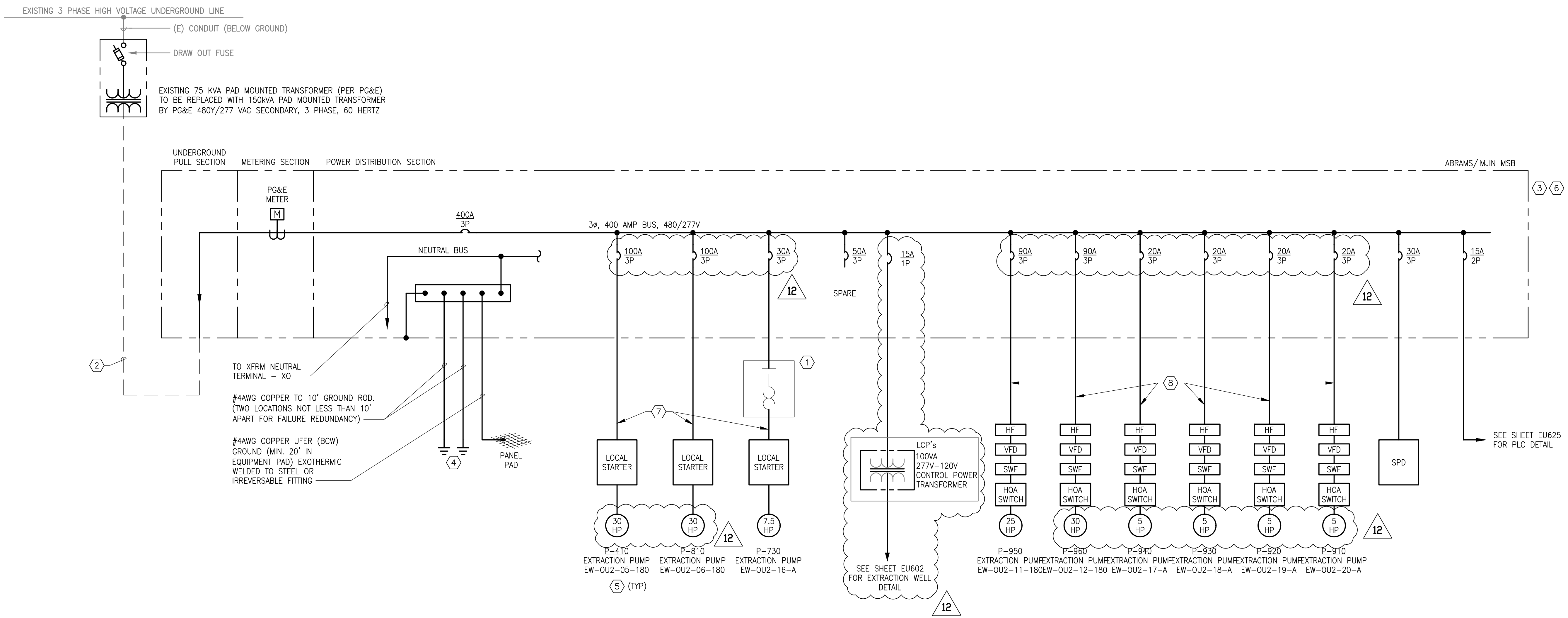

Panel:Abrams/Imjin MSB

Source Information:	Enclosure Information:	Circuit Information:	Main Service Information:
(N) 480V Electrical Cabinet (NEMA 3R cabinet)	NEMA: Type 3R	Voltage: 480/277V	Conductor: 3-600kcmil
(N) XFRM 480/277V "Y"	Mounting: Surface	Phase: 3	Neutral: 1-600kcmil
	Ground Bus: Yes	Hertz: 60	Ground: 1-#3 ga.
	Neutral Bus: Yes	IAC: kA	Raceway:
	Main CB: 400A	Main Bus: 400A	

Ct#	Load Description	Load Type	Rway Size	Cdtr Size	OCPD Size	Load in VA AØ	BØ	CØ	L	Load in VA AØ	BØ	CØ	OCPD Size	Cdtr Size	Rway Size	Load Type	Load Description	Ct#
1	PLC XFRM (2k XFRM)	ME		(3) 10 ga.	15A /2	1,000			L1	2,100						M		2
3		ME		+12 ga G			1,000		L2		2,100		20A /3	(3) 2 ga.	2"	M	EW-OU2-18-A (5hp motor)	4
5									L3			2,100		+8 ga G		M		6
7		M				11,100			L1	2,100						M		8
9	EW-OU2-05-180 (30hp motor)	M	2"	(3) 4 ga.	100A /3		11,100		L2		2,100		20A /3	(3) 4 ga.	2"	M	EW-OU2-19-A (5hp motor)	10
11		M		+8 ga G				11,100	L3			2,100		+10 ga G		M		12
13		M				11,100			L1	2,100						M		14
15	EW-OU2-06-180 (30hp motor)	M	2"	(3) 6 ga.	100A /3		11,100		L2		2,100		20A /3	(3) 6 ga.	2"	M	EW-OU2-20-A (5hp motor)	16
17		M		+10 ga G				11,100	L3			2,100		+10 ga G		M		18
19		M							L1	2,900						M		20
21	SPARE	M			50A /3				L2		2,900		30A /3	(3) 10 ga.	2"	M	EW-OU2-16-A (7.5hp motor)	22
23		M							L3			2,900		+10 ga G		M		24
25		M				9,500			L1	100						ME		26
27	EW-OU2-11-180 (25hp motor)	M	2"	(3) 1 ga.	90A /3		9,500		L2		100		30A/3	(3) 10 ga.	1"	ME	TVSS	28
29		M		+8 ga G				9,500	L3			~~100~~		~~+10 ga G~~		~~ME~~		30
31		M				11,100			L1	600			15A/1	(2) 10 ga.	2"	ME	LCP CONTROL XFRMS	32
33	EW-OU2-12-180 (30hp motor)	M	2"	(3) 2/0 ga.	90A /3		11,100		L2									34
35		M		+6 ga G				11,100	L3									36
37		M				2,100			L1									38
39	EW-OU2-17-A (5hp motor)	M	2"	(3) 4 ga.	20A /3		2,100		L2									40
41		M		+10 ga G				2,100	L3									42
	Phase Totals:					45,900	45,900	44,900		9,900	9,300	9,300					Phase Totals:	

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Load Balance Phase A:	Phase B:	Phase C:	Total Connected Load VA
33.8%	33.4%	32.8%	165,200
Amps:	**Demand+Spare (85% pf) Watts**		**Demand + Spare @ 25% VA**
210.9	**175,127**		**206,031**

Load Type	Connected Load	Demand Factor	Demand Load
Lighting (L)		1.25	
Receptacles		1.0	0
Motors(M)+Largest	153,600	1.0 + 1.25	161,925
HVAC (H)		1.25	
Misc. Equipmt (ME)	2,900	1.0	2,900
	Demand VA		164,825

KEYED NOTES

1. (E) MOTOR STARTER TO REMAIN IN (E) PLC CABINET, FIELD VERIFY IF COMPATIBLE WITH (N) PUMP, EXTEND (N) FEEDER FROM (N) DISTRIBUTION PANEL AND CONNECT, IF NOT COMPATIBLE, REMOVE FROM CIRCUIT AND BYPASS FEEDERS TO STARTER.
2. CONTRACTOR SHALL PROVIDE AND INSTALL (2) 5" PVC CONDUITS PER PG&E SPECIFICATIONS. SERVICE CONDUCTORS SHALL BE INSTALLED TERMINATED, AND CONNECTED BY PG&E.
3. FOR ARC FLASH LABEL, SEE DETAIL 6, E–503.
4. FOR ADDITIONAL GROUNDING INFORMATION SEE DETAILS 1 THRU 10 ON E–502.
5. EXTRACTION PUMP SHALL BE FITTED WITH TEMPERATURE SENSOR, RUN SENSOR WIRES FROM LOCAL STARTER/HOA SWITCH BOX TO VAULT LOW–VOLTAGE CONTROL ENCLOSURE AND WIRE TO MOTOR PROTECTION UNIT THAT IS ALSO INSTALLED IN ENCLOSURE, REFER TO PUMP MANUFACTURER INSTALLATION INSTRUCTIONS.
6. COORDINATE PG&E XFRM SIZE AND VERIFY MSB IAC RATING PRIOR TO ORDERING EQUIPMENT.
7. (N) CONDUCTORS IN (E) CONDUIT, VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.
8. VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.

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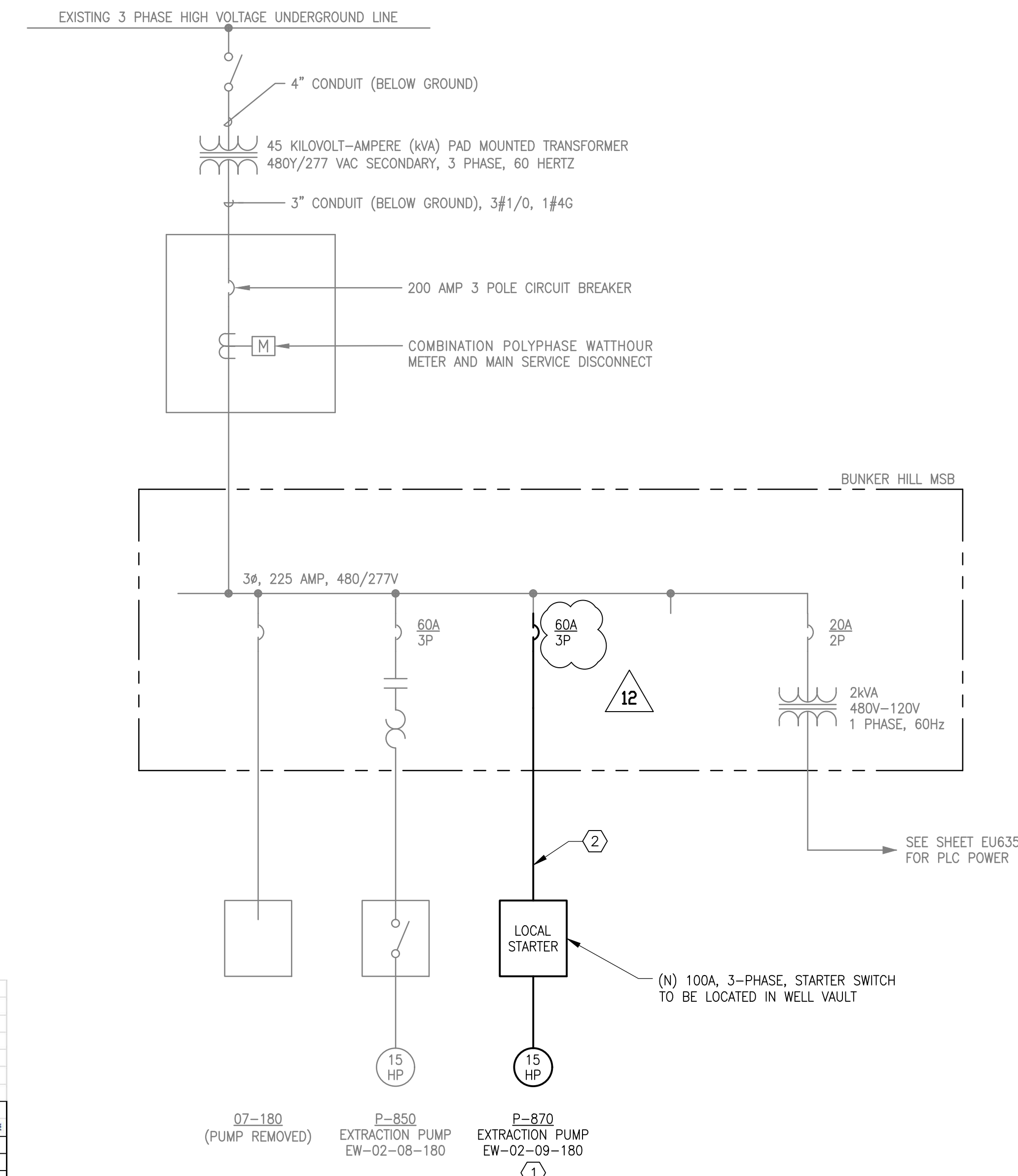

Panel: Bunker Hill PLC

Source Information:	Enclosure Information:	Circuit Information:	Main Service Information:
(E) 480V PLC Electrical Cabinet (NEMA 4X cabinet)	NEMA: Type 1	Voltage: 480/277V	Conductor: 3-4/0 ga.
(E) 45kVA XFRM 480/277V "Y"	Mounting: Surface	Phase: 3	Neutral: 1-4/0 ga.
	Ground Bus:	Hertz: 60	Ground: 1-#6 ga.
	Neutral Bus:	IAC: 14kA	Raceway:
	Main CB: 200A	Main Bus: 225A	

Ct#	Load Description	Load Type	Rway Size	Cdtr Size	OCPD Size	Load in VA AØ	BØ	CØ	L	Load in VA AØ	BØ	CØ	OCPD Size	Cdtr Size	Rway Size	Load Type	Load Description	Ct#
1									L1	5,800						M		2
3									L2		5,800		50A /3	(3) 6 ga.	2"	M	EW-OU2-08-180 (15hp motor)	4
5									L3			5,800				M		6
7									L1									8
9									L2									10
11									L3									12
13									L1	5,800						M		14
15	PLC XFRM (2k XFRM)	ME	3/4"	(2) 12 ga.	20A /2		1,000		L2		5,800		60A /3	(3) 2 ga.	2"	M	EW-OU2-09-180 (15hp motor)	16
17		ME						1000	L3			5,800		+6 ga G		M		18
	Phase Totals:					0	1,000	1,000		11,600	11600	11,600					Phase Totals:	

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Load Balance			Total Connected Load
Phase A:	Phase B:	Phase C:	VA
31.5%	34.2%	34.2%	36,800
Amps:	**Demand+Spare (85% pf) Watts**		**Demand + Spare @ 25% VA**
52.7	**43,722**		**51,438**

Load Type	Connected Load	Demand Factor	Demand Load
Lighting (L)		1.25	
Receptacles		1.0	
Motors(M)+Largest	34,800	1.0 + 1.25	39,150
HVAC (H)		1.25	
Misc. Equipmt	2,000	1.0	2000
	Demand VA		41150

KEYED NOTES

1. EXTRACTION PUMP SHALL BE FITTED WITH A TEMPERATURE SENSOR, RUN SENSOR WIRES FROM LOCAL STARTER BOX TO VAULT LOW-VOLTAGE CONTROL ENCLOSURE AND WIRE TO MOTOR PROTECTION UNIT THAT IS ALSO INSTALLED IN ENCLOSURE, REFER TO PUMP MANUFACTURER INSTALLATION INSTRUCTIONS.
2. (N) CONDUCTORS IN (E) CONDUIT, VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.

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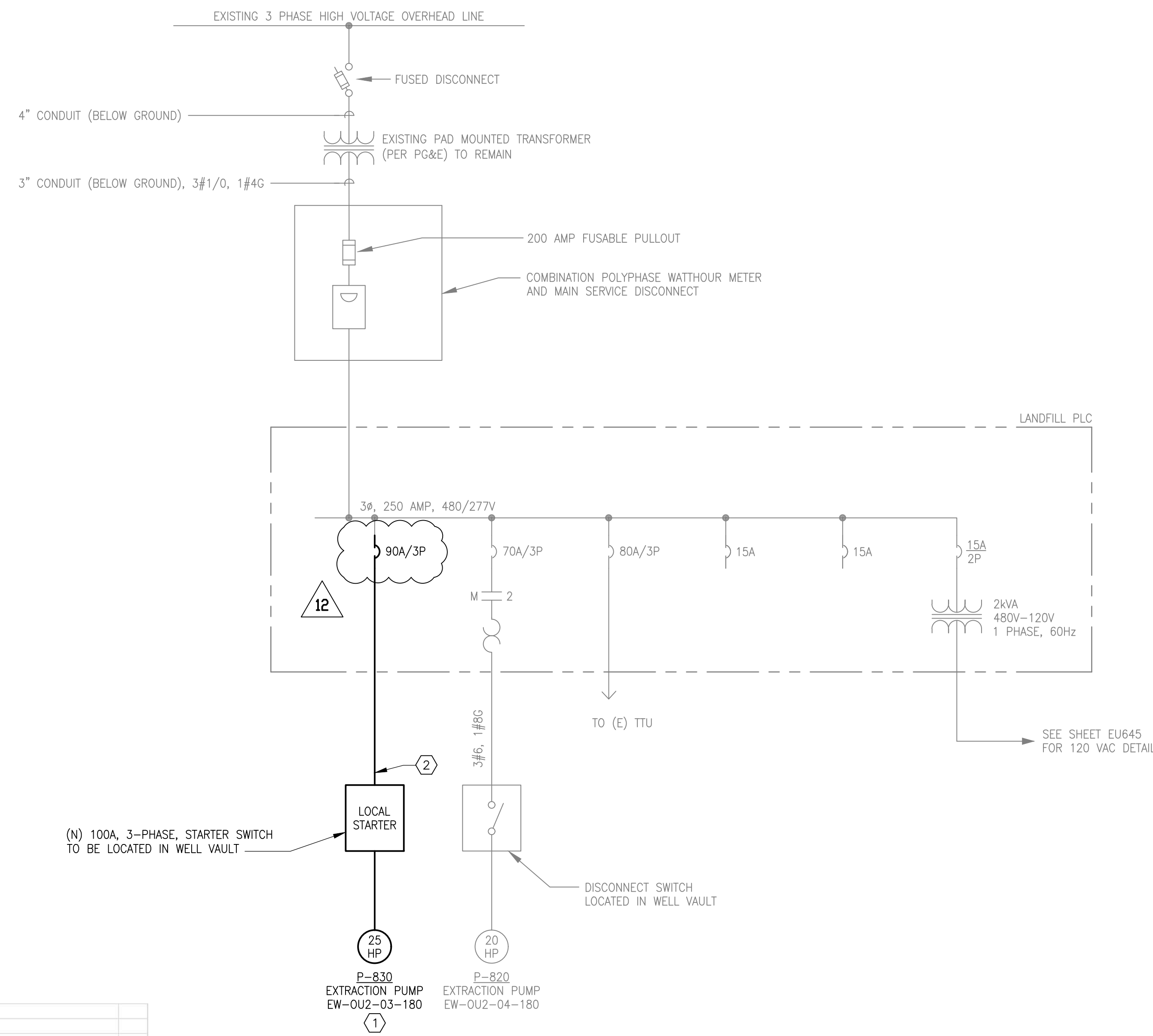


Panel: Landfill PLC

Enclosure Information:	**Circuit Information:**	**Main Service Information:**
NEMA: Type 1	Voltage: 480/277V	Conductor: 3-600 kcmil
Mounting: Surface	Phase: 3	Neutral: 1-600kcmil
Ground Bus:	Hertz: 60	Ground: 1-#3 ga.
Neutral Bus:	IAC: kA	Raceway:
Main CB: 400A	Main Bus: 400A	

Source Information:
(E) 480V PLC Electrical Cabinet (NEMA 4X cabinet)
(N) 112.5kVA XFRM 480/277V "Y"

Ct#	Load Description	Load Type	Rway Size	Cdtr Size	OCPD Size	Load in VA AØ	BØ	CØ	L	Load in VA AØ	BØ	CØ	OCPD Size	Cdtr Size	Rway Size	Load Type	Load Description	Ct#
1	PLC XFRM (2k XFRM)	R	3/4"	(2) 12 ga.	15A /2	1,000			L1	9,500						M		2
3		R					1,000		L2		9,500		90A /3	(3) 6 ga.	2"	M	EW-OU2-03-180 (25hp motor)	4
5									L3			9,500		+ 10 ga G		M		6
7		M				7,500			L1	14,400						ME		8
9	EW-OU2-04-180 (20hp motor)	M	2"	(3) 6 ga.	70A /3		7,500		L2		14,400		80A/3			ME	TTU (existing)	10
11		M						7500	L3			14400				ME		12
13									L1									14
15									L2									16
17									L3									18
	Phase Totals:					8,500	8,500	7,500		23,900	23900	23,900					Phase Totals:	

Load Balance Phase A:	Phase B:	Phase C:	Total Connected Load VA
33.7%	33.7%	32.6%	96,200
Amps:	**Demand+Spare (85% pf) Watts**		**Demand + Spare @ 25% VA**
132.2	**109,783**		**129,156**

Load Type	Connected Load	Demand Factor	Demand Load
Lighting (L)		1.25	
Receptacles	2,000	1.0	2,000
Motors(M)+Largest	51,000	1.0 + 1.25	58,125
HVAC (H)		1.25	
Misc. Equipmt (ME)	43,200	1.0	43200
	Demand VA		103325

12

KEYED NOTES

1. EXTRACTION PUMP SHALL BE FITTED WITH TEMPERATURE SENSOR, RUN SENSOR WIRES FROM LOCAL STARTER/HOA SWITCH BOX TO VAULT LOW-VOLTAGE CONTROL ENCLOSURE AND WIRE TO MOTOR PROTECTION UNIT THAT IS ALSO INSTALLED IN ENCLOSURE, REFER TO PUMP MANUFACTURER INSTALLATION INSTRUCTIONS.
2. (N) CONDUCTORS IN (E) CONDUIT, VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.

US Army Corps of Engineers
Sacramento District

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY

Symbol	Description	Date	Approved
1	RFC SUBMITTAL	9/02/2016	
	REFER to DRAWING SHEET G-001 FOR REVISIONS LIST	4/18/2017	

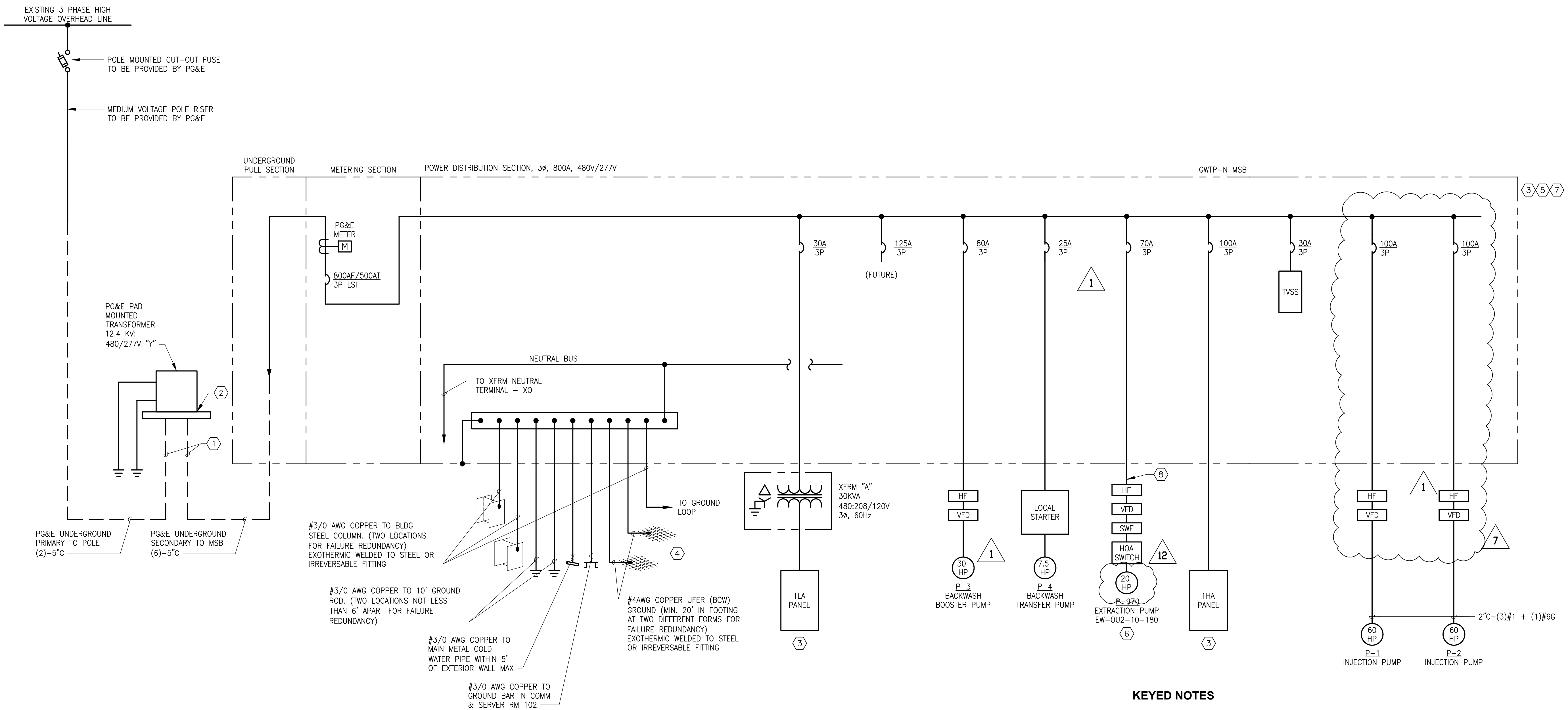
Date: SEPTEMBER 2015
Rev.
Design file no: XXX-XX-XXX
Submittal Status:
File name: NAME.DWG
Plot date: XX/XX/XX
Dwg scale: AS_NOTED
Designed by:
Dwn by:
Spec No.:
Reviewed by:
Submitted by: /s/ Section Chief

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

X_JOINT-LOGO.jpg
RORE Innovative Solutions JV
5151 Shoreham Place
Suite 260
San Diego, California 92122

FORMER FORT ORD CALIFORNIA
D-B GWTP RELOCATION AND SYSTEM IMPROVEMENTS
LANDFILL AREA
ONE-LINE DIAGRAM AND PANEL SCHEDULE

Sheet reference number:
EU641



GWTP-N MSB

KEYED NOTES

1. CONTRACTOR SHALL PROVIDE AND INSTALL CONDUITS PER PG&E SPECIFICATION. SERVICE CONDUCTORS SHALI BE INSTALLED, TERMINATED, AND CONNECTED BY PG&E.
2. CONTRACTOR SHALL INSTALL XFRM PAD, PG&E SHALL INSTALL XFRM.
3. FOR ARC FLASH LABEL, SEE DETAIL 6, E-503.
4. FOR ADDITIONAL GROUNDING INFORMATION SEE DETAILS 1 THRU 10 ON E-502.
5. SEE MAIN SERVICE BOARD ELEVATION ON EU652 FOR ADDITIONAL INFORMATION.
6. EXTRACTION PUMP SHALL BE FITTED WITH TEMPERATURE SENSOR, RUN SENSOR WIRES FROM LOCAL STARTER/HOA SWITCH BOX TO VAULT LOW-VOLTAGE CONTROL ENCLOSURE AND WIRE TO MOTOR PROTECTION UNIT THAT IS ALSO INSTALLED IN ENCLOSURE, REFER TO PUMP MANUFACTURER INSTALLATION INSTRUCTIONS.
7. COORDINATE PG&E XFRM SIZE AND VERIFY MSB IAC RATING PRIOR TO ORDERING EQUIPMENT.
8. VERIFY EXTRACTION PUMP HP & WIRING PRIOR TO INSTALLING (N) CONDUCTORS.

US Army Corps of Engineers Sacramento District

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY

Symbol	Description	Date	Approved
	RFC SUBMITTAL	9/02/2016	
	REFER to DRAWING SHEET G-001 FOR REVISIONS LIST	4/18/2017	

Designed by: | Dwn by: | Reviewed by: | Submitted by: /s/ Section Chief
Date: SEPTEMBER 2015 | Design file no: XXX-XX-XXX | Submittal Status: | File name: NAME.DWG | Plot date: XX/XX/XX | Dwg scale: AS_NOTED

DEPARTMENT OF THE ARMY CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
BORE Innovative Solutions JV 5151 Shoreham Place Suite 260 San Diego, California 92122

FORMER FORT ORD CALIFORNIA
D-B GWTP RELOCATION AND SYSTEM IMPROVEMENTS
GWTP-N MSB ONE-LINE DIAGRAM

Sheet reference number: EU651

APPENDIX B

Responses to Comments on the Draft Report submitted by the United States Environmental Protection Agency Region IX

Responses to Comments submitted by the United States Environmental Protection Agency Region IX[1]

GENERAL COMMENT 1: The Draft Operable Unit 2 Groundwater Treatment System Evaluation and Optimization Report, Former Fort Ord, California, dated June 2021 (the Draft Report) does not include potentiometric surface maps prepared with groundwater elevation data collected from A-Aquifer and Upper 180-Foot Aquifer. As such, the assertions made in the Draft Report regarding groundwater flow direction and capture zones for the extraction well (EW) networks are unsupported. For example, the following statements could not be adequately assessed and/or confirmed due to the lack of potentiometric surface maps:

- The radial flow in the A-Aquifer from the south to the north with deviation to the west and east along a northeast-trending groundwater divide;
- Groundwater west of the A-Aquifer divide flow toward the western edge of the Fort Ord-Salinas Valley Aquitard (FO-SVA) where it enters the unconfined portion of the Upper 180-Foot Aquifer;
- Groundwater flowing east of the A-Aquifer divide eventually discharges to the Salinas River;
- The northeast-trending groundwater divide described for the Upper 180-Foot Aquifer;
- The capture zones and backward-tracking particle pathlines emanating from the A-Aquifer EWs;
- The capture zones and backward-tracking particle pathlines emanating from the Upper 180-Foot Aquifer EWs;
- The impacts to the water table elevations and the potential for mounding in the A-Aquifer and/or the Upper180-Foot Aquifer due to injection of treated groundwater into the Upper 180-Foot Aquifer;
- That groundwater in the unconfined Upper 180-Foot Aquifer west of the divide flows west and discharges to the Monterey Bay; and
- That groundwater in the unconfined Upper 180-Foot Aquifer east of the divide flows under the FO-SVA (becoming confined) toward the Salinas Valley.

Please revise the Draft Report to include potentiometric surface maps prepared with groundwater elevation data collected from wells installed in the A-Aquifer and Upper 180-Foot Aquifer to support the assertions regarding groundwater flow directions and plume containment.

RESPONSE TO GENERAL COMMENT 1: *The text was revised to incorporate potentiometric surface maps by reference to the* Operable Unit 2 Annual Report Volume II, Fourth Quarter 2018 through Third Quarter 2019 Groundwater Monitoring and Treatment Systems Operations and Maintenance, Former Fort Ord, California *(Ahtna, 2020c; Administrative Record No. OU2-724B).*

GENERAL COMMENT 2: The Draft Report does not present chemical time-series trend plots as lines of evidence or include a series of iso-concentration plume maps for contaminants identified in the A-Aquifer and Upper 180-Foot to support the effectiveness of the OU 2 groundwater remedy. As such, the text in Section 5.1 (Groundwater) regarding the long-term reduction of the trichloroethene (TCE) plume footprint in the A-Aquifer and in the Upper 180-Foot Aquifer that indicates the current extraction well

[1] In a letter dated July 14, 2021 (Administrative Record No. OU2-728.5). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.

(EW) configuration has effectively removed TCE mass from these aquifers could not be adequately assessed. Please revise the Draft Report to include time-series trend graphs and iso-concentration contamination plume maps as additional lines of evidence to support the assertion that OU 2 remedy is performing as asserted in the text regarding plume containment and attainment of aquifer cleanup levels (ACLs).

RESPONSE TO GENERAL COMMENT 2: *The text was revised to incorporate chemical time-series trend plots and iso-concentration plume maps by reference to the* Operable Unit 2 Annual Report Volume II, Fourth Quarter 2018 through Third Quarter 2019 Groundwater Monitoring and Treatment Systems Operations and Maintenance, Former Fort Ord, California *(Ahtna, 2020c; Administrative Record No. OU2-724B). The effectiveness of the Operable Unit 2 (OU2) groundwater remedy for the A-Aquifer and the Upper 180-Foot Aquifer is also demonstrated in Figure 14 and Figure 16, respectively.*

SPECIFIC COMMENT 1: Section 2.3, Groundwater Treatment Plant, Page 8: The first sentence of the second complete paragraph states, "Treated water from the GAC system is conveyed to an HDPE effluent tank (Figures 7 and 8);" however, the effluent tank is not shown on Figure 7 (Groundwater Treatment Plant Site Plan). The third paragraph also references Figures 7 and 8 (OU2 New GWTO Layout) as depicting the effluent pumps, but Figure 7 does not present this information. Please revise the text to cite the second figure that includes the effluent tank and effluent pumps.

RESPONSE TO SPECIFIC COMMENT 1: *Based on comments from the California Department of Toxic Substances Control (see Appendix C), one figure was added and figures were reordered and renumbered. As a result, the text in Section 2.3 was corrected to reference Figure 7 (OU2 Groundwater Treatment Plant Schematic) and Figure 9 (OU2 New Groundwater Treatment Plant Layout).*

SPECIFIC COMMENT 2: Section 4.1, Groundwater Extraction Performance, Page 18: The first bullet indicates EW-OU2-01-180 is not operable due to a failed well screen; however, there is no commitment to rehabilitate this well. Please revise the text to state whether EW-OU2-01-180 will be rehabilitated and/or what corrective actions will be implemented to ensure the EW is operable.

RESPONSE TO SPECIFIC COMMENT 2: *Section 4.1 was revised to state that there are no plans to rehabilitate or replace extraction well EW-OU1-01-180. Chemical of concern (COC) concentrations have been below ACLs at this extraction well since 2018, and there is no evidence operation of this well would enhance COC plume capture or COC mass removal.*

SPECIFIC COMMENT 3: Section 4.2.1, Liquid Phase GAC System, Pages 19-20: The text does not clearly state the vinyl chloride concentration level that would need to be exceeded in the groundwater treatment plant (GWTP) influent before an expansion of the GWTP with additional treatment technologies (e.g., an air stripper or ultraviolet light/oxidation) is necessary. The meaning of "significant" concentrations is unclear. Please revise the text to state the concentration level of vinyl chloride detected in GWTP influent that would trigger expansion of the GWTP with additional treatment technologies.

RESPONSE TO SPECIFIC COMMENT 3: *As stated in Section 4.2.1, vinyl chloride has not been detected at the GWTP influent to date and it is not expected to be detected in the future based on current concentration trends. Hence, the concentration level of vinyl chloride detected in the GWTP influent that* *would trigger expansion of the GWTP with additional treatment technologies does not need to be determined at this time. Should vinyl chloride be detected at the GWTP influent in the future, the concentration that would trigger expansion of the GWTP with additional treatment will be determined based on a cost-benefit analysis that will consider proposed treatment technologies and the frequency of granular activated carbon (GAC) change-outs necessary to meet discharge limits.*

SPECIFIC COMMENT 4: Section 5.1, Groundwater, Page 24 and Section 6.1, Groundwater Extraction System, Page 26: Allowing contamination to migrate in the A-Aquifer under the assumption that it can be addressed by extraction in the Upper 180-Foot Aquifer as stated in this section is problematic. One issue is that based on Figure 15 (Simulated Groundwater Capture Upper 180-Foot Aquifer Third Quarter 2020), the transition line to the Upper 180-Foot Aquifer is at least 3,500 feet from the TCE plume boundary and more than 7,500 feet from the northern Carbon Tetrachloride plume. As such, allowing migration in the A-Aquifer between the current plume boundaries and the transition to the Upper 180-Foot Aquifer (at the FO-SVA line) indicates that migration of contaminated groundwater in the A-Aquifer is not under control in this area (i.e., outside of the capture zone). While the text on Page 25 indicates that EW network modification is proposed for the Operable Unit Carbon Tetrachloride Plume, additional EWs to address the TCE plumes should also be recommended. However, it is not clear that the fifth bullet in Section 6.1 (Groundwater Extraction System), which recommends expansion of EW networks to capture portions of the A-Aquifer chemical of concern plume migrating to the north of the Eastern Network, addresses this concern. Please revise the Draft Report to recommend additional EWs to address the uncaptured portions of the TCE plumes.

RESPONSE TO SPECIFIC COMMENT 4: *The text in Section 5.1 was revised per the comment. No revisions to Section 6.1 are necessary based on the revision to Section 5.1. The Evaluation and Optimization Report is not suggesting that allowing the COC plumes in the A-Aquifer to migrate over the edge of the FO-SVA for capture by the Upper 180-Foot Aquifer EW networks is an appropriate or desirable solution for ineffective plume capture in the A-Aquifer; however, under such a scenario, it is predicted the OU2 groundwater remedy would still be protective of human health and the environment with continued operation of the Upper 180-Foot Aquifer EW networks.*

APPENDIX C

Responses to Comments on the Draft Report submitted by the California Department of Toxic Substances Control

Responses to Comments submitted by the California Department of Toxic Substances Control (DTSC)[1]

COMMENTS SUBMITTED BY THE GEOLOGICAL SERVICES UNIT (GSU) OF THE DTSC:

GSU COMMENT 1. Concurrence with Proposed Recommendations. GSU concurs with the proposed geologic based recommendations for the optimization of the new groundwater extraction and treatment system (GWTS). In particular, the recommendation to expand the extraction network to capture portions of the A-Aquifer contaminant of concern (COC) plume migrating to the north of the Eastern Network. A workplan should be prepared that details potential well locations, well construction details (including well screen depth and size), sampling schedule, and proposed well development procedures.

RESPONSE TO GSU COMMENT 1: *Comment acknowledged. A footnote was added to Section 6.1 stating a work plan will be prepared if recommendations for new extraction wells are implemented.*

GSU COMMENT 2. Engineering and Special Projects Office Evaluation. For the remaining recommendations, as they are primarily engineering focused, GSU defers to the Engineering and Special Projects Office to evaluate the adequacy of the proposed optimization modifications to the GWTS system.

RESPONSE TO GSU COMMENT 2: *Comment acknowledged. Response to Engineering and Special Projects Office comments are provided below.*

COMMENTS SUBMITTED BY THE ENGINEERING AND SPECIAL PROJECTS OFFICE (ESPO) OF THE DTSC:

ESPO COMMENT 1. Section 1.3.3 (Geology and Hydrogeology): Please include the Hydrostratigraphy inset on Figures 13 and 15 as a separate figure in the Report and please cite it in this section. It is very difficult to picture the hydrostratigraphy using only the text description provided in this section.

RESPONSE TO ESPO COMMENT 1: *A figure was added and referenced in Section 1.3.3 per the comment.*

ESPO COMMENT 2. Section 1.3.4 (Groundwater Plume Extent): Please cite the relevant figures in this section (e.g., Figures 13-16) that show the current extent of contaminant plumes both in the A-Aquifer and the Upper 180-Foot Aquifer.

A conceptual site model (CSM) for contaminant migration from the phreatic A-Aquifer to the deeper partially confined Upper 180-Foot Aquifer is presented in this section. The CSM describes migration of the contamination in the shallow aquifer towards the Bay and then crossing over into the deeper aquifer where the confining layer (the Fort Ord-Salinas Valley Aquitard [FO-SVA]) pinches out. While this conceptual model is not impossible, especially given the opposite groundwater flow directions in the two aquifers (Figures 13 and 15), an equally plausible CSM is the migration of contamination across lower integrity sections of the FO-SVA. A clear understanding of the CSM is vitally important to limiting

[1] In a letter dated July 28, 2021 (Administrative Record No. OU2-728.3). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.

remediation time frames in groundwater pump and treat (P&T) and dynamic groundwater recirculation (DGR) systems.

ESPO encourages the verification of the Site CSM using data that has already been collected (e.g., hydraulic head measurements in the two aquifers to establish vertical hydraulic gradients and mapping them onto contaminant plumes) or by incorporating the analysis of additional parameters (e.g., relatively inexpensive inorganic ions to establish salinity fingerprints [Richter & Kreitler, 1993] in CVOC-contaminated samples) to the sampling and analysis plan. The latter approach is especially promising given that the Facility overlies coastal aquifer systems with an unusual hydrogeology, i.e., opposite flow directions in the two aquifers. The area has documented saline water intrusion (Jasechko et al., 2020) beyond the usual seawater-freshwater wedge, which develops owing to density differences between saline and freshwater and affects deeper aquifers more than shallower ones. This, together with the freshwater infiltration galleries near the coast (Fetter, 2001), are likely to give the two different aquifers very different salinity signatures. These can potentially be used to identify the migration pathway in CVOC-contaminated samples recovered from the deeper Upper 180-Foot Aquifer.

RESPONSE TO ESPO COMMENT 2: *Relevant figures that show the current extent of chemical of concern (COC) plumes both in the A-Aquifer and the Upper 180-Foot Aquifer are incorporated by reference to the* Operable Unit 2 Annual Report Volume II, Fourth Quarter 2018 through Third Quarter 2019 Groundwater Monitoring and Treatment Systems Operations and Maintenance, Former Fort Ord, California *(Ahtna, 2020c; Administrative Record No. OU2-724B).*

Migration of COCs from the A-Aquifer into the Upper 180-Foot Aquifer where the FO-SVA pinches out is the CSM that has been developed through investigations and data collection over the last 30 years and has been accepted by all project stakeholders, including DTSC. Evaluation and verification of this CSM is performed at least annually based on site-specific data (e.g., see the Operable Unit 2 Annual Report Volume II *referenced above). Migration of COCs across lower integrity sections of the FO-SVA is not a plausible alternative CSM based on the current body of knowledge. For example, as shown on Figure 14 [formerly Figure 13], five COCs are detected in the A-Aquifer at concentrations exceeding ACLs; however, as shown on Figure 16 [former Figure 15], only TCE is detected above the ACL in the Upper 180-Foot Aquifer. There have never been corresponding concentrations of COCs in the A-Aquifer and Upper 180-Foot Aquifer at OU2 that would indicate vertical migration of the plumes via lower-integrity sections of the FO-SVA. Therefore, no additional investigations or sampling and analysis, as suggested in the comment, are warranted with respect to the CSM.*

ESPO COMMENT 3. <u>Section 2.2 (Groundwater Extraction System)</u>: Please cite Figure 6 in this section to identify the different extraction networks as well as the extraction wells within each network.

RESPONSE TO ESPO COMMENT 3: *The text was revised per the comment, though Figure 6 is now Figure 5.*

ESPO COMMENT 4. <u>Section 6.0 (Recommendations)</u>: ESPO concurs with all of the recommendations with minor caveats to the following:

- <u>Groundwater Extraction System</u>: (i) Expanding the extraction well networks to capture CVOC plumes migrating north of the eastern network in the A-Aquifer (Figure 13) as the current network is only capturing the southern upgradient portion of the CVOC plumes. Alternatively, it might be more beneficial to follow a DGR approach in the A-Aquifer where extraction is performed from the most contaminated zones while treated water injection is performed in clean zones so as to achieve maximum pore volume exchange or flushing through the contaminated zone (Suthersan et al. 2017). At present, there appear to be no injection wells screened in the A-Aquifer (Figure 13). (ii) Dynamically pulsing/resting groundwater extraction and injection wells in different configurations to not only better overcome mass transfer/diffusion limitations from lower permeability zones but also to increase flushing through such zones. Extracted water concentration trends over time (Figure 12) support this action as they show declining CVOC concentrations since 2019, indicating a transition of the GWTS from an advection transport dominated system to a diffusion-limited one.

- <u>Recharge System</u>: Increasing the number of infiltration galleries and injection wells to bring the overall recharge rate closer to the design recharge rate of 1,511 gallons per minute (GPM), provided the extraction targets are also concomitantly met, and maintaining an overall water budget (extraction, treatment system losses, recharge) to assess overall GWTS performance.
- <u>Groundwater Remedy Sampling</u>: Updating the groundwater sampling schedule (Table 7) as it is in adequate for assessing data quality objectives (DQOs), especially the higher sampling frequency needed to potentially demonstrate closure requirements laid out in Section 3.2.

RESPONSE TO ESPO COMMENT 4:

- *<u>Groundwater Extraction System</u>: (i) DGR in different configurations was considered; however, this approach was ruled out because historically injection wells screened in the A-Aquifer have:*
  - *Performed poorly and required significant maintenance (e.g., see Administrative Record No. OUCTP-0049A),*
  - *Did not significantly contribute to remedial progress (e.g., see Administrative Record No. OU2-584), or*
  - *Had adverse impacts on remedial efforts in adjacent areas (e.g., see Administrative Record No. OUCTP-0011P).*

  Additionally, redevelopment of the former Fort Ord since base closure has limited the amount of real estate available for expansion of remedial systems and a DGR approach would double the area needed for new wells (extraction wells to capture the current A-Aquifer plume extent effectively and corresponding injection wells for DGR).

  (ii) As described in Section 6.1, pulse pumping is already under consideration; however, this would be in addition to and not in place of expansion of existing extraction well networks, which is needed to capture the current A-Aquifer plume extent effectively.

- *<u>Recharge System</u>: To clarify, the current aquifer recharge capacity is already 1,511 gpm with the existing infrastructure and the current rate of extraction and treatment is about 1,000 gpm. Therefore, there is currently no need for increasing the number of infiltration galleries or injection wells. The recommendation is only to account for potential groundwater extraction capacity expansion in the future (e.g., extraction increases to the GWTP design average flow rate* *of 1,600 gpm), whereupon additional treated water disposal alternatives, such as new infiltration galleries, new injection wells, or existing stormwater infiltration basins, will be evaluated.*

- *Groundwater Remedy Sampling: The groundwater sampling schedule was reviewed and updated. The sampling schedule in Table 7 was replaced with the schedule presented in Section 6.5 of the* Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix A, Final Revision 8, Groundwater Remedies and Monitoring at Operable Unit 2, Sites 2 and 12, and Operable Unit Carbon Tetrachloride Plume *(Ahtna, 2021; Administrative Record No. BW-2785L).*

APPENDIX D

Responses to Comments on the Draft Report submitted by the Fort Ord Community Advisory Group

Responses to Comments submitted by the Fort Ord Community Advisory Group[1]

COMMENT 1A: Document section "Tables", page 1 of 1, has a listing of chemicals of concern. Footnote #5 informs us that chloroform limits, initially set at 0.5 ug/L were revised in an exit strategy technical memorandum for OU2 groundwater (Harding Lawson Associates, 1999). It references "Draft Final Revised Treatment System Plan, OU2 Groundwater Remedy". However the FOCAG was unable to locate this technical memorandum document in the Fort Ord Cleanup online archives. Where is it? It seems to us that this is a rather significant technical memo, now some 22 years old, that changed the course of chloroform limits for an exit strategy that is not disclosed.

RESPONSE TO COMMENT 1A: *To clarify, the aquifer cleanup level (ACL) for chloroform is 2.0 micrograms per liter (µg/L) and the discharge limit for chloroform in treated water was originally 0.5 µg/L per the Operable Unit 2 (OU2) Record of Decision (Administrative Record No. OU2-480). Operational data since startup of the OU2 groundwater treatment system (GWTS) in 1995 indicated low carbon affinity chemicals of concern (COCs), such as chloroform, 1,1-dichloroethane (1,1-DCA), and cis-1,2-dichloroethene (cis-1,2-DCE), were the first compounds breaking through the liquid-phase granular activated carbon (GAC), resulting in carbon change-outs every five to six weeks. This indicated GAC usage was not optimal for the high carbon affinity compounds, such as trichloroethene (TCE) and tetrachloroethene (PCE), which were not reaching their retention capacity before a change-out. Therefore, discharge limits for three low carbon affinity COCs (chloroform, 1,1-DCA, and cis-1,2-DCE) were revised from those listed in the OU2 ROD to their respective ACLs for treated water discharged within the historical boundaries of the OU2 plume area per the Draft Final Revised Treatment System Plan, OU2 Groundwater Remedy, which is available in the online Fort Ord Administrative Record at https://fodis.net/fortorddocs/public/downloadpdf.aspx?arno=OU2-584/. A link to the Revised Treatment System Plan is already provided in Section 7.0 of the OU2 GWTS Evaluation and Optimization Report; however, Note 5 on Table 1 was revised to include the Administrative Record number for the Revised Treatment System Plan.*

COMMENT 1B: What was the exit strategy?

RESPONSE TO COMMENT 1B: *The Revised Treatment System Plan evaluated the effectiveness of the OU2 groundwater remedy and made recommendations for GWTS modifications for achieving remedial action objectives (RAOs). The objective of an exit strategy is to define the steps necessary to reach RAOs, establish the timeline to attain RAOs, define contingency measures should progress not proceed as anticipated, and ultimately attain regulator-approved closure status. The Revised Treatment System Plan does not include all these elements and is not an exit strategy in of itself. Therefore, Note 5 on Table 1 was revised to exclude the term "exit strategy."*

COMMENT 1C: As we recall, in 1999, the Army thought that the Upper 180 and the lower 180 aquifers were separated by an impermeable clay aquitard, that later proved to be not so when it was discovered that there must be a hole, or holes in the aquitard, because contaminants were being found in the lower

[1] In a letter dated July 9, 2021 (see Administrative Record No. OU2-728.4). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.

aquitard. With hundreds of extraction wells having been drilled on former Fort Ord since 1999, and also injection wells, how did this disaster fit with the exit strategy?

RESPONSE TO COMMENT 1C: *The U.S. Department of the Army (Army) had already hypothesized there were discontinuities in the Intermediate 180-Foot Aquitard by 1994 based on low levels of contaminants detected in the Lower 180-Foot Aquifer (see Administrative Record No. BW-1283A, Basewide Hydrogeologic Characterization), and this hypothesis was tested and accepted by 2006 (see Administrative Record No. OUCTP-0011P, Volume I, Remedial Investigation). Since 1999, the Army has installed 108 extraction wells and 59 injection wells at the former Fort Ord as components of groundwater remediation systems. The majority of these were for enhanced in situ bioremediation (EISB) in the uppermost A-Aquifer at Operable Unit Carbon Tetrachloride Plume (OUCTP). The Army has not installed any remedial system extraction wells or injection wells in the Lower 180-Foot Aquifer at the former Fort Ord. However, the Army has installed approximately 300 groundwater monitoring wells since 1999. Of these, 81 were installed in the Upper 180-Foot Aquifer and 75 were installed in the Lower 180-Foot Aquifer. The Army has used data from these wells and those installed before 1999 to characterize the aquifer system at the former Fort Ord, including identifying discontinuities in the Intermediate 180-Foot Aquitard, and successfully developing and implementing remedial strategies for groundwater in these aquifers (e.g., see Administrative Record No. OUCTP-0096). As noted in the Response to Comment 1B, the Revised Treatment System Plan is not an exit strategy per se.*

COMMENT 1D: U.S. EPA recently declared much of former Fort Ord “cleared”, partly to provide the public with some positive news. Was this part of the exit strategy? How so?

RESPONSE TO COMMENT 1D: *It is unclear what declaration the comment is referring to; however, the U.S. Environmental Protection Agency (USEPA) recently deleted portions of the former Fort Ord from the National Priorities List (NPL) because they meet the official criteria for site deletion identified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR 300.425(e). Partial deletion from the NPL can communicate to the public the successful cleanup of portions of the site and does identify property that may be available for productive reuse. The partial deletion reflects USEPA’s determination that cleanup is complete for soil and military munitions contamination for 11,934 acres of the former Fort Ord; however, groundwater at the former Fort Ord was not deleted and remains on the NPL. The Revised Treatment System Plan is not an exit strategy per se and the partial deletion is unrelated to any previously published exit strategy for groundwater or other media at the former Fort Ord.*

COMMENT 2: Some residential housing areas are located near the old landfill cells A,B,C,D,E,and F. The old unlined landfill is a significant cause of the groundwater contamination. The new landfills are also unlined, however they do have what we refer to as rubber “showercaps” on top.

There is also much new housing called “The Dunes on Monterey Bay”. I’m told salespeople seem oblivious to groundwater contamination on former Fort Ord. Granted that Marina Coast Water provides potable water, that meets State and Federal standards, from wells on former Fort Ord, but the wells are near to the Fort Ord Cleanup extraction and injection wells. The subject of this document is to report on the cleanup evaluation and optimization. The FOCAG asks that the Army and EPA Federal Regulators do more outreach to these residents, so all can understand that former Fort Ord remains a better, but still dangerous place on many levels.

RESPONSE TO COMMENT 2: *The Army acknowledges some of the water supply wells owned and operated by the Marina Coast Water District (MCWD) are near the Army's groundwater remedial systems. As noted in the comment, MCWD provides potable water that meets all State and Federal standards. Additionally, MCWD informs its customers about drinking water quality in its annual Consumer Confidence Reports (for example, see https://www.mcwd.org/docs/ccr/mcwd_ccr_2020_rev_English_Final.pdf).*

The purpose of the OU2 GWTS Evaluation and Optimization Report is to determine whether operations and maintenance (O&M) procedures need to be modified or if additional treatment components are required to ensure the new OU2 groundwater treatment plant (GWTP) is operating efficiently and in accordance with OU2 decision documents. Outreach to residents of the former Fort Ord is not within the scope of the OU2 GWTS Evaluation and Optimization Report; however, per the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Army implements a public outreach program (see Administrative Record No. BW-2671A) that includes the Fort Ord Environmental Cleanup Annual Report, which is widely distributed and provides updates on all aspects of the Fort Ord cleanup program (accessible at https://docs.fortordcleanup.com/ar_pdfs/factsheets/02-05/) . In-depth information about the Fort Ord cleanup program is also available at https://fortordcleanup.com/. Additionally, the Army imposes land use restrictions on former Fort Ord property to prevent the use of groundwater within the COC plumes for domestic or agricultural purposes. These land use restrictions are included in the deeds for the property so that each new owner of land at the former Fort Ord is informed about property conditions.