Appendix 3.5-2

Groundwater Assessment

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MEMORANDUM

To: Hae Won Ritchie, City of San Bruno Department of Public Works

From: Anona Dutton, P.G., C.Hg, EKI Environment & Water, Inc. (EKI)
John Fio, EKI
Kristyn Lindhart, EKI

Subject: **Revised Groundwater Assessment in Support of Bayhill Specific Plan Environmental Impact Report**
City of San Bruno
(EKI B90090.00)

The City of San Bruno (City) has requested that EKI Environment & Water, Inc. prepare this technical memo (TM) related to groundwater conditions and potential impacts related to the development of the Bayhill Specific Plan (also referred to herein as the "Project"). This TM is intended to support development of portions of the Environmental Impact Report (EIR) that is being prepared pursuant to the California Environmental Quality Act (CEQA) for the Project.

1. BACKGROUND

We understand that the EIR is providing program-level analysis of the Bayhill Specific Plan (which has a 15- to 20-year build out over five phases) and project-level analysis of Phase 1 of the Project. The Bayhill Specific Plan contemplates approximately 2.46 million square feet (sq ft) of new commercial and potentially residential development, with significant subterranean parking. Phase 1 includes 440,000 sq ft of new offices, with two underground parking garages that will be constructed to depths of 47 or more feet below ground surface (ft bgs). Dewatering is not anticipated to be needed for Phase 1 but is anticipated to be required during construction of several of the other planned subterranean garages throughout the five phases; however, due to the long-term costs and monitoring typically associated with long-term dewatering, EKI understands that the garages will be constructed to be water proof.

A key concern expressed by the City is that dewatering for the construction of the parking garages could potentially impact local groundwater. As such, the City has asked EKI to evaluate Appendix G CEQA checklist questions X.a, X.b and X.e[1]. Specifically,

- Would the project: (a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?
- Would the project: (b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

[1] http://resources.ca.gov/ceqa/docs/2019_CEQA_Statutes_and_Guidelines.pdf, accessed 15 July 2019.

- Would the project: (e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

2. EXISTING CONDITIONS

2.1 Regulatory Setting

2.1.1 Federal

The following section summarizes some of the key regulations that inform the analysis of potential impacts discussed herein.

2.1.1.1 Clean Water Act Section 402—National Pollutant Discharge Elimination System.

The Federal Clean Water Act (CWA) was enacted with the primary purpose of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The CWA directs states to establish water quality standards for all "waters of the United States" and to review and update such standards on a triennial basis.

The U.S. Environmental Protection Agency (EPA) has delegated responsibility for implementation of portions of the CWA, including water quality control planning and control programs, such as the National Pollutant Discharge Elimination System (NPDES) program, to the State Water Resources Control Board (State Water Board) and the Regional Water Quality Control Board (Regional Water Board). The State Water Board establishes statewide policies and regulations for the implementation of water quality control programs mandated by Federal and State water quality statutes and regulations. The Regional Water Boards develop and implement water quality control plans that identify the beneficial uses of surface and ground waters, water quality characteristics, and water quality problems.

The State Water Board's Construction General Permit for Stormwater (Order 2009-0009-DWQ) covers discharge of basic construction dewatering water to surface water and sets water quality standards for sediment in discharge water.

The Regional Water Board's Fuel and Volatile Organic Compound (VOC) General Permit Order No. R2-2017-0048, which became effective on 1 January 2019, covers construction dewatering and discharge to surface water where water quality impacts are present and sets treatment, monitoring, and reporting requirements.

2.1.2 State

2.1.2.1 Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) is established and implemented by the State Water Board and nine Regional Water Boards. The State Water Board is the primary State agency responsible for protecting the quality of the State's surface and groundwater supplies, or "waters of the State." Waters of the State are defined more broadly than "waters of the United States;" they are defined as any surface water or groundwater, including saline waters, within the boundaries of the State. This includes waters in both natural and artificial channels. It also includes all surface waters that are not

waters of the United States or non-jurisdictional wetlands, which are essentially distinguished by whether they are navigable. If waters are not navigable, then they are considered to be isolated and, therefore, fall under the jurisdiction of only the Porter-Cologne Act and not the CWA. The Regional Water Boards are responsible for implementing CWA Sections 401, 402, and 303(d), as previously mentioned and described in more detail below.

The Project lies within the jurisdiction of the San Francisco Bay Regional Water Board. The San Francisco Bay Regional Water Board is responsible for the protection of beneficial uses of water resources in the San Francisco Bay Basin, which includes Alameda, Contra Costa, San Francisco, Santa Clara (north of Morgan Hill), San Mateo, Marin, Sonoma, Napa, and Solano Counties. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) was last updated in 2011[2].

The Basin Plan also establishes beneficial water uses for groundwater basins within the region. The Westside Groundwater Basin (WGB) underlies the Specific Plan Area and is listed in the Basin Plan as providing existing beneficial uses that include municipal and domestic water supply, industrial process water supply, and industrial service water supply, and potential beneficial uses that include agricultural water supply.

2.1.2.2 Sustainable Groundwater Management Act

In 2014, the California State Legislature enacted the Sustainable Groundwater Management Act (SGMA), with subsequent amendments in 2015. The SGMA requires the formation of Groundwater Sustainability Agencies (GSAs) and the development and implementation of Groundwater Sustainability Plans (GSPs) for groundwater basins that are designated by the California Department of Water Resources (DWR) as medium or high priority. SGMA defines sustainable groundwater management as the "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results". Undesirable results are defined by SGMA as any of the following effects caused by groundwater conditions occurring throughout a basin:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply;
- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degraded water quality;
- Significant and unreasonable land subsidence; and/or
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

The Westside Groundwater Basin is currently categorized by DWR as a very low priority basin (DWR, 2019). As such, the WGB is not subject to the requirements of SGMA. However, as discussed below, the WGB has been actively managed for years, including the establishment of pumping limitations.

2.1.3 Local

As described below, several groundwater management programs are actively implemented within the Westside Groundwater Basin that have relevance to the City of San Bruno.

[2] https://www.waterboards.ca.gov/~rwqcb2/basin_planning.html, accessed 24 July 2019.

2.1.3.1 South Westside Basin Groundwater Management Plan

The South Westside Basin is the portion of the WGB that is located south of San Mateo County (Figure 1).The South Westside Basin Groundwater Management Plan (GWMP) was completed in July 2012 as a joint effort between California Water Service Company (Cal Water), the San Francisco Public Utilities Commission, and the Cities of Daly City and San Bruno that superseded prior groundwater management and planning efforts (WRIME, 2012). The GWMP was prepared pursuant to Assembly Bill 3030 (AB 3030; codified in California Water Code (CWC) §10750 et seq.).[3]

The goal of the GWMP is to ensure a sustainable, high quality, reliable water supply at a fair price for beneficial uses achieved through local groundwater management (WRIME, 2012). The GWMP development was supported by a companion effort by the City of Daly City to develop a numerical groundwater model for the WGB. The GWMP includes the following elements:

- Groundwater Storage and Quality Monitoring
- Control of Saltwater Intrusion
- Conjunctive Use
- Recycled Water
- Source Water Protection

Among other things, the GWMP provides steps for monitoring water quality and quantity in the South Westside Basin. Each groundwater well identified in the GWMP has defined triggers for overdraft, seawater intrusion, and various water quality measures. The GWMP also identifies two levels of trigger thresholds for each groundwater well based on historical water levels, and actions to address the trigger that is met.

2.1.3.2 Regional Groundwater Storage and Recovery Project

In a joint effort between SFPUC, Cal Water, Daly City, and San Bruno, the Regional Groundwater Storage and Recovery Project (GSR Project) was developed to support groundwater and surface water management in the South Westside Basin and improve the reliability of the San Francisco Regional Water System (RWS) (San Bruno, 2016). The GSR Project agreement was signed in December 2014 following two phases of successful pilot programs. As part of the GSR Project agreement, the municipal pumpers within the South Westside Basin agreed to self-limit pumping to no more than 6.9 million gallons per day (MGD), of which San Bruno's designated quantity is an annual average rate of 2.1 MGD or 2,352 acre-feet per year (AFY).

Under the GSR Project, the SFPUC will provide supplemental RWS water to San Bruno and the other "Partner Agencies" (i.e., Cal Water and Daly City) during normal and wet years and in turn the Partner Agencies will reduce their groundwater pumping in their own wells to allow the WGB to recharge.[4] During dry years, the Partner Agencies may pump from GSR Project wells in addition to their own wells up to

[3] AB 3030 provided a systematic procedure to develop a groundwater management plan by local agencies overlying DWR Bulletin 118 groundwater basins. Upon adoption of such plan, these agencies could possess the same authority as a water replenishment district to "fix and collect fees and assessments for groundwater management" (CWC §10754) (WRIME, 2012).

[4] Supplemental deliveries do not count towards the Member Agencies' Individual Supply Guarantee.

designated quantities. The in-lieu recharge (i.e., "put") and additional groundwater pumping from GSR wells (i.e., "take") under the GSR project are tracked under the Westside Basin Storage Account. Production wells in the WGB are considered to be either a GSR Well Facility or a Partner Agency Facility, where only production from GSR Well facilities is tracked under the GSR Project[5].

The GSR Project is one of the SFPUC's Water Supply Improvement Program (WSIP) projects and provides additional dry-year water supply to help achieve the WSIP goals to increate RWS supply reliability. The GSR Project consists of the construction of up to 16 new recovery wells and associated facilities, such as pumping systems, pipelines, and chemical treatment equipment. Construction of the GSR Project began in April 2015 and is anticipated to be complete in winter 2021 (SFPUC, 2019a).

2.1.3.3 San Mateo County Pollution Prevention Program

The San Mateo County Pollution Prevention Program provides best management Practices (BMPs) for construction dewatering. Those BMPs state "If the pumping time is more than 24 hours and the flow rate is greater than 20 gallons per minute (gpm), call your local agency for guidance."

2.1.3.4 San Bruno Municipal Code

The following San Bruno City Code sections are relevant to consideration of the hydrology and water quality impacts of the Project that are addressed herein.

- **10.12.150.d (Municipal Services, Water Quality Control, General Discharge Requirements)**: "regulates discharge of groundwater to sanitary sewer, which is prohibited with a few exceptions including construction dewatering if discharge to storm sewer is not possible.
- **10.18.065 (Municipal Services, Storm Water Management and Discharge Control):** prohibits discharge of non-stormwater to the city storm sewer system, with exceptions including uncontaminated pumped groundwater and foundation and footing drains where a NPDES permit is obtained.

2.1.3.5 San Bruno General Plan

The following San Bruno General Plan policies are relevant to consideration of the hydrology and water quality impacts of the Project that are addressed herein.

- **ERCRC-D** Reduce pollution levels within the surface water that San Bruno discharges into the San Mateo County Flood Control District, then into San Francisco Bay.
- **ERCRC-4** Encourage the use of Best Management Practices in conserving the City's valuable water supply sources.
- **ERCRC-19** Regulate new development--specifically Industrial uses--as well as construction and demolition practices to minimize pollutant and sediment concentrations in receiving waters and ensure water bodies within San Bruno and surface water discharged into San Francisco Bay meets or exceeds relevant regulatory water quality standards.

[5] Since the GSR Agreement addresses City and SFPUC wells, the agreement is assumed to not pertain to wells installed by private parties to conduct construction dewatering. The City is confirming this interpretation.

- **ERCRC-20** Require implementation of Best Management Practices to reduce accumulation of non-point source pollutants in the drainage system originating from streets, parking lots, residential areas, businesses, and industrial operations.
- **ERCRC-23** Regulate new development to minimize storm water runoff rates and volumes generated by impervious surfaces, and maximize recharge of local groundwater aquifers when feasible. Utilize the recommendations provided in the Bay Area Stormwater Management Agency's Start at the Source Design Guidance Manual for Stormwater Quality Protection.
- **ERCRC-24** Require that new development incorporate features into site drainage plans that reduce impermeable surface area and surface runoff volumes. Such features may include:
    - Additional landscaped areas including canopy trees and shrubs;
    - Reducing building footprint;
    - Removing curbs and gutters from streets and parking areas where appropriate to allow stormwater sheet flow into vegetated areas;
    - Permeable paving and parking area design;
    - Stormwater detention basins to facilitate infiltration; and
    - Building integrated or subsurface water retention facilities to capture rainwater for use in landscape irrigation and other non-potable uses.
- **HS-23** Ensure appropriate clean-up of all former commercial and industrial sites according to relevant regulatory standards prior to reuse.
- **HS-30** Regulate development on sites with known or suspected contamination of soil and/or groundwater to ensure that construction workers, the public, future occupants, and the environment are adequately protected from hazards associated with contamination, in accordance with federal, State, and local rules, regulations, policies, and guidelines.

2.2 Environmental Setting

2.2.1 Regional Setting

The Westside Groundwater Basin (DWR Basin No. 2-35) underlies the Specific Plan Area, as shown on Figure 1. The WGB covers an area of approximately 25,400 acres and is separated from the Lobos Basin to the north by a northwest trending bedrock ridge through the northeastern part of Golden Gate Park. The San Bruno Mountains bound the WGB on the east. The San Andreas Fault and Pacific Ocean form its western boundary and its southern limit is defined by a bedrock high that separates it from the San Mateo Plain Subbasin. The WGB is connected to the Pacific Ocean on the northwest and San Francisco Bay on the southeast (WRIME, 2012).

Geologically, the WGB is comprised of two formations, consisting of bedrock and unconsolidated materials. The impermeable bedrock is composed of consolidated sediment of the Franciscan Complex and the Great Valley Sequence of late Jurassic and Cretaceous age. Unconsolidated materials overlying the bedrock comprise the water bearing formations. These consist of dune sands, the Colma Formation of Pleistocene age, and the Merced Formation of Pleistocene/ Pliocene age (Phillips and others, 1993; DWR, 2006).

Groundwater used for water supply within the WGB is generally pumped from the Merced and Colma formations. The Merced Formation is composed of sand and thin interbedded silt and clay layers of shallow marine depositional origin. The Colma Formation overlies the Merced Formation and consists of fine-grained sand, silty sand, and inter-fingered clay layers (DWR, 2006). Water is produced from the coarse-grained layers within these complex, layered formations (WRIME, 2012).

The WGB is subdivided for management purposes into northern and southern portions by the county line separating San Francisco and San Mateo counties. The county-line boundary between the "North Westside Basin" and the "South Westside Basin" does not have hydrogeological significance other than influencing the jurisdictional distribution of groundwater pumping. No geologic features restrict groundwater flow between the northern and southern parts of the WGB (SFPUC, 2016). Groundwater pumping has historically provided up to 50% of local water supply in the South Westside Basin for the communities of San Bruno, Daly City, and South San Francisco (WRIME, 2012), although current usage is significantly less as a proportion.

The WGB is not adjudicated and, in its recent evaluation of California groundwater basins, DWR determined that the WGB is not in overdraft and is a low priority basin (DWR, 2019). Recent evaluations by others have also found that current pumping is estimated to be within the basin's safe yield (WRIME, 2012).

2.2.2 Specific Plan Area

The Specific Plan Area includes a 92.2-acre area which is bounded by Interstate 380 to the north, El Camino Real to the east, San Bruno Avenue to the south and Interstate 280 to the west, excluding five parcels fronting El Camino Real and San Bruno Avenue that are included in the City's Transit Corridors Specific Plan Area. The land surface elevation is the greatest on the western side of the Specific Plan Area (~160 feet mean sea level, ft msl) and decreases across the Specific Plan Area, with the lowest elevation (~40 ft msl) being on the most eastern side of the Specific Plan Area.

Similarly, the groundwater elevation is the greatest on the western side of the Specific Plan Area (~110 ft msl) and gradually gets shallower on the eastern side of the Bayhill Specific Plan Site (~8 ft msl) as seen in Figure 2. The inferred groundwater elevation was based on the most recent existing data from the 2018 *ENGEO Preliminary Geotechnical Report for Environmental Impact Report Review* and wells at four Geotracker Sites (T0608100660, T0608100126, T0608100147, and T0608100537). Seasonal fluctuations in the local water table are expected, but the magnitude is unknown.

The Specific Plan Area is proposed to be developed in five phases (refer to Figure 3):

- Phase 1 includes Garages 1 and 3 with a buildout date of 2022.
- Phase 2 includes Garage 4 with a buildout date of 2023.
- Phase 3 includes Garage 7 with a buildout date of 2025.
- Phase 4 includes Garage 2 with a buildout date of 2030.
- Phase 5 includes Garages 5, 8 and 9 with a buildout date of 2035.
- Additional proposed Garages 6, 10, and 11 with construction dates to be determined.

Based on the inferred groundwater elevation, the proposed Garages 10, 11, 7, 2, 5, 8 and 9 will likely be constructed to depths that will intercept the water table and will require dewatering during construction

activities and water proofing construction thereafter. The preliminary dewatering analysis is discussed in Section 3.3 and in detail in Appendix A.

2.2.3 Phase 1 Site

The Phase 1 Site includes an area of 8.15-acres and is comprised of two separate parcels (020-015-020, 020-011-230) with two proposed parking garages (garages 1 and 3). The Phase 1 Site is bounded by Interstate 380 to the north, Grundy Lane to the south and Cherry Avenue to the west. The Phase 1 Site is relatively flat with a slightly lower elevation at the eastern side of the Site. The land surface elevation ranges from approximately 105 ft msl to 95 ft msl. The inferred groundwater elevation below the Phase 1 Site ranges from approximately 55 ft msl to 40 ft msl (see Figure 2). Based on currently available information, it appears that the proposed garages that will be constructed as part of Phase 1 will be completed above the water table and will not require dewatering during construction activities. However, as above, seasonal variations in the water table could change this preliminary finding.

3. TECHNICAL ASSESMENT OF POTENTIAL ISSUES ASSOCIATED WITH PROJECT DEWATERING OPERATIONS

3.1 Estimate of Construction Dewatering Rates and Volumes

Based on the available information, it appears that Phases 1 and 2 most likely will not require dewatering during construction activities. However, Phases 3, 4 and 5 will likely require dewatering of five garages (Garages 2, 5, 7, 8, and 9). There are two additional garages (10 and 11) that will likely require dewatering, but are not part of the currently-identified construction phases.

Construction dewatering information was not provided to EKI. Therefore, as described in Appendix A, construction dewatering volumes, discharge rates, and groundwater level changes due to construction dewatering were preliminarily estimated using Project design information, the estimated depth to the water table beneath the Specific Plan Area, representative aquifer parameters obtained from the San Bruno portion of Westside Basin Groundwater-Flow Model, and equations that simulate well-aquifer hydraulics.

As an example, for Phase 3 (Garage 7), the footprint of the planned subterranean garage is about 430,000 sq ft, and site conditions indicate about 20 acre-feet (AF) of water must be extracted initially to lower the water table 15 feet to the desired excavation depth (i.e., the estimated volume for construction dewatering assumes a drainable porosity equal to the specific yield from the Westside Basin Groundwater-Flow Model, which is 14%). Additional water must be extracted during the maintenance period until construction is complete.

The rate of discharge required to achieve 15 feet of drawdown depends on the number of dewatering wells and their yields. Assuming one month of continuous extraction is required to remove the estimated volume, the approximate discharge rate for the initial month is about 154 gallons per minute (gpm). After the target drawdown of 15 feet is achieved, we conservatively assumed that 25% to 50% of the initial extraction rate is required for maintenance purposes to remove groundwater that seeps from exposed

portions of the excavation walls, its base, or other unsealed areas[6]. Therefore, the estimated annual average discharge of construction dewatering over the one-year construction period is about 66 gpm. The corresponding total volume of water removed during the one-year construction period is estimated to be 106 AF. A similar process was followed to estimate the construction dewatering volumes and discharge rates during all of the construction phases. The results are summarized in Table 1. Additional detail and supporting calculations are provided in Appendix A.

Table 1
Summary of Estimated Dewatering Rates and Volumes

Construction Phase	Assumed Dewatering Period (months)		Construction Dewatering Discharge Rate (gpm)			Estimated Dewatering Volume (AF)
	Initial	Maintenance	Initial	Maintenance	Average Annual	
Phase 1 Garages 1 & 3	*No construction dewatering anticipated*					
Phase 2 Garage 4	*No construction dewatering anticipated*					
Phase 3 Garage 7	1	11	154	58	66	106
Phase 4 Garage 2	1	11	160	60	68	110
Phase 5 Garage 5	1	11	147	37	46	74
Phase 5 Garage 8	1	11	257	64	80	130
Phase 5 Garage 9	1	11	44	17	19	30
Garage 10	1	11	127	48	54	88
Garage 11	1	11	70	26	30	49
Total	--	--	--	--	--	**587**

However, we note that, depending on the actual site conditions encountered and the associated groundwater extraction rates and durations, the actual dewatering rates and volumes could be

[6] The assumed reduction in required dewatering volumes assumes that, consistent with EKI's understanding of typical construction practices, efforts will be made during construction to minimize groundwater seepage into the excavation (e.g., shoring). Maintenance dewatering discharge rates are assumed to differ based on the presence of impermeable boundaries. For detailed information on estimated dewatering discharge rates and volumes refer to Appendix A

significantly different than those estimated herein.

3.2 Identification of Potential Sensitive sites

3.2.1 Water Quality Sites and Issues of Concern

A preliminary evaluation of contaminated sites in the vicinity of the planned Specific Plan Area was performed utilizing GeoTracker, EnviroStor, and the *Phase I Environmental Site Assessment, 900 and 1000 Cherry Avenue, San Bruno, California* (Phase I ESA; Iris, 2015). Generally, the majority of currently or formerly contaminated sites located near, or co-located with, the Specific Plan Area are closed leaking underground storage tank (LUST) sites that likely do not present a serious concern for mobilization of contaminants due to construction dewatering; these sites are not shown on Figure 3.

A potentially problematic contaminated site exists at 999-1001 Bayhill Drive, titled the "Bayhill 7 Facility" on GeoTracker (see Figure 3). The Bayhill 7 Facility is located within the planned Phase 5 construction footprint. According to GeoTracker, an elevator hydraulic fluid leak was discovered at the Bayhill 7 Facility in 2004, followed by excavation of impacted soil. Further investigation in 2005 showed residual petroleum hydrocarbons in soil and groundwater at the Bayhill 7 Facility, but these impacts were deemed not a risk to public health and the environment. The Bayhill 7 Facility was closed under the San Mateo County Health Department Groundwater Protection Program (GPP) in 2009 with the condition that any proposed change in land use or proposed soil or groundwater removal activity be reviewed by the GPP (GPP, 2009); see letter included as Appendix B. Present conditions at the Bayhill 7 Facility are unknown.

Additionally, according to publicly available documents on GeoTracker, VOCs are present in groundwater to the east/southeast and within 450 feet of the planned Phase 5 construction footprint at 709 Camino Plaza. The 709 Camino Plaza site is titled "Mills Park Cleaners" on GeoTracker (see Figure 3). Tetrachloroethylene (PCE) is listed as the primary potential contaminant of concern.

Finally, we note that there is dry cleaner (Bayhill Plaza Cleaners) located immediately upgradient of the planned Phase I Site. Based on a search of GeoTracker and EnviroStor, as well as the environmental database review presented in the Phase I ESA, there do not appear to have been any investigations into any possible groundwater impacts associated with this active dry cleaning operation.

3.2.2 Planned Replacement Well 21

The City of San Bruno is planning to construct a new public water supply well (Proposed Well 21) approximately 300 feet north of the Specific Plan Area. The well site is located north of Interstate 380, east of Commodore Park and south of Commodore Drive West (see Figure 3). The well is planned to be competed to a depth of 500 ft bgs with a screened interval from 420 to 500 ft bgs. Proposed Garage 2, which will require dewatering, is located only 300 feet from the proposed well site.

3.3 Estimate of Groundwater Impacts from Dewatering Operations

As a measure of the potential impacts caused by the planned construction dewatering activity, the estimated water level drawdown at potentially sensitive sites within, and in the vicinity of, the Specific Plan Area are estimated, as shown on Figure 4.

For this analysis we conservatively evaluated the maximum drawdowns at each of the sensitive sites after one year, assuming a construction dewatering scenario that included one month of initial dewatering and 11 months of maintenance dewatering (see Table 1). For the dewatering analysis we placed a hypothetical dewatering well in the middle of each garage, see Appendix A for further details. As shown on Figure 4 and in Table 2, under this scenario, the absolute groundwater level impacts appear to be relatively minor at the known sensitive sites (i.e., less than five feet of impact), with the exception of Bayhill 7 Facility. Phase 5 includes the construction of three garages (5, 8 and 9). Garage 8 is planned to be constructed where the Bayhill 7 Facility is located, therefore the drawdown seen in Table 2 for Phase 5 includes the drawdown needed for construction of the garage (40 ft) and the additional drawdown due to simultaneous dewatering activities at garages 5 and 9 (3.92 ft). It is expected that once dewatering efforts cease, the water levels at the sensitive sites will return to pre-construction conditions. However, as explored in Section 4.2, even the minimal and short-term drawdown associated with construction dewatering may impact the migration of impacted groundwater.

Table 2
Summary of Estimated Drawdown at Sensitive Sites During Dewatering

Construction Phase	Estimated Drawdown at Sensitive Sites (ft)			
	Bayhill Plaza Cleaners	Proposed Well 21	Bayhill 7 Facility	Mills Park Cleaners
Phase 1	*No construction dewatering anticipated*			
Phase 2	*No construction dewatering anticipated*			
Phase 3	0.89	0.95	2.53	1.04
Phase 4	0.77	3.65	2.12	0.53
Phase 5	1.34	3.50	43.92 (a)	3.55
Additional Garages	3.85	0.57	0.31	0.10

Notes:

(a) Sensitive site Bayhill 7 Facility is located where the proposed Garage 8 is planned (see Figure 4). Garage 8 needs to be dewatered approximately 40 ft (i.e., the garage is proposed to be 50 ft deep and the water table is approximately 10 ft bgs). The water table is shallowest on the eastern side of the Specific Plan Area (see Figure 2) therefore the garages on the eastern side of the Specific Plan Area require more dewatering. The drawdown at Bayhill 7 Facility during Phase 5 is equal to the depth needed to dewater Garage 8 (40 ft) and the additional drawdown due to simultaneous dewatering activities at Garages 5 and 9 (i.e., an additional 3.92 ft).

We note that, depending on the actual site conditions encountered and associated groundwater extraction rates and durations, the actual drawdown and migration of groundwater at the sensitive sites could be significantly different than that estimated herein.

4. EVALUATION OF ENVIRONMENTAL IMPACTS – PROGRAM LEVEL

4.1 Thresholds of Significance

The assessment of environmental Impacts of the Bayhill Specific Plan is based on Appendix G CEQA checklist questions X.a, X.b and X.e[7]. Specifically,

- Would the project: (a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?
- Would the project: (b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Would the project: (e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

4.2 Impacts and Mitigation Measures

Would the project: (a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

Preliminary Findings. Dewatering is anticipated during construction of Phases 3 through 5, as well as during construction of Garages 9 and 10. The Bayhill 7 Facility site is co-located with the Phase 5 construction footprint. Therefore, Phase 5 construction plans will likely need to be reviewed by the GPP to determine impacts to water quality, as well as any waste discharge requirements during dewatering. Additionally, it is projected that during Phase 3 and Phase 4 there will be a water level drawdown of more than two feet at the Bayhill 7 Facility site (see Table 2). As such, we would recommend that the GPP be notified of the planned activities associated with the Specific Plan Area redevelopment.

The Mills Park Cleaners Site has soil and groundwater impacted by VOCs. The projected water level drawdown at this site ranges from 0.10 to 3.55 ft (see Table 2 and Figure 4). The greatest impact is estimated to occur during Phase 5 construction. Based on the estimated change to the gradient over the one year of construction dewatering, it is assumed that the current VOC plume could theoretically migrate almost 500 feet and reach the garage[8]. As such, we recommend that conditions at the Mills Park Cleaners

[7] http://resources.ca.gov/ceqa/docs/2019_CEQA_Statutes_and_Guidelines.pdf, accessed 15 July 2019.

[8] The VOC plume at the Mills Park Cleaner Site is located approximately 450 feet away from Garage 8. Previous water level elevation maps for the shallow water bearing zone indicate the horizontal gradient influencing plume migration was about 0.01 and to the southeast, away from the proposed garage location. Under dewatered conditions, the flow direction reverses from the southeast to the northwest and toward the garage, and the corresponding gradient under the maximum drawdown condition increases to about 0.09. Using the Darcy equation and the maximum gradient (the gradient calculated using the minimum groundwater elevation at the garage excavation and the maximum groundwater elevation at the plume edge), the estimated groundwater velocity is about 1.3 ft/day. Applying the velocity for the entire year, a particle of water near the plume edge could move almost 500 feet and reach the garage. However, this time-of-travel calculation is for a particle of water and does not include natural attenuation of dissolved constituents by sediment-constituent interactions which can substantially retard plume migration. Moreover, the calculation applies the maximum gradient to the entire 12-month dewatering period; the actual gradient would decreases with time as dewatering lowers groundwater elevations in the areas that surround

Site be monitored closely during all dewatering operations to ensure that significant changed conditions are not encountered, and that there be at least periodic sampling and chemical analysis of dewatering operation discharge.

If petroleum hydrocarbons or VOCs are detected in Phase 3 through 5 dewatering water, a Fuel and VOC General Permit must be obtained by the Regional Water Board prior to discharge of dewatering water to the storm drain. Per the Fuel and VOC General Permit, dewatering water must be fully characterized for a suite of contaminants of potential concern, after which treatment needs must be assessed and designed prior to permit approval. The Fuel and VOC General Permit also requires ongoing water quality monitoring and reporting, along with payment of an annual fee.

If petroleum hydrocarbons or VOCs are not detected in Phase 3 through 5 dewatering water, a Construction General Permit for Stormwater must be obtained from the State Water Board prior to discharge of dewatering water to the storm drain. Depending on the risk level determination for each phase of construction, monitoring and reporting of various water quality parameters, including pH and turbidity, may be required.

Recommended Mitigation. Potential water quality impacts may be encountered or incurred during construction dewatering. Appropriate notification, monitoring and permitting steps must be followed to mitigate any potential impacts, including coordination and contingency planning with the appropriate permitting and regulatory agencies.

Would the project: (b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Preliminary Findings. As shown in Table 1, the maximum amount of water expected to be dewatered from the Specific Plan Area in any given year is estimated to be 130 AF[9], which is approximately 1.5% of the total annual groundwater extractions from the South Westside Basin (8,564 AF) [10].

The total volume of groundwater anticipated to be extracted for dewatering purposes at the Specific Plan Area is estimated to be approximately 587 AF (see Table 1) over the 20-year Project buildout (30 AFY). This volume is approximately 0.35% of the projected annual groundwater extractions from the South Westside Basin (30 AFY/8,564 AFY = 0.35%)[11]. As such, the incremental volume of extraction associated

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the excavation. The time-of-travel calculation is therefore considered very conservative, and the estimated travel distance for dissolved VOCs at the end of 12-months is probably substantially less than the distance to the garage.

[9] As shown in Table 1, if Garage 8 of Phase 3 is dewatered within one year, the total estimated dewatering volume is 130 AF.

[10] Total groundwater extractions from the South Westside Basin in 2010 were 8,564 AFY, see Table 3.1 of the South Westside Basin Groundwater Management Plan, July 2012.

[11] This calculation takes the estimated total Project extraction of 587 AF and divides that over a 20-year period to get approximately 30 AFY. This calculation further assumes that 8,564 AF (the 2010 extraction rate) will continue to be extracted from the South Westside Basin each year for the next 20 years. Taken together, the yearly average dewatering volume (30 AF) is estimated to be approximately 0.35% of the annual groundwater extractions from the South Westside Basin (8,564 AF).

with dewatering operations during construction is not anticipated to impede sustainable groundwater management within the WGB.

The Proposed Well 21 is planned to be completed to a depth of 500 ft bgs with a screened interval from 420 to 500 ft bgs. During dewatering, the estimated drawdown at this well ranges from 0.57 to 3.65 ft. Since the well will be pulling water from 420 ft bgs, the drawdown from the dewatering efforts are anticipated to have a negligible effect on the water supply generated at this well.[12] We also note that, based on water level measurements collected in a nearby well (CUP-44-1 MW460), there is an average seasonal fluctuation of groundwater levels in the deep aquifer of approximately 10 ft throughout the year.[13]

The Specific Plan Area (92.2 acres) is less than 1% of the WGB area (25,400 acres). Given the already developed condition of the Specific Plan Area, development allowed by the Bayhill Specific Plan is not expected to result in a substantial increase in impervious surface area such that it would substantially interfere with groundwater recharge such that the Project would impede sustainable groundwater management of the WGB.

Recommended Mitigation. No significant impact has been identified; no mitigation is recommended.

Would the project: (e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Preliminary Finding. As shown in Table 1, the maximum amount of water expected to be dewatered from the Specific Plan Area in any given year is estimated to be 130 AF[14], which is approximately 1.5% of the total annual groundwater extractions from the South Westside Basin (8,564 AF) [15].

The total volume of groundwater anticipated to be extracted for dewatering purposes at the Specific Plan Area is estimated to be approximately 587 AF (see Table 1) over the 20-year Project buildout (or 30 AFY). This volume is approximately 0.35% of the projected total groundwater extractions from the South Westside Basin over that same 20-year time period[16].

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[12] According to the 2018 Annual Groundwater Monitoring Report for the Westside Basin (SFPUC, 2019b) the depth to water in the area of where proposed Well 21 will be located was approximately 270 ft bgs. This leaves a water column of approximately 150 ft above the screened interval of the proposed well and therefore a drawdown of 3.65 ft will not expose the screened interval. Additionally, the proposed Well 21 will be pulling water from the primary production aquifer, not the shallow aquifer.

[13] CUP-44-1 MW460 water level data from the 2018 Annual Groundwater Monitoring Report for the Westside Basin (SFPUC, 2019b). Seasonal fluctuation was calculated using water level data collected between 2009 and 2014.

[14] As shown in Table 1, if Garage 8 of Phase 3 is dewatered within one year, the total estimated dewatering volume is 130 AF.

[15] Total groundwater extractions from the South Westside Basin in 2010 were 8,564 AFY, see Table 3.1 of the South Westside Basin Groundwater Management Plan, July 2012.

[16] This calculation takes the estimated total Project extraction of 587 AF and divides that over a 20-year period to get approximately 30 AFY. This calculation further assumes that 8,564 AF (the 2010 extraction rate) will continue to be extracted from the South Westside Basin each year for the next 20 years. Taken together, the yearly average dewatering volume (30 AF) is estimated to be approximately 0.35% of the annual groundwater extractions from the South Westside Basin (8,564 AF).

These extraction volumes are not anticipated to obstruct implementation of a sustainable groundwater management plan or a water quality control plan for the WGB since they represent such a comparatively small amount of water.

Recommended Mitigation. No significant impact has been identified; no mitigation is recommended.

5. EVALUATION OF ENVIRONMENTAL IMPACTS – PHASE 1

5.1 Thresholds of Significance

The assessment of environmental Impacts of the Bayhill Specific Plan is based on Appendix G CEQA checklist questions X.a, X.b and X.e[17]. Specifically,

- Would the project: (a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?
- Would the project: (b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Would the project: (e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

5.2 Impacts and Mitigation Measures

Would the project: (a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

Preliminary Finding. Dewatering is not planned during Phase 1 construction since excavation depths during Phase 1 are not anticipated to extend below the anticipated groundwater level encountered at the Phase 1 Site. Additionally, no known contaminated sites are co-located with or located within the immediate vicinity of the planned Phase 1 construction. Therefore, it is not anticipated that Phase 1 construction will have a significant impact on water quality, waste discharge requirements, or surface and groundwater quality.

Recommended Mitigation. No significant impact has been identified; no mitigation is recommended.

Would the project: (b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Preliminary Findings. Dewatering is not planned during Phase 1 construction. As such, Phase 1 is not anticipated to decrease groundwater supplies locally and within the Westside Groundwater Basin.

[17] http://resources.ca.gov/ceqa/docs/2019_CEQA_Statutes_and_Guidelines.pdf, accessed 15 July 2019.

The Phase 1 Site area (8.15 acres) is less than 1% of the WGB area (25,400 acres). Given the already developed condition of the Phase 1 Site, development is not expected to result in a substantial increase in impervious surface area such that it would substantially interfere with groundwater recharge or impede sustainable groundwater management of the WGB.

Recommended Mitigation. No significant impact has been identified; no mitigation is recommended.

Would the project: (e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Preliminary Finding. Dewatering is not planned during Phase 1 construction since excavation depths during Phase 1 are not anticipated to extend below the anticipated groundwater level encountered at the Phase 1 Site. Therefore, it is not anticipated that Phase 1 construction will obstruct implementation of a sustainable groundwater management plan or a water quality control plan.

Recommended Mitigation. No significant impact has been identified; no mitigation is recommended.

6. EVALUATION OF ENVIRONMENTAL IMPACTS – "MAXIMUM POTENTIAL" SCENARIO

6.1 Estimate of Construction Dewatering Rates and Volumes

Construction dewatering information was not provided to EKI and there is significant uncertainty regarding the estimates presented above in Sections 3.1. Therefore, as described in Appendix A, a "maximum potential" scenario was developed to estimate potential construction dewatering volumes, discharge rates, and groundwater level changes due to construction dewatering. Specifically, the following is assumed:

- All seven garages will be dewatered simultaneously;
- The garages will initially be dewatered in a one-month period and will require the highest maintenance rate (50% of the initial dewatering rate) for eleven months; and
- The construction dewatering discharge rate for each hypothetical dewatering well is based on the footprint of the planned subterranean garage, the dewatering depth required for each garage, and aquifer properties[18].

Using the assumptions above, and based on the analysis presented in Appendix A, the estimated total discharge rate for the initial month of dewatering totals 959 gpm, as seen below in Table 3. The estimated total discharge rate for the 11-month maintenance period is 478 gpm. Therefore, the total annual average discharge of construction dewatering water over the one-year construction period from all of the garages is estimated to be 519 gpm.

The corresponding total volume of water removed from each garage during the year of construction is estimated to range from 38 AF (Garage 9) to 224 AF (Garage 8) with a total of 837 AF of water being removed.

[18] We note that the aquifer properties are another significant source of uncertainty which could impact potential dewatering rates and volumes.

Table 3
Summary of Estimated Dewatering Rates and Volumes Under the "Maximum Potential" Scenario

Garage	Assumed Dewatering Period (months)		Construction Dewatering Discharge Rate (gpm)			Estimated Dewatering Volume (AF)
	Initial	Maintenance	Initial	Maintenance	Average Annual	
2	1	11	160	80	87	140
5	1	11	147	73	79	128
7	1	11	154	77	83	134
8	1	11	257	128	139	224
9	1	11	44	22	24	38
10	1	11	127	63	69	111
11	1	11	70	35	38	62
Total	**--**	**--**	**959**	**478**	**519**	**837**

6.2 Estimate of Groundwater Impacts from Dewatering Operations

As a measure of the potential maximum impact of dewatering operations, the estimated water level drawdown at potentially sensitive sites within, and in the vicinity of, the Specific Plan Area are estimated below in Table 4 and shown on Figure 5.

For this dewatering analysis a hypothetical dewatering well was placed in the middle of each garage and pumped simultaneously for a year period (see Appendix A for further details). Under this scenario, the absolute groundwater level impacts are greater than the phased scenarios, but the duration of the impact is limited (i.e., less than one year). It is expected that once dewatering efforts cease, the water levels at the sensitive sites will eventually return to pre-construction conditions. However, as explored in Section 6.4, even the short-term drawdown associated with construction dewatering may impact the migration of impacted groundwater.

Table 4
Summary of Estimated Drawdown at Sensitive Sites During Dewatering
Under the "Maximum Potential" Scenario

Construction Phase	Estimated Drawdown at Sensitive Sites (ft)			
	Bayhill Plaza Cleaners	Proposed Well 21	Bayhill 7 Facility	Mills Park Cleaners
All garages dewatered simultaneously	8.82	12.2	52.2 (a)	7.85

Note:

(a) Sensitive site Bayhill 7 Facility is located where the proposed Garage 8 is planned (see Figure 4). Garage 8 needs to be dewatered approximately 40 ft (i.e., the garage is proposed to be 50 ft deep and the water table is approximately 10 ft bgs). The water table is shallowest on the eastern side of the Specific Plan Area therefore the garages on the eastern side of the Specific Plan Area require more dewatering. The drawdown

at Bayhill 7 Facility is equal to the depth needed to dewater Garage 8 (40 ft) and the additional drawdown due to simultaneous dewatering activities (i.e., an additional 12.2 ft).

We note that, depending on the actual site conditions encountered and associated groundwater extraction rates and durations, the actual drawdown and migration of groundwater at the sensitive sites could be significantly different than that estimated herein.

6.3 Threshold of Significance

The assessment of environmental Impacts of the Bayhill Specific Plan is based on Appendix G CEQA checklist questions X.a, X.b and X.e[19]. Specifically,

- Would the project: (a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?
- Would the project: (b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Would the project: (e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

6.4 Impacts and Mitigation Measures

Would the project: (a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

Preliminary Findings. The Bayhill 7 Facility site is co-located with the Garage 8 construction footprint. Therefore, the simultaneous dewatering construction plans will likely need to be reviewed by the GPP to determine impacts to water quality, as well as any waste discharge requirements during dewatering. Additionally, under this scenario, it is projected there will be a water level drawdown of more than ten feet at the Bayhill 7 Facility site (see Table 4). As such, we would recommend that the GPP be notified of the planned activities associated with the Specific Plan Area redevelopment.

The Mills Park Cleaners Site has soil and groundwater impacted by VOCs. The projected water level drawdown at this site under this scenario is 7.85 ft (see Table 4). Based on the estimated change to the gradient over the one year of construction dewatering, it is assumed that the current VOC plume could theoretically migrate 500 feet and reach Garage 8[20]. As such, per Section 4.2 (Impacts and Mitigation Measures), it is recommended that conditions at the Mills Park Cleaners Site be monitored closely during all dewatering operations to ensure that significant changed conditions are not encountered, and that there be at least periodic sampling and chemical analysis of dewatering operation discharge.

If petroleum hydrocarbons or VOCs are detected in the dewatering water, a Fuel and VOC General Permit must be obtained by the Regional Water Board prior to discharge of dewatering water to the storm drain.

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[19] http://resources.ca.gov/ceqa/docs/2019_CEQA_Statutes_and_Guidelines.pdf, accessed 15 July 2019.

[20] The VOC plume at the Mills Park Cleaner Site is located approximately 450 feet away from Garage 8. Previous water level elevation maps for the shallow water bearing zone indicate the horizontal gradient influencing plume migration was about 0.01 and to the southeast, away from the proposed garage location. Under dewatered conditions, the flow direction reverses from the southeast to the northwest and toward the garage, and the

Per the Fuel and VOC General Permit, dewatering water must be fully characterized for a suite of contaminants of potential concern, after which treatment needs must be assessed and designed prior to permit approval. The Fuel and VOC General Permit also requires ongoing water quality monitoring and reporting, along with payment of an annual fee.

If petroleum hydrocarbons or VOCs are not detected in the dewatering water, a Construction General Permit for Stormwater must be obtained from the State Water Board prior to discharge of dewatering water to the storm drain. Depending on the risk level determination for each phase of construction, monitoring and reporting of various water quality parameters, including pH and turbidity, may be required.

Recommended Mitigation. Consistent with the recommendation in Section 4.2 (Impacts and Mitigation Measures), potential water quality impacts may be encountered or incurred during construction dewatering. Appropriate notification, monitoring and permitting steps must be followed to mitigate any potential impacts, including coordination and contingency planning with the appropriate permitting and regulatory agencies.

Would the project: (b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Preliminary Findings. The Specific Plan Area (92.2 acres) is less than 1% of the WGB area (25,400 acres). Given the already developed condition of the Specific Plan Area, development allowed by the Bayhill Specific Plan is not expected to result in a substantial increase in impervious surface area such that it would substantially interfere with groundwater recharge or impede sustainable groundwater management of the WGB.

The total volume of groundwater anticipated to be extracted for dewatering purposes at the Specific Plan Area for this scenario is anticipated to be 837 AF. This volume is approximately 9.8% of the total yearly groundwater extractions from the South Westside Basin (8,564 AF).[21] While this volume of extraction is close to 10% of the total groundwater extractions from the South Westside Basin, given its short duration, it is not anticipated to significantly decrease groundwater supplies locally and within the WGB.

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corresponding gradient under the maximum drawdown condition increases to about 0.1. Using the Darcy equation and the maximum gradient (the gradient calculated using the minimum groundwater elevation at the garage excavation and the maximum groundwater elevation at the plume edge), the estimated groundwater velocity is about 1.4 ft/day. Applying the velocity for the entire year, a particle of water near the plume edge could move more than 500 feet and reach the garage. However, this time-of-travel calculation is for a particle of water and does not include natural attenuation of dissolved constituents by sediment-constituent interactions which can substantially retard plume migration. Moreover, the calculation applies the maximum gradient to the entire 12-month dewatering period; the actual gradient would decrease with time as dewatering lowers groundwater elevations in the areas that surround the excavation. The time-of-travel calculation is therefore considered very conservative, and the estimated travel distance for dissolved VOCs at the end of 12-months is probably substantially less than the distance to the garage.

[21] Total groundwater extractions from the South Westside Basin in 2010 were 8,564 AFY, see Table 3.1 of the South Westside Basin Groundwater Management Plan, July 2012.

The Proposed Well 21 is planned to be completed to a depth of 500 ft bgs with a screened interval from 420 to 500 ft bgs. During the dewatering period, the estimated drawdown at this well is projected to be as much as 12.2 ft. Based on water level measurements collected in a nearby well (CUP-44-1 MW460) there is an average seasonal fluctuation of groundwater levels of approximately 10 ft throughout the year.[22] The estimated short-term drawdown of 12.2 ft therefore is generally similar to rates of the natural seasonal fluctuation and would not be expected to substantially decrease groundwater supplies. Further, since the well will be pulling water from 420 ft bgs, the drawdown from the short-term dewatering efforts is not anticipated to have a significant effect on the water supply generated at this well.[23]
Recommended Mitigation. Taken on its own, even the dewatering volumes anticipated under this "maximum potential" scenario are not expected to have a long-term impact on groundwater sustainability within the WGB. However, in order to ensure that is the case, it is recommended that the Project dewatering be required to be phased such that extractions do not exceed more than 2.5% of total pumping from the South Westside Basin (e.g., less than 200 AF per year and less than 1,000 AF over five years).

Would the project: (e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Preliminary Findings. The total volume of groundwater anticipated to be extracted for dewatering purposes at the Specific Plan Area for this scenario is anticipated to be 837 AF. This volume is approximately 9.8% of the total yearly groundwater extractions from the South Westside Basin (8,564 AF).[24] While this volume of extraction is close to 10% of the total groundwater extractions from the South Westside Basin, given its short duration, it is not anticipated to significantly conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Recommended Mitigation. Taken on its own, even the dewatering volumes anticipated under this "maximum potential" scenario are not expected to have a long-term impact on groundwater sustainability within the WGB. However, in order to ensure that is the case, it is recommended that the Project dewatering be required to be phased such that extractions do not exceed more than 2% of total pumping from the South Westside Basin (i.e., less than 200 AF per year and less than 1,000 AF over five years).

7. GENERAL RECOMMENDATIONS FOR CONSIDERATION RELATED TO CONSTRUCTION DEWATERING

Per the City's request, based on the preliminary analysis conducted to date, the City may consider the following general recommendations related to management of all construction dewatering activities within the City.

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[22] CUP-44-1 MW460 water level data from the 2018 Annual Groundwater Monitoring Report for the Westside Basin (SFPUC, 2019b). Seasonal fluctuation was calculated using water level data collected between 2009 and 2014.
[23] According to the 2018 Annual Groundwater Monitoring Report for the Westside Basin (SFPUC, 2019b) the depth to water in the area of where proposed Well 21 will be located was approximately 270 ft bgs. This leaves a water column of approximately 150 ft above the screened interval of the proposed well and therefore a drawdown of 12.2 ft will not expose the screened interval. Additionally, the proposed Well 21 will be pulling water from the primary production aquifer not the shallow aquifer.
[24] Total groundwater extractions from the South Westside Basin in 2010 were 8,564 AFY, see Table 3.1 of the South Westside Basin Groundwater Management Plan, July 2012.

1. Require Project proponents to provide estimates of construction dewatering duration, rates, volumes and methods as part of project consideration. If anticipated or observed rates exceed or approach 2.5% of total pumping from the South Westside Basin (i.e., less than 200 AF per year and less than 1,000 AF over five years), additional analysis must be required to assess potential impacts.
2. Require the installation of monitoring wells to measure water levels and water quality, prior to and during dewatering activities, with a focus on potential constituents of concern based on permitting requirements and known or suspected water quality impacts within or near the development site.
3. Require water proof garages such that dewatering activities are not on-going.
4. Require updated evaluations radius of impact and estimated volume of dewatering water once construction dewatering efforts are underway and site conditions are better understood. If anticipated or observed rates exceed or approach than 2.5% of total pumping from the South Westside Basin (i.e., less than 200 AF per year and less than 1,000 AF over five years), additional analysis must be required to assess potential impacts.
5. Limit volume, rates or timing of dewatering water discharge based on City storm drain or other utility capacity constraints, as applicable.
6. Require dewatering to occur in phases such that extraction rates do not exceed 2.5% of total pumping from the South Westside Basin (i.e., less than 200 AF per year and less than 1,000 AF over five years).

As additional information, a summary of dewatering requirements for other local cities is included as Appendix C.

TABLES

FIGURES

APPENDICES

Appendix A. Bayhill Specific Plan Dewatering Analysis

Appendix B. Bayhill 7 Facility Site Closure Letter

Appendix C. Palo Alto Guidance Document and Summary of Dewatering Requirements for Local Cities

REFERENCES

CEQA, 2019. California Environmental Quality Act Statute and Guidelines 2019, accessed 24 July 2019.

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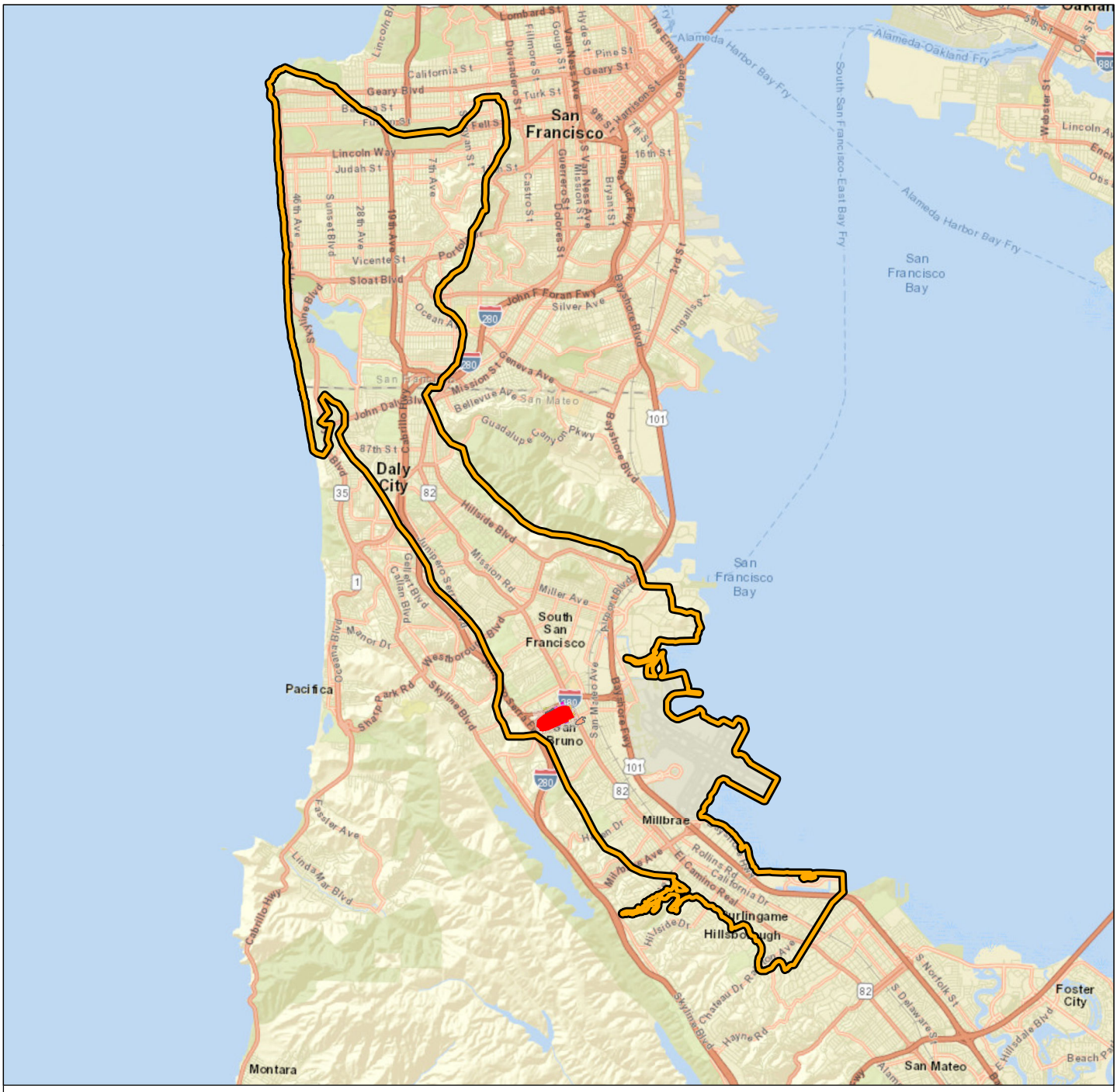

Legend

Proposed Project Planning Area

Westside Groundwater Basin (DWR Basin No. 2-35)

Notes

1. All locations are approximate.

N

0 2 4

Miles

Sources

1. DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - updated 11 February 2019.
2. Basemap is ESRI's ArcGIS Online world topopgraphic map, obtained 17 July 2019.

Proposed Project Location in the Westside Basin

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Bayhill Development
San Bruno, CA
March 2020
B90090.00

Figure 1

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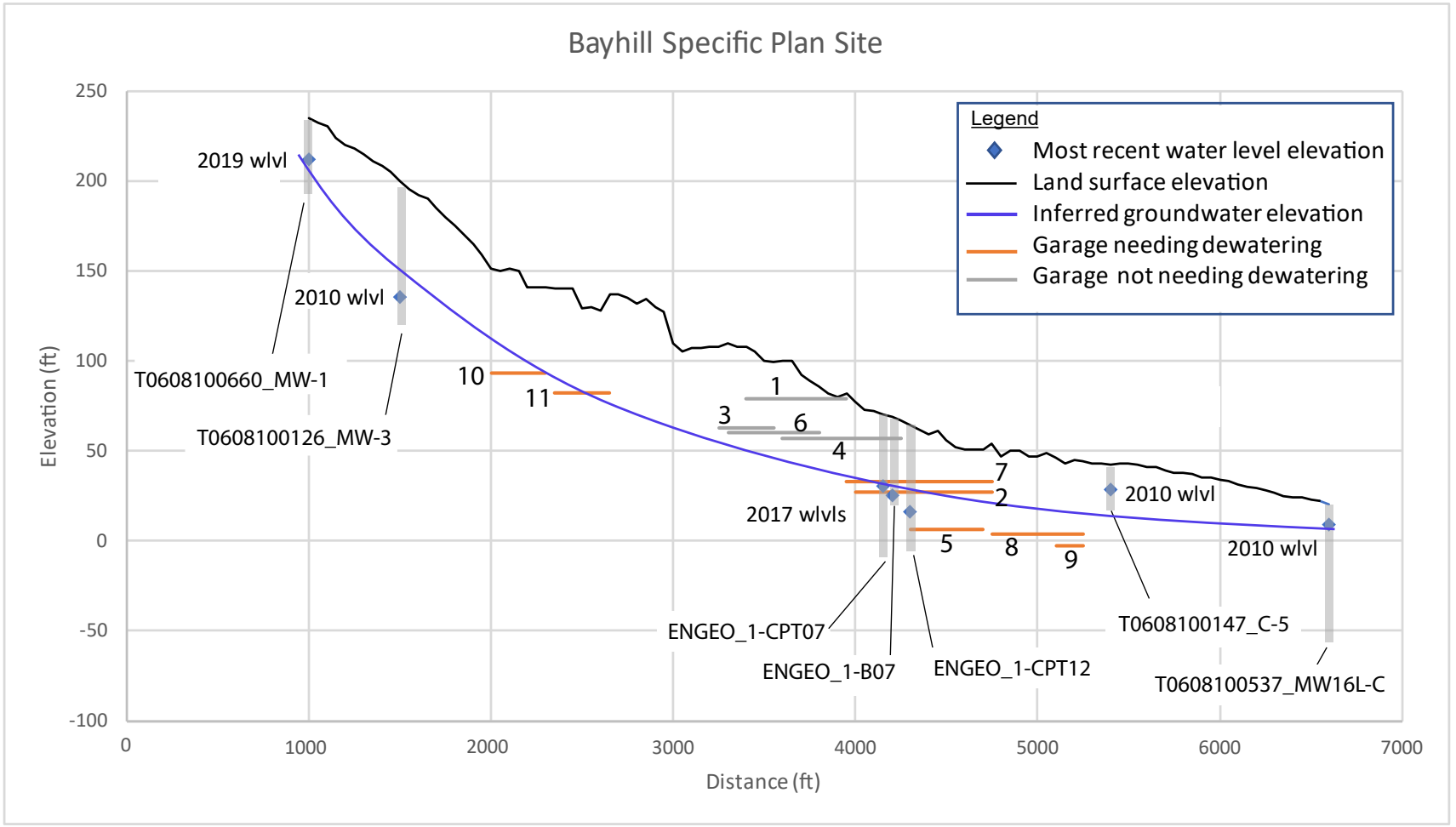

Abbreviations
GWE = Groundwater Elevation
wlvls = waterlevels

Notes
1. All locations are approximate.
2. Groundwater elevation is inferred from most recent water level data.

Sources
1. Water level data from 2018 ENGEO, Preliminary Geotechnical Report for Environmental Impact Report Review and Geotracker sites: https://geotracker.waterboards.ca.gov/

Profile View of Proposed Site with Inferred Groundwater Elevation

Bayhill Development
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Figure 2

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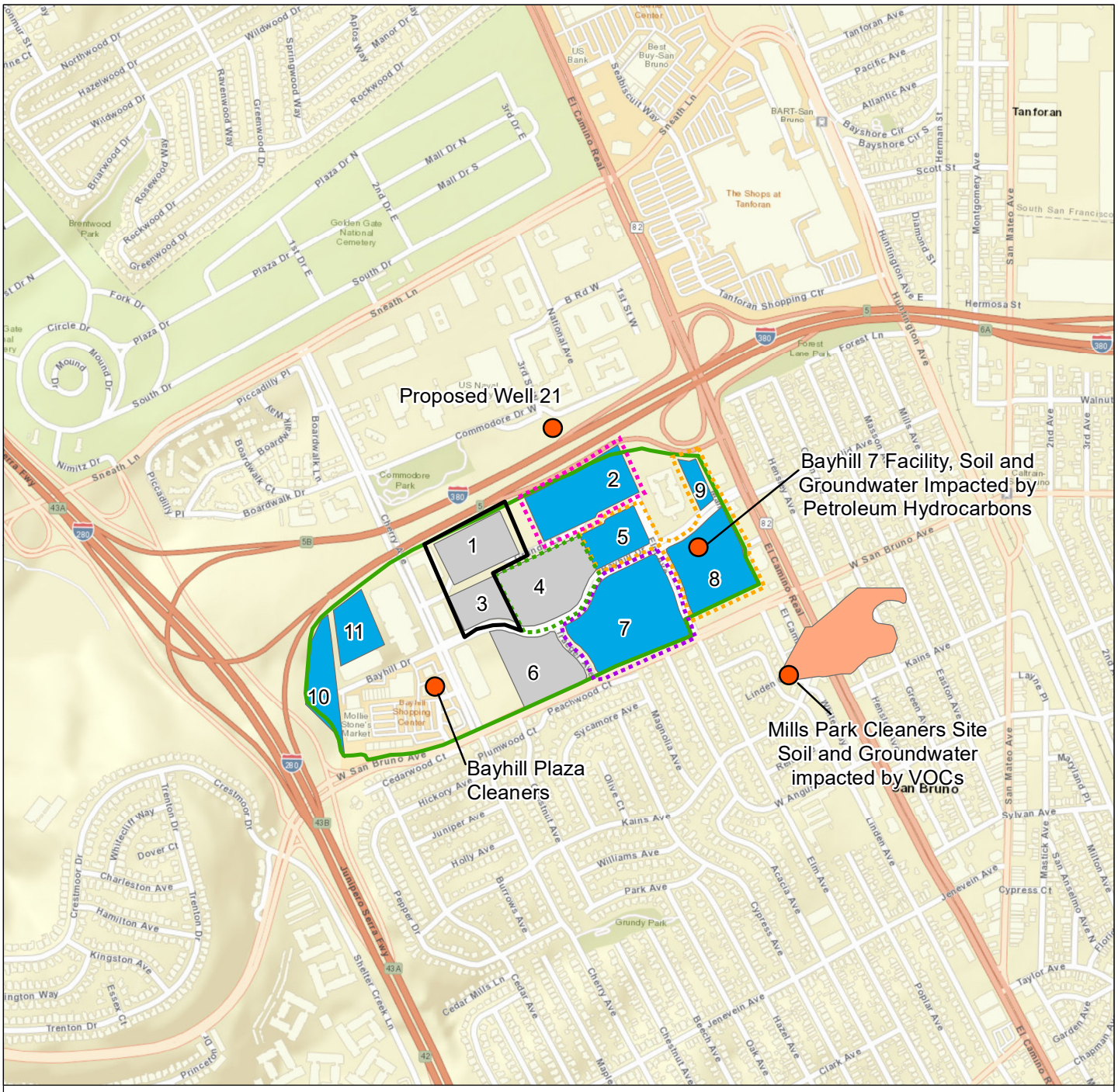

Legend

- Sensitive Sites
- Specific Plan Area
- PCE Plume 2017

Proposed Garages

- No Dewatering Needed
- Dewatering Needed

Construction Phases

- Phase 1 - Buildout 2022
- Phase 2 - Buildout 2023
- Phase 3 - Buildout 2025
- Phase 4 - Buildout 2030
- Phase 5 - Buildout 2035

Notes

1. All locations are approximate.

N

0 1,000 2,000

Feet

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 17 July 2019.

Proposed Subterranean Parking Garages
Bayhill Specific Plan

DRAFT

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Bayhill Development
San Bruno, CA
March 2020
B90090.00

Figure 3

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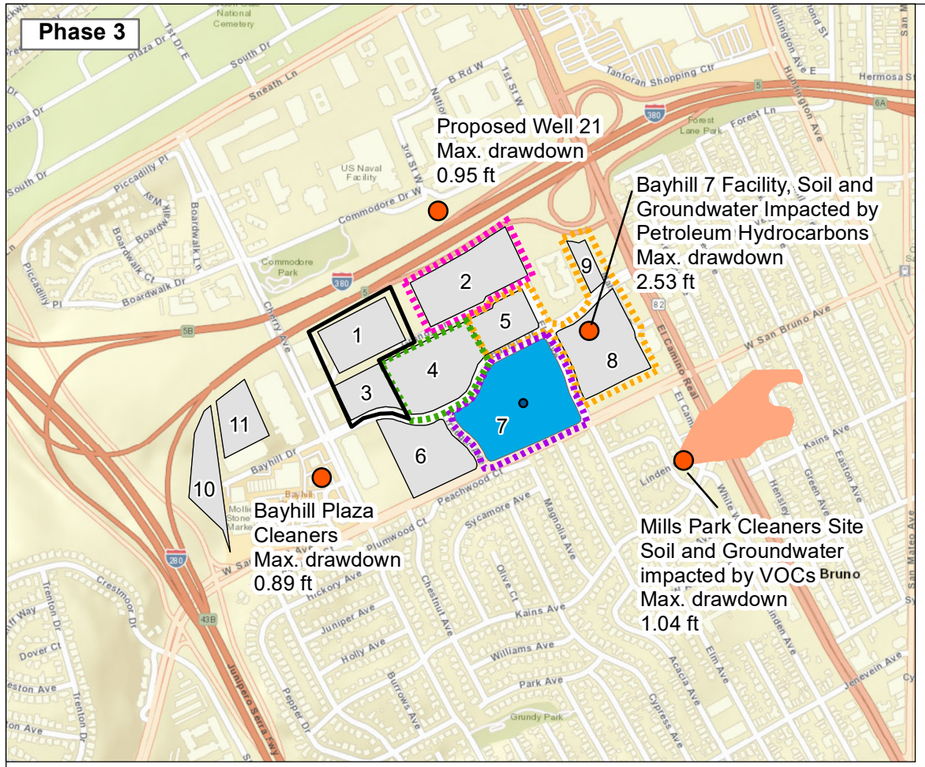

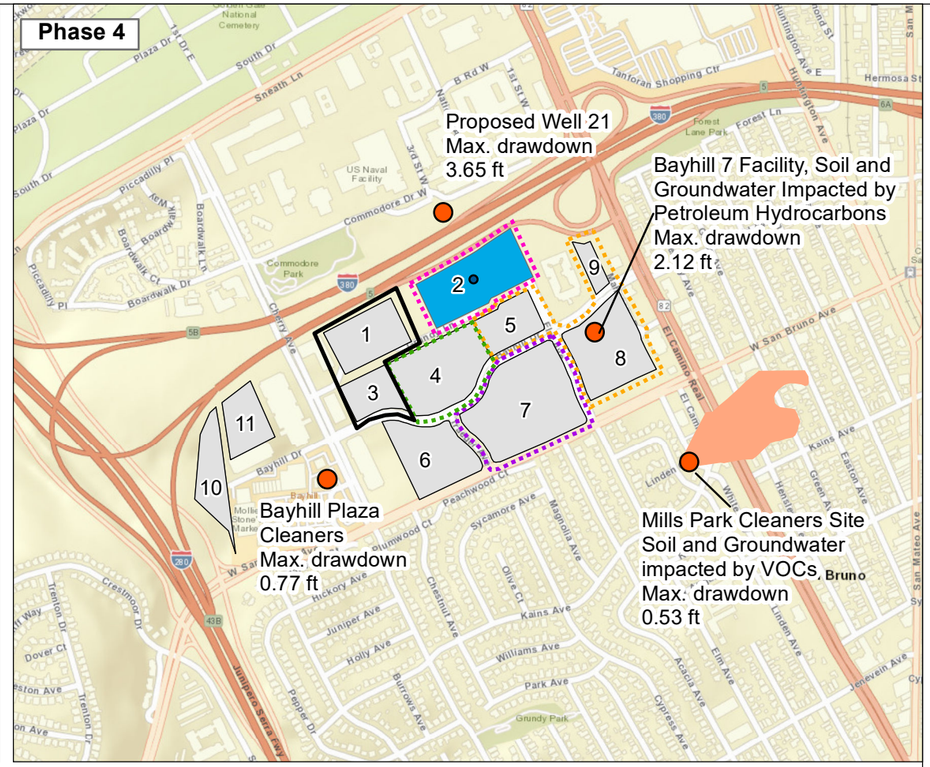

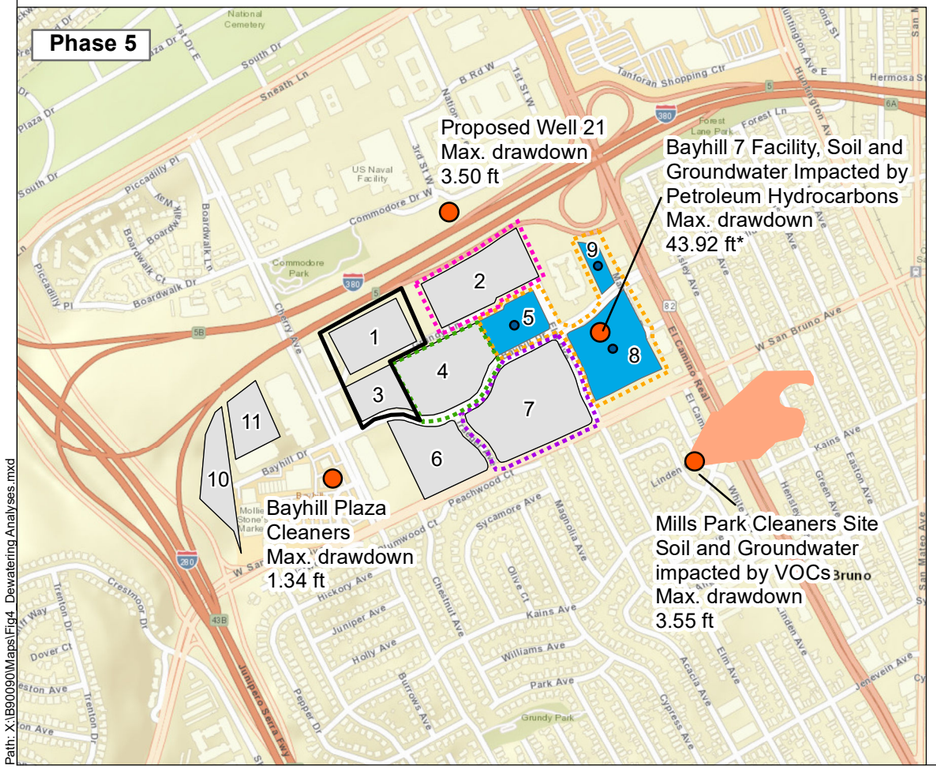

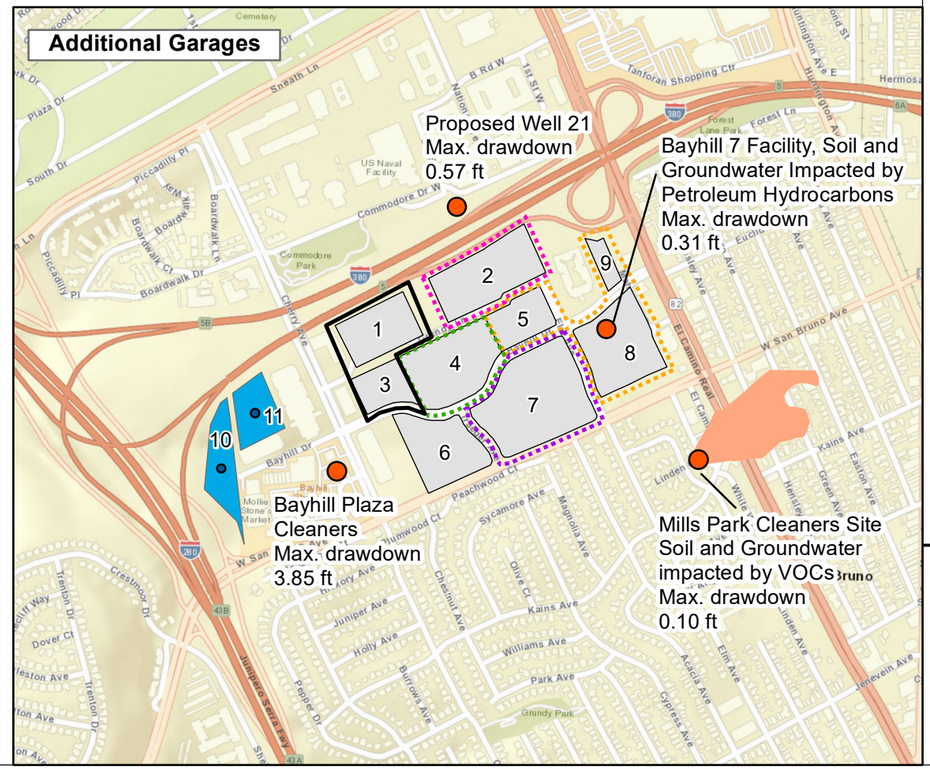

Legend

- Hypothetical Dewatering Well
- Sensitive Sites
- PCE Plume 2017

Construction Phases

- Phase 1 - Buildout 2022
- Phase 2 - Buildout 2023
- Phase 3 - Buildout 2025
- Phase 4 - Buildout 2030
- Phase 5 - Buildout 2035

Proposed Garage

- Not being dewatered during current phase
- Dewatering needed during current phase

Abbreviations

ft = feet
Max. = Maximum
PCE = Tetrachloroethylene
VOCs = Volatile organic compounds

Notes

1. All locations are approximate.
2. Sensitive site Bayhill 7 Facility is located where proposed garage 8 is. The drawdown is equal to the depth needed to dewater garage 8 for construction activities.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 25 July 2019.

N

0 1,000 2,000
Feet

DRAFT

Estimated Drawdown at Sensitive Sites

Bayhill Development
San Bruno, CA
March 2020
B90090.00
Figure 4

eki environment & water

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Legend

- Sensitive Site
- Hypothetical Dewatering Well
- Specific Plan Area
- PCE Plume 2017

Proposed Garages

- No Dewatering Needed
- Dewatering Needed

Notes
1. All locations are approximate.

N

0 1,000 2,000
Feet

Sources
1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 17 July 2019.

"Maximum Potential Scenario"
Estimated Drawdown at Sensitive Sites
Bayhill Specific Plan

DRAFT

Bayhill Development
San Bruno, CA
March 2020
B90090.00

Figure 5

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APPENDIX A

BAYHILL SPECIFIC PLAN DEWATERING ANALYSIS

13 March 2020

APPENDIX A
BAYHILL SPECIFIC PLAN DEWATERING ANALYSIS

Included herein is a summary of the dewatering analysis approach and assumptions used to estimate the dewatering effects throughout each construction phase of the Bayhill Specific Plan (also referred to herein as the "Project") development, shown in Figure 1. Given the high degree of uncertainty at this time, a range of values is presented for all projected pumping rates and drawdown estimates.

1. BACKGROUND

The proposed garage depths in Phases 3, 4 and 5 of Project construction, as well as two additional garages that are not part of the currently-identified construction phases, intercept the water table and will require dewatering during construction (see Figure 2). In order to achieve and maintain the necessary drawdown within the garages, groundwater extractions are needed across the construction sites. Hence, an estimation of the total dewatering volume and required pumping rate to maintain the water table level below the garage depth is required for each phase of the Project construction.

Construction dewatering information was not provided. Therefore, construction dewatering volumes, discharge rates, and groundwater level changes due to construction dewatering were preliminarily estimated using Project design information, estimated depth to the water table beneath the Specific Plan Area, representative aquifer parameters obtained from the San Bruno portion of Westside Basin Groundwater-Flow Model (HydroFocus Inc., 2017), and equations that simulate well-aquifer hydraulics. Specifically, the water storage and transmitting properties of shallow zone water-bearing sediments were represented as follows: specific yield (0.14), hydraulic conductivity (2 feet per day), and assumed shallow aquifer thickness (300 feet).

We note that, depending on the actual site conditions encountered and associated groundwater extraction rates and durations, the actual dewatering rates and volumes could be significantly different than those estimated herein.

2. ESTIMATED DEWATERING VOLUME

The first step of the dewatering analysis estimated the total volume of dewatering needed for the construction of the garages. The dewatering volume is comprised of: (1) the "initial dewatering volume", which is the volume of water within the garage area and its excavation depth that must be extracted to dewater the garage excavation area, and (2) the "construction maintenance volume", which is the volume of water that will seep into the garage excavation from exposed portions of the excavation walls, its base, or other unsealed areas during construction and must be extracted.

The initial dewatering volume was calculated by multiplying the garage footprint area, the saturated depth interval of sediments planned for excavation, and the aquifer properties.[1] Assuming the construction period is one year, and that one to three months of continuous extraction is required to remove the initial dewatering volume, the "initial pumping rate" was calculated by dividing the initial

[1] The water storage and transmitting properties of shallow zone water-bearing sediments were represented by the specific yield and hydraulic conductivity, respectively. The values for specific yield (0.14), hydraulic conductivity (2 feet per day), and assumed shallow aquifer thickness (300 feet) were obtained from the Westside Groundwater Basin Model (HydroFocus Inc., 2017).

dewatering volume by the assumed range of potential initial extraction periods (one-, two-, or three months).

The maintenance pumping rate could range between 25% and 50% of the initial pumping rate and that such pumping rates would be required throughout the remainder of the one-year construction period (eleven to nine months, respectively). As shown in Table A-1, for most construction phases, the assumed maintenance pumping rate was assumed to be the average percentage based on the low and high rates (i.e., 37.5%). For certain garages, where the presence of impermeable boundaries from previously constructed garages becomes a factor, the assumed low maintenance pumping rate (25%) was used.

Table A-1
Summary of Estimated Dewatering Rates and Volumes

Construction Phase	Assumed Dewatering Period (months)		Construction Dewatering Discharge Rate (gpm)					Total Dewatering Volume (AF)
	Initial	Maintenance	Initial	Maintenance			Average Annual	
				Low (25%)	High (50%)	Average (37.5%)		
Phase 1	*No construction dewatering anticipated*							
Phase 2	*No construction dewatering anticipated*							
Phase 3 Garage 7[a]	**1**	**11**	**154**	--	--	**58**	**66**	**106**
	2	10	77	--	--	29	37	60
	3	9	51	--	--	19	27	44
Phase 4 Garage 2[a]	**1**	**11**	**160**	**--**	**--**	**60**	**68**	**110**
	2	10	80	--	--	30	38	62
	3	9	53	--	--	20	28	46
Phase 5 Garage 5[b]	**1**	**11**	**147**	**37**	**--**	**--**	**46**	**74**
	2	10	73	18	--	--	27	44
	3	9	49	12	--	--	21	35
Phase 5 Garage 8[b]	**1**	**11**	**257**	**64**	**--**	**--**	**80**	**130**
	2	10	128	32	--	--	48	78
	3	9	86	21	--	--	37	61
Phase 5 Garage 9[a]	**1**	**11**	**44**	**--**	**--**	**17**	**19**	**30**
	2	10	22	--	--	8	10	17
	3	9	15	--	--	6	8	12
Garage 10[a]	**1**	**11**	**127**	**--**	**--**	**48**	**54**	**88**
	2	10	63	--	--	24	30	49
	3	9	42	--	--	16	22	36
Garage 11[a]	**1**	**11**	**70**	**--**	**--**	**26**	**30**	**49**
	2	10	35	--	--	13	17	27
	3	9	23	--	--	9	12	20

Note: Scenarios in **bold** were utilized to calculate maximum drawdown due to construction dewatering and are used as the basis of the summary results presented in the Technical Memorandum.

(a) Assumed maintenance pumping rate equals 37.5% of initial pumping rate.
(b) Assumed maintenance pumping rate equals 25% of initial pumping rate.

Actual groundwater extraction rates, pumping duration, and dewatering volumes will depend on actual site conditions, which may vary from the assumed conditions used to calculate the results reported in Table A-1.

3. ESTIMATED DRAWDOWN

The possible impacts from dewatering operations at the Sensitive Sites shown on Figure 3 were estimated by calculating the drawdown resulting from the extraction of groundwater for construction dewatering. The drawdown distribution from pumping was estimated using Papadopulos and Cooper's drawdown solution for pumping from a large-diameter well (Papadopulos, 1967). This approach represents the excavation as a hypothetical dewatering well, with a casing area equal to the footprint of the proposed garage excavation. The model AQTESOLV (Duffield, 2007) was used to solve the equations and simulate the relationship between pumping rate, extraction period, and drawdown.

Table A-2 shows the maximum drawdown at the Sensitive Sites (refer to Figure 4) identified in the vicinity of the Project. These drawdown estimates assume one month of initial dewatering pumping followed by 11 months of maintenance pumping. The drawdown estimated in Phase 5 and the Additional Garages assumes that the multiple garages include din those phases will be dewatered at the same time; if those garages are dewatered sequentially, the drawdown would be less.

Table A-2
Estimated Maximum Drawdown at Select Sites at the End of Dewatering Operations

Construction Phase	Estimated Drawdown After One-Year at Sensitive Sites (feet, ft)			
	Bayhill Plaza Cleaners	Proposed Well 21	Bayhill 7 Facility	Mills Park Cleaners
Phase 1	*No construction dewatering anticipated*			
Phase 2	*No construction dewatering anticipated*			
Phase 3	0.89	0.95	2.53	1.04
Phase 4	0.77	3.65	2.12	0.53
Phase 5	1.34	3.50	43.92 (a)	3.55
Additional Garages	3.85	0.57	0.31	0.10

Notes:

(a) The Bayhill 7 Facility is located where the proposed Garage 8 is planned. Garage 8 needs to be dewatered approximately 40 ft (i.e., the garage is proposed to be 50 ft deep and the water table is approximately 10 ft bgs). The drawdown at the Bayhill 7 Facility during Phase 5 is equal to the depth needed to dewater Garage 8 (40 ft) and the additional drawdown due to simultaneous dewatering activities at Garages 5 and 9 (i.e., an additional 3.92 ft).

Actual construction de-watering requirements, drawdowns, and changes in groundwater-flow patterns depend on site conditions, which may vary from the assumed conditions used to calculate the results reported in Table A-2.

4. MAXIMUM POTENTIAL SCENARIO

A "maximum potential scenario" was developed to estimate the maximum potential construction dewatering volumes, discharge rates, and groundwater level changes due to construction dewatering, assuming the following: (1) All seven garages will be dewatered simultaneously; (2) The garages will initially be dewatered in a one-month period and will require the highest maintenance rate (50% of the initial dewatering rate) for eleven months; and (3) the construction dewatering discharge rate for each hypothetical dewatering well is based on the footprint of the planned subterranean garage, the dewatering depth required for each garage, and aquifer properties[2].

As described in Section 2, the first step of the dewatering analysis is to estimate the total volume of dewatering needed for the construction of the garages. The dewatering volume is comprised of the initial dewatering volume, which is the volume of water within the garage area and its excavation depth, and the construction maintenance volume, which is the volume of water pumped that seeps into the garage excavation from exposed portions of the excavation walls, its base, or other unsealed areas during construction.

The initial dewatering volume was calculated by multiplying the garage footprint area, the saturated depth interval of sediments planned for excavation, and their aquifer properties.[3] Assuming the construction period is one year, and that one month of continuous extraction is required to remove the initial dewatering volume, the initial pumping rate was calculated by dividing the initial dewatering volume by the extraction period. The maintenance pumping rate is assumed to be 50% of the initial pumping rate and to be required throughout the remaining eleven months of the one-year construction period. The resultant dewatering discharge rates and volumes are summarized below in Table A-3 (refer to Figure 5).

Table A-3
Summary of Estimated Dewatering Rates and Volumes Under the "Maximum Potential Scenario"

Garage	Assumed Dewatering Period (months)		Construction Dewatering Discharge Rate (gpm)			Estimated Dewatering Volume (AF)
	Initial	Maintenance	Initial	Maintenance (50%)	Average Annual	
2	1	11	160	80	87	140
5	1	11	147	73	79	128
7	1	11	154	77	83	134

[2] We note that the aquifer properties are another significant source of uncertainty which could impact potential dewatering rates and volumes.

[3] The water storage and transmitting properties of shallow zone water-bearing sediments were represented by the specific yield and hydraulic conductivity, respectively. The values for specific yield (0.14), hydraulic conductivity (2 feet per day), and assumed shallow aquifer thickness (300 feet) were obtained from the Westside Groundwater Basin Model (HydroFocus Inc., 2017).

8	1	11	257	128	139	224
9	1	11	44	22	24	38
10	1	11	127	63	69	111
11	1	11	70	35	38	62
Total	**--**	**--**	**959**	**478**	**519**	**837**

As described in Section 3, the drawdown distribution from pumping was estimated using Papadopulos and Cooper's drawdown solution for pumping from a large-diameter well (Papadopulos, 1967). For this scenario, each garage excavation was represented as a hypothetical dewatering well (seven wells total), with casing areas equal to each footprint of the proposed garage excavations. AQTESOLV (Duffield, 2007) was employed to solve the equations and simulate the relationship between pumping rates, extraction periods, and drawdowns.

The drawdown results at each Sensitive Site after simultaneously dewatering the seven wells during the one year-construction period are summarized below in Table A-4.

Table A-4
Summary of Estimated Drawdown at Sensitive Sites During Dewatering
Under the "Maximum Potential" Scenario

Construction Phase	Estimated Drawdown at Sensitive Sites (ft)			
	Bayhill Plaza Cleaners	Proposed Well 21	Bayhill 7 Facility	Mills Park Cleaners
All garages dewatered simultaneously	8.82	12.2	52.2 (a)	7.85

Note:

(a) Sensitive site Bayhill 7 Facility is located where the proposed Garage 8 is planned. Garage 8 needs to be dewatered approximately 40 ft (i.e., the garage is proposed to be 50 ft deep and the water table is approximately 10 ft bgs). The drawdown at Bayhill 7 Facility is equal to the depth needed to dewater Garage 8 (40 ft) and the additional drawdown due to simultaneous dewatering activities (i.e., an additional 12.2 ft).

5. REFERENCES

Glenn M. Duffield, AQTESOLV for Windows Version 4.5 User's Guide. HydroSOLVE Inc, dated 2007.

HydroFocus, Inc., 2017, Westside Basin Groundwater-Flow Model: Extended and Updated Model Simulation Results, Version 4.1 (1959-2014). Prepared for City of Daly City, dated March 2017.

Papadopulos, I. S., and Cooper, H. H. (1967), Drawdown in a well of large diameter. Water Resources. Res., 3 (1), 241 -244.

APPENDIX B

BAYHILL 7 FACILITY SITE CLOSURE LETTER

13 March 2020

SAN MATEO COUNTY
HEALTH SYSTEM

June 16, 2009

APN # 020-019-070
SMCo Site # 889060

Tom Leonard
Chief Building Official
City of San Bruno
567 El Camino Real
San Bruno, CA 94066

SUBJECT: RESIDUAL HYDROCARBONs AT BAYHILL 7 FACILITY, 999-1001 BAYHILL DRIVE, SAN BRUNO, CA 94066

Dear Mr. Leonard:

The attached case closure letter was prepared by the San Mateo County Health Department Groundwater Protection Program (GPP) with the tacit approval of the California Regional Water Quality Control Board (CRWQCB). Although site closure was granted, a small amount of hydraulic oil-affected soil and groundwater exists near the #2 Elevator at the subject site (see attached Figure). Although these hydrocarbons do not appear to pose a risk to public health and the environment under existing land use conditions, changes in land use or removal of soil and groundwater from the affected area may create a risk. Therefore, any proposed change in land use or proposed soil or groundwater removal activity at or in close proximity to the subject site must be submitted to the GPP for our review under government code section 65850.2 so we can evaluate whether the residual contaminates will likely pose a risk to public health and the environment if the proposed activities are implemented. The costs to evaluate the potential public health or environmental impacts of the proposed land use or construction activity in relation to the residual contaminants will be billed directly to the entity responsible for submitting the documents for review.

Please call me at (650) 372-6298 if you have any questions. Thank you for your cooperation.

Sincerely,

Jacob Madden
Hazardous Materials Specialist
Groundwater Protection Program

attachment

cc: CA-Bayhill 4-7 Limited Partnership, Paul Saccone, Two North Riverside Plaza, Suite 2100, Chicago, IL 60606
James Soutter, Equity Offices, James_Soutter@equityoffice.com
Paul King, RGA Environmental, pdking0000@aol.com

SAN MATEO COUNTY
HEALTH SYSTEM

June 11, 2009

APN # 020-019-070
SMCo Site # 889060

CA-Bayhill 4-7 Limited Partnership
Attention: Paul Saccone
Two North Riverside Plaza, Suite 2100
Chicago, IL 60606

SUBJECT: CASE CLOSURE, REMEDIAL ACTION OVERSIGHT, BAYHILL 7 FACILITY, 999-1001 BAYHILL DRIVE, SAN BRUNO, CA 94066

Dear Mr. Saccone,

This letter confirms the completion of site investigation and remedial action activities for the release of waste formerly located at the above-described location. Thank you for your cooperation throughout this investigation. Your willingness and promptness in responding to our inquiries concerning the release of waste are greatly appreciated.

Based on information in the above-referenced file, and with the provision that the information provided to this agency was accurate and representative of site conditions, this agency finds that the site investigation and remedial action carried out at the above-referenced site satisfies the cleanup goal requirements of the remedial action agreement between the responsible party and San Mateo County Environmental Health as outlined in Section 101480 of the Health and Safety Code, and that no further action related to the release of waste at the site is required.

This notice is issued pursuant to subdivision (e) of Section 101480 of the Health and Safety Code. Please contact our office if you have any questions regarding this matter.

Sincerely,

Dean D. Peterson, PE, REHS
Director, Environmental Health

cc: RWQCB
SWRCB
James Soutter, Equity Offices, James_Soutter@equityoffice.com
Paul King, RGA Environmental, pdking0000@aol.com

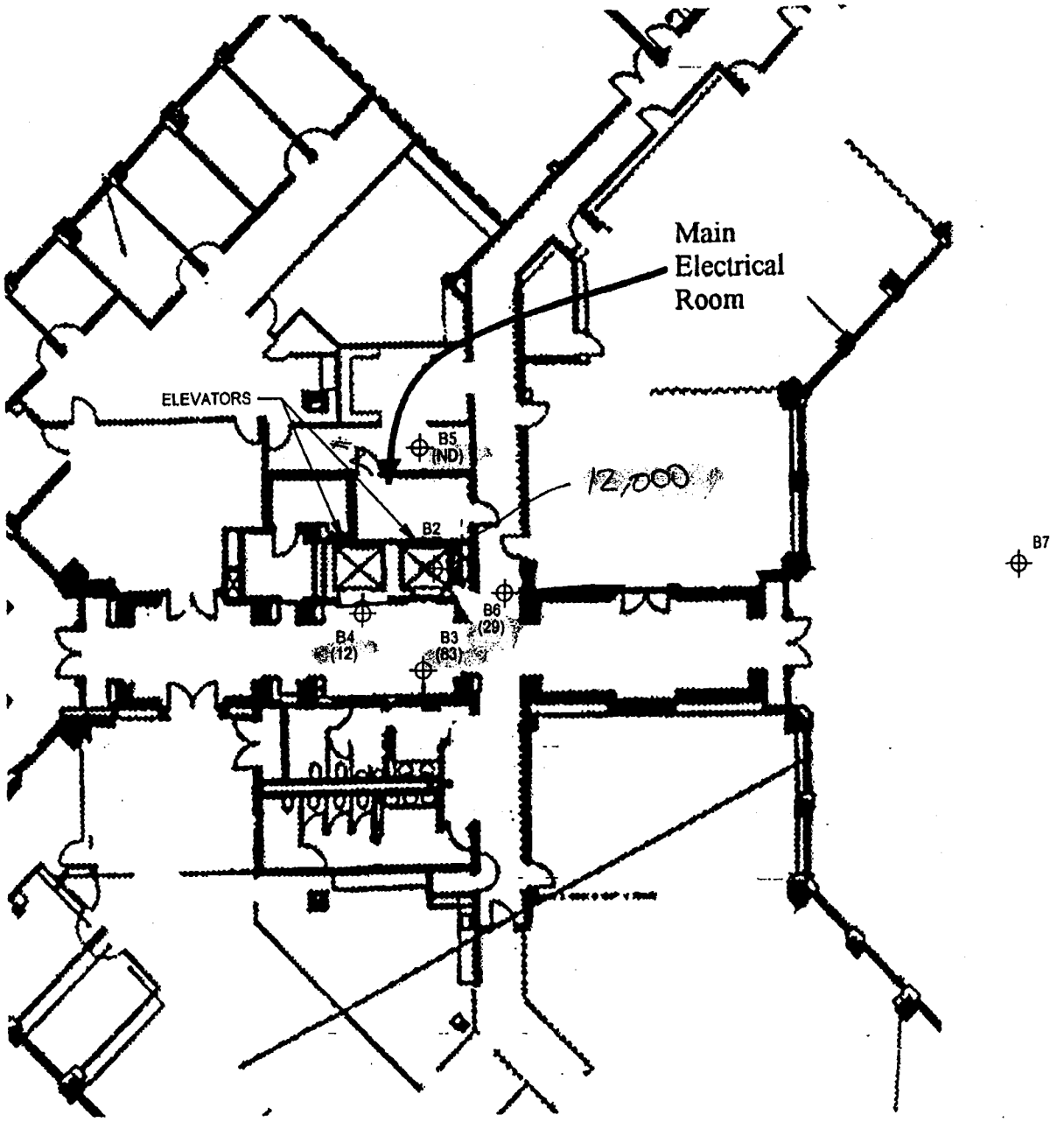


Figure 2
Site Plan Detail
TPH as Hydraulic Oil Concentration in Soil at 20 Feet Below Ground Surface
999-1001 Bayhill Drive
San Bruno, California

N

Base Map From: Equity Office Properties October, 2004	RGA Environmental, Inc. 1466 66th St. Emeryville, CA 94608	0 10 20 SCALE IN FEET

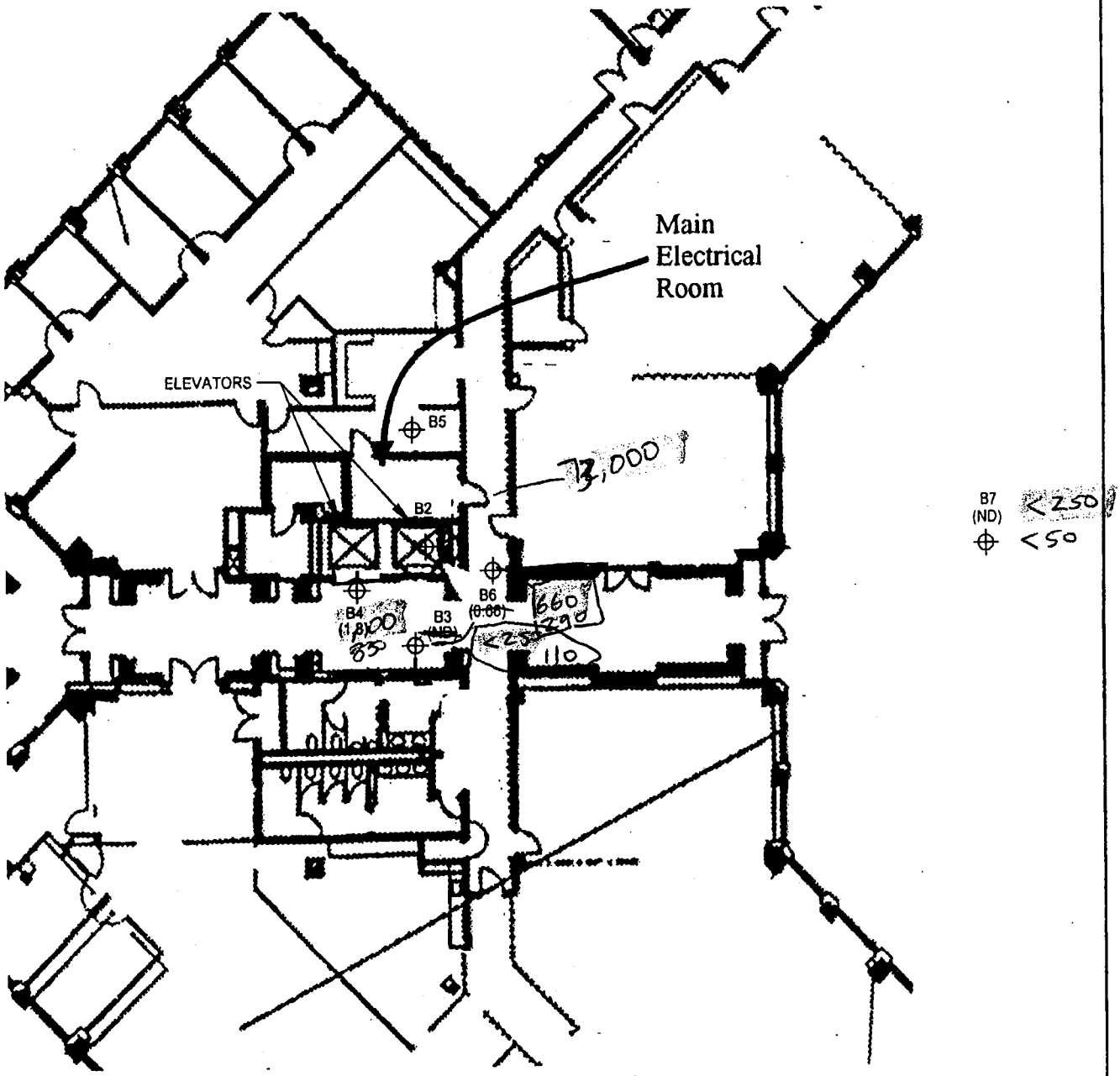


Figure 3
Site Plan Detail
TPH as Hydraulic Oil Concentration in Groundwater
999-1001 Bayhill Drive
San Bruno, California

Base Map From: Equity Office Properties October, 2004	RGA Environmental, Inc. 1466 66th St. Emeryville, CA 94608	0 10 20 SCALE IN FEET

APPENDIX C

PALO ALTO GUIDANCE DOCUMENT AND SUMMARY OF DEWATERING REQUIREMENTS FOR LOCAL CITIES

13 March 2020

577 Airport Blvd. Suite 500
Burlingame, CA 94010
(650) 292-9100
ekiconsult.com

APPENDIX C - PALO ALTO GUIDANCE DOCUMENT AND SUMMARY OF DEWATERING REQUIREMENTS FOR LOCAL CITIES

The below summary provides information related to dewatering requirements for several cities located in the San Francisco Bay Area.

1. SUMMARY OF DEWATERING REQUIREMENTS

1.1 Palo Alto

In February 2016, the City of Palo Alto established requirements "designed to minimize and standardize the process of pumping and discharge of groundwater from dewatering of below ground structures (e.g., basement or parking garage) during construction" (City of Palo Alto, 2018). Since February 2016, several enhancements to the requirements have been codified in the Palo Alto Municipal Code. Existing requirements can be found in section 16.28.155 of the Palo Alto Municipal Code. In April 2018, the City of Palo Alto published a document titled *Regulations for Groundwater Dewatering during Construction of Below Ground Structures, A How-to Guide to Meeting City of Palo Alto Dewatering Requirements* (City of Palo Alto, 2018), which is attached to this Appendix as Attachment A. City of Palo Alto dewatering requirements generally necessitate, in some situations, the study of site hydrology prior to dewatering, attainment of a dewatering permit through the City of Palo Alto, limitation of dewatering water discharge rate to surface water, and project status reporting. Detailed requirements can be found in Attachment A of this appendix.

1.2 Other Cities

The following city and municipal code sections for San Francisco Bay Area cities are relevant to discharge of construction dewatering water.

1.2.1 Mountain View

- **35.32.3.2 (Water, Sewage and Other Municipal Services, Discharge to curbside gutter, storm sewer, storm drain or natural outlets):** provides authority to regulate the quality and quantity of water discharged into the storm drain to the fire chief.
- **35.32.3.3 (Water, Sewage and Other Municipal Services, Discharge to curbside gutter, storm sewer, storm drain or natural outlets):** allows discharge of construction dewatering water into the storm sewer collection system, provided it does not contain organic solvents and is filtered prior to entry into the system.

1.2.2 South San Francisco

- **14.08.210.d (Water and Sewage, Water Quality Control, General Discharge Requirements):** regulates discharge of groundwater to sanitary sewer, which is prohibited with a few exceptions including construction dewatering if discharge to storm sewer is not possible.

- **14.04.140 and .150 (Stormwater Management and Discharge Control, Discharge of Pollutants / Exceptions to Discharge prohibition):** prohibits discharge of non-stormwater to the city storm sewer system, with exceptions including uncontaminated pumped groundwater and foundation and footing drains where a NPDES permit is obtained.

1.2.3 Daly City

- **14.08.020 (Storm Water Management and Discharge Control, Discharge Regulations and Requirements, Exceptions to Discharge Prohibition):** prohibits discharge of non-stormwater to the city storm sewer system, with exceptions including uncontaminated pumped groundwater and foundation and footing drains where a NPDES permit is obtained.

1.2.4 San Mateo

- **7.38.150 (Health, Sanitation, and Public Nuisances, Sanitary Sewer Use, Discharge of Groundwater):** regulates discharge of groundwater to sanitary sewer, which is prohibited with a few exceptions including construction dewatering if discharge to storm sewer is not possible.
- **7.39.090** (**Health, Sanitation, and Public Nuisances, Stormwater Management and Discharge Control):** prohibits discharge of non-stormwater to the city storm sewer system, with exceptions including uncontaminated pumped groundwater and foundation and footing drains where a NPDES permit is obtained.

1.2.5 Sunnyvale

- **12.12.050 (Water and Sewers, Sewer Use Regulations, Prohibitions on discharge of storm drainage and groundwater into sewer – exceptions):** regulates discharge of groundwater to sanitary sewer, which is prohibited with a few exceptions including construction dewatering if discharge to storm sewer is not possible.
- **12.60.070 (Water and Sewers, Stormwater Management, Discharge Prohibitions):** similar to San Bruno 10.18.065.

ATTACHMENTS

Attachment A. City of Palo Alto Groundwater Dewatering Guidance Document

2. REFERENCES

City of Palo Alto, 2018, Regulations for Groundwater Dewatering during Construction of Below Ground Structures. City of Palo Alto, dated April 2018.

ATTACHMENT A
CITY OF PALO ALTO GROUNDWATER DEWATERING GUIDANCE DOCUMENT

Regulations for Groundwater Dewatering during Construction of Below Ground Structures

A How-to Guide to Meeting City of Palo Alto Dewatering Requirements

I. BACKGROUND

In recent years, concerns that temporary construction-related groundwater dewatering may be wasting water, potentially damaging structures, trees and vegetation, and depleting or altering the flow of groundwater, have arisen. In response, the City of Palo Alto (City) established new requirements in February 2016 designed to minimize and standardize the process of pumping and discharge of groundwater from dewatering of below ground structures (e.g., basement or parking garage) during construction.

After assessing the results of new groundwater dewatering regulations from the 2016 and 2017 Construction Seasons, the City Council approved several enhancements to the dewatering policy that were codified in the Palo Alto Municipal Code and went into effect in May 2017, and again in December 2017 (Attachment 1). The 2017 changes include improving Fill Station performance, monitoring actual groundwater elevation changes during the entire dewatering season, assessing impacts on nearby structures, clarifying reporting requirements, and enhancing the Geotechnical (now Hydrogeological) Study (Study). This guide provides further explanation regarding the most recent code changes (which became effective on February 21, 2018) and is intended to assist project applicants in meeting code requirements.

II. GENERAL GROUNDWATER DEWATERING REQUIREMENTS

Note that this document is in reference to *temporary groundwater dewatering during construction of below ground structures*. This document does not contain information regarding dewatering of *existing* below ground structures in the City of Palo Alto. Temporary construction-related groundwater dewatering (dewatering) may be conducted using 1) groundwater exclusionary techniques (e.g., secant or cut-off wall), or 2) controlled groundwater pumping, otherwise known as drawdown well dewatering. The City's Public Works Department (Public Works) does not allow open pit dewatering of groundwater during construction; however, it may be allowed, if water quality limits are met, for removal of rainwater if it has accumulated at the bottom of an excavation site. If rainwater dewatering is required, the project manager/applicant must contact the City's Watershed Protection Group at (650) 329-2122 before discharging to the City's storm drain system.

Attachment 2 provides applicants a basic flow chart to understand the City's compliance process regarding the two types of allowed construction dewatering. To assist the City in determining whether dewatering will likely be required in the construction of below ground structures, the project applicant must submit a Geotechnical Report (separate from the Hydrogeological Study described below) prior to the Building Permit application. In addition, if the deepest excavation will be within five feet of the anticipated groundwater level submitted in the Geotechnical Report, the contractor must determine the depth to groundwater immediately prior to submittal of the Excavation and Grading Permit.

If groundwater is found to be within two feet of the deepest excavation, a drawdown well dewatering system or cutoff wall must be installed. Regardless of this testing, if groundwater is actually encountered during construction (and the applicant does not have a dewatering permit), the contractor must immediately stop all work and must meet all of the following requirements prior to resuming work.

The City's dewatering season is April 1 through October 31 due to the capacity of the City's storm drain system. Dewatering to the sanitary sewer system will be allowed only under special circumstances and with a discharge permit obtained through Public Works' Watershed Protection Group. During the dewatering season, sites will be allowed to dewater for a 12-week time period, including a two-week start-up period. The two-week start-up period is intended to provide adequate time for the contractor to meet the City's dewatering requirements as well as City staff to inspect and approve the equipment set-up and discharge quantity and quality. At the end of the two-week start-up period, compliance with all performance standards and water quality standards shall be demonstrated in order to continue dewatering.

Residential sites are expected to complete dewatering within the allotted time period, but may be allowed to continue dewatering beyond 12 weeks only under special circumstances and if approved by the City Engineer. For large, non-residential sites, City staff will consider allowing groundwater discharges to occur (to the storm drain system) from November 1 to March 31 if 1) the discharge is limited to ≤ 10 gallons per minute *or* 2) the applicant can provide sufficient evidence that the receiving storm drain line and water body has sufficient capacity to accommodate a 10-year, 6-hour storm event in addition to the dewatering discharge.

Where dewatering is required, applicants shall conduct dewatering in full compliance with the provisions of Chapter 16.28 (Excavation, Grading and Fills) as well as Chapter 9.10 (Noise) of the City's Municipal Code, the regulations in this guide, and other permit conditions established by City staff. Due to the complexity of dewatering projects, City staff may impose and enforce additional requirements when or after a permit is issued in order to ensure public safety, ensure the condition of its infrastructure, or to protect the water quality of downstream water bodies. During the period of construction and dewatering discharge, project applicants/permittees are expected to promptly implement actions identified and required by City staff, including, but not limited to, notices of non-compliance and directives requiring immediate cessation of discharge. Administrative penalties may be put into effect for sites not in compliance with City requirements, and will accrue if the applicant does not comply as requested by the City. A cessation order may be issued for reasons including, but not limited to: capacity issues in the storm drain or sanitary sewer systems; storm drain or sanitary sewer system failures; excess flow entering the Palo Alto Regional Water Quality Control Plant, including exceptional storm events; emergency or routine maintenance of City infrastructure; and protection of the environment, public health, safety and welfare.

III. GROUNDWATER EXCLUSIONARY TECHNIQUE REQUIREMENTS

If the rate of groundwater discharge is greater than thirty gallons per minute for residential sites, groundwater exclusionary techniques cannot be used, and the requirements of Subsections IV (below) shall be followed.

When groundwater exclusionary techniques are utilized, applicants must submit to the City a Dewatering Permit packet with Grading and Excavation Permit application (after planning entitlement is issued). The Grading and Excavation Permit for a project will not be issued until all required submittals related to dewatering have been submitted, reviewed and approved by Public Works Engineering staff. The (Exclusionary Techniques) Dewatering Packet (Attachment 3) shall include the following: 1) Cover Page and 2) Inspection Checklist. Groundwater exclusionary techniques shall be conducted in compliance with the following:

A. The rate of discharge of groundwater shall be limited to thirty gpm or less for.

B. The Dewatering Plan shall be followed at all times when removal of groundwater from the project site is required and must focus on using the pumped groundwater to the maximum extent possible. When feasible, the primary focus of discharge shall be to percolate the discharge onto the construction property where pumping is occurring rather than into the storm drain system. Groundwater may be discharged on neighboring properties located on the same side of the street if the property owners provide permission. This should be handled between the project applicant and the property owners without facilitation or further approval from the City.

C. A Traffic Control Plan, which must be followed during the entire dewatering period may be required with the Grading Permit Application and be followed. The traffic control plan shall include, among other provisions, an appropriate schedule for an attendant to be present on the street during the period of the installation of the groundwater exclusionary technique.

D. The applicant shall install a groundwater monitoring well at the site. It shall be at the farthest feasible point on the construction site from the underground structure. Initial groundwater level results must be included in the dewatering plan (same data point as the one required prior to grading and excavation permit application).

E. Project status reporting: During the construction period of the underground structure, the applicant must submit periodic groundwater level reports and have the data available per request. At minimum, monitoring well data shall be collected daily for the first two weeks of the 12-week period and weekly thereafter. A final report shall be submitted two weeks after pumping ceases. All status reports should be submitted to Public Works Engineering staff at the Development Resource Center. Questions should be directed to pwecips@CityofPaloAlto.org.

IV. CONTROLLED GROUNDWATER PUMPING (WITHOUT A SECANT OR CUT-OFF WALL) REQUIREMENTS

When controlled groundwater pumping techniques are utilized, applicants must submit to the City a Dewatering Permit Packet with the Street Work and Grading and Excavation Permit applications (after planning entitlement is issued). Once all required submittals have been reviewed and approved by Public Works Engineering staff, the applicant may be issued the Grading and Excavation Permit, a Dewatering Permit, and a Street Pork permit; a Dewatering Permit must be obtained before any discharge from the site occurs. Note that for residential projects, the grading and excavation permit is only issued concurrently with the

Building Permit. While discharging to the storm drain system, construction work on the underground structure shall be continuous and occur daily, with the contractor making progress towards completion of the underground structure without delay and following the detailed construction schedule provided in the Dewatering Permit packet.

In addition to what is required for exclusionary techniques (aside from the cut-off wall itself and the 30 gpm limitation), a Hydrogeological Study and an in-depth Groundwater Use Plan must also be submitted. Refer to the Controlled Groundwater Pumping Dewatering Permit Packet in Attachment 4 for more information. The following provides additional details regarding the City's controlled groundwater pumping requirements:

As with exclusionary techniques, the applicant shall install a groundwater monitoring well at a farthest feasible point on the construction site from the underground structure. Initial groundwater level results must be included in the Hydrogeological Study. During the construction period of the underground structure, the applicant must submit periodic groundwater level reports and have the data available per request. At minimum, monitoring well data shall be conducted daily for the first two weeks of the 12-week period and weekly thereafter. At the end of the start-up period or thereafter, if drawdown results are greater than anticipated, the applicant shall submit a revised Dewatering Hydrogeological Study and any revised conclusions on impacts of the groundwater drawdown.

A. Dewatering Hydrogeological Study - The purpose of this Study is to determine the initial, pre-construction groundwater levels as well as the impacts of groundwater pumping on the site and surrounding area. The Study should include the radius of influence (i.e. extent of cone of depression) from each dewatering well (if more than one is installed on-site) as a function of time, based on local soil and groundwater conditions. Avoidance measures are to be employed to the maximum extent practicable to minimize the flow rate and duration of the pumping. The Study shall be stamped by a California licensed Hydrogeologist or equivalent and submitted to the City as part of the Dewatering Packet. The Study should also include the following items:

   i. A description and cross section(s) of the cone(s) of depression of on-site monitoring well(s) as well as any nearby dewatering sites within a 400-foot radius of the property that may interact with or be influenced by the dewatering activity at the site. The location of the monitoring well(s) and nearby sites should also be shown on a map.

   ii. Verify the anticipated drawdown curve with a pump test performed on monitoring well(s) installed on the project site. Though the City is not currently requiring a particular type of pump test, the type used should be authorized and approved by a California licensed Hydrogeologist. Using the pump test and any other relevant data, the report shall state the anticipated pumping flow rate as well as the total amount of water due to be pumped for the 12 week dewatering period; daily pumped totals shall also be included. Following the two-week start-up period, the dewatering, pumping rates and maximum amount of water pumped on a daily basis shall be limited to the values calculated in the verification study.

   iii. Prior to pouring a basement slab, groundwater may be pumped no

deeper than three feet below the depth of the slab, measured at the center. After the slab is poured, groundwater may be pumped no deeper than one foot below the center. These values can be extrapolated using the (verified) drawdown curves and the on-site monitoring well data points.

B. Groundwater Use Plan (Plan) shall illustrate how the pumped groundwater will be used to the maximum extent practicable. Two required components of this plan are the 1) groundwater flow meter and sediment settling tank system and 2) the Fill Station. Both components must be inspected and approved by City staff before applying for a Controlled Groundwater Pumping Dewatering Permit. The inspections are documented via the Inspection Checklist (Attachment 4), which **must** be signed by a Public Works Inspector prior to issuing the Grading Permit, Dewatering Permit, and associated Building Permit; no Dewatering Permit will be issued without a Public Works Inspector–signed Checklist. At a minimum, the Plan should include the items below; however, the applicant should be creative in its plan to use the pumped groundwater and shall adhere to the Plan throughout the dewatering period.

   i. Groundwater flow meter and sediment settling tank system:
      1. Provide an accurate and **safely-accessible** flow meter with a data logger in good working condition at the inlet of the tank. Both flow rate and total flow measurements shall be easily readable. Before any water is pumped, the initial flow meter reading shall be checked and approved by the Watershed Protection Inspector (WP Inspector) as part of the initial dewatering approval process. The WP Inspector will collect regular meter readings on a daily basis during the two-week start-up period and weekly thereafter.
      2. Design the tank system so that the storage tank is always at minimum one-half full during the entire dewatering period to facilitate water truck usage.
      3. During the start-up period, once the tank is at least half-full and before any discharge of groundwater, contact Watershed Protection at (650) 329-2122 for an initial inspection and for water quality testing. For non-(contaminated) plume areas, basic measurements will generally include pH, conductivity and turbidity.
      4. After the Watershed Protection Inspector collects water quality samples and provides a clearance that the sample is within limits, the tank should be drained to the property while waiting to obtain the Dewatering Permit Packet from Public Works Engineering. Consult the Inspector for assistance. Provide a screen or a type of translucent covering over the tank for mosquito management. City staff may require the use of Bacillus thuringiensis israelensis (Bti), a naturally occurring soil bacterium that effectively kills mosquito larvae, if necessary.

5. Settling tank set-up:
    - The area surrounding the tank should be kept clear at all times, with a **safe** and **accessible** pathway to the meter and tank.
    - The edge of the tank should not be at the edge of the excavation area, as it may lead to unsafe conditions.
    - Temporary power source for pump(s) should have an "in-use" cover and should be placed in an area that will be minimally impacted by weather.
    - Provide signage that reads "Non-Potable Discharge" at the discharge point.

ii. A Fill Station shall be established to provide the City and nearby residents and business owners the opportunity to use the pumped groundwater to minimize the amount discharged to the storm drain system. The Fill Station should include two points for water distribution: a truck-filling outlet for water truck irrigation of sites in the City and a fill-up outlet for neighboring properties. Detailed information about the fill station and its components is listed below. A comprehensive detailed fill station plan should be included in the Groundwater Use Plan to be reviewed by staff as part of the Dewatering Permit Packet submittal. When the Fill Station is ready, contact Public Works Engineering Inspection staff (PWE Inspector) at (650) 496-6929 for an inspection of both the Fill Station and settling tank system and contact Building Inspection staff at (650) 444-6173 for an Electrical Safety Check. Inspectors must check off and sign the Inspection Checklist. The following is required in the Fill Station Plan:

1. Location and set-up:
    - Locate the Fill Station outside the site construction fence to allow 24-hour access. The construction site should be locked outside of normal construction hours.
    - A lock is not required at the Fill Station, but if the applicant deems it necessary, a combination lock should be used with the combination of *2, 4, 6, 8*.
    - Truck fill area: provide a 2.5-inch hydrant fitting hose connection with a 50-foot traffic-rated hose.
    - Neighboring properties fill outlet: provide at least two 100-foot (minimum) hoses arranged on reels and connected to standard hose bibs. Hose bibs shall produce a minimum of 10gpm at the end of each 100 foot hose simultaneously. The applicant shall allow adjacent properties to use hoses connected to the fill station(s). If used and as needed, applicant must provide ADA-compliant bridges across sidewalks. Hoses shall be placed in a manner that is safe to the public and does not cause damage to neighboring or City property, and shall not cross the street. The City may modify these requirements as circumstances require.

- As with the tank system, the fill station shall include accurate and safely accessible flow meters with data loggers in good working condition at the outlet point of the Fill Station outlet points to log water reuse. Both flow rate and total flow measurements shall be easily readable. The initial flow meter reading should be noted before any water is pumped, which shall be checked and approved by the PWE Inspector as part of the initial dewatering approval process. The WPG Inspector will collect regular meter readings on a daily basis during the two-week start-up period and weekly thereafter.
- Supply log sheets and a pen for truck drivers to show the date and amount of each fill-up.
- The temporary power source needed for the Fill Station should be placed inside the locked construction area (and NOT in the Fill Station), if possible. If needed, a switch to power on the pump station may be placed inside the fill station cabinet, only with an installed in-use cover. Two switches should be used, one for the truck-fill hose and one for the residential hose area. These switches should be appropriately and clearly labeled.
- Provide easy-to-read signage for the Fill Station (including "Do not Drink") and directions explaining how to use it.
- For the hose bibs, provide signage that reads "No Hoses Crossing Street, Sidewalk and Private Properties."

2. The applicant must demonstrate maximum 10-minute fill time for a ~2700 gallon water truck to obtain staff approval.
3. Prior to the commencement of dewatering activities, the applicant shall notify occupants of neighboring properties of the temporary availability of water. Contact Public Works Engineering staff (650 329-2496, Option 8) for copies of door hangers to be used for notification. Door hangers must be removed after 24 hours.

iii. Irrigation of sites: The applicant is responsible for having pumped groundwater delivered to nearby parks and schools as requested by the City. The applicant shall contract with or otherwise provide water truck service to deliver water as directed by the City on a regular basis as described below. The City's Urban Forestry staff should be contacted by the truck service company at (650) 496-5986 to determine a list of sites to be irrigated. During the first six weeks of dewatering activities (not including the two-week start-up period), water should be trucked one full day (8 hours) per week from the project site to the irrigation sites. This shall increase to five days per week (8 hours per day) during the remaining 4 weeks of the dewatering period.

iv. On-site Use of Groundwater: Pumped groundwater should be used on the construction site when possible, such as for controlled infiltration, irrigation of existing landscaping, dust suppression and other determined

construction needs.

C. A Pre-construction Building Condition Survey and Report of structures located on adjacent parcels prepared by a licensed surveyor and meeting City standards must be included in the Dewatering Application Packet. The applicant is responsible for obtaining permission from neighboring property owners to enter their property to take survey points of the building interior. If permission is not granted, City staff should be notified; however, interior survey points are not required in order to obtain a Dewatering Permit. The survey shall include a photographic and narrative report on the external condition of each structure as well as surveyed and marked elevations of adjacent parcels, with particular attention to the condition of concrete foundations, structural connections, brickwork, plasterwork and other architectural finishes that are susceptible to cracking. The report shall assess the likelihood that the proposed dewatering would cause effects (including but not limited to settlement or movement) on off-site private or public structures or infrastructure, including the right-of-way, easements, and utilities within public utility easements, and the health or viability of vegetation or trees. To the extent that the report concludes that off-site effects are reasonably likely to occur, the applicant shall identify avoidance measures to be implemented that will minimize the type and severity of those effects, and shall develop a monitoring plan to assess any actual effects on vegetation, trees, structures and infrastructure.

F. Project status reporting: During the construction period of the underground structure, the applicant must submit periodic reports and have the data available per request. Report contents and submittal frequency requirements are listed below. All status reports should be submitted via email to the Public Works Engineering staff who has been working on your project and who issued the Excavation and Grading permit. Questions should be directed to pwecips@CityofPaloAlto.org.

1) Monitoring well levels: At minimum, monitoring well data shall be collected daily for the first two weeks (start-up period) of the 12-week period and weekly thereafter. Status reports should be submitted weekly during start-up period and monthly thereafter. A final report shall be submitted two weeks after pumping ceases.

2) Flow meter readings: At minimum, monitoring well data shall be collected daily for the first two weeks (start-up period) of the 12-week period and weekly thereafter. Status reports should be submitted weekly during start-up period and monthly thereafter. A final report shall be submitted two weeks after pumping ceases.

3) Survey data (see subsection IV.C. above). Once dewatering commences, survey data should be collected and reported weekly during the two-week start-up period and monthly thereafter. Note that the information will be made available to the public upon request.

V. ADDITIONAL REQUIREMENTS FOR TEMPORARY CONSTRUCTION-RELATED GROUNDWATER DEWATERING IN GROUNDWATER (CONTAMINATED) PLUME AREAS

Certain areas in the City have contaminated groundwater plumes due to previous land use. To determine if a site is in or nearby one of these areas, refer to the Attachment 5 figure. Dewatering sites in these areas must be carefully managed to ensure pumped groundwater does not enter the City's storm drain system nor that it is used by members of the public without being treated. Therefore, Fill Stations are not required at these sites. However, the same flow meter/data logger requirements described in Section IV (B.i.) shall still be followed in order to account for the amount of groundwater pumped from the site.

Construction of below ground structures in these areas triggers treatment requirements (in addition to sediment settlement) before discharging to the City's storm drain system in order to protect the water quality of downstream creeks and the SF Bay. Because of site complexities, specific requirements may vary site by site. Therefore, for any site in or within 500 feet of the edge of a plume, contact the City's Watershed Protection Group at (650) 329-2122 for guidance and requirements on sampling, treatment and disposal of temporary construction-related groundwater. Sampling groundwater for contaminants prior to initial discharge will be required, and potentially at intervals during dewatering. For all required sampling, the contractor must retain an independent testing firm to collect and process samples. Finally, the applicant should contact the Regional Water Quality Control Board (Water Board) to ensure additional state agency requirements are met. Note that compliance with the City does not imply compliance with the Water Board.

ATTACHMENTS

ATTACHMENT 1: COMPARISON OF MARCH 2017 AND FEBRUARY 2018 CHANGES:
GROUNDWATER DEWATERING ORDINANCE (Section 16.28 of the P.A.M.C.)

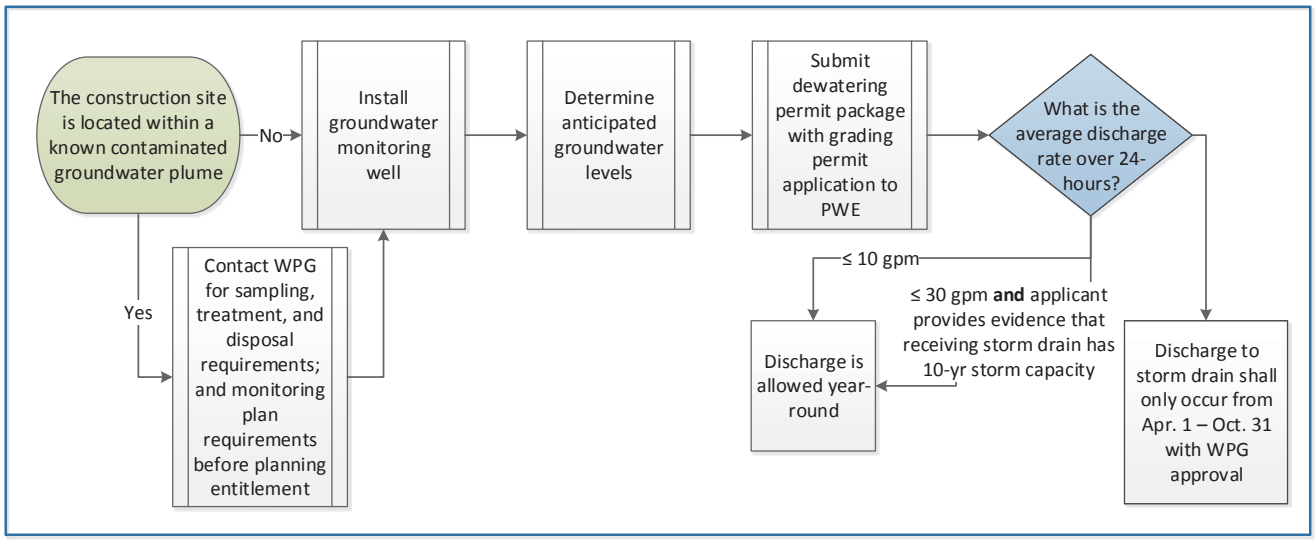
CATEGORY	MARCH 2017 ORDINANCE	FEBRUARY 2018 ORDINANCE REVISION
GROUNDWATER EXCLUSIONARY TECHNIQUE	Optional for all projects.	Optional for all projects.
	No specific requirements presented for the installation or during subsequent construction.	Requires a traffic control plan with a schedule for an attendant during the installation. Requires a groundwater monitoring well located at the farthest feasible point.
PRE-CONSTRUCTION BUILDING CONDITION SURVEY OF NEIGHBORING STRUCTURES	Not included	Requires evaluation of existing condition of neighboring structures as well as evaluation of likelihood of dewatering impacts to the neighboring structures, trees, and vegetation.
FILL STATION	While not expressly described in ordinance, the City Guidelines required applicant's trucking of water one day per week during entire dewatering period.	The previous Guidelines are clarified in the Ordinance. In addition, trucking of water must increase to five days per week after six weeks of dewatering period (not including two-week start-up period).
LIMITS OF DISCHARGES TO DRY SEASON	Discharges to storm or sanitary drains only allowed April 1st through October 31st.	Provides a provision, case-by-case, to consider allowing discharge from November 1 to March 31st if (1) the discharge is limited to ≤ 10 gallons per minute or (2) the receiving storm drain line would have sufficient capacity for a 10-year storm. Discharges subject to cessation orders from the City.
LIMITS TO PUMPING DEPTH	Not included	Prior to pouring a basement slab, groundwater may be pumped no deeper than three feet below the depth of the slab, measured at the center. After the slab is poured, groundwater may be pumped no deeper than one foot below the center.

CATEGORY	MARCH 2017 ORDINANCE	FEBRUARY 2018 ORDINANCE REVISION
PRE-DEWATERING TECHNICAL STUDY	Required Geotechnical Study but the details were not expressly described in ordinance.	Renamed a Dewatering Hydrogeological Study and incorporated details from the 2017 City Guidelines to clarify content of the study.
VERIFICATION OF DEWATERING STUDY	Required verification via pump test and project site monitoring wells.	Clarified that after the 2 week start-up, the pumping rates and volume pumped shall be limited by the values calculated in the study.
MEASUREMENTS DURING DEWATERING	Required periodic measurements as required by the City.	Clarified that measurements include periodic groundwater level monitoring and weekly surveys of adjacent buildings.
GROUNDWATER USE PLAN	Not expressly described in ordinance but was included in City Guidelines.	Ordinance clarifies the Use Plan requirements based on the 2017 guidelines and field observations during 2017 construction season.
DEWATERING PLAN AND STREET WORKS PERMIT	Not expressly described in ordinance.	Clarifies required submittals if there is a planned storm drain discharge.
EXCEPTIONAL WASTE DISCHARGE PERMIT APPLICATION	Not expressly described in ordinance.	Clarifies required submittals if there is a planned sewer discharge.

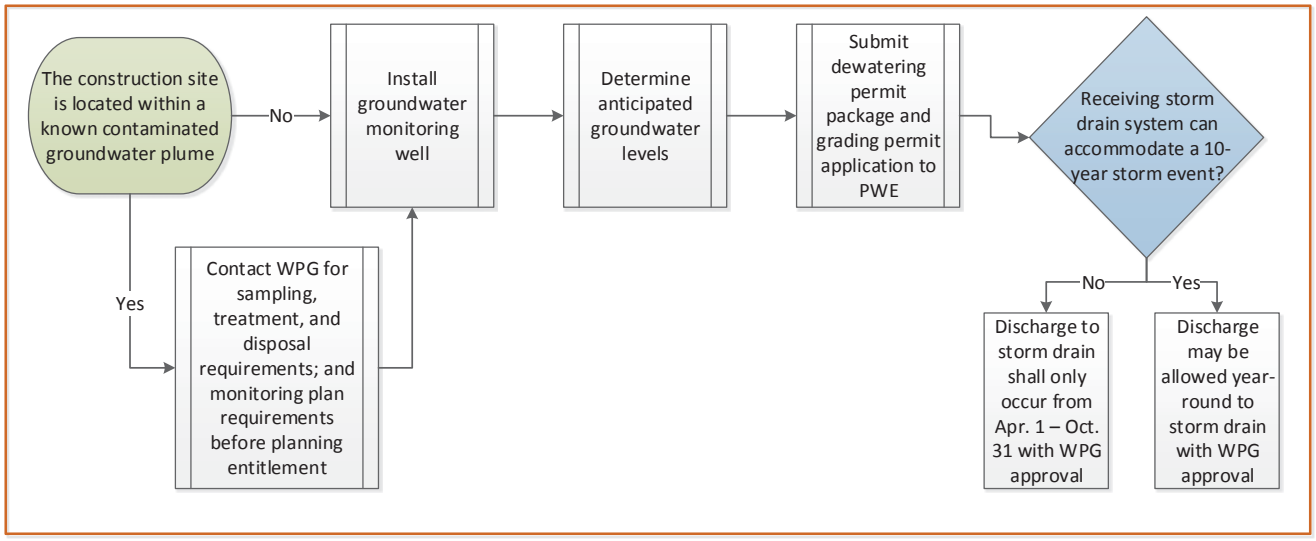
Attachment 2:

Groundwater Dewatering Regulations for Construction of Below Ground Structures

Groundwater Exclusionary Techniques



Controlled Groundwater Pumping



Additional Information

PWE – Public Works Engineering
WPG – Watershed Protection Group

For more information contact:
City of Palo Alto, Public Works Engineering – (650) 329-2496 Option 8, cityofpaloalto.org
City of Palo Alto, Watershed Protection Group – (650) 329-2122
Palo Alto Regional Water Quality Control Plant – (650) 329-2598, cleanbay.org

Refer to *Regulations for Groundwater Dewatering During Construction of Below Ground Structures* for more information.

Attachment 3: Groundwater Exclusionary Techniques Dewatering Packet

1) Cover Page

2) Dewatering Inspection checklist

DEWATERING PERMIT – GROUNDWATER EXCLUSIONARY TECHNIQUE

PUBLIC WORKS
Engineering Services Division
pwecips@cityofpaloalto.org – 650.329.2496 Ext.8 – Inspection: 650.496.6929

Related Permits:

LOCATION OF WORK:
CONSTRUCTION TYPE:
DESCRIPTION OF WORK:

PERMITTEE/CONTRACTOR
Name:
Company:
Address:
Contractor's License Number:
Phone:
Email:
Dewatering Sub-contractor:
Sub-contractor Phone:

Date

EXPECTED START DATE: **EXPECTED COMPLETION DATE:**

PERMIT EXPIRATION DATE: _____

Attachment Name	Page
☐ Exclusionary Technique Plan	1
☐ Groundwater Use Plan	2
☐ Traffic Control	3
☐ Completed Inspection Checklist – Groundwater Exclusionary Technique	4

Contact Public Works Inspection minimum 24 hours prior to starting work: 650-496-6929

Permittee affirms that the facts stated heron are true and agrees that they, their agents, employees, and contractors shall perform all work described heron in conformance with ordinances and standard specifications of the City of Palo Alto, all pertinent state laws and to the plans specifications approved by the City Engineer. The work allowed in this permit shall be performed by an appropriately licensed contractor as required in the Palo Alto Municipal Code. The Permittee shall pay the cost of all soils investigation and compaction tests, and shall reimburse the city for any services provided as may be required by the City Engineer, Utilities Department, or Police Department. Permittee further agrees to hold the City of Palo Alto, its officers, agents, and employees harmless from all costs and damages which might arise from the Permittee's use or occupancy of the public right-of-way. The Permittee also agrees to maintain required insurance coverage through the closure of the permit and sign off by the Public Works Inspector. This permit is subject to all attached conditions made part of the permit document and may be revoked at any time for violation of any of these conditions.

Inspector _____

The dewatering season is from April 1 to October 31. If dewatering occurs past permit expiration or outside the dewatering season, administrative fines may occur. Refer to Dewatering Regulations and Guidelines for more information.

Applicant Signature _____

Printed_____

Permit Issued By _____
(Initials)

Permit Issuer _____ _____
Date

Revised 4/10/2018

GROUNDWATER DEWATERING INSPECTION CHECKLIST

CITY OF PALO ALTO

PUBLIC WORKS INSPECTION
Engineering Services Division
pwecips@cityofpaloalto.org – 650.329.2496 Ext. 8 – Inspection: 650.496.6929

ALL CONDITIONS *MUST* BE CHECKED 'YES' BEFORE A GRADING PERMIT AUTHORIZING GROUNDWATER DEWATERING CAN BE PROCESSED AND ISSUED. THE INSPECTOR WILL SIGN THIS FORM AND PROVIDE IT TO THE CONTRACTOR. THE CONTRACTOR MAY THEN SUBMIT THIS INSPECTION FORM TO PUBLIC WORKS STAFF AT THE DEVELOPMENT CENTER AND OBTAIN A GRADING & DEWATERING PERMIT AUTHORIZING THE START OF DEWATERING OPERATIONS.

Address: _____

Contractor: _____ **Phone:** _____

Required Water Station Features	Yes	No	Additional Comments
If the fill station is secured by a lock with 4 digit lock combination, then the combination should be 2,4,6,8			
Log sheets with pen in box			
Minimum 50', 2.5" hose in box with hydrant fittings for water truck filling			
At least 2 hose bibs outside the fill station box with 2, 100' hoses providing a minimum of 10 GPM each, simultaneously			
GFI outlet inside or electrical connection outside of box			
"In-use" cover over switch/outlet in box if in the fill station			
Electrical Safety Check (from Building Inspector, phone: 650.444.6173. Alternate - Bud Starmer: 650-444-6175)			
"Water Filling Station, Non-Potable Water, Do Not Drink" sign on fill station door box with Public Works phone number: 650.329.2496			
"No Hoses Crossing Street and Sidewalk and Private Property " sign at hose bibs			
Switches labeled – bibs and hose; instructions for use			
* "Non-potable Discharge" sign on the discharge point			
* Water quality test – acceptable for discharge to storm drain (from Inspector, phone number: 650.617.3165)			
* Flow meters showing instantaneous and total flow at inlet point of settling tank			
* Verify flow meters are starting at Zero or a start-up reference starting point			
* Flow meters easily readable and in a safe location; one at inlet of settlement tank and one at fill station (if fill station is required)			
Pump is operational (tested personally by a PW inspector)			
Hose bib is operational (tested personally by a PW inspector)			
* No diesel or gas generator pumps – electric pumps only			
Door Hangers			
Monitoring wells – 1, farthest onsite point from structure			
Demonstrate maximum of 10-minute fill time for a ~2700 gallon water truck			
Demonstrate 10 GPM flow rate from both 100' hoses simultaneously			
Received initial survey plan and data from adjacent structures			

Date

PW Inspector Passed By

*Only requirements for Groundwater Exclusionary Technique. Controlled Groundwater Pumping must comply with entire checklist.

Additional Comments:

Attachment 4: Controlled Groundwater Pumping Dewatering Packet

1) Cover Page

2) Hydrogeological Study Worksheet

3) Dewatering Inspection Checklist

DEWATERING PERMIT – CONTROLLED GROUNDWATER PUMPING

PUBLIC WORKS
Engineering Services Division
pwecips@cityofpaloalto.org – 650.329.2496 Ext.8 – Inspection: 650.496.6929

Related Permits:

LOCATION OF WORK:
CONSTRUCTION TYPE:
DESCRIPTION OF WORK:

PERMITTEE/CONTRACTOR
Name:
Company:
Address:
Contractor's License Number:
Phone:
Email:
Dewatering Sub-contractor:
Sub-contractor Phone:

Date

EXPECTED START DATE: **EXPECTED COMPLETION DATE:**

PERMIT EXPIRATION DATE: _____

Attachment Name	Page
☐ Dewatering Hydrogeological Study & Accompanying Worksheet	1 2
☐ Groundwater Use Plan	
☐ Completed Inspection Checklist	3
☐ Pre-Construction Survey & Report	4 5

Contact Public Works Inspection minimum 24 hours prior to starting work: 650-496-6929

Inspector _____

Permittee affirms that the facts stated heron are true and agrees that they, their agents, employees, and contractors shall perform all work described heron in conformance with ordinances and standard specifications of the City of Palo Alto, all pertinent state laws and to the plans specifications approved by the City Engineer. The work allowed in this permit shall be performed by an appropriately licensed contractor as required in the Palo Alto Municipal Code. The Permittee shall pay the cost of all soils investigation and compaction tests, and shall reimburse the city for any services provided as may be required by the City Engineer, Utilities Department, or Police Department. Permittee further agrees to hold the City of Palo Alto, its officers, agents, and employees harmless from all costs and damages which might arise from the Permittee's use or occupancy of the public right-of-way. The Permittee also agrees to maintain required insurance coverage through the closure of the permit and sign off by the Public Works Inspector. This permit is subject to all attached conditions made part of the permit document and may be revoked at any time for violation of any of these conditions.

The dewatering season is from April 1 to October 31. If dewatering occurs past permit expiration or outside the dewatering season, administrative fines may occur. Refer to Dewatering Regulations and Guidelines for more information.

Applicant Signature _____

Printed_____

Permit Issued By _____
(Initials)

Permit Issuer _____ _____
Date

Revised 4/10/2018

DEWATERING HYDROGEOLOGICAL STUDY WORKSHEET & DEWATERING PLAN

Which Projects Must Complete This Worksheet?

Applicants for **all projects** anticipating the need to perform construction dewatering via groundwater pumping must complete this worksheet.

Please note that this information must be stamped by a California licensed Hydrogeologist (or equivalent) and will be made available to the public.

1. PROJECT INFORMATION

Project Name: _____ APN: _____

Project Address: _____

Applicant Name/ Developer: _____

Geotechnical Engineer: _____

Project Description: _____

_____

2. SITE ASSESMENT

Hydrogeological Study provided[1][2][3][4] (see guidelines for specific requirements) : ☐ Yes ☐ No

a. Depth to groundwater: _____

b. Maximum depth of excavation (including utilities, pits, shafts, etc.): _____

c. Proposed maximum depth of dewatering wells/pumping: _____

d. Size and anticipated flow from each pump: _____

e. Anticipated dewatering flow rate and total dewatering duration: _____

f. Control to be utilized: ☐Settling Tank ☐Turbidity Curtain ☐Other (describe): _____

g. Location of anticipated discharge including final receiving water (creek name or Bay): _____

h. All wells and other dewatering sites within a 400 foot radius (roughly one City block) of the property that may interact with dewatering activity, using information available from the City, show the exact location of these dewatering sites.

Map attached: ☐ Yes ☐ N/A (no wells or other dewatering sites within 400 foot radius)

i. Include a schematic diagram showing pipe and pump sizes and locations and sizes of all tanks, fill station, pipe route to nearest storm drain inlet (including flexible and rigid pipe locations), and all street and sidewalk impacts including trenching, saw cuts, and asphalt patching between project site and storm drain inlet.

Schematic attached: ☐ Yes ☐ No

j. Determine the radius of influence (i.e. extent of cone of depression) from each dewatering well as a function of time, based on local soil and groundwater conditions. Prepare a map and cross sections of the cone(s) of depression.

Map and cross sections attached: ☐ Yes ☐ No

k. State whether it is reasonably likely that the proposed dewatering will cause effects (including settlement or movement) on off-site structures or infrastructure, including the right of way, easements, and utilities within public utility easements. ☐ Yes ☐ No

[1] The Hydrogeological Study must include verification of the anticipated drawdown curve with a pump test using a minimum of one actual well, by the end of the two week start-up period.

[2] Cone Penetrometer Tests (CPT) is also encouraged to verify soils data. The actual pumping rates, following the two week start-up period, shall be limited to the rates used in in the verification. The maximum amount of water pumped over the ten week period, (excluding the two week start- up period) shall be limited to that calculated during verification.

[3] The ground water level must be measured at a distance representative of the distance to the nearest structure on an adjacent parcel, or farthest feasible point on the subject site. This monitoring shall be daily for the first week (including the two week start-up period), then weekly thereafter. If drawdown results are greater than anticipated by the Hydrogeological Study at the end of the two week start-up period or thereafter, a revised Hydrogeological Study and any revised conclusions on impacts of the groundwater drawdown must be submitted.

[4] The Hydrogeological Study and verification shall not be required if the dewatering pumping is continuously limited to 30 gallons per minute (gpm) or less following the two week start-up period. This could be accomplished through installation of groundwater cut-off walls (such as secant walls) or similar construction techniques. Additionally, the contractor need only provide off-site hauling of water sufficient to meet the needs of adjacent neighbors, as opposed to the one-day per week requirement for 2016.

l. State whether it is reasonably likely that the proposed dewatering will reduce the amount of water taken up by any vegetation or trees to a level that will affect the health or viability of the vegetation or trees. Utilize an Urban Forestry Sub Consultant (certified arborist) to verify any such effects on trees. ☐ Yes ☐ No

3. MONITORING PLAN (All applicants must fill out this section)

Describe monitoring plan to assess any actual effects on vegetation, trees, structures and infrastructure.

4. ENGINEER CERTIFICATION: The hydrogeological study, description and extent of cone of depression, and determination of offsite effects must be stamped by a California licensed Hydrogeologist (or equivalent).

Hydrogeological
Report Prepared By: _____

Stamp with Signature:

5. APPLICANT CERTIFICATION: I acknowledge the following dewatering requirements:

☐ Fill Stations: Must demonstrate a maximum 10-minute, 2700 gallon truck fill time and 2 simultaneous, 100' hose, 10 gallons per minute (gpm) deliveries (for each hose) during the two week start up period defined below. Storage tank designed to be at least one-half full. Ongoing metering of instantaneous and total flow of fill stations required.

☐ Pump for no more than 10 weeks for residential sites. A two week start-up period ahead of the 10 weeks is allowed. At the end of the two week startup period, compliance with all performance standards and water quality standards shall be demonstrated.

☐ Report on all measurements and requirements (reports due daily for the first two weeks and weekly thereafter, and then a final report at the end of pumping). Refer to status reporting in regulations.

☐ At the center of the basement excavation (center of where the slab will be), the groundwater shall be pumped no deeper than 3 feet below the depth of excavation/bottom of slab, following the two week start-up period. Once the slab is poured, the depth to groundwater at the center of the slab shall be 1 foot.

☐ Offer to water trees/plants on adjacent properties and do so if requested. Refer to regulations.

☐ Prior to anypumping, survey and mark land elevations on structures on adjacent parcels (assuming permission is obtained) – results due daily for the first two weeks and weekly thereafter. Refer to Regulations.

Applicant Name: _____

Applicant Signature: _____

GROUNDWATER DEWATERING INSPECTION CHECKLIST

CITY OF PALO ALTO

PUBLIC WORKS INSPECTION
Engineering Services Division
pwecips@cityofpaloalto.org – 650.329.2496 Ext. 8 – Inspection: 650.496.6929

ALL CONDITIONS *MUST* BE CHECKED 'YES' BEFORE A GRADING PERMIT AUTHORIZING GROUNDWATER DEWATERING CAN BE PROCESSED AND ISSUED. THE INSPECTOR WILL SIGN THIS FORM AND PROVIDE IT TO THE CONTRACTOR. THE CONTRACTOR MAY THEN SUBMIT THIS INSPECTION FORM TO PUBLIC WORKS STAFF AT THE DEVELOPMENT CENTER AND OBTAIN A GRADING & DEWATERING PERMIT AUTHORIZING THE START OF DEWATERING OPERATIONS.

Address: _____

Contractor: _____ **Phone:** _____

Required Water Station Features	Yes	No	Additional Comments
If the fill station is secured by a lock with 4 digit lock combination, then the combination should be 2,4,6,8			
Log sheets with pen in box			
Minimum 50', 2.5" hose in box with hydrant fittings for water truck filling			
At least 2 hose bibs outside the fill station box with 2, 100' hoses providing a minimum of 10 GPM each, simultaneously			
GFI outlet inside or electrical connection outside of box			
"In-use" cover over switch/outlet in box if in the fill station			
Electrical Safety Check (from Building Inspector, phone: 650.444.6173. Alternate - Bud Starmer: 650-444-6175)			
"Water Filling Station, Non-Potable Water, Do Not Drink" sign on fill station door box with Public Works phone number: 650.329.2496			
"No Hoses Crossing Street and Sidewalk and Private Property " sign at hose bibs			
Switches labeled – bibs and hose; instructions for use			
* "Non-potable Discharge" sign on the discharge point			
* Water quality test – acceptable for discharge to storm drain (from Inspector, phone number: 650.617.3165)			
* Flow meters showing instantaneous and total flow at inlet point of settling tank			
* Verify flow meters are starting at Zero or a start-up reference starting point			
* Flow meters easily readable and in a safe location; one at inlet of settlement tank and one at fill station (if fill station is required)			
Pump is operational (tested personally by a PW inspector)			
Hose bib is operational (tested personally by a PW inspector)			
* No diesel or gas generator pumps – electric pumps only			
Door Hangers			
Monitoring wells – 1, farthest onsite point from structure			
Demonstrate maximum of 10-minute fill time for a ~2700 gallon water truck			
Demonstrate 10 GPM flow rate from both 100' hoses simultaneously			
Received initial survey plan and data from adjacent structures			

Date

PW Inspector Passed By

*Only requirements for Groundwater Exclusionary Technique. Controlled Groundwater Pumping must comply with entire checklist.

Additional Comments: