Groundwater Management Plan

San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project, San Francisco Bay to Highway 101

This plan describes procedures for pumping, diverting, containing, and analyzing groundwater that upwells from trenching and other grading and excavation activities during construction of the above project. This plan also describes procedures to document discharge quality and volume.

SAN FRANCISQUITO CREEK
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Santa Clara Valley Water District

7-29-2016

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Santa Clara Valley Water District

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Groundwater Management Plan

1.0 Purpose

The purpose of this plan is to describe procedures for anticipated dewatering activities that will occur during implementation of the San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project (Project) in accordance with the following regulatory requirements:

- Regional Water Quality Control Board, San Francisco Bay Region (Water Board), Section 401 permit approval for the San Francisquito Creek Flood Reduction, Ecosystem Restoration, & Recreation Project (Water Board, 2015). Specifically, Condition 401-14 requires the following:

  > *The JPA shall prepare and implement a Groundwater Management Plan as part of the Dewatering Plan. At a minimum, the Groundwater Management Plan shall include detailed descriptions of the procedures for pumping, diverting, containing, and analyzing groundwater that upwells from trenching and other grading and excavation activities. In addition, the plan shall include:*
  >
  > *i. a sketch of the approximate excavation and grading locations anticipated to generate groundwater needing to be managed during the construction activity;*
  > *ii. the purpose of each excavation activity where groundwater will be managed;*
  > *iii. anticipated depth and length of each excavation area;*
  > *iv. plans for containing and monitoring groundwater flow before discharging it to the Creek downstream of the lower coffer dam; and*
  > *v. identification of an appropriate discharge point for the proposed dewatering flows downstream of the lower coffer dam.*

- City of Palo Alto Construction Dewatering Plans Guidelines and Permits: http://www.cityofpaloalto.org/gov/depts/pwd/forms_and_permits.asp#4
  The City of Palo Alto stated that their dewatering guidelines are not strictly applicable to the San Francisquito Creek Flood Reduction Project because the groundwater is expected to be hypersaline, and there would not be any targeted uses for the extracted groundwater. In particular, their requirements for truck fill and timing limitations are suspended for the project). However, onsite reuse for dust control or other uses are applicable for this project. (Kristen Struve, personal communications June 2016). Onsite reuse is also required by the 401 Certification.
- City of East Palo Alto Permits, including encroachment, NPDES discharge and/or flood hazard review.
- California Stormwater Construction General Permit, Order No. 2009-0009-DWQ as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ. This permit provides applicable requirements for best management practices to prevent spills and for general good housekeeping.
- Biological Opinion water quality requirements

The overall Project elements are provided in Figure 1, Project Location, and Surrounding Areas, San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project.

Santa Clara Valley Water District

N W E S

0 250 500 1,000 Feet

Figure 1: Project Elements and Footprint

San Francisquito Creek Flood Reduction, Ecosystem Restoration, and Recreation Project from San Francisco Bay to Highway 101

July 2016

Existing utilities in the project area are shown in Figure 2. These utilities, of which the vast majority are not currently in use, will be removed from the new levee footprint in 2017. Based on discussions with Golf Course personnel, there will almost certainly be additional irrigation lines that may not be shown on the maps. Some groundwater may be present while removing utilities lines; however, there is not a need for entirely dry conditions for removal unless unusual conditions are noted, such unusual color or odor in the excavation, obvious non-potable pipe breaks, or the presence of a potentially hazardous material and/or underground petroleum storage tank.

The following steps are planned for utility line removal:

- When possible work will be performed during the dry season to minimize groundwater upwelling:
- Verification that all active lines have been shut down, de-energized or otherwise cut from supply and are no longer active,
- USA Alert for utility location and/or use of a private utility locater to clear digging areas for gas, electric or sewer lines
- Periodic test potholing to assess conditions
- Excavation and removal of utility lines
- Inspections and documentation

The above steps are the minimum actions that will occur during utility line removal. PG&E will develop their own plan for gas transmission line removal and submit as an addendum to the Utility Line Relocation Plan. PG&E is currently preparing a sampling and analysis plan to evaluate soil conditions and determine soil disposal options that will inform their removal plan.

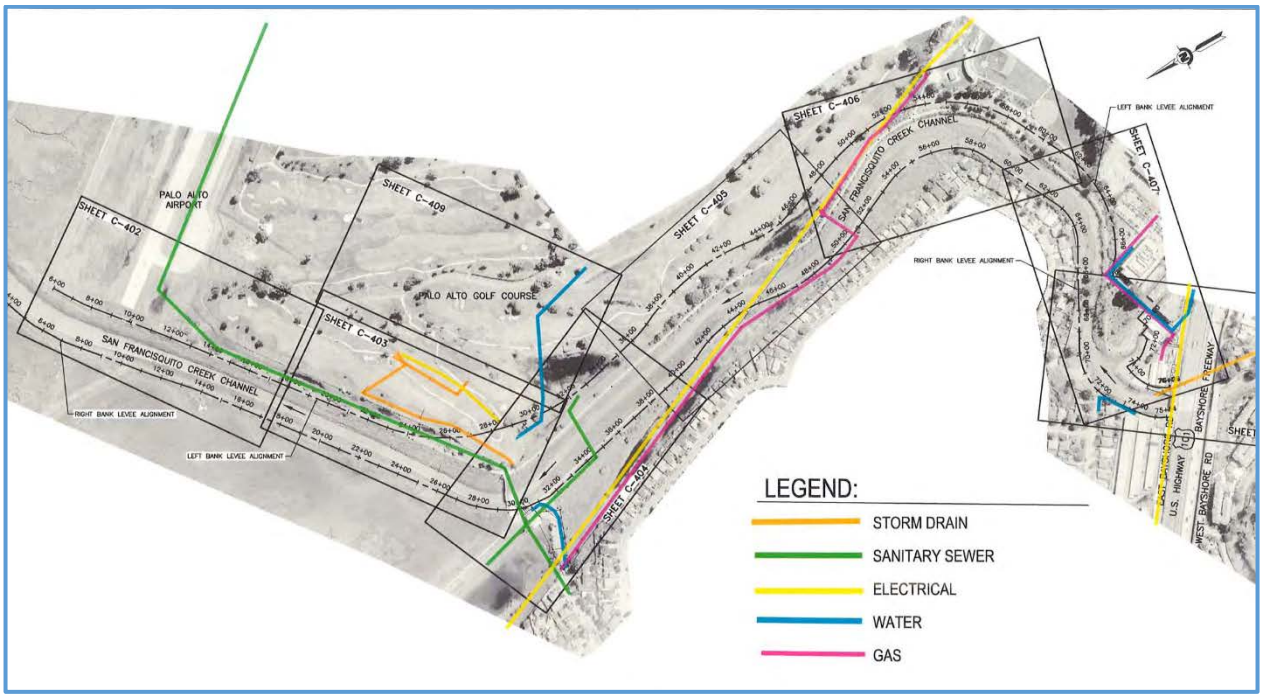


Figure 2 Location of Existing Utility Lines in Project Footprint, San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project

2.0 Scope

This plan applies to work implemented as part of the Project. Due to the shallow depth to groundwater, which ranges from approximately 2 down to 8 feet below ground surface (bgs) beneath the project site, dewatering will be necessary during construction. Dewatering is anticipated as required for the specified activities during Project construction. In particular, the following work is anticipated to require groundwater management for the following purposes:

- Pacific Gas and Electric (PGE) gas line relocation: trenching and micro-tunneling
- East Palo Alto Sewer District Sanitary sewer line relocation and new siphon: trenching
- Removal of abandoned utility lines during levee degrade: trenching or grading
- Construction of the new Low Flow Channel: grading
- Friendship Bridge boardwalk foundation piles
- Possibly fixing a storm drain inlet on Public Storage Property
- Although currently not anticipated, this plan covers any other small scale dewatering required based on observed site conditions during project construction to remove water that accumulates in excavations during construction, so that work can be completed under dry conditions, unless otherwise approved by the Engineer.

Excavated areas will be kept free from water while underground utilities or structures are constructed, while concrete is setting and until backfill or elements of the structure have been placed to a sufficient height to anchor the work against possible leakage or buoyant uplift forces.

This plan does not include surface water diversions planned for in-channel work. This plan does not cover stormwater management, except to the extent that groundwater and stormwater may become mixed in an open trench. In this case, mixed storm water and groundwater will be retained on site and tested prior to discharge in accordance with procedures in this document.

The location of the approximate excavation and grading locations that are anticipated to generate groundwater needing to be managed during the construction activity are provided in Figures 3, 4 and 5.

Relationship to Diversion Plan

This plan is a companion document to the Water Diversion Plan (SCVWD April 2016). The Water Diversion Plan applies to dewatering within San Francisquito Creek channel.

The Groundwater Management Plan applies to dewatering required outside of the channel for trenching or other purposes.

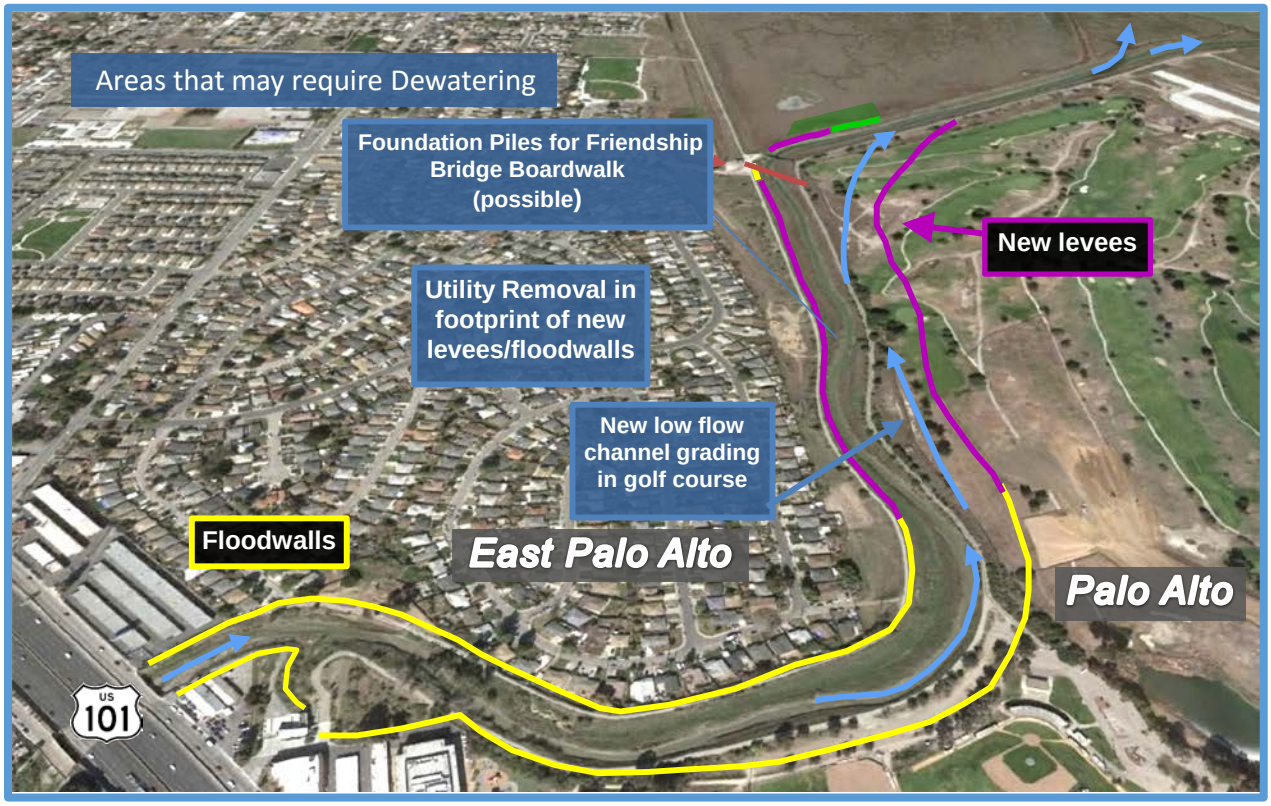


Figure 3 Location of Project Elements that may require dewatering, San Francisquito Creek Flood Reduction, Ecosystem Enhancement and Recreation Project, San Francisco Bay to Highway 101

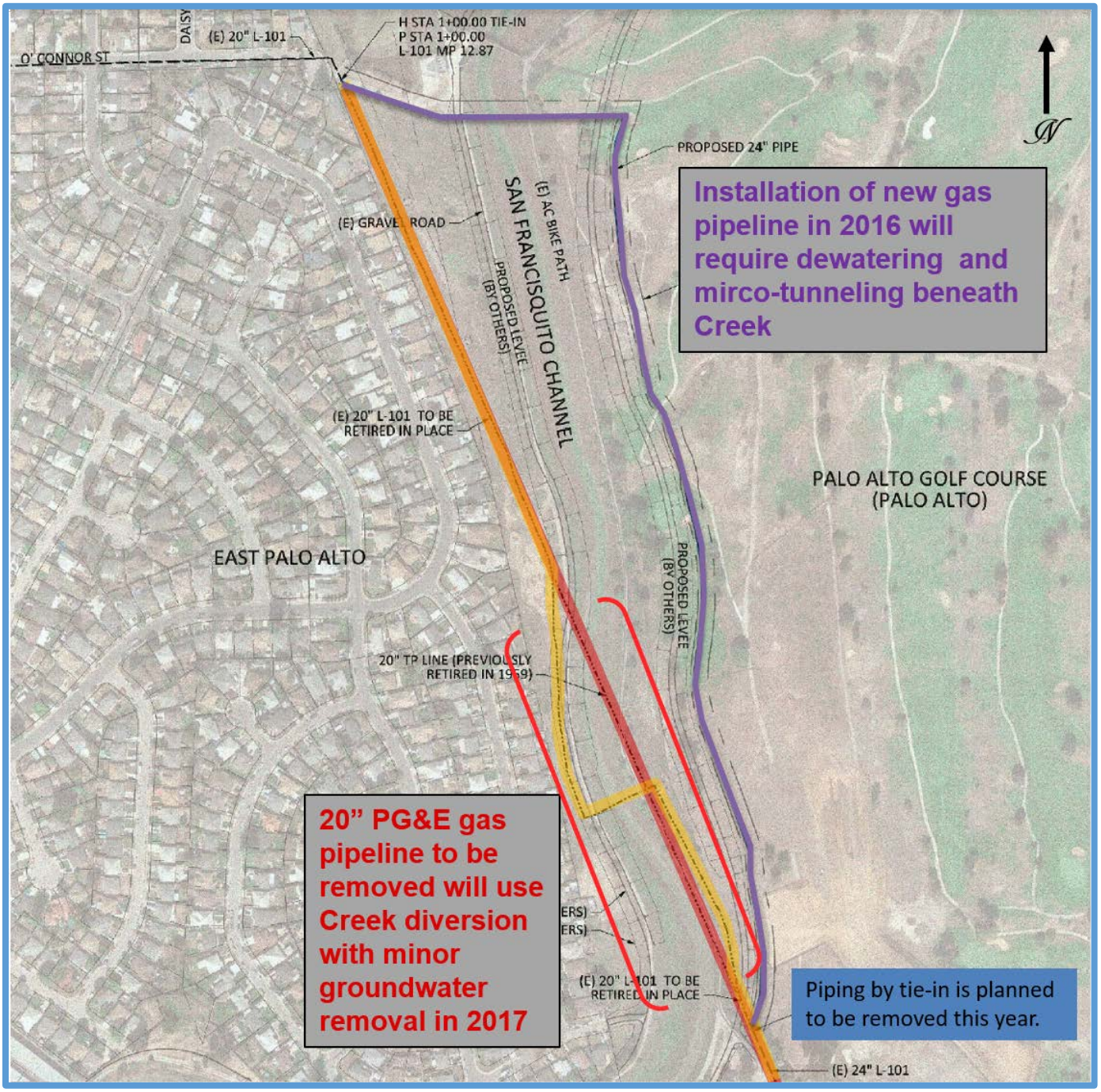


Figure 4. Planned Dewatering Areas for Gas Pipeline Relocation and Removal, San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project

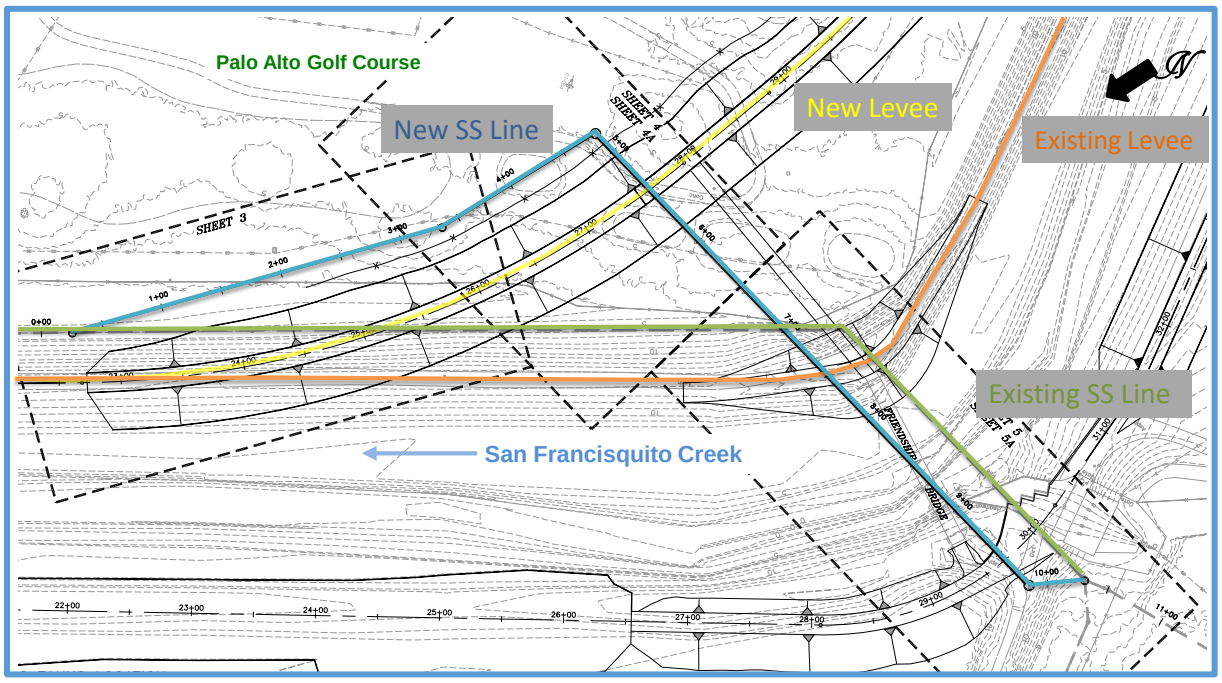


Figure 5 Planned Dewatering Areas, East Palo Alto Sanitary Sewer (SS) Siphon Relocation Project, San Francisquito Creek Flood Control, Ecosystem Enhancement and Recreation Project

The anticipated depth and length of each excavation area is provided in Table 1; with basis for information referenced. Sampling and discharge forms are provided in Appendix A, Best Management Practices are provided in Appendix B.

Table 2. Anticipated Excavation Locations, Depths, Length and Reference for Dewatering, San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project, Sand Francisco Bay to Highway 101

Location	Depth (feet below ground surface, bgs)	Length (feet)	Estimated Volume (gallons per day)	Estimated Duration	Methods/Reference
PG&E Gas Pipeline	Varies from ~5 to 10 feet bgs outside creek and levees. Inside creek and levees, excavation up to 27 feet is planned, to -16 feet bgs.	3,350	Peak daily estimated flows approximates 552,000 GPD (120,000 GPD bore pit sustaining dewatering and 432,000 GPD bell holes supporting open trench)	12 to 14 weeks for total project duration; see schedule in Appendix C.	Microtunneling will be used beneath creek channel. Outside the creek, dewatering will use 10'x10' bell holes where piping will be welded after placement. These bell holes will be placed every 200 to 300 feet of

Location	Depth (feet below ground surface, bgs)	Length (feet)	Estimated Volume (gallons per day)	Estimated Duration	Methods/Reference
					project. A 2-inch sump pump will be placed inside the bell hole, and connected to 6-inch PVC pipe outside of the trench and carried to holding tanks for testing prior to discharge to storm drain. See site specific dewatering and diversion plan in Appendix C.
East Palo Alto Sanitary District Siphon	Groundwater was encountered between elevations -2 and 2 feet during geotechnical exploration but it is anticipated that levels will vary. EPASD will be excavating down to elevation -8.	1,000	200 gallons per minute, total volume would be 4 million gallons.	Two weeks for in creek work; entire project duration is unknown.	
Removal of abandoned utility lines during levee degrade	3 to 5 feet	960 sanitary sewer 340 of 24-inch sanitary sewer 1,350 to 3000 feet of gas transmission line—Note that Attachment C would be amended prior to 2017 to consider this.	Assuming 8 feet wide, 4 feet deep with 5:1 slopes, and 200 foot sections, volume estimated to be 490,000 gallons if groundwater		Utility line removal will occur in 2017. As of July 12, 2016, PG&E has elected to remove their abandoned lines. A separate removal plan will

Location	Depth (feet below ground surface, bgs)	Length (feet)	Estimated Volume (gallons per day)	Estimated Duration	Methods/Reference
		800 feet of solid flex pipe from storm drains 1120 feet of potable water 320 ft of City of Palo Alto gas line 200 feet of Irrigation line	is at 2 feet below ground surface.		be submitted, beginning with soil sampling prior to removal. Lines will be abandoned in 2016 and removed in 2017.
Low Flow Channel reconfiguration	14 feet maximum	~1,000	Grading to minimum of 0.4 feet NAVD88,	2 to 4 weeks Work to be scheduled with other work so duration	Dry season work, dewatering pumps in excavation as needed
Foundation piles for new boardwalk for Friendship Bridge	Foundation piles to about 40 ft	~30 feet	Foundation piles are estimated based on 2 feet to groundwater and 18-inch diameter hole, resulting in about 225 gallons that must be evacuated. Assuming minor seepage, the estimated pumping rate to achieve for dewatering of each pile is estimated at 25 gpm, or 36,000 gpd.	6 -8 weeks	Foundation piles for Bridge will used dewatering pumps as needed
Fixing an existing storm drain inlet on Public Storage	10	5 feet, excavation depth estimated at 15 feet.	None currently anticipated.	Two weeks	Work will be scheduled for dry season so dewatering

Location	Depth (feet below ground surface, bgs)	Length (feet)	Estimated Volume (gallons per day)	Estimated Duration	Methods/Reference
Property adjacent to Creek			Inspection in May 2016 indicated the drain was dry.		should not needed.

3.0 Hydrogeology

Groundwater beneath the Project is from the San Francisquito Cone alluvial aquifer, and the Project lies within the groundwater discharge area to San Francisco Bay. The water quality of shallow groundwater is highly variable but is generally similar in composition to recharge water (Todd Groundwater 2015), which in the project area includes surface waters of San Francisquito Creek, precipitation, and tidal mixing with estuary water from San Francisco Bay.

Shallow groundwater in this area can be hypersaline (Kirsten Struve, City of Palo Alto, personal communication, June 21, 2016). Data collected by Pacific Gas and Electric Gas Transmission for this project contained 26,000 milligrams per liter of total dissolved solids (Appendix C).

The shallow aquifer is underlain by a deep aquifer, generally separated by an aquitard composed of low permeability silty clays. Deep groundwater in the area is used for domestic supply (Todd Groundwater 2015).

4.0 Procedures

This section provides detailed descriptions of the procedures for pumping, diverting, containing, and analyzing groundwater that upwells from trenching and other grading and excavation activities. Acceptable methods for dewatering include:

- dewatering wells
- dewatering piping for linear dewatering and/or
- in-trench pumping.

REUSE: The City of Palo Alto Dewatering requirements specify that the water should be reused for dust control, irrigation or another on-site purpose to the greatest extent possible; this is also consistent with the Section 401 Water Quality Certification. Reuse of the extracted groundwater has been evaluated for irrigation watering at golf course and other potential locations, onsite dust control and groundwater replenishment. Due to the high dissolved solids, irrigation uses were eliminated. Water for dust control will be used if dewatering occurs at the same time when dust control is needed. Groundwater replenishment is the favored option; however, this is not possible because:

- Shallow groundwater discharges to the Bay in this area and does not recharge in this area

- The required volume of water is not expected to significantly infiltrate due to low permeability materials, resulting surface ponding issues;
- There are no suitable infiltration areas
- Infiltration in the Faber marsh will have special status species concerns.

Infiltration upstream is not an option due to the high salt content of the shallow groundwater that could cause degradation.

Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment or rehabilitation. Other potential reuse will be discussed with contractor and implemented if feasible. Although onsite reuse is a priority for all dewatering activities, additional volumes will be generated that will require disposal.

Any reuse should not cause the ponding or runoff of water, which may then cause concentrated runoff and unauthorized discharges.

Estimated Volumes: Each area of planned dewatering will have a site specific amount of water to be removed for construction activities as shown in Table 1. Initial drawdown of groundwater is estimated at approximately 288,000 to 360,000 gallons per day (gpd). Discharge to storm drains is limited to 200,000 gallons per minute, or 288,000 gpd per storm drain.

Discharge Locations: Groundwater extracted during the dewatering process will be discharged after confirming water quality meets discharge criteria to specified storm drains, possibly a surface pond (these are identified on Figure 6) , or directly to the City of Palo Alto's sanitary sewer. The storm drain that discharges to the City of East Palo Alto's stormwater pond near the project may, upon approval by the City of East Palo Alto, be used to discharge groundwater from the project. The pond flows by gravity to the Bay.

Three stormwater drains have been identified for discharge in Palo Alto (Figure 6). Two are located in the Palo Alto Golf Course, and one is located on Geng Road. The storm drains located in Palo Alto all flow to the City of Palo Alto's Airport Storm Water Pump Station located on the apron area of the Palo Alto Airport. The Airport Storm Water Pump Station discharges directly to San Francisco Bay. The East Palo Alto storm drain system at the O'Connor Pump Station and associated Runnymede surface water collection area discharge to San Francisquito Creek down gradient of the Project area. If ground water dewatering operations are operating at the same time as the Creek diversions, groundwater may be discharged with stream diversions downstream of the coffer dam in accordance with the Section 401 Permit and the procedures described herein and in the Water Diversion Plan (SCVWD, 2016).

Figure 6 Proposed Discharge Locations for Groundwater, San Francisquito Creek Flood Protection, Ecosystem Enhancement and Recreation Project, Bay to Highway 101

Other requirements: For discharges in the City of Palo Alto, a Permit for Construction in the Public Street from Public Works Engineering must be obtained before discharging water to a street, gutter, or storm drain. Right of Way and/or encroachment permits may also be required. In addition, call the Palo Alto Regional Water Quality Control Plant at (650) 329-2598 for an inspection prior to commencing discharge. The City of East Palo Alto has site specific requirements including different permits and fees prior to discharge.

In areas of known or suspected contamination, additional testing is required prior to reuse or discharge of groundwater. Contaminated groundwater must be treated, hauled off-site for proper disposal or with approval, discharged to sanitary sewer

Field sampling forms and discharge forms are provided in Appendix A.

The Best Management Practices (BMPs) to be implemented to ensure groundwater flows are appropriately pumped, contained, and analyzed such that they meet applicable water quality objectives before discharging the flow back into the Creek downstream of the lower coffer dam, discharge to storm drains and/or sanitary sewer are provided in Appendix B. In addition, the Stormwater Pollution Control Plan specifies other BMPs that are applicable for the Project.

PG&E Gas Transmission Line Dewatering

PG&E plans on commencing work on the relocating gas transmission lines by September 1, 2016 with mobilization the week before. A site specific dewatering and diversion plan is provided in Attachment C. The water diversion plan is required in this case because the utility work is planned for the 2016 construction season, and the Project contractor, Teichert Construction of Rocklin, CA will not be installing a coffer dam this season. PG&E plans on using microtunneling under the creek to minimize the volume of water required and to minimize effects on the sensitive creek environment.

The PG&E plan describes water quality and discharge locations to both the storm drain system and sanitary sewer. Initial discharges will be to the sanitary sewer until the treatment regime is verified and PG&E is certain that the discharge can meet the requirements. In addition, the proposed filtration treatment scheme may require both types of discharges because the filtration treatment system will have a periodic backwash for maintenance, and this backwash water may not be suitable for discharge to the storm drains.

Sanitary Sewer Siphon Project Dewatering

East Palo Alto Sanitary District (EPASD) plans to replace sanitary sewer piping and siphon in 2017. EPASD will discharge groundwater from trench dewatering on the Palo Alto Golf Course directly into their sanitary sewer line. For work in the creek, EPASD is requiring that that the "Contractor shall be responsible for dewatering, testing, and treatment of retained water to meet water quality effluent limitations during construction activities in accordance with the Water Diversion Plan prepared by the Santa Clara Valley Water District (SCVWD). The location designated for Contractor's dewatering tanks is shown on the Water Diversion Plan, and is located on the south side of the channel approximately 850' downstream of the most downstream new sanitary sewer manhole."

The engineering specifications state, "The Contractor shall take measures as may be required and shall furnish, install, and operate such pumps or other devices as may be necessary to remove seepage, storm water, or sewage that may be found or accumulate in the excavations during the progress of the work. Once seepage or groundwater conditions in the trench are encountered, no further trenching will be allowed until suitable dewatering procedures are in

operation. The Contractor shall keep all excavations free from water at all times during the construction of the work and until the work is completed."

The specifications for dewatering are Contractor's means and methods, and do not specify if dewatering will be from the trench or from bell holes.

Dewatering volumes are very preliminary estimates. Volumes will depend on many factors including the actual level of groundwater encountered during construction and how quickly groundwater seeps into the excavation. Groundwater was encountered between elevation -2 and 2 during geotechnical exploration, but it is anticipated that levels will vary. EPASD is excavating down to elevation -8 ft NAVD88.

Assuming the work requires 2 weeks and dewatered the entire time at 200 gallons per minute, the volume would be 4 million gallons. Creek dewatering water will be discharged downstream of the downstream coffer dam per the SCVWD Water Diversion Plan.

5.0 Discharge Requirements

This section describes plans for containing and monitoring groundwater flow before discharging it into the waters of the State. Discharges to the sanitary sewer are not part of these requirements but are subject to requirements of the associated facility, such as the Palo Alto Regional Water Quality Control Plant, and associated fees.

Figure 4 identifies discharge points for the dewatering flows to two stormwater catch basins located in the Palo Alto Golf Course, a catch basin on Geng Road CB-014-09 and possibly the O'Connor Pump Station catch basin. Field sampling forms are provided in Appendix A.

Water Quality Objectives encompass all of the parameters in the Basin Plan based on the 401 Water Quality Certification permit. If any known or suspected contaminants based on Site history may be present, additional parameters should be added for analysis. In addition, if unusual color or odor is observed, please add additional monitoring parameters, such as hydrocarbons.

At a minimum, the water should be filtered through a basin, tank, or sediment trap prior to discharge and demonstrate that it achieves discharge requirements. Dewatering activities must not cause erosion at the discharge location or in the receiving environment.

Energy dissipation must be provided at all dewatering discharge points. This may include the use of surface protection such as concrete aprons, geofabric, shade cloth, gabions or form ply depending on the condition of the receiving environment.

The following parameters are used for discharge compliance:

Discharge Limits Creek dewatering discharges, accumulated groundwater or stormwater removed during dewatering of excavations, and diverted creek and stormwater flows shall not be discharged to waters of the State without meeting the following discharge and receiving water limitations:

a. Discharge pH - the instantaneous discharge pH shall be in the range of 6.5 to 8.5 and shall not vary from ambient pH by more than 0.5 pH units.
b. Discharge Dissolved Oxygen - the discharge dissolved oxygen concentration shall be no less than 5.0 milligrams per liter (mg/L) as an hourly average for discharging into tidal water and 7.0 mg/L (hourly average) for discharging into non-tidal receiving waters.
c. Discharge Dissolved Sulfide shall not be greater than 0.1 mg/L.
d. Receiving Water Turbidity - the receiving water turbidity measured as nephelometric turbidity units (NTU) shall not be greater than 10 percent of natural conditions in areas where natural turbidity is greater than 50 NTU (daily average). All Project discharge plans shall identify an acceptable location or locations at which to measure background turbidity. The JPA will monitor receiving water when background is greater than 50 NTU and discharge turbidity at least one time every 8 hours on days when discharges from excavations or any other dewatering processes occur.
e. Nutrients - the receiving waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
f. There shall be no violation of any water quality standard for receiving waters adopted by the Regional Water Board or the State Water Resources Control Board.

In addition, Condition 14 of the 401 Water Quality Certification specifies that temperature be monitored. Specific conductance will also be measured for discharges to the Sanitary Sewer. Dissolved Oxygen, pH, turbidity, temperature and specific conductance will be analyzed in the field using hand held instruments. All measurements must follow proper calibration procedures as specified by the manufacturer, and field notes must document calibration.

Sulfide Monitoring: Field methods for dissolved sulfide will be based on United States Geological Survey's protocols used for the National Water Quality Assessment Program. This consists of the following steps:

- Record in field notes (1) if detect the "rotten egg" smell of hydrogen sulfide during the process of sampling for other constituents, or (2) if do not notice the smell of hydrogen sulfide when sampling under conditions when it would be expected to be noticed if it were present (i.e. under low dissolved oxygen conditions).
- Measure the concentrations of sulfide using either Hach or Chemetrics field kits when (a) the dissolved-oxygen concentration is found to be less than 1 mg/L and/or (b) the smell of hydrogen sulfide is detected

In lieu of the field test kit, a water sample can be collected for offsite analysis using USEPA Standard Method #376.2. Sample collection must follow proper procedures, as outlined below:

- Samples must be taken with a minimum of aeration. Sulfide may be volatilized by aeration and any oxygen inadvertently added to the sample may convert the sulfide to an unmeasurable form.
- Use a bottle supplied by the lab for sulfide. It should be plastic or glass, and it will be easier to have lab provide bottles with preservative added, since the method requires the use of Zinc Acetate plus Sodium Hydroxide to pH>9.
- Place in a cooled with wet ice and deliver to lab within 2 days. The holding time for sulfide samples is seven days. Samples collected on Friday should be delivered the same day if possible, with the latest delivery by Monday.
- Follow proper chain-of-custody procedures.
- The sampler must be trained in proper sampling procedures.

Turbidity Monitoring: Turbidity monitoring where discharge exceeds 50 NTU must be performed at least once per 8 hours on days that discharges occur. The turbidity discharge standard is based on relative levels between the discharge and receiving water, unless the discharge turbidity is < 50 NTU.

Background/ambient turbidity of the receiving water will be monitored, with proposed locations on Figure 7 for discharges greater than 50 NTU. At least one sample will be collected and analyzed every 8 hours on days when discharges will occur. The discharge requirement where natural turbidity is greater than 50 NTU is no increases of natural turbidity greater than 10 percent. The proposed background locations include the area adjacent to the airport in Palo Alto where the golf course storm drains discharge to the Bay. The water may also be mixed with the City of Palo Alto's Regional Water Quality Control Plant discharges. This location, although representative of the receiving water body, could be influenced by other discharges; therefore other background locations were selected to provide a better snapshot of receiving water turbidity. The background locations are at or near Lucy Edwards Baylands Nature Reserve, kayak launching area and near the Faber Marsh downstream. The proposed turbidity background locations may be modified in the field based on accessibility.

Figure 7. Location of Proposed Background Locations for Turbidity Measurements, San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project, Bay to 101

Nutrient Monitoring: for discharges of any dewatering source (i.e., flows from creek diversion, other surface water, and groundwater flows). Monitoring for this objective will consist of visual observations for signs of rapid or excessive aquatic growth within or downgradient of the Project area. If observed, (a) immediately report to Project Supervisor so that the Water Board can be notified, and (b) develop a plan to determine source(s)/cause of observations (c) implement plan, which may include laboratory sampling for nitrogen, phosphorus and/or potassium, or other constituents and (d) develop and implement the plan, in consultation with the Water Board to remediate in a timely manner if the observed rapid or excessive aquatic growth is determined to be result of Project activities.

To facilitate the above process, the following project related sources of nutrients have been identified: compost. This nutrient source should not cause algal blooms; however compost use will be monitored.

6.0 Recordkeeping

Each discharger must have the following records onsite and retained for a minimum of three years following construction completion:

a) A copy of this Groundwater Management Plan, and any site specific amendments
b) Date, time and estimated volume of water released for each discharge location
c) Water quality test results for each discharge and
d) Treatment provided, if required, to meet discharge criteria (such as settling, filtration, pH adjustment or other treatment).

Suggested sample and discharge forms are provided in Appendix A.

7.0 Schedule

The detailed project schedule is under development. PG&E has provided a schedule for the gas line relocation in Appendix C. Work is planned to begin September 1, 2016 and completed this construction season.

A summary of planned activities is provided below based on information to date:

- Sanitary sewer relocation will occur in 2017.
- The abandoned utility lines will be removed after replacement and will occur during grading activities in 2017.
- Construction of the new Low flow channel will occur in 2017.
- New levee construction, floodwall construction and foundation piles will occur in 2017 and 2018.
- Construction of the new storm drain on Public Storage Property will occur in 2018.

No dewatering work will proceed without Water Board approval of this plan.

8.0 References

Todd Groundwater 2015. *Groundwater Management Plan for City of East Palo Alto*, August.

Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) 2015. *Conditional Certification of the San Francisquito Creek Flood Reduction, Ecosystem Enhancement and Recreation Project,* San Francisco Bay to Highway 101, letter from Bruce Wolfe to Len Materman, April 7.

RWQCB 2016. *Comments on Technical Reports Submitted in Accordance with Water Quality Certification for the of the San Francisquito Creek Flood Reduction, Ecosystem Enhancement and Recreation Project,* San Francisco Bay to Highway 101, letter from Bruce Wolfe to Len Materman, June 28.

Santa Clara Valley Water District, Temporary Water Diversion Plan and Fish Relocation Plan (Diversion Plan), April, 2016.

United States Geological Survey, 2005. *Methods for Collecting Data on Hydrogen Sulfide in Groundwater During the NAWQA Program and Entering them into NWIS*, authored by Jack Barbash (methods), and Rick Bell (coding), September 5, Revised July 2005.

APPENDICES

A Field Sampling and Discharge Forms
B: Best Management Practices (BMPs) for Dewatering, San Francisquito Creek Project
C Pacific Gas and Electric Site Specific Dewatering and Diversion Plan

Appendix A

Sampling and Discharge Forms

Field Data Sheet for Water Quality Monitoring

Date _____ Page _____

of _____

Media (circle): Creek, Bay, Groundwater, Stormwater, Storage Tank, other:_____

Project Name: *San Francisquito Creek Flood Reduction, Ecosystem Enhancement and Recreation, Bay to 101*

Station ID: _____

Station Name: _____

Organization name: _____

Sampler's Name: _____

Pre-Sampling Equipment Calibration

Equipment Make and Model	Calibration Log	Date	Results	Corrective Action?	Calibration details

Observations: *Circle one underlined option:* **Observations Time:** _____

Cloud cover	no clouds; partly cloudy; cloudy sky
Precipitation	none ; misty; foggy; drizzle; rain;
Wind	calm; breezy; windy;
Water Murkiness	clear water; cloudy water (>4" visibility), murky (<4" visibility)
Natural Creek Flow conditions	dry creekbed; isolated pools; trickle (< 0.25 gal/sec); < 5 gal/sec; > 5 gal/sec
Is Creek being diverted? (i.e is Coffer Dam operational?)	yes / no If yes, days operational? Estimated cofferdam diversion amounts (specify units)?
Sample color	none; amber; yellow; green; brown; gray; other:
Sample odor	none; fresh algae smell; chlorine; rotten eggs; sewage; other
Other (presence:)	algae or water plants; oily sheen; foam or suds; litter; trash; other

Measurements

Station ID*	**Parameter**	**Unit**	**Result**	**Repeat** Measurement Result	**Bracket/ Instrument Resolution**	Measurement **Time**	**Site Specific Discharge Criteria**	**Comments**
	pH .	pH					6.5-8.5	
	temperature	°C					no limit specified, but must record.	
	Dissolved oxygen (DO)	mg/l					>/= 5 tidal or 7 non-tidal hourly average of discharge	
	Dissolved sulfide	mg/l					<0.1 mg/L	
	Turbidity	NTU					10% of natural conditions in areas where natural turbidity is greater than 50 NTU (daily average)	
	Nutrients	visual					If unusual growth observed, must assess and report.	
	Specific Conductance	uS/cm					none	

***The following station IDs are established**: dewatering pit/trench, storm drain, discharge sample port, or receiving water

Sampling Container: *(must be clean)* : lab jar; beaker; bucket; other:

Sample ID *(Complete Chain-of-Custody for offsite analyses)*	Reason for Collection: Routine or Non-Routine	Sample Container(s)	Analytes

CHAIN OF CUSTODY

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

FED-EX Tracking #	Bottle Order Control #
SGS Accutest Quote #	SGS Accutest NC Job #: C

Client / Reporting Information

Company Name

Address

City **State** **Zip**

Project Contact:

Phone #

Samplers's Name

Project Information

Project Name: San Fancisquito Creek Flood Control, Ecosystem Enhancement and Recreation Project, SF Bay to 101

Street

City **State**

Project #

EMAIL:

Client Purchase Order #

Requested Analysis

Matrix Codes

WW- Wastewater
GW- Ground Water
SW- Surface Water
DW- Drinking Water

Laboratory Sample ID	Sample ID / Field Point / Point of Collection	Collection: Date	Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	HNO3	H2SO4	NONE	NaHSO4	MEOH	ENCORE	LAB USE ONLY

Turnaround Time (Business days)

Approved By:/ Date:

- ☐ 10 Day _____
- ☐ 5 Day _____
- ☐ 3 Day _____
- ☐ 2 Day _____
- ☐ 1 Day _____
- ☐ Same Day _____

Emergency T/A data available VIA Lablink

Data Deliverable Information

- ☐ Commercial "A" - Results only
- ☐ Commercial "B" - Results with QC summaries
- ☐ Commerical "B+" - Results, QC, and chromatograms
- ☐ FULT1 - Level 4 data package
- ☐ EDF for Geotracker ☐ EDD Format_____
- Provide EDF Global ID _____
- Provide EDF Logcode: _____

Comments / Remarks

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1			1	2		2
3	Relinquished by:	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
5	Relinquished by:	Date Time:	Received By: 5	Custody Seal #		

Appropriate Bottle / Pres. Y / N Headspace Y / N On Ice Y / N Cooler Temp.

Labels match Coc? Y / N Separate Receiving Check List used: Y / N _____oC

Daily Construction Dewatering Discharge Documentation

This form is to be completed each day of dewatering discharges and retained in Project files for review and documentation as requested by San Francisco Bay Regional Water Quality Control Board, and/or the Cities of Palo Alto and East Palo Alto for the San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project.
All discharges must demonstrate compliance with water quality parameters prior to discharge.

Discharge Location	
Water Quality	
pH	
Dissolved Oxygen	
Dissolved Sulfide	
Turbidity Receiving Water	
Turbidity Discharge Water	
Nutrients- visual	
Color	
Odor	
Area Dewatered (approx)	

Volume Discharged, gallons per day (GPD)	
Pump rate in gallons per minute (GPM)	
Estimate of total volume to be discharged	
Start date of dewatering	*End date of dewatering*
Dewatering method (coffer dam, well etc.)	
Discharge point (manhole, creek etc.)	
If discharging to ditch, provide analysis that the discharge will not adversely affect the rights of way or abutting private property	
If discharging to piped storm sewer, provide calculations that show pipe capacity to handle rate of discharge	
Site Diversion and Groundwater Management Plan available?	
Description of treatment method(s) and/or used to control solids:	
Remarks and unusual conditions:	
Signature :	*Date:*
Signature of Approval:	*Date:*

Note: Turbidity, measured as nephelometric turbidity units (NTU) shall not be greater than 10 percent of natural conditions in areas where natural turbidity is greater than 50 NTU (daily average) based on measured background turbidity. Receiving water and discharge turbidity must be monitored at least one time every 8 hours on days when discharges from excavations or any other dewatering processes may occur.
Water sampling forms must accompany this discharge form.

Appendix B

Best Management Practices for Dewatering

Appendix B
DEWATERING BEST MANAGEMENT PRACTICES

The following Best Management Practices shall be implemented at all times for dewatering operations for the San Francisquito Creek Flood Reduction, Ecosystem Enhancement and .

Avoidance

It is preferred that dewatering be avoided if at all possible. As such, the Contractor will schedule construction to be performed during low-flow or dry conditions where possible. However, some work must occur within the approved window for special status species located in the San Francisquito Creek Project area, including Ridgeway's Rail, Salt Marsh Harvest Mouse and Steelhead. As such, in-channel work must not start until September 1 and must be completed by October 15th.

Dewatering BMPs

- During extremely wet conditions, the Biological Monitor may require matting for equipment ingress and egress.

- Visibility permitting, all excavations will be inspected for sensitive aquatic wildlife prior to dewatering. Wildlife found in excavations will be allowed to leave passively or will be relocated by a qualified biologist

- If dewatering of an excavation is needed, all dewatering pump intakes will be fitted with filter screening to prevent impacts to aquatic wildlife that may accidentally enter excavations.

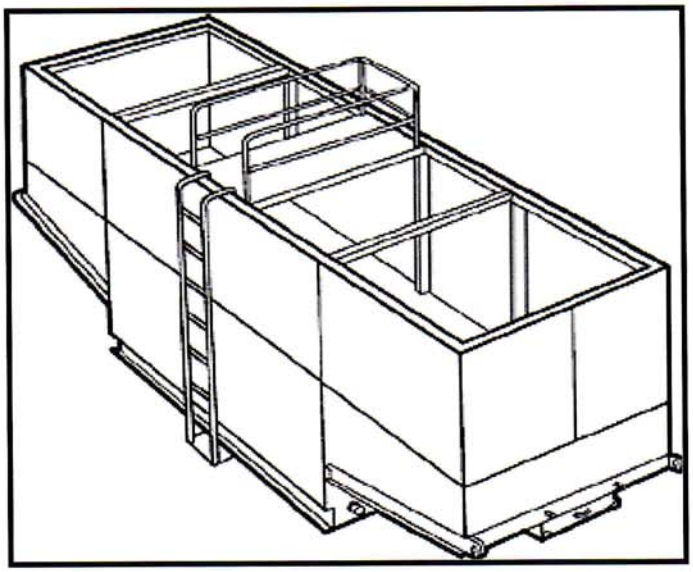
- The Contractor shall have on hand, at all times, sufficient pumping equipment, filter sleeves, hoses and machinery in good working condition and shall have available, at all times, competent personnel for the implementation of dewatering. Adequate standby equipment and supplies shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

- Dewatering shall commence at an appropriate time prior to commencing excavation (if possible), or immediately upon encountering groundwater, and shall be continuous until structures are completed.

- Contractor shall comply at all times with the Project Stormwater Pollution Prevention Plan.

- The Contractor shall be responsible to design and control the dewatering operations such that disposal of water does not cause erosion or other damage and such that water to be disposed of is free from silt and other objectionable materials in accordance with the Surface Water Diversion Plan (SCVWD 2016) and this Groundwater Management Plan. .

Dewatering Operations NS-2



Categories		
EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location to proceed with construction work or to provide vector control.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Discharges from dewatering operations can contain high levels of fine sediment that, if not properly treated, could lead to exceedences of the General Permit requirements.

Suitable Applications

These practices are implemented for discharges of non-stormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area to facilitate construction.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (stormwater) from depressed areas at a construction site.

Stormwater mixed with non-stormwater should be managed as non-stormwater.

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

SE-5: Fiber Roll

SE-6: Gravel Bag Berm

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Limitations

- Dewatering operations will require, and should comply with applicable local and project-specific permits and regulations. In some areas, all dewatering activities, regardless of the discharge volume, require a dewatering permit.
- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this fact sheet primarily address sediment. Other secondary pollutant removal benefits are discussed where applicable.
- The controls detailed in this fact sheet only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Avoid dewatering discharges where possible by using the water for dust control.

Implementation

- A Construction Site Monitoring Plan (CSMP) should be included in the project Stormwater Pollution Prevention Plan (SWPPP).
- Regional Water Quality Control Board (RWQCB) Regions may require notification and approval prior to any discharge of water from construction sites.
- The destination of discharge from dewatering activities will typically determine the type of permit required by the discharger. For example, when discharging to a water of the U.S., a groundwater extraction permit will be required through the site's governing RWQCB. When discharging to a sanitary sewer or Municipal Separate Storm Sewer System (MS4), a permit may need to be obtained through the owner of the sanitary sewer or MS4 in addition to obtaining an RWQCB dewatering permit. Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges should not cause erosion at the discharge point. Appropriate BMPs should be implemented to maintain compliance with all applicable permits.
- Maintain dewatering records in accordance with all local and project-specific permits and regulations.

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations. Several devices are presented below and provide options to achieve sediment removal. The sediment particle size and permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate. Use of other enhanced treatment methods (i.e., introduction of chemicals or electric current to enhance flocculation and removal of sediment) must comply with: 1) for storm drain or surface water discharges, the requirements for Active Treatment Systems (SE-11); or 2) for sanitary sewer discharges, the requirements of applicable sanitary sewer discharge permits.

Sediment Basin (see also SE-2)

Description:

- A sediment basin is a temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment basins are generally larger than Sediment Traps (SE-3) and have a designed outlet structure.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, silt, some metals that settle out with the sediment.

Implementation:

- Excavation and construction of related facilities is required.
- Temporary sediment basins should be fenced if safety is a concern.
- Outlet protection is required to prevent erosion at the outfall location.

Maintenance:

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outlet, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Sediment Trap (See also SE-3)

Description:

- A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment traps are generally smaller than Sediment Basins (SE-2) and do not have a designed outlet (but do have a spillway or overflow).

Appropriate Applications:

Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment.

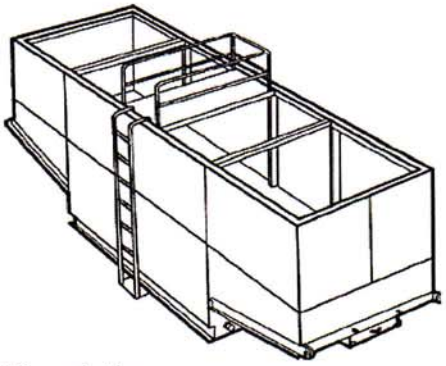
Implementation:

- Excavation and construction of related facilities is required.
- Trap inlets should be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion.

Maintenance:

- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Weir Tanks



Description:

- A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Appropriate Applications:

- The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.
- Treatment capacity (i.e., volume and number of tanks) should provide at a minimum the required volume for discrete particle settling for treatment design flows.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by a licensed waste disposal company.

Dewatering Tanks

Description:

- A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Appropriate Applications:

- The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

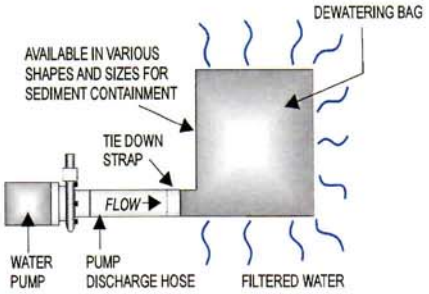
Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by licensed waste disposal company.

Gravity Bag Filter



Description:

- A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects gravel, sand, silt, and fines.

Appropriate Applications:

- Effective for the removal of sediments (gravel, sand, silt, and fines). Some metals are removed with the sediment.

Implementation:

- Water is pumped into one side of the bag and seeps through the top, bottom, and sides of the bag.
- Place filter bag on pavement or a gravel bed or paved surface. Avoid placing a dewatering bag on unprotected bare soil. If placing the bag on bare soil is unavoidable, a secondary barrier should be used, such as a rock filter bed placed beneath and beyond the edges of the bag to, prevent erosion and capture sediments that escape the bag.
- Perimeter control around the downstream end of the bag should be implemented. Secondary sediment controls are important especially in the initial stages of discharge, which tend to allow fines to pass through the bag.

Maintenance:

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier (as applicable) is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- Caution should be taken when removing and disposing of the bag, to prevent the release of captured sediment
- Properly dispose of the bag offsite. If sediment is removed from the bag prior to disposal (bags can potentially be reused depending upon their condition), dispose of sediment in accordance with the general maintenance procedures described at the end of this BMP Fact Sheet.

Sand Media Particulate Filter

Description:

- Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.
- Sand filters can be used for stand-alone treatment or in conjunction with bag and cartridge filtration if further treatment is required.
- Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filters require regular service to monitor and maintain the level of the sand media. If subjected to high loading rates, filters can plug quickly.
- Venders generally provide data on maximum head loss through the filter. The filter should be monitored daily while in use, and cleaned when head loss reaches target levels.
- If cleaned by backwashing, the backwash water may need to be hauled away for disposal, or returned to the upper end of the treatment train for another pass through the series of dewatering BMPs.

Pressurized Bag Filter

Description:

- A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Appropriate Applications:

- Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filter bags require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Cartridge Filter

Description:

- Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Appropriate Applications:

- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance.

Maintenance:

- The cartridges require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Costs

- Sediment control costs vary considerably depending on the dewatering and sediment treatment system that is selected. Pressurized filters tend to be more expensive than gravity settling, but are often more effective. Simple tanks are generally rented on a long-term basis (one or more months) and can range from $360 per month for a 1,000 gallon tank to $2,660 per month for a 10,000 gallon tank. Mobilization and demobilization costs vary considerably.

Inspection and Maintenance

- Inspect and verify that dewatering BMPs are in place and functioning prior to the commencement of activities requiring dewatering.
- Inspect dewatering BMPs daily while dewatering activities are being conducted.

- Inspect all equipment before use. Monitor dewatering operations to ensure they do not cause offsite discharge or erosion.
- Sample dewatering discharges as required by the General Permit.
- Unit-specific maintenance requirements are included with the description of each unit.
- Sediment removed during the maintenance of a dewatering device may be either spread onsite and stabilized, or disposed of at a disposal site as approved by the owner.
- Sediment that is commingled with other pollutants should be disposed of in accordance with all applicable laws and regulations and as approved by the owner.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003; Updated March 2004.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Labor Surcharge & Equipment Rental Rates, April 1, 2002 through March 31, 2003, California Department of Transportation (Caltrans).

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Appendix C

PG&E Gas Pipeline Relocation
Groundwater Dewatering and Management Plan
San Francisquito Creek Flood Reduction, Ecosystem Restoration and Recreation Project
July 11, 2016
REVISED REPORT TO BE ADDED