INITIAL STUDY

FOR THE

SAN GABRIEL VALLEY WATER COMPANY PLANT B14 PROJECT

Prepared for:

State Water Resources Control Board
P.O. Box 944212
Sacramento, California 94244-2120

Prepared by:

Tom Dodson & Associates
2150 N. Arrowhead Avenue
San Bernardino, California 92405
(909) 882-3612

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INTRODUCTION

1. Project Title: San Gabriel Valley Water Company Plant B14 Project

2. Lead Agency Name: State Water Resources Control Board
   Address: Attn: Sara Paiva-Lowry
   P.O. Box 944212
   Sacramento, CA 94244-2120

3. Contact Person: Sara Paiva-Lowry, Senior Environmental Scientist
   Phone Number: (916) 323-0626

4. Project Location: The Project is located near the intersection of Camino Del Tomasini and Valdemar Drive in an unincorporated area of Los Angeles County known as Hacienda Heights. The Project is located within the USGS Topo 7.5-minute map for La Habra, CA, and is located in Section 13, Township 2 South and Range 11 West. The approximate GPS coordinates of the Project site are 33.989911, -117.991766. Refer to Figures 1 and 2 for the regional and site location maps.

5. Project Sponsor Name: San Gabriel Valley Water Company
   Address: 11142 Garvey Avenue, El Monte, CA 91733

6. General Plan Designation: Residential Agriculture

7. Zoning: Residential Agriculture (R-A)

8. Project Description:

Introduction

San Gabriel Valley Water Company (SGVWC or San Gabriel) serves several communities throughout southern California, and is based in El Monte in the San Gabriel Valley. San Gabriel provides water service to a population of over 481,000 within the Los Angeles County and Fontana Water division service areas.

Project Description

San Gabriel Valley Water Company's 2012 Water System Master Plan Update (Master Plan) recommended the proposed B14 Project. The Master Plan recommends the construction of a second reservoir at the existing Plant B14 site to allow San Gabriel operational flexibility to store additional water supplied from Plant B12 during periods of low demand. The second reservoir will also allow for the existing reservoir to be taken out of service when required for routine maintenance.

The existing Plant B14 facility is located within an approximately 4.02-acre site, and it currently consists of one 1.19 million gallon (MG) buried concrete reservoir (156 feet in diameter by 15 feet

high), four booster pumps with a total pumping capacity of 4,000 gallons per minute (GPM), an emergency generator and electronic control equipment. The site is currently bounded by a combination of chain link fencing and concrete block walls. Ground cover consists of crushed rock and asphalt pavement.

The site presently contains the following facilities, as shown on Figures 3, 4, 5, and 6, which are photos of the site as it exists at present from various angles:

Physical Components

a. One concrete block wall booster station enclosure,
b. Four booster pumps with a total pumping capacity of 4,000 GPM,
c. Perimeter chain link fencing and concrete block walls,
d. Piping for all processes,
e. Electrical power equipment,
f. Electronic control equipment,
g. One 1.19-MG (usable capacity) buried concrete water storage reservoir (156 feet in diameter by 15 feet high), and
h. One emergency generator.

Operational Components

1. The booster motors, pumps, and piping are currently operational and in good condition.
2. The existing control system telemetry is operational and in good condition.
3. The existing water storage reservoir is operational and in good condition.

The development of a new reservoir at this location will include the following: retaining wall and hillside stabilization, grading, and construction of a new 1 MG water storage reservoir and related piping. These activities are discussed in detail below and are depicted in the site plan provided as Figure 7:

Retaining Wall / Hillside Stabilization: The proposed Project includes the construction of retaining walls and hillside stabilization improvements. The existing reservoir site is located at the base of a steep hillside which often erodes and carries sediments to the base of the existing buried reservoir. The reservoir is partially buried with about three feet of the concrete wall above the ground surface. There is a two-foot section between the reservoir wall and the roof that is protected only by a wire mesh. During heavy rain events, sediments have been transported down the hillside and have settled against the base of the reservoir. If not immediately removed, these sediments could build up and eventually overflow into the water storage reservoir. This is a potential health hazard, as sediments entering the distribution system could contaminate the water supply. San Gabriel previously retained a contractor to grade an earthen swale around the base of the reservoir as an interim solution. However, a more permanent solution is needed and will be addressed through site drainage improvements by the proposed Project. The earthen swale currently diverts water away from the reservoir wall, but water ponds in the swale rather than discharging to the street.

In addition to drainage problems, sediments have accumulated at the base of the existing chain link fence. The existing fence has been damaged by the stress caused by the buildup of dirt and sediment. In order to mitigate the drainage problems, San Gabriel will construct a retaining wall to replace the existing chain link fence. The retaining wall will improve conditions by reducing the tributary area of surface flows to the reservoir. The proposed retaining wall will be constructed to enable grading of a relatively flat area on which to construct the new reservoir.

Grading: The Plant B14 Project will require grading to prepare the site for the construction of the new reservoir. Grading work includes over-excavation, import and/or export of soil and compaction of soil beneath the new reservoir foundation for the proposed reservoir. A relatively flat area will be graded to allow for construction of the foundation. The site will also be precisely graded to direct storm water runoff away from both the existing and proposed reservoirs and into proper drainage devices. Grading work at Plant B14 will improve drainage conditions and eliminate the risk of sediments overflowing into the reservoir.

Site Improvements (Drainage): The Plant B14 Project will require the construction of site improvements in order to safely convey storm runoff away from the proposed reservoirs. All on-site flows will be directed toward the street or to the existing drainage channel via concrete swales, catch basins and drain pipes.

Landscape and Irrigation Improvements: The new slope area generated from grading operations will be covered with proper vegetations to stabilize the slopes per Los Angeles County permit requirements. The trees and shrubs that meet the fuel modification criteria will be planted in the proposed slopes and an irrigation system will be constructed to provide supplemental water to the plants to guarantee the survival under dry weather conditions.

Construct 1 MG Reservoir and Related Piping: The Plant B14 Project includes the construction of a second storage reservoir. The new reservoir will be an above ground welded steel storage reservoir and will work in conjunction with the existing buried concrete reservoir. The proposed reservoir will be constructed to allow San Gabriel operational flexibility to store additional water from Plant B12 at the Plant B14 site during periods of low demand. The new reservoir will also serve to recover the lost capacity of the existing reservoir caused by the implementation of freeboard requirements. Lastly, the second reservoir will also allow for the existing reservoir to be taken out of service when required for routine maintenance. The proposed reservoir will be 80 feet in diameter by 32 feet high with a physical capacity of 1.20 MG. It will enable San Gabriel to store the difference between the incoming and outgoing flows at Plant B14.

The addition of a second reservoir at the Plant B14 site will also allow for the reservoirs to be properly maintained and retrofitted to meet new American Water Works Association (AWWA) guidelines as they change over the years. The existing concrete reservoir was constructed in 1935 and requires maintenance and retrofits to comply with current applicable codes. In January 2013, San Gabriel retained Harper and Associates (Harper) to complete a full inspection of both the interior and exterior of the reservoir. According to Harper's report there are numerous safety and health items recommended for the reservoir as well as maintenance of steel appurtenances and joint sealants. These maintenance items cannot be completed unless the existing reservoir is taken out of service for the duration of the repairs. Due to Southern California's year-round water demands, a second reservoir is needed so that the existing reservoir may be taken out of service and maintained, while the other reservoir remains in service. Plant B14 is a critical source in San Gabriel's distribution system as it is the only plant providing water to storage reservoirs at Plants B17, B18 and B19. The three reservoirs fed by Plant B14 have a combined useable storage capacity of approximately 3.16 MG. By implementing a proper inspection and maintenance schedule, San Gabriel will keep its reservoirs in good condition, which will result in an increased service life. If properly maintained and re-coated, the life span of steel reservoirs can be increased from 50 years to about 100 years.

The new reservoir will be designed in accordance with the California Building Code (CBC), the Occupational Safety and Health Administration (OSHA), American Concrete Institute (ACI),

Precast/Prestressed Concrete Institute (PCI) and AWWA's design standards. AWWA's design standards require that reservoirs be operated below their maximum physical height in order to prevent roof damage which may be caused by a "sloshing wave" during a seismic event. As a result, the usable capacity of the new reservoir will be reduced by approximately 27% to 1 million gallons. Although the physical height of the reservoir is 32 feet, the water level will be maintained at approximately 24 feet to comply with AWWA's freeboard requirements.

When the peak demand in the system exceeds the water supply capacity, water is drawn from storage. If this extends beyond a day or two, the demand out paces supply available from storage and the needed water comes from the pipelines in higher elevations until consumption of the water decreases and the demand matches the supply. This results in reduced fire-fighting capability, potential contamination and requires flushing of the depressurized portions of the lines further reducing the amount of water available for supply. Reduced fire-fighting capacity has real consequences if there is a fire needing the storage. In that case, reduced storage would result in additional losses from a fire. Inadequate storage can reduce the ISO fire rating by as much as 35 percent which could result in increased insurance rates for customers in the service area. Furthermore, no backup storage means that the existing reservoir cannot be removed from service to perform routine maintenance such as emergency repairs.

Construction Scenario

Design and construction of the Project is anticipated to be completed in approximately 30 months. The two alternatives are described below.

Welded Steel Reservoir Alternative: For the welded steel reservoir construction alternative, the site will be excavated to create a flat area about 23 feet wider than the tank diameter for construction of reservoir foundation and reservoir. The extra 10 feet around tank perimeter is need for maintenance access and installation of reservoir appurtenances. Permanent retaining walls around proposed reservoir with height varying from 10 to 26 feet will be constructed to account for elevation difference between proposed reservoir bottom and surrounding terrain as well as that between two reservoir bottoms. A drainage system for the back side of the retaining wall will be constructed together with the retaining wall to direct storm water away from reservoir. Finally, a landscape and irrigation system will be constructed to stabilize the area created by the reservoir and retaining wall construction. The construction of this alternative may take 22 to 26 months.

9. Surrounding land uses and setting: (Briefly describe the project's surroundings)

The surrounding land uses surround the Project site:

- To the north of the reservoir site, the zoning is Light Agriculture (A-1-1), and the General Plan Designation is Light Agriculture;
- To the east of the reservoir site, the zoning is Heavy Agriculture (A-2-1), and the General Plan Designation is Heavy Agriculture;
- To the south of the reservoir site, the zoning is Residential Agriculture (R-A-12000), and the General Plan Designation is Residential Agriculture; and,
- To the west of the reservoir site, the zoning is Residential Agriculture (R-A-10000), and the General Plan Designation is Residential Agriculture.

10. Other agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

The Project requires a General Construction National Pollutant Discharge Elimination System (NPDES) permit. The permit requires notification to the State Water Board and preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP). When SGVWC integrates the new reservoir into its system, a permit will be required from the State Water Resources Control Board, Division of Drinking Water. Los Angeles County requires a permit from the California Department of Fish and Wildlife (CDFW) because the unnamed intermittent stream meets the criteria of streambed subject to CDFW jurisdiction because defined channel bed and banks and associated riparian vegetation (i.e., mulefat) are present. Any proposed permanent or temporary impacts to this intermittent stream will likely require a Streambed Alteration Agreement from the CDFW, and Clean Water Act (CWA) Sections 401/404 permits from the Santa Ana RWQCB and U.S. Army Corps of Engineers, respectively. No other permits are known to be required. SGVWC will circulate the Initial Study/Mitigated Negative Declaration at the State Clearinghouse during a 30-day public review period.

11. Have California Native American tribes traditionally and cultural affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun? Yes.

    Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See Public Resources Code section 21083.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that Public Resources Code section 21082.3(c) contains provisions specific to confidentiality.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Energy
☒ Geology / Soils	☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials
☐ Hydrology & Water Quality	☐ Land Use / Planning	☐ Mineral Resources
☒ Noise	☐ Population / Housing	☐ Public Services
☐ Recreation	☒ Transportation	☒ Tribal Cultural Resources
☒ Utilities / Service Systems	☒ Wildfire	☒ Mandatory Findings of Significance

DETERMINATION (To be completed by the Lead Agency)

On the basis of this initial evaluation, the following finding is made:

☐	The proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☒	Although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
☐	The proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	The proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
☐	Although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

   a) the significance criteria or threshold, if any, used to evaluate each question; and
   b) the mitigation measure identified, if any, to reduce the impact to less than significance.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
I. AESTHETICS: Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning or other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

SUBSTANTIATION

a. *Less Than Significant Impact* – Adverse impacts to scenic vistas can occur in one of two ways. First, an area itself may contain existing scenic vistas that would be altered by new development. The proposed Project site currently contains an existing reservoir; construction of a second reservoir will not impact any scenic vistas within the site itself. The site is located in the foothills of the Hacienda Hills in unincorporated Los Angeles County, but the site itself doesn't contain any important scenic vistas which could be impacted by implementing the proposed new 1 MG, 80' (diameter) x 32' (height) reservoir. A scenic vista impact can also occur when a scenic vista can be viewed from the Project area or immediate vicinity and a proposed development may interfere with the view to a scenic vista. The proposed reservoir will be located adjacent to the existing reservoir, though it will be constructed on a portion of the site such that the reservoir will be slightly greater in height than the existing reservoir. Views to the north/northwest, west, and south/southwest consist of the small hills surrounding the existing reservoir. However, upon a review of Google Earth imaging of the Project area (8/27/18) and a site reconnaissance visit, the location of the reservoir is set back into the hills, which prevents nearby residents from viewing the reservoir. Therefore, the addition of a second reservoir at this location is not anticipated to substantially impact scenic vistas to residents within the Project area. Furthermore, construction of a second reservoir will be similar to (though taller than) that which exists in the vista of the foothills at present. Therefore, implementation of the proposed new reservoir is not expected to cause any substantial effects on any important scenic vistas. This potential impact is considered a less than significant adverse aesthetic impact. No mitigation is required.

b. *Less Than Significant Impact* – The proposed Project site contains an existing reservoir, and therefore the construction of a new reservoir at this location is consistent with that which would be expected at the site. No trees exist on the Project site. Rock outcroppings, historic buildings, or other scenic resources identified by the County General Plan do not occur on site, especially given that the Project site contains an existing reservoir and is therefore suitable for development of a second reservoir. Consequently, impacts to scenic resources on site are considered less than significant, and no mitigation is required.

c. *Less Than Significant Impact* – The Project site is located in a relatively urbanized area surrounded by residential homes. The Project site currently contains a 1.19 MG water storage reservoir that will

install an above ground reservoir at a slightly greater elevation of the existing reservoir. The site consists of mostly dirt as the site has been cleared of most vegetation and ranges in elevation. The site is located in an area that contains existing water facilities and the construction of the new reservoir would be visually consistent with the existing landscape at the site. The existing reservoir is set back into the hills behind most residences, so while a small number of residents may be able to see the reservoir from their back yards, the addition of the new reservoir would not be visible to a majority of nearby residents. Furthermore, the Project is located within the Residential Agriculture Zone, which allows for a maximum height limit of 35 feet, and the proposed reservoir will be under this height limit. Additionally, infrastructure projects such as the proposed reservoir installation project are considered land use independent, and therefore, the proposed development of a second reservoir and associated site improvements would not have a significant potential to substantially degrade the existing visual character or to conflict with applicable zoning or other regulations governing scenic quality. Impacts under this issue are considered less than significant, and no mitigation is required.

d. *No Impact* – The existing reservoir utilizes lighting on an as-need basis. It is assumed that the new reservoir would not require additional lighting in order to operate. Existing sources of light in the Project area include the residences that surround the Project site to the east and residences farther up along the hillside. The construction activities are limited to daylight hours unless an emergency occurs, and the amount of security lighting needed during construction will be limited. Therefore, given that the proposed Project would not require additional lighting during operation, the proposed Project is not anticipated to introduce a new source of light and glare into the Project area over previous uses. No impacts are anticipated to occur under this issue and no mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
II. AGRICULTURE AND FORESTRY RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

SUBSTANTIATION

a. *No Impact* – The replacement reservoir is located in the foothills of the Hacienda Hills within the County of Los Angeles. The Project site is zoned for Residential Agriculture; the permitted uses under this zoning classification are single family residences and crops (field, tree, bush, berry, row and nursery stock). The Project site does not currently contain any agricultural uses, as it currently contains an SGVWC reservoir. Furthermore, the development of water related infrastructure is considered land use independent. No agricultural activities exist within the Project site; and there is no potential for impact to any agricultural uses or values as a result of Project implementation. According to the maps prepared pursuant to the farmland mapping and monitoring program of the California Resources Agency, no prime farmland, unique farmland, or farmland of statewide importance exists within the vicinity of the proposed Project (Figure II-1). No adverse impact to any agricultural resources would occur from implementing the proposed Project. No mitigation is required.

b. *No Impact* – There are no agricultural uses currently on the Project site or on adjacent properties. The Project site is zoned for Residential Agriculture; the permitted uses under this zoning classification are single family residences and crops (field, tree, bush, berry, row and nursery stock). The Project site does not currently contain any agricultural uses, as it currently contains an SGVWC reservoir. Furthermore, the development of water related infrastructure is considered land use independent. Therefore, the development of a new reservoir at this site would not conflict with agricultural zoning or Williamson Act contracts within the Project area. No mitigation is required.

c. *No Impact* – Please refer to issues a) and b) above. The Project site is located in the foothills of the Hacienda Hills. The area surrounding the Project is urban residential. The Project site is zoned for Residential Agriculture; the permitted uses under this zoning classification are single family residences and crops (field, tree, bush, berry, row and nursery stock). The Project site does not currently contain any forest land uses, as it currently contains an SGVWC reservoir. No potential exists for a conflict between the proposed Project and forest/timberland zoning. No mitigation is required.

d. *No Impact* – There are no forest lands within the Project area, which is because the Project area is urbanized. No potential for loss of forest land would occur if the Project is implemented. No mitigation is required.

e. *No Impact* – The Project site and surrounding area does not contain forestry uses, and though the Project is zoned for Residential Agriculture use, the Project site does not contain any agricultural uses as it currently contains an existing SGVWC reservoir. Furthermore, water related infrastructure is considered land use independent; therefore, implementation of the proposed Project would not cause or result in the conversion of Farmland or forest land to alternative use. No adverse impact would occur. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☒	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

SUBSTANTIATION: The following information utilized in this section of the Initial Study was obtained from the following technical study: *Air Quality and GHG Impact Analyses, San Gabriel Valley Water Company Plant B14 Project, San Bernardino County, California"* dated September 12, 2018 prepared by Giroux & Associates. This technical study is provided as Appendix 1 to this document.

Background

Climate

The climate of Hacienda Heights, as with all of Southern California, is governed largely by the strength and location of the semi-permanent high-pressure center over the Pacific Ocean and the moderating effects of the nearby vast oceanic heat reservoir. Local climatic conditions are characterized by very warm summers, mild winters, infrequent rainfall, moderate daytime on-shore breezes, and comfortable humidities. Unfortunately, the same climatic conditions that create such a desirable living climate combine to severely restrict the ability of the local atmosphere to disperse the large volumes of air pollution generated by the population and industry attracted in part by the climate.

Winds across the Project area are an important meteorological parameter because they control both the initial rate of dilution of locally generated air pollutant emissions as well as their regional trajectory. Local wind patterns show a fairly unidirectional daytime onshore flow from the SW-W with a very weak offshore return flow from the NE that is strongest on winter nights when the land is colder than the ocean. The onshore winds during the day average 6-8 mph, while the offshore flow is often calm or drifts slowly westward at 1-3 mph. During the daytime, any locally generated air emissions are thus transported eastward toward San Bernardino and Cajon Pass without generating any localized air quality impacts.

In conjunction with the two dominant wind regimes that affect the rate and orientation of horizontal pollutant transport, there are two similarly distinct types of temperature inversions that control the vertical depth through which pollutants are mixed. The summer on-shore flow is capped by a massive dome of warm, sinking air which caps a shallow layer of cooler ocean air. These marine/subsidence inversions act like a giant lid over the basin. They allow for local mixing of emissions, but they confine the entire polluted air mass within the basin until it escapes into the desert or along the thermal chimneys formed along heated mountain slopes.

In winter, when the air near the ground cools while the air aloft remains warm, radiation inversions are formed that trap low-level emissions such as automobile exhaust near their source. As background levels of primary vehicular exhaust rise during the seaward return flow, the combination of rising non-local baseline levels plus emissions trapped locally by these radiation inversions creates micro-scale air pollution "hot spots" near freeways, shopping centers and other traffic concentrations. Because the incoming air draining off the mountains into the San Gabriel Valley during nocturnal radiation inversion conditions is relatively clean, the summer subsidence inversions are a far more critical factor in determining Hacienda Heights area air quality than the winter time local trapping inversions.

Air Quality Standards

In order to gauge the significance of the air quality impacts of the proposed Project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone (the primary ingredient in photochemical smog) may lead to adverse respiratory health even at concentrations close to the ambient standard. These standards and their health effects are listed in Table III-1 and III-2 respectively.

Baseline Air Quality

Long-term air quality monitoring is carried out by the South Coast Air Quality Management District (SCAQMD) at various monitoring stations. There are no nearby stations that monitor the full spectrum of pollutants. Ozone, carbon monoxide, PM-2.5 and nitrogen oxides are monitored at the Pico Rivera facility, while 10-micron diameter particulate matter (PM-10) is measured at the Azusa station. Table III-3 summarizes the last four years of monitoring data from a composite of these data resources. The following conclusions can be drawn from this data:

a. Photochemical smog (ozone) levels occasionally exceed standards. The 8-hour state ozone standard as well as the 1-hour state standard have been exceeded on less than two percent of all days in the past four years. The 8-hour federal standard has been exceeded nine times for the same period. While ozone levels are still high, they are much lower than 10 to 20 years ago. Attainment of all clean air standards in the Project vicinity is not likely to occur soon, but the severity and frequency of violations is expected to continue to slowly decline during the current decade
b. Measurements of carbon monoxide have shown very low baseline levels in comparison to the most stringent one- and eight-hour standards.
c. Respirable dust (PM-10) levels exceed the state standard on approximately 22 percent of measurement days, but the less stringent federal PM-10 standard has not been violated once for the same period. Year to year fluctuations of overall maximum 24-hour PM-10 levels seem to follow no discernable trend, though 2016 had the lowest maximum 24-hour concentration in recent history.
d. A substantial fraction of PM-10 is comprised of ultra-small diameter particulates capable of being inhaled into deep lung tissue (PM-2.5). Year 2013 showed the maximal concentration in recent years. Both the frequency of violations of particulate standards, as well as high percentage of PM-2.5, are occasional air quality concerns in the Project area. Less than one percent of all days exceeded the current national 24-hour standard of 35 $\mu g/m^3$ from 2013-2016.

Although complete attainment of every clean air standard is not yet imminent, extrapolation of the steady improvement trend suggests that such attainment could occur within the reasonably near future.

Table III-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	Average Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		–		
Fine Particulate Matter (PM2.5)[9]	24 Hour	–	–	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15.0 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	–	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	–	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–	–	
Nitrogen Dioxide (NO2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	–	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	–	Ultraviolet Flourescense; Spectrophotometry (Paraosaniline Method)
	3 Hour	–		–	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[11]	–	
Lead 8[12,13]	30-Day Average	1.5 µg/m^3	Atomic Absorption	–	–	–
	Calendar Quarter	–		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Avg	–		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No Federal Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Footnotes

1 California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter – PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year, with a 24-hour average concentration above 150 $\mu g/m^3$, is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3 Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4 Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7 Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

8 On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9 On December 14, 2012, the national PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primarily and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primarily and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10 To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11 On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12 The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13 The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 j.tg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14 In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Table III-2
HEALTH EFFECTS OF MAJOR CRITERIA POLLUTANTS

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter.	• Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions.	• Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	• Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	• Contaminated soil.	• Impairment of blood function and nerve construction. • Behavioral and hearing problems in children.
Respirable Particulate Matter (PM-10)	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardio respiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.
Fine Particulate Matter (PM-2.5)	• Fuel combustion in motor vehicles, equipment, and industrial sources. • Residential and agricultural burning. • Industrial processes. • Also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.	• Increases respiratory disease. • Lung damage. • Cancer and premature death. • Reduces visibility and results in surface soiling.
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility. • Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.

Source: California Air Resources Board, 2002.

Table III-3
PROJECT AREA AIR QUALITY MONITORING SUMMARY 2013-2016
(DAYS STANDARDS WERE EXCEEDED AND MAXIMUM OBSERVED LEVELS)

Pollutant/Standard	2013	2014	2015	2016
Ozone				
1-Hour > 0.09 ppm (S)	2	7	6	9
8-Hour > 0.07 ppm (S)	3	7	11	6
8- Hour > 0.075 ppm (F)	0	5	2	2
Max. 1-Hour Conc. (ppm)	0.10	0.12	0.11	0.11
Max. 8-Hour Conc. (ppm)	0.07	0.09	0.08	0.08
Carbon Monoxide				
1-Hour > 20. ppm (S)	0	0	0	0
8-Hour > 9. ppm (S, F)	0	0	0	0
Max 8-Hour Conc. (ppm)	2.0	2.5	1.7	1.7
Nitrogen Dioxide				
1-Hour > 0.18 ppm (S)	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.08	0.09	0.07	0.06
Respirable Particulates (PM-10) [1]				
24-Hour > 50 $\mu g/m^3$ (S)	6/61	22/60	12/59	12/60
24-Hour > 150 $\mu g/m^3$ (F)	0/61	0/60	0/59	0/60
Max. 24-Hr. Conc. ($\mu g/m^3$)	76.	96.	101.	74.
Fine Particulates (PM-2.5) [1]				
24-Hour > 35 $\mu g/m^3$ (F)	0/114	0/116	3/118	2/120
Max. 24-Hr. Conc. ($\mu g/m^3$)	29.1	35.1	52.7	46.6

S=State Standard
F=Federal Standard
Source: South Coast AQMD – Pico Rivera Air Monitoring Station for Ozone, CO, NOx and PM-2.5
Azusa Monitoring Station for PM-10
data: www.arb.ca.gov/adam/

Air Quality Planning

For a detailed discussion of the Air Quality Plans in place that are applicable to the Project and surrounding area, see Appendix 1, pages 10-12.

The Federal Clean Air Act (1977 Amendments) required that designated agencies in any area of the nation not meeting national clean air standards must prepare a plan demonstrating the steps that would bring the area into compliance with all national standards. The Southern California Air Basin (SCAB) could not meet the deadlines for ozone, nitrogen dioxide, carbon monoxide, or PM-10. In the SCAB, the agencies designated by the governor to develop regional air quality plans are the SCAQMD and the Southern California Association of Governments (SCAG). The two agencies first adopted an Air Quality Management Plan (AQMP) in 1979 and revised it several times as earlier attainment forecasts were shown to be overly optimistic.

Table III-4
SOUTH COAST AIR BASIN EMISSIONS FORECASTS (EMISSIONS IN TONS/DAY)

Pollutant	2015[a]	2020[b]	2025[b]	2030[b]
NOx	357	289	266	257
VOC	400	393	393	391
PM-10	161	165	170	172
PM-2.5	67	68	70	71

[a]2015 Base Year.
[b]With current emissions reduction programs and adopted growth forecasts.
Source: California Air Resources Board, 2013 Almanac of Air Quality

AQMPs are required to be updated every three years. The 2012 AQMP was adopted in early 2013. An updated AQMP was required for completion in 2016. The 2016 AQMP was adopted by the SCAQMD Board in March 2017 and has been submitted the California Air Resources Board for forwarding to the EPA. The 2016 AQMP acknowledges that motor vehicle emissions have been effectively controlled and that reductions in NOx, the continuing ozone problem pollutant, may need to come from major stationary sources (power plants, refineries, landfill flares, etc.). The current attainment deadlines for all federal non-attainment pollutants are now as follows:

8-hour ozone (70 ppb) 2032
Annual PM-2.5 (12 $\mu g/m^3$) 2025
8-hour ozone (75 ppb) 2024 (former standard)
1-hour ozone (120 ppb) 2023 (rescinded standard)
24-hour PM-2.5 (35 $\mu g/m^3$) 2019

The key challenge is that NOx emission levels, as a critical ozone precursor pollutant, are forecast to continue to exceed the levels that would allow the above deadlines to be met. Unless additional stringent NOx control measures are adopted and implemented, ozone attainment goals may not be met.

The proposed Project does not directly relate to the AQMP in that there are no specific air quality programs or regulations governing water improvement projects. Conformity with adopted plans, forecasts and programs relative to population, housing, employment and land use is the primary yardstick by which impact significance of planned growth is determined. The SCAQMD, however, while acknowledging that the AQMP is a growth-accommodating document, does not favor designating regional impacts as less-than-significant just because the proposed development is consistent with regional growth projections. Air quality impact significance for the proposed Project has therefore been analyzed on a project-specific basis.

Standards of Significance

Air quality impacts are considered “significant” if they cause clean air standards to be violated where they are currently met, or if they “substantially” contribute to an existing violation of standards. Any substantial emissions of air contaminants for which there is no safe exposure, or nuisance emissions such as dust or odors, would also be considered a significant impact.
Appendix G of the California CEQA Guidelines offers the following five tests of air quality impact significance. A project would have a potentially significant impact if it:

a. Conflicts with or obstructs implementation of the applicable air quality plan.
b. Violates any air quality standard or contributes substantially to an existing or projected air quality violation.

c. Results in a cumulatively considerable net increase of any criteria pollutants for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
d. Exposes sensitive receptors to substantial pollutant concentrations.
e. Creates objectionable odors affecting a substantial number of people.

Primary Pollutants

Air quality impacts generally occur on two scales of motion. Near an individual source of emissions or a collection of sources such as a crowded intersection or parking lot, levels of those pollutants that are emitted in their already unhealthful form will be highest. Carbon monoxide (CO) is an example of such a pollutant. Primary pollutant impacts can generally be evaluated directly in comparison to appropriate clean air standards. Violations of these standards where they are currently met, or a measurable worsening of an existing or future violation, would be considered a significant impact. Many particulates, especially fugitive dust emissions, are also primary pollutants. Because of the non-attainment status of the South Coast Air Basin (SCAB) for PM-10, an aggressive dust control program is required to control fugitive dust during project construction.

Secondary Pollutants

Many pollutants, however, require time to transform from a more benign form to a more unhealthful contaminant. Their impact occurs regionally far from the source. Their incremental regional impact is minute on an individual basis and cannot be quantified except through complex photochemical computer models. Analysis of significance of such emissions is based upon a specified amount of emissions (pounds, tons, etc.) even though there is no way to translate those emissions directly into a corresponding ambient air quality impact. Because of the chemical complexity of primary versus secondary pollutants, the SCAQMD has designated significant emissions levels as surrogates for evaluating regional air quality impact significance independent of chemical transformation processes. Projects with daily emissions that exceed any of the following emission thresholds are recommended by the SCAQMD to be considered significant under CEQA guidelines.

Table III-5
DAILY EMISSIONS THRESHOLDS

Pollutant	Construction	Operations
ROG	75	55
NOx	100	55
CO	550	550
PM-10	150	150
PM-2.5	55	55
SOx	150	150
Lead	3	3

Source: SCAQMD CEQA Air Quality Handbook, November, 1993 Rev.

Additional Indicators

In its CEQA Handbook, the SCAQMD also states that additional indicators should be used as screening criteria to determine the need for further analysis with respect to air quality. The additional indicators are as follows:

- Project could interfere with the attainment of the federal or state ambient air quality standards by either violating or contributing to an existing or projected air quality violation;

- Project could result in population increases within the regional statistical area which would be in excess of that projected in the AQMP and in other than planned locations for the project's build-out year; and
- Project could generate vehicle trips that cause a CO hot spot.

Impact Analysis

a. *Less Than Significant Impact* – Projects—such as the proposed development of a new 1.2 MG water storage reservoir—do not directly relate to the AQMP in that there are no specific air quality programs or regulations governing general development. This makes sense since, once installed, the reservoirs do not generate new emissions. Conformity with adopted plans, forecasts and programs relative to population, housing, employment and land use are the primary yardsticks by which impact significance of planned growth is determined. Based on the analysis of the County's General Plan Land Use section, the proposed Project is consistent with the adopted County's General Plan. Thus, the proposed Project is consistent with regional planning forecasts maintained by the Southern California Association of Governments (SCAG) regional plans. The SCAQMD, however, while acknowledging that the AQMP is a growth-accommodating document, does not favor designating regional impacts as less-than-significant only because of consistency with regional growth projections. Air quality impact significance for the proposed Project has therefore been analyzed on a project-specific basis. As the analysis of Project-related emissions provided below indicates, the proposed Project will not cause or be exposed to significant air pollution, and is, therefore, consistent with the applicable air quality plan.

b. *Less Than Significant With Mitigation Incorporated* – Air pollution emissions associated with the proposed Project would occur over both a short and long-term time period. Short-term emissions include fugitive dust from construction activities (i.e., site prep, grading, creating of the retaining wall, and exhaust emission) at the proposed Project site. Long-term emissions generated by future operation of the proposed Project primarily include energy consumption, if necessary. However, there is no direct nexus between consumption and the type of power source or the air basin where the source is located. Operational air pollution emissions from electrical generation are therefore not attributable on a project-specific basis. The construction and operational emissions were estimated and compared to the SCAQMD significance thresholds using the CalEEMod model. The Project entails grading and installation of a retaining wall for hillside stabilization and construction of a new one MG water storage reservoir and related piping. Estimated construction emissions were modeled using CalEEMod2016.3.2 to identify maximum daily emissions for each pollutant during Project construction. Construction was modeled in CalEEMod2016.3.2 using construction equipment and schedule with input from the Project engineer as shown in Table III-6 below.

   Utilizing this indicated equipment fleet and durations shown in Table III-6 the following worst-case daily construction emissions are calculated by CalEEMod and are listed in Table III-7.

   Peak daily construction activity emissions are estimated to be well below SCAQMD CEQA thresholds without the need for added mitigation. The only model-based mitigation measured applied for this Project was watering exposed dirt surfaces at least three times per day to minimize the generation of fugitive dust generation during grading.

Table III-6
CalEEMod CONSTRUCTION ACTIVITY EQUIPMENT FLEET AND WORKDAYS

Grading and Retaining Wall 4 months	1 Dozer
	1 Loader/Backhoe
	1 Grader
	1 Excavator
New Tank Construction 20 months	1 Crane/Hoe Ram
	1 Forklift
	2 Concrete Pumps
	1 Loader/Backhoe
	1 Generator Set
	4 Welders
	1 Stress Tower
Painting 3 months	2 Air Compressors
Drainage and Piping 3 months	1 Trencher
	1 Roller
	1 Loader/Backhoe
	1 Forklift

Table III-7
CONSTRUCTION ACTIVITY EMISSIONS
MAXIMUM DAILY EMISSIONS (POUNDS/DAY)

Maximal Construction Emissions	ROG	NOx	CO	SO_2	PM-10	PM-2.5
Year 2019						
Unmitigated	3.9	29.6	26.8	0.0	7.5	4.4
Mitigated	3.9	29.6	26.8	0.0	3.8	2.3
Year 2020						
Unmitigated	3.5	27.2	26.2	0.0	1.8	1.4
Mitigated	3.5	27.2	26.2	0.0	1.8	1.4
Year 2021						
Unmitigated	0.9	7.5	8.6	0.0	0.9	0.6
Mitigated	0.9	7.5	8.6	0.0	0.9	0.6
SCAQMD Thresholds	75	100	550	150	150	55

Construction activities are not anticipated to cause dust emissions to exceed SCAQMD CEQA thresholds. Nevertheless, emissions minimization through enhanced dust control measures is recommended as a best management practices measure because of the non-attainment status of the air basin. Therefore, the following mitigation measure shall be implemented to reduce potential impacts to the greatest extent possible that could result from the proposed Project:

AIR-1 ***Fugitive Dust Control. The following measures shall be incorporated into Project plans and specifications for implementation:***

- ***Apply soil stabilizers or moisten inactive areas;***

- ***Water exposed surfaces as needed to avoid visible dust leaving the construction site (typically 2-3 times/day);***
- ***Cover all stock piles with tarps at the end of each day or as needed;***
- ***Provide water spray during loading and unloading of earthen materials;***
- ***Minimize in-out traffic from construction zone;***
- ***Cover all trucks hauling dirt, sand, or loose material and require all trucks to maintain at least two feet of freeboard; and***
- ***Sweep streets daily if visible soil material is carried out from the construction site.***

Similarly, ozone precursor emissions (ROG and NOx) are calculated to be below SCAQMD CEQA thresholds during construction. However, because of the non-attainment for photochemical smog, the use of reasonably available control measures for diesel exhaust is recommended. The following mitigation measures shall be implemented:

AIR-2 Exhaust Emissions Control

- ***Utilize well-tuned off-road construction equipment.***
- ***Establish a preference for contractors using Tier 3-rated or better heavy equipment.***
- ***Enforce 5-minute idling limits for both on-road trucks and off-road equipment.***

With the implementation of these mitigation measures, any Project-related construction impacts will remain less than significant.

Operational Impacts

Operational air pollution emissions will be minimal. Electrical generation of power will be used for pumping. Electrical consumption has no single uniquely related air pollution emissions source because power is supplied to and drawn from a regional grid. Electrical power is generated regionally by a combination of non-combustion (nuclear, hydroelectric, solar, wind, geothermal, etc.) and fossil fuel combustion sources. There is no direct nexus between consumption and the type of power source or the air basin where the source is located. Operational air pollution emissions from electrical generation are therefore not attributable on a project-specific basis.

Conclusion

Based on the discussion above, with implementation of mitigation measure **AIR-1** and **AIR-2** the project would have a less than significant potential to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard for both construction and operational scenarios.

c. *Less Than Significant With Mitigation Incorporated* – The SCAQMD has developed analysis parameters to evaluate ambient air quality on a local level in addition to the more regional emissions-based thresholds of significance. These analysis elements are called Localized Significance Thresholds (LSTs). LSTs were developed in response to Governing Board's Environmental Justice Enhancement Initiative 1-4 and the LST methodology was provisionally adopted in October 2003 and formally approved by SCAQMD's Mobile Source Committee in February 2005.

Use of an LST analysis for a project is optional. For the proposed Project, the only source of possible LST impact would be during construction. LSTs are applicable for a sensitive receptor where it is possible that an individual could remain for 24 hours such as a residence, hospital or convalescent facility.

LSTs are only applicable to the following criteria pollutants: oxides of nitrogen (NOx), carbon monoxide (CO), and particulate matter (PM-10 and PM-2.5). LSTs represent the maximum emissions from a project that are not expected to cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area and distance to the nearest sensitive receptor.

LST screening tables are available for 25, 50, 100, 200 and 500-meter source-receptor distances. The proposed reservoir is west of the existing reservoir and is more than 250 feet from the residential uses along Camino Del Tomasini and Valdemar Drive. Therefore a 50-meter separation distance was used. The SCAQMD has issued guidance on applying CalEEMod to LSTs. LST pollutant screening level concentration data is currently published for 1, 2 and 5-acre sites for varying distances. For this Project, the most stringent thresholds for a 1-acre site were applied. The following thresholds and emissions in Table III-8 are therefore determined (pounds per day):

Table III-8
LST AND PROJECT EMISSIONS (POUNDS/DAY)

LST 1 acre/150 meters Northwest San Bernardino Valley	**CO**	**NOx**	**PM-10**	**PM-2.5**
LST Thresholds	783	69	11	4
Max On-Site Emissions				
Unmitigated	27	30	8	4
Mitigated	27	30	4	2
Significant?	No	No	No	No

CalEEMod Output in Appendix

LSTs were compared to the maximum daily construction activities. As seen in Table III-8, even without use of dust control (watering exposed surfaces 3 times daily), emissions meet the LST for construction thresholds. LST impacts are less than significant and as such, with mitigation measures **AIR-1** and **AIR-2**, the project would have a less than significant potential to expose sensitive receptors to substantial pollutant concentration.

d. *Less Than Significant Impact* – Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational- source odor impacts. Project operations (pumping and storage) are an essentially closed system with negligible odor potential. The reservoir will be designed with adequate freeboard (head space between the top of the water and the roof) to contain any surges without forcing the emergency vents to open. Odors will be briefly detectable during application of the interior epoxy coating and outdoor paint application on the reservoir shell. Good painting practice (low wind speeds and high efficiency sprayers) will minimize odor or overspray and paint transport. Impacts under this issue are considered less than significant. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
IV. BIOLOGICAL RESOURCES: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒		☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☒	☐	☐

SUBSTANTIATION: The following information is provided based on a Biological Resources Assessment of the Project site. The assessment was conducted by Jericho Systems dated September 2017 and was updated in 2019 to reflect current conditions, and is titled "Biological Resources Assessment and Jurisdictional Delineation for the San Gabriel Valley Water Company's Plant B14 Facilities Improvement Project, Unincorporated Area of Hacienda Heights, County of Los Angeles, California." The following information is abstracted from the Biological Resources Assessment provided as Appendix 2.

a. *Less Than Significant With Mitigation Incorporated* – Implementation of the proposed Project may have a potential for an adverse effect, either directly or through habitat modifications, on species identified as a candidate, sensitive, or special species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or U.S. Fish and Wildlife Service (USFWS). The Project area lies within the range of several sensitive species including several that have been documented in the Project vicinity (approximately 3 miles), namely: the federally-listed as threatened coastal California Gnatcatcher (CAGN) and the State- and federally-listed as endangered least Bell's vireo (LBVI). Either these species must be assumed present (not recommended) within the Project area of potential effect (APE), or focused protocol-level surveys (recommended) need to be conducted to determine presence or absence. Regardless, potential Project-related impacts to CAGN and/or LBVI would be considered minimal given that the Project site is within an already disturbed site and mostly within unvegetated bare ground. No suitable CAGN

habitat will be removed and any impacts to this species would be indirect. The Project will permanently impact only 0.004 acres of suitable LBVI habitat (i.e. mulefat thicket); therefore, based on the conclusion outlined in the Biological Resources Assessment (BRA) provided as Appendix 2 to this Initial Study, a focused protocol-level survey is recommended and must be conducted to determine presence or absence. Mitigation to ensure that this survey is conducted prior to construction is provided below.

BIO-1 ***Preconstruction presence/absence surveys for least Bell's vireo shall be conducted within 30 days prior to any onsite ground disturbing activity. The least Bell's vireo survey shall be conducted pursuant to the recommendations and guidelines established by the California Department of Fish and Wildlife. No further action is required.***

BIO-2 ***Preconstruction presence/absence surveys for coastal California gnatcatcher shall be conducted within 30 days prior to any onsite ground disturbing activity. The coastal California gnatcatcher survey shall be conducted pursuant to the recommendations and guidelines established by the California Department of Fish and Wildlife. In the event this species is not identified within the Project limits, no further mitigation is required. If during the preconstruction survey, the coastal California gnatcatcher is found to occupy the site, Mitigation measure BIO-3 shall be required.***

BIO-3 ***In the event that coastal California gnatcatcher is found the following measures shall be taken to prevent impacts to this species:***

- ***Construction shall not occur during nesting season for CAGN.***
- ***Firm boundaries shall be established to prevent impacts.***
- ***SGVWC shall compensate for suitable CAGN habitat at a 1:1 ratio (for each acre one acre of compensatory mitigation will be provided).***

With the implementation of mitigation measures BIO-1 through BIO-3 above, impacts under this issue are considered less than significant.

b. *Less Than Significant Impact* – Implementation of the proposed Project will not have an adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS. The Project APE is not located within or immediately adjacent any USFWS designated Critical Habitat. However, the site is within approximately 0.05 miles (280 feet) east of the East Los Angeles County – Matrix Natural Community Conservation Plan Subregion of Orange County Unit (Unit 9) of CAGN Critical Habitat.

The Project site is within an undefined Hydrologic Sub-Area, which comprises a 101,715-acre drainage area within the larger San Gabriel Watershed. There is one unnamed intermittent stream within the Project APE, which parallels the south side of the existing and proposed water storage facilities. This drainage is classified as a temporarily-flooded intermittent stream that likely has surface water present for only brief periods during growing season, typically immediately following storm events, and would therefore be classified as a non-relatively permanent water (non-RPW) by the U.S. jurisdictional water feature that is subject to the CWA and FGC under the jurisdictions of USACE, RWQCB, and CDFW respectively. Any proposed permanent or temporary impacts to this intermittent stream will likely require a Streambed Alteration Agreement from the CDFW, and CWA Sections 401/404 permits from the RWQCB and Corps respectively. However, based on the location of the development on site, it is not anticipated that the Plant B14 Project will result in permanent or temporary impacts to any jurisdictional features on site because the site plan avoids jurisdictional features on site. As such, impacts to any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service would be considered less than significant with no mitigation required.

c. *No Impact* – According to the data gathered by Jericho Systems in Appendix 2, Areas meeting all three parameters (i.e. hydrophytic vegetation, hydric soils, and wetland hydrology) would be designated as USACE wetlands. There are no areas meeting all three wetland characteristics within the Project APE. Although hydrophytic vegetation, including mulefat, is present within the area of the proposed drainage outlets, hydric soils and wetland hydrology are not present within the Project APE. Therefore, no wetlands were identified in the Project APE during this investigation, based on the absence of hydric soil indicators or wetland hydrology.

d. *Less Than Significant With Mitigation Incorporated* – Vegetation that is suitable for nesting birds does exist within the Project APE and adjacent areas, and the State does protect all migratory and nesting native birds. Though no impacts to nesting or migratory birds are anticipated, the Project area may include locations that function as nesting locations for native birds. As such, to prevent interfering with native bird nesting, the following mitigation measure shall be implemented.

BIO-4 The State of California prohibits the "take" of active bird nests. To avoid an illegal take of active bird nests, any grubbing, brushing or tree removal should be conducted outside of the the State identified nesting season (Raptor nesting season is February 15 through July 31; and migratory bird nesting season is March 15 through September 1). Alternatively, the site shall be evaluated by a qualified biologist prior to the initiation of ground disturbace to determine the presence or absence of nesting birds. Active bird nests shall be avoided during the nesting season. If an active nest is located in the Project construction area it will be flagged and a 300-foot avoidance buffer placed around it. No activity shall occur within the 300-foot buffer until the young have fledged the nest.

Thus, with implementation of the above measure, any effects on wildlife movement or the use of wildlife nursery sites can be reduced to a less than significant impact.

e. *Less Than Significant Impact* – Development of the proposed Project would have a less than significant potential to conflict with any local policies or ordinances protecting biological resources. Impacts to biological resources have been addressed above under issues IV(a-d). Therefore, the potential for the Project to conflict with local policies or ordinances pertaining to biological resources would be considered less than significant.

f. *Less Than Significant With Mitigation Incorporated* – As stated above, the site is approximately 0.05 miles (280 feet) east of the East Los Angeles County – Matrix Natural Community Conservation Plan Subregion of Orange County Unit (Unit 9) of CAGN Critical Habitat. However, given that the proposed Project is located so close to this Natural Community Conservation Plan, implementation of mitigation measures BIO-2 and BIO-3 would prevent significant impacts to CAGN as a result of the proposed Project. No further mitigation is required to prevent impacts to CAGN or to any other adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
V. CULTURAL RESOURCES: Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

SUBSTANTIATION: The following information is provided based on a Historical/Archaeological Resources Survey Report of the Project site. The report was conducted by CRM TECH dated October 18, 2018 and is titled "Historical/Archaeological Resources Survey Report, 1.42-MG Reservoir and Improvements at Plant B14, Hacienda Heights Area, Los Angeles County, California." The following information is abstracted from Appendix 3.

Summary of the Finding

The purpose of the study prepared by CRM TECH is to provide SGVWC with the necessary information and analysis to determine whether the Project would cause substantial adverse changes to any "historical resources" or "tribal cultural resources," as defined by CEQA, which may exist in or around the Project area.

In order to identify such resources, CRM TECH conducted a historical/archaeological resources records search, pursued historical background research, contacted Native American representatives, and carried out an intensive-level field survey of the entire Project area. The results of these procedures indicate that the existing 1.19-MG concrete reservoir currently on the property dates originally to 1935 and thus meets the age threshold to be considered historical in origin (i.e., more than 50 years of age). As an infrastructure feature of standard design/construction and utilitarian character, the reservoir exhibits no remarkable historical, architectural, engineering, artistic, or aesthetic qualities. As such, it demonstrates no potential to qualify as a "historical resource" under CEQA guidelines and requires no further consideration.

No other features or artifacts of historical or prehistoric origin were encountered within or adjacent to the Project area during this study, and the subsurface sediments in the Project area appear to be relatively low in sensitivity for potentially significant archaeological deposits.

Tribal consultation, detailed in Section XVIII Tribal Cultural Resources, also did not result in the identification of known resources. However, there was tribal concern regarding the accidental discovery of archaeological resources, especially tribal cultural resources.

a-c. *Less Than Significant With Mitigation Incorporated* – CEQA establishes that "a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (PRC §21084.1). "Substantial adverse change," according to PRC §5020.1(q), "means demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired."

Per the above discussion and definition, as well as the information contained in Appendix 3, no known historical or archaeological resources were identified within the Project boundaries.

However, if archaeological materials are discovered during any earth-moving operations associated with the Project, the following mitigation measures shall be implemented:

CUL-1 ***Professional Standards: All archaeological and Native American personnel conducting monitoring or archaeological assessment during construction projects will be qualified and their work consistent with current professional standards. All feasible care to avoid any unnecessary disturbance, physical modification, or separation of human remains and associated funerary objects shall be taken. The principal archaeologist must meet the Secretary of the Interior standards for archaeology and have a minimum of 10 years of experience as a principal investigator working with Native American archaeological sites in southern California. The Qualified Archaeologist shall ensure that all other personnel are appropriately trained and qualified.***

CUL-2 ***Unanticipated Discovery of Tribal Cultural, Historical, and Archaeological Resources: Upon discovery of archaeological resources, cease construction activities in the immediate vicinity of the find until the find can be assessed by a qualified archaeologist. All archaeological resources unearthed by project construction activities shall be evaluated by the qualified archaeologist and tribal monitor approved by the Gabrieleño Band of Mission Indians-Kizh Nation. If the resources are Native American in origin, the Gabrieleño Band of Mission Indians-Kizh Nation shall coordinate with the landowner regarding treatment and curation of these resources. Typically, the Tribe will request reburial or preservation for educational purposes.***

After the assessment is completed, the archaeologist shall submit a report to the State Water Board describing the significance of the discovery with cultural resource management recommendations. Work may continue on other parts of the Project while evaluation and, if necessary, mitigation takes place (CEQA Guidelines Section15064.5 [f]). If a resource is determined by the qualified archaeologist to constitute a "historical resource" or "unique archaeological resource", time allotment and funding sufficient to allow for implementation of avoidance measures, or appropriate mitigation, must be available. The treatment plan established for the resources shall be in accordance with CEQA Guidelines Section 15064.5(f) for historical resources and Public Resources Code Sections 21083.2(b) for unique archaeological resources. Preservation in place (i.e., avoidance) is the preferred manner of treatment. If preservation in place is not feasible, treatment may include implementation of archaeological data recovery excavations to remove the resource along with subsequent laboratory processing and analysis. Any historic archaeological material that is not Native American in origin shall be curated at a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County or the Fowler Museum, if such an institution agrees to accept the material. If no institution accepts the archaeological material, they shall be offered to a local school or historical society in the area for educational purposes.

CUL-3 ***Retain a Native American Monitor: The Project Applicant will be required to obtain the services of a tribal monitor approved by the Gabrieleño Band of Mission Indians-Kizh Nation and will be present on-site during the construction phases that involve any ground disturbing activities. Ground disturbance is defined by the Gabrieleño Band of Mission Indians-Kizh Nation as activities that include, but are not limited to, pavement removal, pot- holing or auguring, grubbing, weed abatement, boring, grading, excavation, drilling, and trenching, within the Project area. The Tribal Monitor will complete monitoring logs on a daily basis that will provide descriptions of the daily activities, including construction activities, locations, soil, and any cultural materials identified. The on-site monitoring shall end when the Project site***

grading and excavation activities are completed, or when the Tribal Representatives and monitor have indicated that the site has a low potential for archeological resources.

CUL-4 ***Unanticipated Discovery of Human Remains and Associated Funerary Objects: Native American human remains are defined in PRC 5097.98 (d)(1) as an inhumation or cremation, and in any state of decomposition or skeletal completeness. Funerary objects, called "associated grave goods" in PRC 5097.98, are also to be treated according to this statute. Health and Safety Code 7050.5 dictates that any discoveries of human skeletal material shall be immediately reported to the County Coroner and excavation halted until the coroner has determined the nature of the remains. If the coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the Native American Heritage Commission and PRC 5097.98 shall be followed.***

Upon discovery, the Tribal monitor will immediately divert work at minimum of 50 feet and place an exclusion zone around the burial. The monitor will then notify the qualified archaeologist and the construction manager who will call the coroner. Work will continue to be diverted while the coroner determines whether the remains are Native American. The discovery is to be kept confidential and secure to prevent any further disturbance. If Native American, the coroner will notify the NAHC as mandated by state law who will then appoint a Most Likely Descendent (MLD).

If the Gabrieleno Band of Mission Indians – Kizh Nation is designated MLD, the following treatment measures shall be implemented. To the Tribe, the term "human remains" encompasses more than human bones. In ancient as well as historic times, Tribal Traditions included, but were not limited to, the burial of funerary objects with the deceased, and the ceremonial burning of human remains. These remains are to be treated in the same manner as bone fragments that remain intact. Associated funerary objects are objects that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later; other items made exclusively for burial purposes or to contain human remains can also be considered as associated funerary objects.

Prior to the start of ground disturbing activities, the land owner shall arrange a designated site location within the footprint of the Project for the respectful reburial of the human remains and/or ceremonial objects. In the case where discovered human remains cannot be fully documented and recovered on the same day, the remains will be covered with muslin cloth and a steel plate that can be moved by heavy equipment placed over the excavation opening to protect the remains. If this type of steel plate is not available, a 24-hour guard should be posted outside of working hours. The Tribe will make every effort to recommend diverting the Project and keeping the remains in situ and protected. If the Project cannot be diverted, it may be determined that burials will be removed. The Tribe will work closely with the qualified archaeologist to ensure that the excavation is treated carefully, ethically and respectfully. If data recovery is approved by the Tribe, documentation shall be taken which includes at a minimum detailed descriptive notes and sketches. Additional types of documentation shall be approved by the Tribe for data recovery purposes. Cremations will either be removed in bulk or by means as necessary to ensure completely recovery of all material. If the discovery of human

remains includes four or more burials, the location is considered a cemetery and a separate treatment plan shall be created. Once complete, a final report of all activities is to be submitted to the NAHC. The Tribe does not authorize any scientific study or the utilization of any invasive diagnostics on human remains.

Each occurrence of human remains and associated funerary objects will be stored using opaque cloth bags. All human remains, funerary objects, sacred objects and objects of cultural patrimony will be removed to a secure container on site if possible. These items should be retained and reburied within six months of recovery. The site of reburial/repatriation shall be on the Project site but at a location mitigated between the Tribe and the landowner at a site to be protected in perpetuity. There shall be no publicity regarding any cultural materials recovered.

With the above contingency mitigation incorporation, potential for impact to cultural resources will be reduced to a less than significant level. No additional mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
VI. ENERGY: Would the project:				
a) Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operations?	☐	☒	☐	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☒	☐	☐

SUBSTANTIATION

a&b. *Less Than Significant With Mitigation Incorporated* – The proposed reservoir development project would allow SGVWC operational flexibility to store additional water supplied from Plant B12 during periods of low demand. As such, it is not anticipated that any greater use of energy than exists on site at present would be required to operate the new water storage reservoir. However, energy would be required to operate construction equipment during construction of the new water storage reservoir.

As stated in Section III, Air Quality, the construction of the proposed Plant B14 Project would require mitigation measures to minimize emissions impacts from construction equipment use. These mitigation measures also apply to energy resources as they require equipment not in use for 5 minutes to be turned off, and for electrical construction equipment to be used where available. These measures would prevent a significant impact during construction due to wasteful, inefficient, or unnecessary consumption of energy resources, and would also conform to the CARB regulations regarding energy efficiency.

SCE is the primary provider for electricity at the site, and will continue to provide service though no expanded services are anticipated. According to SCE's website[1], SCE is committed to delivering power reliably and to meet demand; SCE is expanding and upgrading the transmission and distribution networks to meet the region's growing demand for electricity, and improve grid performance, while meeting California's ambitious renewable-power goals. As such, it is anticipated that SCE will continue to have ample power supply to serve the project without the need for additional electrical capacity. As such, it is not anticipated that the project would either result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operations, or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. Impacts under these issues are considered less than significant.

[1] https://www.sce.com/about-us/reliability/meeting-demand

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
VII. GEOLOGY AND SOILS: Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
(i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
(ii) Strong seismic ground shaking?	☐	☐	☒	☐
(iii) Seismic-related ground failure, including liquefaction?	☐	☒	☐	☐
(iv) Landslides?	☐	☒	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite land-slide, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

SUBSTANTIATION: The *Updated Geotechnical Study Report, San Gabriel Valley Water Company Plant B14 Proposed 1.2 Million Gallon Reservoir, West End of Camino Del Tomasini, Hacienda Heights, Los Angeles County, California* prepared by Conserve Consultants, dated July 19, 2017 is used in support of the analysis below, and is provided as Appendix 4 to this Initial Study.

a. Ground Rupture

Less Than Significant Impact – The Project site is located in the unincorporated area of the County of Los Angeles, which is situated between and around several active faults. Figure VII-1 shows where these faults are located as depicted in the Earthquake Zones of Required Investigation, La Habra Quadrangle prepared by the California Geologic Survey (Figure VII-1), which depicts seismic related geologic hazards within the La Habra Quadrangle. According to Figure VII-1, the site is not located on an active fault or within the nearest Alquist-Priolo fault zone. The Alquist-Priolo fault zone is

approximately 1 or 2 miles south of the Project site. Based on this information, the risk for ground rupture at the site location is low; therefore, it is not likely that future employees visiting the new reservoir site or employees working at the site during construction will be subject to rupture from a known earthquake fault. The Project does not propose any human occupancy structures or other structures that will place people on the site for long periods of time or pose a significant threat to people or property from ground rupture. All structures will be built to meet earthquake building standards, particularly for water storage reservoirs. Therefore, impacts associated within ground rupture would be considered less than significant. No mitigation is required.

Strong Seismic Ground Shaking

Less Than Significant Impact – As stated in the discussion above, several faults run through the County, and as with much of southern California, the proposed structure will be subject to strong seismic ground shaking impacts should any major earthquakes occur in the future, particularly due to the site's proximity to a fault zone, as shown in Figure VII-1. As a result, and like all other development projects in the City and throughout the southern California region, the proposed Project will be required to comply with all applicable seismic design standards contained in the 2010 California Building Code (CBC), including Section 1613- Earthquake Loads. Compliance with the CBC and the use of best management design practices will ensure that structural integrity will be maintained in the event of an earthquake. Therefore, impacts associated with strong ground shaking will be less than significant.

Seismic-Related Ground Failure Including Liquefaction

Less Than Significant With Mitigation Incorporated – According to the Earthquake Zones of Required Investigation, La Habra Quadrangle prepared by the California Geologic Survey (Figure VII-1), the proposed Project site is located in an area susceptible to liquefaction. However, the Geotechnical Report (Appendix 4) confirms that the Project site is not susceptible to liquefaction. The estimated potential seismically induced settlement is on the order of 0.91 inches with potential differential settlement of approximately 0.46 inches. In order to prevent any impacts under this issue, the following mitigation measure shall be implemented, as recommended by the Geotechnical Report:

GEO-1 SGVWC shall require the structural engineer to consider the effects of seismically-induced settlement when finalizing the foundation design for the new reservoir.

Landslides

Less Than Significant With Mitigation Incorporated – According to the Earthquake Zones of Required Investigation, La Habra Quadrangle prepared by the California Geologic Survey (Figure VII-1), the proposed Project site is not located within though is located adjacent to an area that is susceptible to landslides. Furthermore, according to the Geotechnical Report (Appendix 4), a number of landslides and slope stability problems have been reported in the surrounding residential developments. These landslides and slope stability problems have been associated with above normal rainfall years and the increased infiltration of water into the underlying earth materials. There has been a direct correlation between heavy rainfall years and slope stability problems. Marginally stable slope areas become unstable with increased water infiltration. Most earth movement problems are generally associated with water and site drainage.

GEO-2 Based upon the geotechnical study (Appendix 4 of this document), all of the geotechnical findings identified in Appendix 4 (listed on Pages 13-29) shall be implemented by SGVWC. Implementation of these specific measures will address all of the identified geotechnical constraints identified at the Project site, including seismic related hazards on future Project-related water storage reservoir.

Therefore, with construction of the retaining wall and the recommended design measures, the Project is not anticipated to expose people or structures to potential substantial adverse landslide effects, including the risk of loss, injury, or death involving landslides. Any impacts under this issue are considered less than significant and no mitigation is required.

b. *Less Than Significant With Mitigation Incorporated* – During construction, the Project site may have a potential for soil erosion. Due to the area of disturbance associated with site clearing and grading, as well as the excavation and development of the retaining wall/hillside stabilization required to a level surface for the new reservoir, there is a potential for substantial soil erosion. Stabilization of the hillside upon which the reservoir will be constructed is incorporated into the site design, as stabilization measures are necessary to ensure that the reservoir is placed on engineered fill. Once the level surface has been manufactured, the potential for soil erosion will be minimal. However, during Project construction when soils are exposed, temporary soil erosion may occur, which could be exacerbated by rainfall. Project grading would be managed through the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP). Additionally, recommended design and construction measures outlined in the Geotechnical Investigation (Appendix 4) and enforced through implementation of mitigation measure GEO-2 above will ensure that soil erosion is managed during operation of the new reservoirs. In addition to mitigation measure GEO-2 above, the following mitigation measures shall be implemented to address these issues:

GEO-3 Stored backfill material shall be covered with water resistant material during periods of heavy precipitation to reduce the potential for rainfall erosion of stored backfill material. If covering is not feasible, then measures such as the use of straw bales or sand bags shall be used to capture and hold eroded material on the Project site for future cleanup.

GEO-4 All exposed, disturbed soil (trenches, stored backfill, etc.) shall be sprayed with water or soil binders twice a day, or more frequently if fugitive dust is observed migrating from the site within which the new reservoir with associated water improvements is being constructed.

With implementation of the above mitigation measures, and the mandatory SWPPP erosion control measures incorporated in the site design (i.e. retaining walls and extensive compacted fill), the Project will not result in substantial soil erosion or the loss of topsoil. No further mitigation is necessary.

c. *Less Than Significant With Mitigation Incorporated* – As previously stated, the proposed Project will develop a new reservoir that will be 80 feet in diameter by 32 feet high with a physical capacity of 1.20 MG. Through implementation of the site design, the proposed Project would not require further mitigation beyond that which has already been identified in this section to prevent a significant impact from occurring under this issue. The recommended measures outlined in the Geotechnical Study, provided as mitigation measure GEO-2 above will ensure that any potential impacts regarding soil stability will be mitigated to a level of less than significant. Therefore, with implementation of the stabilizing measures identified in the site plan, the Project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse.

d. *Less Than Significant With Mitigation Incorporated* – According to the Geotechnical Report (Appendix 4), the proposed Project site is not located on expansive soils. Expansive soils are characterized by the ability to undergo significant volume change (shrink and swell) as a result of variation in soil moisture content. The Geotechnical Report included measures that will be enforced through mitigation measure GEO-2 to prevent any fill used in development of the Project site from including any expansive soils. Therefore, with implementation of mitigation measure GEO-2, the development of the new reservoir will have a less than significant potential to create a substantial risk to life or

property by being placed on expansive soils because none exist on the site. No further mitigation is required.

e. *No Impact* – The Project does not propose any septic tanks or alternative wastewater disposal systems. Therefore, determining if the Project site soils are incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater does not apply. No impacts are anticipated. No mitigation is required.

f. *Less Than Significant With Mitigation Incorporated* – The potential for discovering paleontological resources during development of the Project is considered highly unlikely based on the fact that the site has been previously engineered and disturbed at depth. No unique geologic features are known or suspected to occur on or beneath the sites. However, because these resources are located beneath the surface and can only be discovered as a result of ground disturbance activities, the following measure shall be implemented:

GEO-5 Should any paleontological resources be encountered during construction of these facilities, earthmoving or grading activities in the immediate area of the finds shall be halted and an onsite inspection should be performed immediately by a qualified paleontologist. Responsibility for making this determination shall be with SGVWC's onsite inspector. The paleontological professional shall assess the find, determine its significance, and make recommendations for appropriate mitigation measures.

With incorporation of this contingency mitigation, the potential for impact to paleontological resources will be reduces to a less than significant level. No additional mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
VIII. GREENHOUSE GAS EMISSIONS: Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

SUBSTANTIATION: The following information utilized in this section of the Initial Study was obtained from the following technical study: *Air Quality and GHG Impact Analyses, San Gabriel Valley Water Company Plant B14 Project, San Bernardino County, California"* dated September 12, 2018 prepared by Giroux & Associates. This technical study is provided as Appendix 1 to this document.

a&b. *Less Than Significant Impact* –

Thresholds of Significance

In response to the requirements of SB 97, the State Resources Agency developed guidelines for the treatment of GHG emissions under CEQA. These new guidelines became state laws as part of Title 14 of the California Code of Regulations in March 2010. The CEQA Appendix G guidelines were modified to include GHG as a required analysis element. A project would have a potentially significant impact if it:

- Generates GHG emissions, directly or indirectly, that may have a significant impact on the environment, or,
- Conflicts with an applicable plan, policy or regulation adopted to reduce GHG emissions.

Section 15064.4 of the Code specifies how significance of GHG emissions is to be evaluated. The process is broken down into quantification of Project-related GHG emissions, making a determination of significance, and specification of any appropriate mitigation if impacts are found to be potentially significant. At each of these steps, the new GHG guidelines afford the lead agency with substantial flexibility.

Emissions identification may be quantitative, qualitative or based on performance standards. CEQA guidelines allow the lead agency to "select the model or methodology it considers most appropriate." The most common practice for transportation/combustion GHG emissions quantification is to use a computer model such as CalEEMod, as was used in the ensuing analysis.

The significance of those emissions then must be evaluated; the selection of a threshold of significance must take into consideration what level of GHG emissions would be cumulatively considerable. The guidelines are clear that they do not support a zero net emissions threshold. If the lead agency does not have sufficient expertise in evaluating GHG impacts, it may rely on thresholds adopted by an agency with greater expertise.

On December 5, 2008 the SCAQMD Governing Board adopted an Interim quantitative GHG Significance Threshold for industrial projects where the SCAQMD is the lead agency (e.g., stationary source permit projects, rules, plans, etc.) of 10,000 Metric Tons (MT) CO_2 equivalent/year. In September 2010, the SCAQMD CEQA Significance Thresholds GHG Working Group released revisions which recommended a threshold of 3,000 MT CO_2e for all land use projects. This 3,000 MT/year recommendation has been used as a guideline for this analysis. In the absence of an adopted numerical threshold of significance, Project

related GHG emissions in excess of the guideline level are presumed to trigger a requirement for enhanced GHG reduction at the project level.

Construction Activity GHG Emissions

The Project is assumed to require approximately three years to complete. The CalEEMod2016.3.2 computer model predicts that the construction activities will generate the annual CO_2e emissions identified in Table VIII-1.

Table VIII-1
CONSTRUCTION EMISSIONS (METRIC TONS CO_2e)

Year	CO_2e
Year 2020	469.0
Year 2021	491.6
Year 2022	67.0
Total	1,027.6
Amortized	**34.3**

CalEEMod Output provided in appendix

SCAQMD GHG emissions policy from construction activities is to amortize emissions over a 30-year lifetime. The amortized level is also provided. GHG impacts from construction are considered individually less than significant as they are below the adopted 3,000 MT threshold.

Consistency with GHG Plans, Programs, and Policies

The County of Los Angeles (County) has developed the Community Climate Action Plan (CCAP) to reduce greenhouse gas (GHG) emissions associated with community activities in the unincorporated areas of Los Angeles County. The CCAP addresses emissions from activities in the following sectors: building energy, transportation, water conveyance and wastewater processing, and waste generation. The CCAP also establishes a GHG reduction target consistent with the State's efforts to reduce GHG emissions and provides a roadmap for successfully implementing GHG reduction measures selected by the County. The County's GHG emissions reduction target of at least 11% below 2010 levels by 2020 is consistent with statewide reductions under AB 32.

Building energy consumption accounts for about 49% of the County's GHG inventory. Transportation emissions from on- and off-road vehicles are the second largest source of emissions (42%). The third largest source is community waste generation (7%). The remaining sources are water conveyance and wastewater generation (2%), agriculture (0.4%), and stationary sources (0.02%).

The County has identified local actions of which the majority include voluntary, incentive-based programs that will reduce emissions from both existing and new development in the County. Actions to address GHG emissions from building energy use are separated into two categories: energy efficiency and renewable energy. Energy efficiency measures reduce actual energy consumption through efficient design, whereas renewable energy measures reduce the carbon intensity of electricity generation.

This Project is a water improvement use and the only applicable measure would be the following:

Waste Reduction, Reuse and Recycling

> **SW-1 Waste Diversion Goal**: Effective in 2016 the California's Green Building Standards Code (CALGreen) required the diversion of at least 65 percent of the construction waste generated during

non-residential “new construction” projects. Therefore, a plan will be developed whose goal would be that 65% of construction waste be diverted from landfills.

The County will track the CCAP’s overall progress in terms of reducing GHG emissions in the unincorporated areas, as well as each CCAP action’s progress and performance. Inventory updates will be incorporated into the General Plan Annual Progress Report and will provide information regarding overall trends in community emissions for the unincorporated areas.

The actions in the CCAP allow for the County to achieve its GHG reduction goal for 2020 for the unincorporated areas of LA County and satisfies the goal of meeting the recommendations for local governments in the Scoping Plan of Assembly Bill (AB) 32, California’s Global Warming Solutions Act. The proposed Project will adhere with the CCAP, and therefore impacts under this issue are considered less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
IX. HAZARDS AND HAZARDOUS MATERIALS: Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

SUBSTANTIATION

a&b. *Less Than Significant Impact* – The Project should not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials; but it may create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment during construction. During construction there is a potential for accidental release of petroleum products in sufficient quantity to pose a significant hazard to people and the environment. Best management practices (BMPs) will be employed to prevent hazards from occurring during construction including, but not limited to compliance with applicable state and local regulations regarding cleanup and disposal of the contaminant to prevent all spills or leakage of petroleum. Adherence to BMPs is considered adequate to prevent significant impacts from occurring.

The Project will consist of constructing a new reservoir with associated connections within an existing SGVWC site containing an existing reservoir. The activities associated with storing water in the new reservoirs will not involve potential for routine transport or use of hazardous materials or routine generation of hazardous wastes. Compliance with all federal, state and local regulations will ensure

that the Project operates and is constructed in a manner that poses no substantial hazards to the public or the environment. No mitigation is required.

c. *No Impact* – The nearest schools to the Project are just under a mile away to the east and southeast—Los Altos Elementary School and Los Molinos Elementary School. Furthermore, the operations of this Project do not include any new use of hazardous materials, and thus will not pose a significant risk to any nearby school populations. No impacts are anticipated. No mitigation is required.

d. *No Impact* – The proposed Project is not located in an area that has been included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result it will not create a significant hazard to the public or environment. According to the California State Waterboard's GeoTracker, which provides information regarding Leaking Underground Storage Tanks, there are no locations within a 2,500-foot radius of any of the proposed Project facilities that is identified as Leaking Underground Storage Tank (LUST) site (Figure IX-1 see GeoTracker figure). There are several cleanup sites within a mile or two of the proposed Project site, though most of these sites have been remediated. Furthermore, the nature of the proposed Project is not such that persons working or residing in the area would be exposed to any hazards from any nearby contaminated sites. Thus, the proposed construction and operation of the site with a new reservoir, will not create a significant hazard to the population or to the environment from their implementation. No impacts are anticipated. No mitigation is required.

e. *No Impact* – The San Gabriel Valley Airport is located approximately 6 miles north of the proposed Project, and the Long Beach Airport is located approximately 12 miles south of the proposed Project. Given the large distance between the proposed Project and nearby airports, and the location of the proposed Project adjacent to a hill that is at greater elevation than the proposed reservoir will be once constructed, Project implementation would not result in a safety hazard for people residing or working in the Project area. Furthermore, there are no private airstrips located within two miles of the Project site. Therefore, the Project area has no potential to cause or experience any adverse impact related to private airstrip operations.

f. *Less Than Significant Impact* – The proposed Project will be confined to the Project site. Within the proposed reservoir site, the proposed facilities are not anticipated to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Ingress and egress of maintenance trucks and construction vehicles would come from Camino Del Tomasini, which is a residential street. The Project site is located within a residential area with limited traffic in the vicinity of the Project. Additionally, the Project site is located at the terminus of adjacent roadway. The construction activities would not have a significant impact on the flow of traffic, and therefore no mitigation will be required to address any traffic disruption, as none will occur. Therefore, the Project will not significantly impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Any impacts under this issue are considered less than significant.

g. *Less Than Significant Impact* – The proposed Project is located against a hillside with residences located above and below it. There is a large amount of open space in the adjacent hills that could be susceptible to wildfires should one occur; however, the area surrounding the hillside is completely urban. The Project does not include the use of flammable or explosive materials. Based on the location and type of uses proposed, this Project has no identifiable potential to expose people or property to wildland fires. It should be noted that this Project will increase the area's water supply capabilities and is viewed as a benefit to fire protection. Therefore, any impacts are considered less than significant. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
X. HYDROLOGY AND WATER QUALITY: Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:	☐	☐	☒	☐
(i) result in substantial erosion or siltation onsite or offsite?	☐	☐	☒	☐
(ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite or offsite?	☐	☐	☒	☐
(iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff? or,	☐	☐	☒	☐
(iv) impede or redirect flood flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

SUBSTANTIATION

a. *Less That Significant Impact* – The proposed new reservoir will be located in a residential area adjacent to a hillside that will require earthwork to stabilize the surface upon which the reservoir will be placed, as well as the area surrounding the existing reservoir. The site contains an existing reservoir that will remain in use once the new reservoir is constructed and connected to SGVWC's water distribution system. Therefore, the addition of the new reservoir would be comparable to that which exists on site at present. The surface of the site as it presently exists is located adjacent to a hillside within the community of Hacienda Heights. Three sources of potential violation of water quality standards or waste discharge requirements are from generation of municipal wastewater; from stormwater runoff; and potential discharges of pollutants, such as accidental spills. No connection to wastewater is necessary to serve the proposed Project. The project is required to submit an Erosion and Sediment Control Plan to Los Angeles County, which would ensure that no such water quality violations occur. Given the small size of disturbance at this site, no other permits are required by the County. With implementation of the Erosion and Sediment Control Plan and their BMPs, the development of a 1.2 MG water storage reservoir, will not cause a violation of any water quality standards or waste discharge requirements.

b. *Less Than Significant Impact* – The Project does not propose the installation of any water wells that would directly extract groundwater. The proposed Project will connect to existing water connections at the site and wells within SGVWC's system for storage, in this case to be stored in the new 1.2 MG water storage reservoir. The amount of pervious surface on the site after construction will decrease by approximately 5,026.5 SF; this is due to the area that the new reservoir will be constructed upon. The development of the new reservoir itself will allow SGVWC to store a larger volume of water through the addition of a 1.2 MG storage tank (with an actual capacity of 0.85 MG), which will ultimately provide additional storage capacity to SGVWC's customers. Additionally, the development of the new reservoir at this location will allow SGVWC to take the existing reservoir out of service for maintenance and repair work. Thus, the operation of the new reservoir will require minimal new outside water sources to supply water to the Project site. Thus, because of the size and nature of the proposed Project, there is a less than significant potential to substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin as a result of the proposed Project.

c(i). *Less Than Significant Impact* – Impacts to the existing drainage pattern of the site or area could occur if development of the Project results in substantial on- or off- site erosion or siltation. The Project site currently contains an existing reservoir and will require construction of a retaining wall on the adjacent hillside to develop a level surface upon which to construct the new reservoir. Construction of the proposed reservoir includes the construction of retaining walls and hillside stabilization improvements. The existing reservoir site is located at the base of a steep hillside which often erodes and carries sediments to the base of the existing buried reservoir. During heavy rain events, sediments have been transported down the hillside and have settled against the base of the reservoir. If not immediately removed, these sediments could build up and eventually overflow into the water storage reservoir. This is a potential health hazard, as sediments entering the distribution system could contaminate the water supply. The retaining wall will improve conditions by reducing the tributary area of surface flows to the reservoir. The proposed retaining wall will also be constructed to enable grading of a relatively flat area on which to construct the new reservoir. All on-site flows will be directed toward the street or to the existing drainage channel via concrete swales, catch basins and drain pipes. The Project will require the implementation of a Erosion and Sediment Control Plan that would be submitted to Los Angeles County, and implementation of hazardous material best management practices, which will ensure that any potential discharge of polluted material does not occur or is remediated in the event of an accidental spill. Therefore, with the implementation of the site drainage plan, and the limited amount of pervious surface onsite that will become impervious as a result of the Project, implementation of the Project will not substantially alter the drainage pattern of the site in a manner that would result in substantial erosion or siltation onsite or offsite due to the construction of onsite drainage. In fact, part of the purpose for the proposed Project is to improve erosion and drainage management onsite. Any impacts under this issue are considered less than significant based on the Project design. No mitigation is required.

c(ii). *Less Than Significant Impact* – Please refer to response IX(c) above. Impacts to the existing drainage pattern of the site or area could occur if the development of the Project results in an increased amount of flooding onsite or offsite. As stated above, the Project site's surface currently consists of compacted and loose soils adjacent to a hillside that requires stabilization as part of the proposed Project actions. As stated above, all on-site flows will be directed toward the street or to the existing drainage channel via concrete swales, catch basins and drain pipes. This drainage trajectory will prevent any onsite flooding; based on the Project drainage plans, no offsite flooding is anticipated, particularly because a purpose of the proposed Project is to improve onsite drainage and manage erosion more effectively. Therefore, implementation of the Project will not substantially increase the rate or amount of surface runoff resulting in flooding onsite or offsite, and any impacts under this issue are considered less than significant. No mitigation is required.

c(iii). *Less Than Significant Impact* – As indicated under issues IX(a), IX(c) and IX(d) above, the Project will not substantially create or contribute runoff water that would exceed the capacity of existing or planned stormwater capacity, or provide substantial additional sources of polluted water. The Project

will require the implementation of the Erosion and Sediment Control Plan that would be submitted to Los Angeles County as well as hazardous material BMPs which will ensure that discharge of polluted material does not occur or is remediated in the event of an accidental spill. However, in most cases onsite surface flows will be directed toward the street or to the existing drainage channel via concrete swales, catch basins and drain pipes. Therefore, given that the proposed Project includes drainage improvements and drainage management, the proposed Project will have a less than significant potential to create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. No mitigation is required.

c(iv). *No Impact* –According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel for the proposed Project, the Project is located on map 06037C1851F (Figure X-1), and within Zone D, which is considered an area of Undetermined flood hazard. Therefore, the proposed Project site is not located in a 100-year flood hazard area. Figure X-1 illustrates that the Project site is not located within a 100-Year floodplain, and therefore development of the site with the new reservoir would not impede or redirect flood flows as none would occur at the Project site. No impacts under this issue are anticipated, and no mitigation is required.

d. *No Impact* – As stated above, according to the FEMA FIRM panel for the proposed Project, the Project is located on map 06037C1851F (Figure X-1), and within Zone D, which is considered an area of Undetermined flood hazard. Therefore, the proposed Project site is not located in a flood hazard area. The Project site is located more than 20 miles from the Pacific Ocean, which eliminates the potential for a tsunami to impact the Project area. Additionally, a seiche would not occur within the vicinity of the Project because no lakes or enclosed bodies of water exist near the site that could be impacted by such an event. Mudflow typically occurs on hillsides, and though the Project is located on a hillside, the Project site will be stabilized through a retaining wall and again further through the implementation of recommendations made within the Geotechnical Study, enforced through mitigation measure GEO-2 above, which would prevent a significant impact from occurring due to mudflow. Therefore, the development of the new reservoir would not risk release of pollutants due to project inundation. No impacts are anticipated to occur under this issue. No mitigation is required.

e. *Less Than Significant Impact* – The purpose of the proposed project is to construct a second reservoir at the existing Plant B14 site to allow San Gabriel operational flexibility to store additional water supplied from Plant B12 during periods of low demand. The second reservoir will also allow for the existing reservoir to be taken out of service when required for routine maintenance. The proposed project would ensure that SGVWC has proper storage within its service area. Because the project is a water storage project, it is anticipated that with conservative construction practices (outlined under Hazards and Hazardous Materials above, and above in this Subchapter), the proposed project would have a less than significant potential to conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XI. LAND USE AND PLANNING: Would the project:				
a) Physically divide an established community?	☐	☐	☒	☐
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

SUBSTANTIATION

a. *Less Than Significant Impact* – The proposed new reservoir with associated site improvements will be constructed on land that contains an existing reservoir that is designated for Residential Agriculture Use, with a Zoning Classification of Residential Agriculture. Essential infrastructure improvements, such as water storage reservoirs, can be constructed within any Land Use designation. The uses surrounding the Project are generally Residential in nature or Open Space uses. Given that the proposed new reservoir would be developed within a site already containing an existing reservoir, the Project would not physically divide an established community, and as such, impacts under this issue are considered less than significant and no mitigation is required.

b. *Less Than Significant Impact* – Please refer to the discussion under issue X(a) above. As previously stated, the Project site is zoned under the County of Los Angeles as Residential Agriculture, and the Land Use Designation of the Project site is Residential Agriculture. In general, water production facilities are zone independent because they are needed to support all types of development. The area immediately surrounding the Project is generally residential in nature. The Project site currently contains one reservoir. The addition of a second reservoir at this location will not result in a conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to the general plan or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect. There is no specific plan or local coastal program that would apply to the Project area. Any impacts are considered less than significant. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XII. MINERAL RESOURCES: Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☒	☐
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☒	☐

SUBSTANTIATION:

a&b. *Less Than Significant Impact* – The proposed reservoir is located in the unincorporated community of Hacienda Heights within the County of Los Angeles, and is surrounded by residential and open space uses. According to the map prepared by the California Geologic Survey and the California Department of Conservation titled "San Gabriel Valley P-C Region Showing MRZ-2 Areas and Active Mine Operations" (Figure XII-1), no known mines or mineral resources are known to occur on the Project site. As no current mining operations exist at the Project site or have been identified by the County, implementation of the proposed Project will not result in in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state or a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XIII. NOISE: Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☒	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

SUBSTANTIATION: The following analysis is supported by the "Noise Impact Analysis: San Gabriel Valley Water Company Plant B14 Project, Hacienda Heights, California," prepared by Giroux & Associates on October 17, 2018, provided as Appendix 5 to this Initial Study.

Background

Noise is generally described as unwanted sound. The proposed Project will include the development of a reservoir with associated water system connections and site improvements. The site is located in a residential area adjacent to the Hacienda Hills. The nearest resident to the area in which the reservoir will be constructed is approximately 100 feet away. The nearest resident to the Project site boundary where some site improvements will be made is approximately 40 feet away.

The unit of sound pressure ratio to the faintest sound detectable to a person with normal hearing is called a decibel (dB). Sound or noise can vary in intensity by over one million times within the range of human hearing. A logarithmic loudness scale, similar to the Richter scale for earthquake magnitude, is therefore used to keep sound intensity numbers at a convenient and manageable level. The human ear is not equally sensitive to all sound frequencies within the entire spectrum. Noise levels at maximum human sensitivity from around 500 to 2,000 cycles per second are factored more heavily into sound descriptions in a process called "A-weighting," written as "dBA."

Leq is a time-averaged sound level; a single-number value that expresses the time-varying sound level for the specified period as though it were a constant sound level with the same total sound energy as the time-varying level. Its unit is the decibel (dB). The most common averaging period for Leq is hourly.

Because community receptors are more sensitive to unwanted noise intrusion during more sensitive evening and nighttime hours, state law requires that an artificial dBA increment be added to quiet time noise

levels. The State of California has established guidelines for acceptable community noise levels that are based on the Community Noise Equivalent Level (CNEL) rating scale (a 24-hour integrated noise measurement scale). The guidelines rank noise land use compatibility in terms of "normally acceptable," "conditionally acceptable," and "clearly unacceptable" noise levels for various land use types. The State Guidelines, Land Use Compatibility for Community Noise Exposure, single-family homes are "normally acceptable" in exterior noise environments up to 60 dB CNEL and "conditionally acceptable" up to 70 dB CNEL based on this scale. Multiple family residential uses are "normally acceptable" up to 65 dB CNEL and "conditionally acceptable" up to 70 CNEL. Schools, libraries and churches are "normally acceptable" up to 70 dB CNEL, as are office buildings and business, commercial and professional uses with some structural noise attenuation.

Noise Ordinance Standards

For stationary noise sources located proximate to residential uses, Los Angeles County has adopted a detailed Noise Control Ordinance, which is codified in Chapter 12.08, Noise Control, of Title 12, Environmental Protection, of the Los Angeles County Code. Noise from one land use crossing the property line of an adjacent property is regulated by Section 12.08.390 of the Los Angeles County Code. These standards are expressed in terms of a mean (50th percentile) noise level, which is the noise level allowed for up to 30 minutes in any hour. Some short-term noise levels may exceed the 50th percentile standard, up to a maximum of 20 dB above the allowable mean. The Los Angeles County Noise Control Ordinance allowable exterior noise levels for various land uses are shown in Table XIII-1. A mean noise level of 50 dB L_{50} (50th percentile, or "L_{50}") by day and 45 dB L_{50} for residential areas at night is the standard applicable at the proposed Project site. However, when these noise levels are already exceeded by ambient noise levels, then the ambient level becomes the standard.

Table XIII-1
CALIFORNIA LAND USE COMPATIBILITY GUIDELINES FOR EXTERIOR COMMUNITY NOISE

Land Use	Community Noise Exposure CNEL, dB			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Single Family, Duplex, Mobile Homes	50-60	55-70	70-75	Above 75
Multi-Family Homes	50-65	60-70	70-75	Above 75
Transient Lodging: Motels, Hotels	50-65	60-70	70-80	Above 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-70	60-70	70-80	Above 80
Auditoriums, Concert Halls, Amphitheaters	-	50-70	-	Above 65
Sports Arena, Outdoor Spectator Sports	-	50-75	-	Above 70
Playgrounds, Neighborhood Parks	50-70	-	67-75	Above 75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-75	-	70-80	Above 80
Office Buildings, Business and Professional Commercial	50-70	67-77	Above 75	-
Industrial, Manufacturing, Utilities, Agriculture	50-75	70-80	Above 75	-

Source: State of California, General Plan Guidelines, 2017, Governor's Office of Planning and Research.
Notes:
Normally Acceptable: Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

Table XIII-2
LOS ANGELES COUNTY NOISE CONTROL ORDINANCE STANDARDS

Noise Zone	Land Use (Receptor Property)	Time Intervals	Exterior Noise Level (dB)				
			1 (L_{50}) 30 Min/Hr	2 (L_{25}) 15 Min/Hr	3 ($L_{8.3}$) 35 Min/Hr	4 ($L_{1.7}$) 70 Min/Hr	5 (L_0) at no time
I	Noise-Sensitive Area	Anytime	45	50	55	60	65
II	Residential Properties	10:00 p.m. to 7:00 a.m. (nighttime)	45	50	55	60	65
		7:00 a.m. to 10:00 p.m. (daytime)	50	55	60	65	70
III	Commercial Properties	10:00 p.m. to 7:00 a.m. (nighttime)	55	60	65	70	75
		7:00 a.m. to 10:00 p.m. (daytime)	60	65	70	75	80
IV	Industrial Properties	Anytime	70	75	80	85	90

Source: Los Angeles County Noise Control Ordinance, Exterior Noise Standards, Chapter 12.08.390.

Notes:

1. **Los Angeles County Noise Standard No. 1, L_{50}**: Noise levels which may not be exceeded for a cumulative period of more than 30 minutes in any hour. If the ambient L_{50} exceeds the levels listed above, then the ambient L_{50} becomes the exterior noise level for Standard No. 1.
2. **Los Angeles County Noise Standard No. 2, L_{25}:** Noise levels which may not be exceeded for a cumulative period of more than 15 minutes in any hour. If the ambient L_{25} exceeds the levels listed above, then the ambient L_{25} becomes the exterior noise level for Standard No. 2.
3. **Los Angeles County Noise Standard No. 3, $L_{8.3}$:** Noise levels which may not be exceeded for a cumulative period of more than 5 minutes in any hour. If the ambient $L_{8.3}$ exceeds the levels listed above, then the ambient $L_{8.3}$ becomes the exterior noise level for Standard No. 3.
4. **Los Angeles County Noise Standard No. 4, $L_{1.7}$:** Noise levels which may not be exceeded for a cumulative period of more than 1 minute in any hour. If the ambient $L_{1.7}$ exceeds the levels listed above, then the ambient $L_{1.7}$ becomes the exterior noise level for Standard No. 4.
5. **Los Angeles County Noise Standard No. 5, L_0:** Noise levels which may not be exceeded for any period of time. If the ambient L_0 exceeds the levels listed above, then the ambient L_0 becomes the exterior noise level for Standard No. 5

Groundborne Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is described as the velocity and the rate of change of the speed is described as the acceleration. Each of these descriptors can be used to correlate vibration to building damage, and acceptable equipment vibration levels.

During construction, the operation of construction equipment can cause groundborne vibration. This type of vibration is best measured in terms of velocity or acceleration. The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to describe vibration amplitudes. The units for PPV velocity is normally inches per second (in/sec). PPV is defined as the maximum instantaneous peak of the vibration signal and is considered appropriate for evaluating potential building damage.

County Noise Standards

Noise Restrictions at Affected Structures. The contractor shall conduct construction activities in the following schedule:

1. At Residential Structures.

   a. Mobile Equipment. Maximum noise levels from non-scheduled, intermittent, and short-term operation (less than 10 days) of mobile equipment:

Table XIII-3
LOS ANGELES COUNTY NOISE CONTROL STANDARDS
FOR NON-SCHEDULED, INTERMITTENT, AND SHORT-TERM OPERATION OF MOBILE EQUIPMENT

	Single-family Residential (dBA)	Multi-family Residential (dBA)	Semi-residential/ Commercial (dBA)
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75	80	85
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays.	60	65	70

   b. Stationary Equipment Maximum noise level for repetitively scheduled and relatively long-term operation (period of 10 days or more) of stationary equipment:

Table XIII-4
LOS ANGELES COUNTY NOISE CONTROL STANDARDS
FOR SCHEDULED AND LONG-TERM OPERATION OF STATIONARY EQUIPMENT

	Single-family Residential (dBA)	Multi-family Residential (dBA)	Semi-residential/ Commercial (dBA)
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	60	65	70
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays.	50	55	60

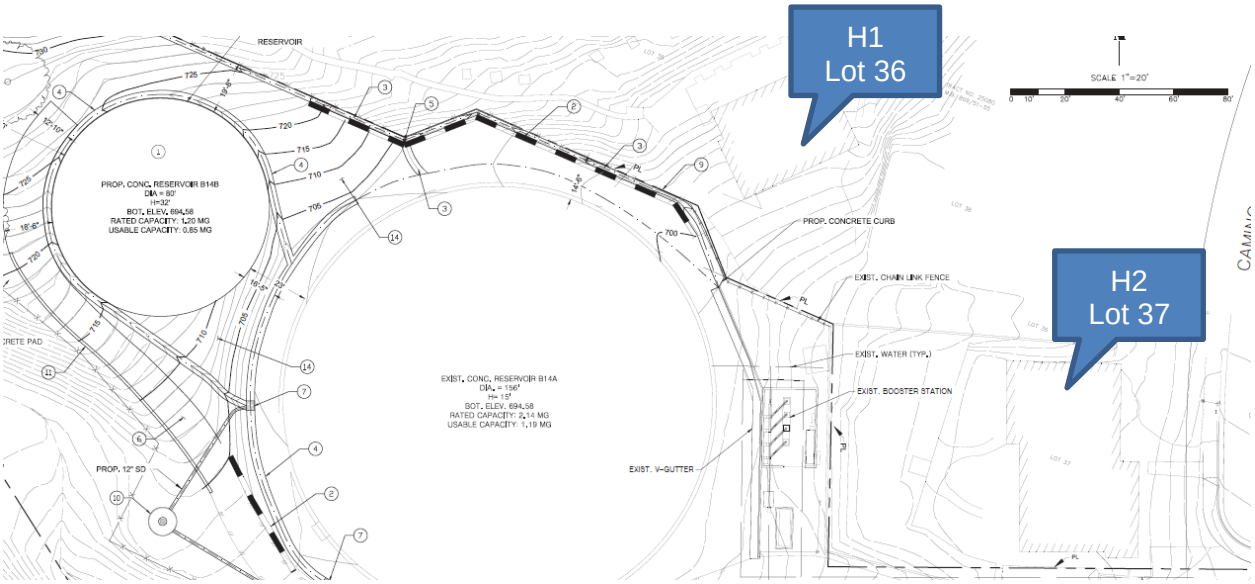
Source: County Code: Chapter 12.08.440

Nearby Sensitive Receptors

There are two homes that would be most impacted by the Project as shown in Exhibit XIII-1. H1 is approximately 175-feet from the closest perimeter of the new reservoir and H2 is about 275-feet from the closest perimeter. The existing reservoir blocks direct line-of-sight between the construction activity and H2 and would provide a degree some sound attenuation. Although the existing reservoir would block some of the new construction from H1, most activity would have a direct-line-of-sight so that no benefit was analyzed.

Pipelines are planned to connect the Project to connect the proposed reservoir with the existing system. Noise levels associated with pipeline installation are limited to the time it takes to install pipeline adjacent to any residence which would be brief and would affect a given sensitive receptor for only a short period of time.

Exhibit XIII-1
MOST IMPACTED RESIDENCES ADJACENT TO CONSTRUCTION



** Note: although this is a previous version of the site plan, it depicts the impacted adjacent residences accurately.

Impact Analysis

a. *Less Than Significant With Mitigation Implemented* – The closest receptor to the Project site are two homes that would be most impacted by the Project as shown in Exhibit XIII-1. H1 is approximately 175-feet from the closest perimeter of the new reservoir and H2 is about 275-feet from the closest perimeter. Short-term noise levels associated with Project construction activities could impact these nearby residences. Construction noise levels would fluctuate. To estimate probable noise impacts, typical equipment and construction techniques are assumed. Table XIII-5 identifies highest (L_{max}) noise levels associated with each type of equipment identified for use, then adjusts this noise level for the extent of equipment usage (usage factor), which is represented as L_{eq}. The table is organized by construction activity and equipment associated with each activity.

Table XIII-5
CONSTRUCTION NOISE IMPACT

Phase Name	Equipment	Usage Factor[1]	Hours of Operation[2]	Reference Noise Level @ 50 feet (dB)	Cumulative Noise Level @ 50 feet (dB))
Grading & Retaining Wall	Loader/Backhoe	40%	3.2	84	80
	Dozer	40%	3.2	85	81
	Grader	40%	3.2	85	81
	Excavator	40%	3.2	81	78
Reservoir Construction	Forklift	20%	1.6	75	68
	Air Compressor	40%	3.2	78	74
	Pump	28%	2.2	81	75
	Loader/Backhoe	37%	3.0	78	74
	Crane/Stress Tower	16%	1.3	81	73
Drainage and Piping	Compactor	50%	4.0	77	74
	Loader/Backhoe	37%	3.0	78	74
	Forklift	20%	1.6	75	68
	Trencher	50%	4.0	85	82
	Roller	38%	3.0	80	76

Source: FHWA's Roadway Construction Noise Model, 2006
[1]Represents the actual hours of peak construction equipment activity out of a typical 8 hour day.
[2]Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.

Quantitatively, the primary noise prediction equation is expressed as follows for the hourly average noise level (Leq) at distance D between the source and receiver (dBA):

Leq = Lmax @ 50' – 20 log (D/50') + 10log (U.F%/100) – I.L.(bar)

Where:

Lmax @ 50' is the published reference noise level at 50 feet
U.F.% is the usage factor for full power operation per hour
I.L.(bar) is the insertion loss for intervening barriers

Table XIII-5 describes the noise level at a 50-foot reference distance. However, noise levels would vary at each receptor depending on proximity to construction activities. The noise level during the construction period at both evaluated receptor location was calculated by making a distance adjustment to the construction source sound level. Table XII-6 indicates the resulting noise level at receptor locations.

On-site construction equipment, under direct line-of-sight conditions, could create a peak exterior noise level at the closest residence H1 as high as 71 dB. At H2 the maximal noise levels are calculated to be as high as 67 dB. Noise impacts would be significant if they caused a violation of any adopted standards. For mobile equipment, the allowable noise level is 75 dB for activities occurring during the daytime. No construction would occur within the nocturnal time period, and therefore construction noise would be less than significant.

Table XIII-6
CONSTRUCTION NOISE LEVELS AT INDIVIDUAL RECEPTORS

Phase Name	Equipment	Noise H1 (dB)	Noise H2 (dB)
Grading & Retaining Wall	Loader/Backhoe	69	65
	Dozer	70	66
	Grader	70	66
	Excavator	67	63
Construction	Forklift	57	53
	Air Compressor	63	59
	Pump	64	60
	Loader/Backhoe	63	59
	Crane/ Tower	62	58
Drainage and Piping	Compactor	63	59
	Loader/Backhoe	63	59
	Forklift	57	53
	Trencher	71	67
	Roller	65	61

Short-term construction noise impacts are mitigated by required compliance with the County of Los Angeles Noise Control Ordinance. The allowed hours of construction are from 7 a.m. to 7 p.m. Monday through Friday. Construction noise is unlikely to exceed 75 dB at the nearest noise-sensitive land use. However, to minimize noise impacts during the allowed hours of construction, the following mitigation measures shall be implemented:

NOI-1 SGVWC will require that all construction equipment be shut off when it is not in use.

NOI-2 SGVWC will require the use of construction equipment that is equipped with properly operating and maintained mufflers.

NOI-3 SGVWC will require the use of electrical power to run air compressors and similar power tools.

The proposed Project will not cause any measurable permanent increase in ambient noise levels in the vicinity of the Project above levels existing without the Project, in particular because this Project will construct a second reservoir at a location containing an existing reservoir. Reservoirs typically do not generate substantial noise because they do not require a motor to store or convey water. Operation of the new reservoir would not result in significant noise impacts and the structure would be in ground. The loudest Project activity is generally associated with operation of electric water pumps within solidly enclosed pump stations. However, the pump station already exists for the existing reservoir and therefore will not represent a new noise source. Thus, the Project would not result in any substantial new stationary noise sources adjacent to sensitive receptors, or any other noise sources when excavation activities are completed.

Therefore, with mitigation measures **NOI-1** through **NOI-3** the proposed Project would have a less than significant potential to result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of a project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b. *Less Than Significant Impact* – Ground-borne vibration occurs when heavy equipment travels over unpaved surfaces or when it is engaged in soil movement. The effects of ground-borne vibration include discernable movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Vibration related problems generally occur due to resonances in the structural components of a building because structures amplify groundborne vibration. Within the "soft" sedimentary surfaces of much of Southern California, ground vibration is quickly damped out. Groundborne vibration is almost never annoying to people who are outdoors.

Groundborne vibrations from construction activities rarely reach levels that can damage structures. Because vibration is typically not an issue, very few jurisdictions have adopted vibration significance thresholds. Vibration thresholds have been adopted for major public works construction projects, but these relate mostly to structural protection (cracking foundations or stucco) rather than to human annoyance.

The vibration descriptor commonly used to determine structural damage is the peak particle velocity (ppv) which is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in in/sec. The range of such vibration is as follows in Table XIII-7:

Table XIII-7
HUMAN RESPONSE TO TRANSIENT VIBRATION

Average Human Response	ppv (in/sec)
Severe	2.000
Strongly perceptible	0.900
Distinctly perceptible	0.240
Barely perceptible	0.035

Source: Caltrans Transportation and Construction Vibration Guidance Manual, 2013.

Over the years, numerous vibration criteria and standards have been suggested by researchers, organizations, and governmental agencies. There are no Caltrans or Federal Highway Administration standards for vibration.

The American Association of State Highway and Transportation Officials (AASHTO) Standard R 8-96 (AASHTO, 2004) describes three general categories of damage to buildings from vibration: 1) Threshold cracking; 2) Architectural or Minor Damage; and 3) Major Damage. Both Threshold and Minor damage include cracks in room interior surfaces that do not affect the strength or structural integrity of the structure. The term "threshold cracking" is defined as the highest vibration amplitude at which no cosmetic, minor, or major damage occurs. This may include "threshold cracks" as hairline cracks in room walls that occur at the lowest vibration amplitudes. Based on the AASHTO guidelines, a threshold damage criterion of 0.5 in/sec PPV is appropriate to evaluate vibration impacts by transient and irregular sources. This threshold is applied in this analysis for transient vibration.

The closest residence would be located at least 175 feet from the proposed reservoir. Maximum vibration levels at that could be generated by construction equipment operating at the Project boundary are presented in Table XIII-8.

Table XIII-8
ESTIMATED VIBRATION LEVELS DURING PROJECT CONSTRUCTION

Equipment	PPV at 25 ft (in/sec)	PPV at 50 ft (in/sec)	PPV at 175 ft (H1) (in/sec)	PPV at 275 ft (H2) (in/sec)
Large Bulldozer	0.089	0.031	0.005	0.002
Loaded trucks	0.076	0.027	0.004	0.002
Jackhammer	0.035	0.012	0.002	0.001
Small Bulldozer	0.003	0.001	<0.001	<0.001

Source: FHWA Transit Noise and Vibration Impact Assessment

The calculation to determine PPV at a given distance is:

PPVdistance = PPVref*(25/D)^1.5

Where:

PPVdistance = the peak particle velocity in inches/second of the equipment adjusted for distance,

PPVref = the reference vibration level in inches/second at 25 feet, and

D = the distance from the equipment to the receiver.

As indicated in Table XIII-8, based on the Federal Transit Administration (FTA) data, vibration velocities from typical heavy construction equipment operation that would be used during Project construction would range from less than 0.001 to 0.005 (in/sec) peak particle velocity (PPV) at each receptor. Therefore, vibration levels associated with operation of construction equipment is not expected to exceed the 0.5 in/sec PPV threshold for cosmetic damage from transient vibration and will likely be below the threshold of perception. There is no significant impact and no need for mitigation.

c. *No Impact* – The Project is not located within an airport land use plan. The San Gabriel Valley Airport is located approximately 6 miles north of the proposed Project, and the Long Beach Airport is located approximately 12 miles south of the proposed Project. Given the large distance between the proposed Project and nearby airports, and the location of the proposed Project adjacent to a hill that is at greater elevation than the proposed reservoir will be once constructed, Project implementation would not expose people residing or working in the Project area to excessive noise levels. There are no private airstrips located within two miles of the Project site. Therefore, the Project area has no potential to expose people residing or working in the Project area to excessive noise levels. No impacts will occur as a result of Project implementation. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XIV. POPULATION AND HOUSING: Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

SUBSTANTIATION

a. *Less Than Significant Impact* – The type of use planned for the Project site is not of a type that would induce substantial population growth in the area. No housing is proposed as part of the Project. Though construction of a new 1.2 MG reservoir with associated water connections and site improvements will require a temporary work force, this is short-term and with a maximum of about 20 employees onsite during construction, it will not induce population growth. Additionally, the number of employees needed to operate the new reservoir with water improvement facilities will not be increased; SGVWC employees will visit the site on an as needed or planned maintenance basis, which may involve one or two employees per visit. Therefore, impacts under this issue are considered less than significant and no mitigation is required.

b. *No Impact* – The proposed Project will occur on a site that currently contains an existing 1.19 MG reservoir; implementation of the Project will require development of a retaining wall and associated hillside stabilization to manufacture a level surface upon which the new reservoir will be constructed. No housing is proposed as part of the Project. Therefore, implementation of the Project as a whole—which consists of a reservoir and associated pipeline connections and site improvements—will not displace any existing housing or displace a substantial number of people that would necessitate the construction of replacement housing elsewhere. No impacts will occur as a result of Project implementation. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XV. PUBLIC SERVICES: Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a) Fire protection?	☐	☐	☒	☐
b) Police protection?	☐	☐	☒	☐
c) Schools?	☐	☐	☒	☐
d) Parks?	☐	☐	☐	☒
e) Other public facilities?	☐	☐	☐	☒

SUBSTANTIATION

a. *Less Than Significant Impact* – The unincorporated community of Hacienda Heights is currently served by the Los Angeles County Fire Department. The Los Angeles County Fire Department Station 91 is located approximately 2,000 feet north of the Project site at 2691 Turnbull Canyon Rd, Hacienda Heights, CA 91745. The Project will not include the use or storage of highly flammable materials. The Project will develop a new 1.2 MG water storage reservoir with associated water connections and site improvements that could benefit fire protection services by providing greater water storage to the SGVWC customers. The structure to be developed on site—the new water storage reservoir—would not present a fire hazard, though it is located within an area of minimal-to-moderate potential for wildfires. The reservoir will be made of block, steel, and concrete, which are materials that are considered fire-resistant. Thus, with no greater potential for fire risk, no new or altered fire protection facilities will be required to serve this Project. Any impact to the existing fire protection system is considered less than significant. No additional mitigation is required.

b. *Less Than Significant Impact* – The proposed Project site is within an urbanized residential area with background lighting and moderate traffic flow in the vicinity of the Project site. The Project will develop a new 1.2 MG water storage reservoir with associated water connections and site improvements. The Los Angeles County Sheriff department is located approximately 3 miles north/northeast of the Project site at 150 Hudson Ave, City of Industry, CA 91744. Development of the site, which currently contains an existing reservoir, will require development of a retaining wall and hillside stabilization to ensure that the surface upon which the new reservoir is constructed is stable. The proposed Project is not the kind of use that would likely attract criminal activity, except for random trespass and theft; however, any random trespass is unlikely given the new security fence that will enclose the property. The proposed facility would not be readily accessible to the public as the Project site is fenced, so a less than significant potential exists for demand for police protection or expansion of police infrastructure. Due to the Project's location within an existing facility, and the lack of new people associated with operation of the proposed facilities, implementation of the proposed Project would not substantially increase the demand for law enforcement services beyond that already existing at the Project site.

c. *Less Than Significant Impact* – The proposed Project is located within the area served by Hacienda La Puente Unified School District, and the nearest schools to the Project are just under a mile away to the east and southeast—Los Altos Elementary School and Los Molinos Elementary School. The

Project would not induce population growth within the County, as it will neither construct housing, nor result in a growth in employment opportunities within the area (it will potentially employ one to two persons who will visit the site on a maintenance basis). Thus, the proposed Project will not generate an increase in elementary, middle, or high school population. Therefore, any impacts under this issue are considered less than significant. No mitigation is required.

d. *No Impact* – As stated in the preceding sections, the proposed Project is not anticipated to create a substantial increase in population because it will only potentially employ one to two additional staff who will visit the site on a maintenance basis. The nearest park is Manzanita Park, which is located about 1 mile to the north/northeast of the Project site. However, implementation of the proposed Project will not impact any current or planned park use, as it will be constructed on land containing and adjacent to existing water infrastructure. Thus, implementation of the proposed Project would not cause a substantial adverse physical impact to any parks within the County or nearby Cities. No impacts are anticipated, and no mitigation is required.

e. *No Impact* – Other public facilities include library and general municipal services. Since the Project will not directly induce substantial population growth, it is not forecast that the use of such facilities will increase as a result of the proposed Project. As a result, the implementation of the Project will not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities; need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times or other performance objectives for public services to include other public facilities. This, no impacts are anticipated under this issue and no mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XVI. RECREATION:				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

SUBSTANTIATION

a. *No Impact* – As previously discussed in Section XII, Population and Housing and Section XIII, Public Services, this Project will not contribute to an increase in the population beyond that already allowed or planned for by local and regional planning documents. Therefore, this Project will not result in an increase in the demand for parks and other recreational facilities. It should be noted that the provision of water storage facilities (such as the new 1.2 MG reservoir) is generally considered a benefit to parks and recreational uses. No impacts are anticipated. No mitigation is required.

b. *No Impact* – The proposed Project consists of the construction of a new 1.2 MG reservoir that will connect to SGVWC's existing water systems. The Project will not include any recreational facilities, nor will it require the construction of new recreational facilities or expansion of new recreational facilities because the proposed Project is not anticipated to substantially induce any population growth. The use of the site as the location for the second reservoir is not forecast to require a substantial short- or long-term labor force. As a result, no recreational facilities—existing or new—are required to serve the Project, thus no impacts are anticipated under this issue. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XVII. TRANSPORTATION: Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous inter-sections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☒	☐	☐

SUBSTANTIATION

a. *Less Than Significant Impact* – This Project does not propose any new roads. The operation of the proposed water facility has no potential to conflict with alternative transportation plans, policies or programs. The Project operations in the long term will not generate significant additional traffic and no new public roads or alterations to any existing public roads will result. The proposed reservoir will be constructed entirely within the Project site and will therefore not impact or otherwise decrease performance or safety of public transit, bicycle, or pedestrian facilities during this phase. Thus, the Project would not conflict with any adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities. The project is not anticipated to result in a substantial number of trips such that levels of service or other State and County measures of performance would be violated. Therefore, based on the availability of roadways and the developed area in which the Project is located, the proposed Project has a less than significant potential to conflict with a program, plan, ordinance or policy addressing the circulation system.

b. *Less Than Significant Impact* – The proposed Project would develop a new 1.2 MG reservoir that will connect to SGVWC's existing water systems reservoir on a site containing an existing reservoir. The County of Los Angeles has not developed a threshold for vehicle miles travelled; however, the proposed project will require minimal vehicle miles traveled to accomplish once constructed. In the short term, construction of the proposed facilities will result in the generation of up to about 20-30 additional roundtrips per day on the adjacent roadways by construction personnel and trucks removing any excavated materials and remains of the structures on site. The vehicle miles traveled in these instances would likely average less than 50 miles round trip. The number of temporary truck trips will be minimized by using 15 cubic yard material haulers instead of smaller 10 cubic yard trucks to haul material onto and off of the site. Additionally, the same trucks that haul material onto the site would also carry material off of the site. The total number of truck roundtrips per day is estimated to be 30 trips, plus 15 employee roundtrips per day. Once constructed, the only traffic that would be generated by this Project would be the continued occasional visits to the Project site by SGVWC personnel to inspect and maintain facilities, resulting in minimal vehicle miles traveled once the reservoir is in operation. As such, development of the Plant B14 Project is not anticipated to result in significant impact related to vehicle miles travelled, and thus would not conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b). Impacts under this issue are considered less than significant.

c. *Less Than Significant Impact* – The proposed Project will occur entirely within the Project site boundaries. Construction activities will not occur within the adjacent roadways to the Project site. Access to nearby residences on the roadways adjacent to the proposed Project will not be impacted

by construction equipment or construction trips. Large trucks delivering equipment, fill material, or removing small quantities of excavated dirt or debris can enter the site without major conflicts with the flow of traffic on the roadways used to access the site. Primary access to the site will be provided by an access road off of Camino Tomasini. Access to the site must comply with all County design standards and would be reviewed by the County to ensure that inadequate design features or incompatible uses do not occur. Additionally, the proposed Project would be required to comply with all applicable fire code and ordinance requirements for construction and access to the site. Emergency response and evacuation procedures would be coordinated with the County, as well as the police and fire departments, resulting in less than significant impacts; no mitigation measures are required.

d. *Less Than Significant With Mitigation Incorporated* – The Project site includes direct access on public roadways and an access road on Camino Tomasini, which is a residential roadway. According to the County General Plan, no known emergency access plans or emergency response or evacuation plans will be affected by this Project in the short- or long-term. Construction activities will not occur within the roadways adjacent to the Project site boundaries. Large trucks delivering equipment will be removing materials, as well as hauling materials off of the site. These construction activities could potentially cause conflicts to the flow of traffic, though this is unlikely due to the remote location of the Project. However, to ensure adequate emergency access, particularly in the event of a wildfire or emergency situation, a Traffic Management Plan will be created and implemented to mitigate the impacts to traffic. Features of the traffic plan include flag persons and other features to control the interaction of the truck traffic and the flow of vehicles on nearby roadways. To minimize traffic flow impacts to and from the site to the extent feasible, the following mitigation measures will be implemented.

TRAF-1 ***The construction contractor will provide adequate traffic management resources, as determined by the SGVWC. SGVWC shall require a construction traffic management plan for work in public roads that complies with the Work Area Traffic Control Handbook, or other applicable standard, to provide adequate traffic control and safety during excavation activities. The traffic management plan shall be prepared and approved by the County prior to initiation of excavation activities. At a minimum this plan shall include how to minimize the amount of time spent on construction activities; how to minimize disruption of vehicle and alternative modes of transport traffic at all times, but particularly during periods of high traffic volumes; how to maintain safe traffic flow on local streets affected by construction at all times, including through the use of adequate signage, protective devices, flag persons or police assistance to ensure that traffic can flow adequately during construction; the identification of alternative routes that can meet the traffic flow requirements of a specific area, including communication (signs, webpages, etc.) with drivers and neighborhoods where construction activities will occur; and at the end of each construction day roadways shall be prepared for continued utilization without any significant roadway hazards remaining.***

With implementation of the above mitigation measure, the Project would provide adequate emergency access during construction. Thus, with implementation of the above mitigation measure, the Project will provide adequate emergency access. No further mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XVIII. TRIBAL CULTURAL RESOURCES: Would the project cause a substantial change in the significance of tribal cultural resources, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to the California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	☒
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in sub-division (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

SUBSTANTIATION

On October 1, 2018, Project notification letters with invitations to consult on the Project were sent by certified mail to representatives of the two tribes on the State Water Board's Assembly Bill (AB) 52 list for Los Angeles County: The Gabrieleno Band of Mission Indians -Gabrieleno Tongva and the Gabrieleno Band of Mission Indians- Kizh Nation. The Gabrieleno Band of Mission Indians -Gabrieleno Tongva did not request consultation. The Gabrieleno Band of Mission Indians- Kizh Nation (Tribe) requested consultation in an email dated October 5, 2018. The State Water Board contacted the tribal office by email on October 22, 2018 and a conference call consultation meeting was scheduled for December 12, 2018.

Chairman Salas and Matt Teutimez participated in the consultation meeting for the Tribe. While no specific tribal cultural resources were identified in the Project footprint, the Tribe said the area is near an important ancient trade route and as such, is very sensitive for the presence of archaeological materials, isolated burials, and cremations. They are concerned that there may be tribal cultural resources underlying the disturbed surface layer that could be discovered during construction. They asked that an approved member of the Gabrieleno Band of Mission Indians, Kizh Nation be on site for Project excavation to monitor the excavation of the reservoir footprint and provided mitigation measure language.

Ground-disturbing activities have the potential to result in the discovery of, or inadvertent damage to, archaeological contexts and human remains, and this possibility cannot be eliminated. Consequently, there is a potential for significant impacts on TCRs if they are discovered during construction. Implementation of monitoring and the stop work and treatment procedures to avoid and minimize potential impacts as described in Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4 would reduce the potential impacts to less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XIX. UTILITIES AND SERVICE SYSTEMS: Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment, or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill(s) with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☒	☐	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☒	☐	☐

SUBSTANTIATION

a. Water

Less Than Significant Impact – The proposed Project will construct new water facilities—a new 1.2 MG water storage reservoir—to store additional water within SGVWC's jurisdiction and to allow existing water storage reservoirs to be taken out of service for maintenance when required. The Project will include the development of a 1.2 MG reservoir with associated connections to SGVWC's existing water infrastructure system. The Project will not require any additional water to operate, other than the water proposed to be stored in the reservoirs, which will contribute to the existing water facilities within SGVWC's District boundaries. With no demand for water as a result of implementing the proposed Project, the development of the 1.2 MG water storage reservoir, connection to SGVWC's existing water system, and site improvements are not forecast to require or result in the construction of new water facilities or expansion of existing facilities in order to serve the Project.

Wastewater

No Impact – New development in the County is required to install wastewater infrastructure concurrent with Project development. The proposed Project will not develop any housing or human-occupied structures. The only structure proposed at this time is the 1.2 MG water storage reservoir. Therefore, with no connections to the wastewater treatment plant and no generation of wastewater

at the site, site improvements are not forecast to require or result in the construction of new wastewater facilities or expansion of existing facilities in order to serve the Project.

Stormwater
Less Than Significant Impact – As stated under issue IX(e), implementation the proposed Project is not forecast to significantly alter the volume of surface/stormwater runoff that will be generated from the Project site. The Project site is located on a hillside, which means that much of the flow of water in the vicinity runs downhill from the Project area. The development of the Project will include a drainage plan. The proposed retaining wall will be constructed to enable grading of a relatively flat area on which to construct the new reservoir. All on-site flows will be directed toward the street or to the existing drainage channel via concrete swales, catch basins and drain pipes. The Project will require the implementation of a SWPPP and WQMP, and hazardous material BMPs during construction, which will ensure that any potential discharge of polluted material does not occur or is remediated in the event of an accidental spill. Thus, the development of the Project will not require or result in the construction of new or expansion of existing stormwater drainage facilities because the site plan includes a drainage plan and the SWPPP will be implemented with mitigation. Any impacts under this issue are considered less than significant. No mitigation is required.

Electric Power
No Impact – Development of the Plant B14 Reservoir Project would not require the installation of electrical services. There is an existing booster pump on site that utilizes electric power in order to operate. However, expanded services are not required to operate the booster pump. Therefore, the project would not result in a significant environmental effect related to the relocation or construction of new or expanded electric power facilities. No impacts are anticipated.

Natural Gas
No Impact – Development of the Plant B14 Reservoir Project would not require installation of natural gas. Therefore, the project would not result in a significant environmental effect related to the relocation or construction of new or expanded natural gas facilities. No impacts are anticipated.

Telecommunications
No Impact – Development of the Plant B14 Reservoir Project would not installation of wireless internet service or phone serve. Therefore, the project would not result in a significant environmental effect related to the relocation or construction of new or expanded telecommunication facilities. No impacts are anticipated.

b. *Less Than Significant Impact* – Please refer to the discussion under X(b) and XIX(a) above. The proposed Project will construct new water facilities—a new 1.2 MG water storage reservoir—to store additional water within SGVWC's jurisdiction and to allow existing water storage reservoirs to be taken out of service for maintenance when required. The construction and operation of the new water storage reservoir will not create a greater demand for water at this site than that which presently exists, as the reservoir will connect to the existing water system within SGVWC's and store water for future use. The new reservoir will allow better overall management of water distribution within the SGVWC's service area. Thus, implementation of the proposed Project will have sufficient water supplies available to serve the Project from existing entitlements and resources. Any impacts under is issue is considered less than significant. No mitigation is required.

c. *No Impact* – Please refer to the discussion under issues XIX(a) and XIX(b). The proposed 1.2 MG water storage reservoir will not generate any wastewater, as there are no connections to the wastewater treatment plant because no human occupied structures are proposed as part of this Project. Therefore, implementation of the Project will not create a demand of wastewater treatment services that would impact the provider's ability to serve their existing commitments. No impacts are anticipated under this issue, and no mitigation is required.

d&e. *Less Than Significant With Mitigation Incorporated* – The Project is not anticipated to generate a large amount of waste as a result of construction or operation of the new 1.2 MG reservoir. Any construction and demolition (C & D) waste will be recycled to the maximum extent feasible and any residual materials will be delivered to one of several C & D disposal sites in the area surrounding the Project site. Solid waste will be disposed of in accordance with existing regulations at an existing licensed landfill—such as the Savage Canyon Landfill, which has a maximum daily permitted throughput of 3,350 tons per day, and a remaining capacity of 9,510,833 cubic yards (CY), located within 5 miles of the Project site at 13919 East Penn Street Whittier, CA 90602. Any hazardous materials collected on the Project site during either construction of the Project will be transported and disposed of by a permitted and licensed hazardous materials service provider. Therefore, the Project is expected to comply with all regulations related to solid waste under federal, state, and local statutes. To further reduce potential impacts to solid waste facilities due to the large scale of the materials that may require disposal or recycling, the following mitigation measure will be implemented:

UTIL-1 The contract with demolition and construction contractors shall include the requirement that all materials that can feasibly be recycled shall be salvaged and recycled. This includes, but is not limited to, wood, metals, concrete, road base, and asphalt. The contractor shall submit a recycling plan to the County for review and approval prior to the start of demolition/construction activities to accomplish this objective.

Therefore, with the above mitigation measure, the Project is expected to comply with all regulations related to solid waste under federal, state, and local statutes and be served by a landfill(s) with sufficient permitted capacity to accommodate the Project's solid waste disposal needs. No further mitigation is necessary.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XX. WILDFIRE: If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire?	☐	☐	☒	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☒	☐	☐

SUBSTANTIATION

a. *Less Than Significant Impact* – The proposed project is located within/adjacent to a Very High Fire Hazard Severity Zone in a State Responsibility Area (SRA), shown on Figure XX-1. The proposed Project is also located within a Very High Fire Hazard Severity Zone within a Local Responsibility Area. Please review the discussion under Subchapter IX, Hazards and Hazardous Materials. Within the proposed reservoir site, the proposed facilities are not anticipated to impair implementation an adopted emergency response plan or emergency evacuation plan. Ingress and egress of maintenance trucks and construction vehicles would come from Camino Del Tomasini, which is a residential street. The Project site is located within a residential area with limited traffic in the vicinity of the Project. Additionally, the Project site is located at the terminus of adjacent roadway. The reservoir would be developed in such a way that emergency response would have access in the area around the new reservoir. Therefore, the Project will not substantially impair an adopted emergency response plan or emergency evacuation plan. Impacts under this issue are considered less than significant and no mitigation is required.

b. *Less Than Significant Impact* – The proposed project includes the development of a new water storage reservoir at a site in which an existing water storage reservoir is located. The Project does not propose any human occupancy structures or other structures that will place people on the site for long periods of time or pose a significant threat to people or property from wildfire risk. The project site is located adjacent to a hillside and therefore has a potential to be exposed to wildfire as there is not a significant amount of development located at this hillside. Because the proposed project would develop a water storage reservoir within a site containing an existing water storage reservoir, and because the provision of water storage is considered a benefit to the prevention of the spreading of wildfire in high risk areas, it is not anticipated that development at this site would expose occupants to pollutant concentrations from a wildfire. Therefore, given that the proposed project does not contain any human occupancy structures, it is not anticipated that the project would exacerbate fire risks thereby exposing project occupants to pollutant concentrations from a wildfire or uncontrolled spread of wildfire. Impacts under this issue are considered less than significant and no mitigation is required.

c. *Less Than Significant Impact* – The proposed project is a water storage reservoir construction project on a site that currently contains an existing reservoir. The site does not contain vegetation or other such circumstances that would exacerbate fire risk during construction at this site located within a high fire hazard zone. The project does not include any uses, such as power lines, that would have a potential to result in random fire risk under accidental circumstances (such as a downed wire, etc.). As such, though the proposed project would construct a water storage reservoir, it is not anticipated that the construction of the reservoir at this site would exacerbate fire risk or that may result in temporary or ongoing impacts to the environment. Impacts under this issue are considered less than significant and no mitigation is required.

d. *Less Than Significant With Mitigation Incorporated* – According to the Geotechnical Report (Appendix 4), a number of landslides and slope stability problems have been reported in the surrounding residential developments. These landslides and slope stability problems have been associated with above normal rainfall years and the increased infiltration of water into the underlying earth materials. There has been a direct correlation between heavy rainfall years and slope stability problems. These circumstances could be exacerbated should a fire occur at the adjacent hillside rendering the slope even less stable should heavy rain occur. As stated under the Geology and Soils Subchapter, marginally stable slope areas become unstable with increased water infiltration. Most earth movement problems are generally associated with water and site drainage. However, implementation of specific measures outlined in the geotechnical study (enforced by mitigation measure **GEO-2**), the project would construct a retaining wall and recommended design measures, which would minimize downslope landslides as a result of post-fire slope instability. Furthermore, the project does not propose any habitable structures and thus the exposure of persons to such an event is minimal. As stated under the Hydrology Subchapter, flood risks at the project site are minimal, and therefore downslope flooding is not anticipated to occur as a result of post-fire slope instability or drainage changes. Based on the discussion above, with mitigation measure **GEO-2**, the project would have a less than significant potential to expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XIV. MANDATORY FINDINGS OF SIGNIFICANCE:				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☒	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

SUBSTANTIATION

The analysis in this Initial Study and the findings reached indicate that the proposed Project can be implemented without causing any new Project specific or cumulatively considerable unavoidable significant adverse environmental impacts. Mitigation is required to control potential environmental impacts of the proposed Project to a less than significant impact level. The following findings are based on the detailed analysis of the Initial Study of all environmental topics and the implementation of the mitigation measures identified in the previous text and summarized following this section.

a. *Less Than Significant With Mitigation Incorporated* – The Project has no potential to cause a significant impact any biological or cultural resources. The Project has been identified as having no potential to degrade the quality of the natural environment, substantially reduce habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal. The Project requires mitigation to prevent significant impacts from occurring as a result of implementation of the Project. Based on the historic disturbance of the site, and its current disturbed condition, the potential for impacting cultural resources is low. The Cultural Resources Report determined that no cultural resources of importance were found at the Project site, so it is not anticipated that any resources could be affected by the Project because no cultural resources exist. However, because it is not known what could be unearthed upon any excavation activities, contingency mitigation measures are provided to ensure that, in the unlikely event that any resources are found, they are protected from any potential impacts. Please see biological and cultural sections of this Initial Study.

b. *Less Than Significant With Mitigation Incorporated* – Based on the analysis in this Initial Study, the proposed Plant B14 Project has the potential to cause impacts that are individually or cumulatively considerable. There are no other Projects in the vicinity to which this Project would make a cumulatively considerable impact. The issues of Air Quality, Biology, Cultural Resources, Geology and Soils, Noise, Transportation and Traffic, Tribal Cultural Resources, Utilities and Service Systems, and Wildfire require the implementation of mitigation measures to reduce impacts to a less than

significant level and ensure that cumulative effects are not cumulatively considerable. All other environmental issues were found to have no significant impacts without implementation of mitigation. The potential cumulative environmental effects of implementing the proposed Project have been determined to be less than considerable and thus, less than significant impacts.

c. *Less Than Significant With Mitigation Incorporated* – The proposed Project includes activities that have a potential to cause direct substantial adverse effects on humans. The issues of Air Quality, Geology and Soils, Noise, and Wildfire require the implementation of mitigation measures to reduce human impacts to a less than significant level. All other environmental issues were found to have no significant impacts on humans without implementation of mitigation. The potential for direct human effects from implementing the proposed Project have been determined to be less than significant.

Conclusion

This document evaluated all CEQA issues contained in the Initial Study Checklist form. The evaluation determined that either no impact or less than significant impacts would be associated with the issues of Aesthetics, Agricultural and Forestry Resources, Energy, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Mineral Resources, Population/Housing, Public Services, and Recreation. The issues of Air Quality, Biology, Cultural Resources, Geology and Soils, Noise, Transportation and Traffic, Tribal Cultural Resources, Utilities and Service Systems, Wildfire require the implementation of mitigation measures to reduce impacts to a less than significant level. The required mitigation has been proposed in this Initial Study to reduce impacts for these issues to a less than significant impact.

Based on the findings in this Initial Study, the SWRCB proposes to adopt a Mitigated Negative Declaration (MND) for the San Gabriel Valley Water Company Plant B14 Project. A Notice of Intent to Adopt a Mitigated Negative Declaration (NOI) will be issued for this Project by the SWRCB. The Initial Study and NOI will be circulated for 30 days of public comment.

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Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; *Sundstrom v. County of Mendocino*,(1988) 202 Cal.App.3d 296; *Leonoff v. Monterey Board of Supervisors*, (1990) 222 Cal.App.3d 1337; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; San *Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.
Revised 2016
Authority: Public Resources Code sections 21083 and 21083.09
Reference: Public Resources Code sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3/ 21084.2 and 21084.3

SUMMARY OF MITIGATION MEASURES

Air Quality

AIR-1 Fugitive Dust Control. The following measures shall be incorporated into Project plans and specifications for implementation:

- Apply soil stabilizers or moisten inactive areas;
- Water exposed surfaces as needed to avoid visible dust leaving the construction site (typically 2-3 times/day);
- Cover all stock piles with tarps at the end of each day or as needed;
- Provide water spray during loading and unloading of earthen materials;
- Minimize in-out traffic from construction zone;
- Cover all trucks hauling dirt, sand, or loose material and require all trucks to maintain at least two feet of freeboard; and
- Sweep streets daily if visible soil material is carried out from the construction site.

AIR-2 Exhaust Emissions Control

- Utilize well-tuned off-road construction equipment.
- Establish a preference for contractors using Tier 3-rated or better heavy equipment.
- Enforce 5-minute idling limits for both on-road trucks and off-road equipment.

Biological Resources

BIO-1 Preconstruction presence/absence surveys for least Bell's vireo shall be conducted within 30 days prior to any onsite ground disturbing activity. The least Bell's vireo survey shall be conducted pursuant to the recommendations and guidelines established by the California Department of Fish and Wildlife. No further action is required.

BIO-2 Preconstruction presence/absence surveys for coastal California gnatcatcher shall be conducted within 30 days prior to any onsite ground disturbing activity. The coastal California gnatcatcher survey shall be conducted pursuant to the recommendations and guidelines established by the California Department of Fish and Wildlife. In the event this species is not identified within the Project limits, no further mitigation is required. If during the preconstruction survey, the coastal California gnatcatcher is found to occupy the site, Mitigation measure BIO-3 shall be required.

BIO-3 In the event that coastal California gnatcatcher is found the following measures shall be taken to prevent impacts to this species:

- Construction shall not occur during nesting season for CAGN.
- Firm boundaries shall be established to prevent impacts.
- SGVWC shall compensate for suitable CAGN habitat at a 1:1 ratio (for each acre one acre of compensatory mitigation will be provided).

BIO-4 The State of California prohibits the "take" of active bird nests. To avoid an illegal take of active bird nests, any grubbing, brushing or tree removal should be conducted outside of the the State identified nesting season (Raptor nesting season is February 15 through July 31; and migratory bird nesting season is March 15 through September 1). Alternatively, the site shall be evaluated by a qualified biologist prior to the initiation of ground disturbace to determine the presence or absence of nesting birds. Active bird nests shall be avoided during the nesting season. If an active nest is located in the Project construction area it will be flagged and a 300-foot avoidance buffer placed around it. No activity shall occur within the 300-foot buffer until the young have fledged the nest.

Cultural Resources

CUL-1 Professional Standards: All archaeological and Native American personnel conducting monitoring or archaeological assessment during construction projects will be qualified and their work consistent with current professional standards. All feasible care to avoid any unnecessary disturbance, physical modification, or separation of human remains and associated funerary objects shall be taken. The principal archaeologist must meet the Secretary of the Interior standards for archaeology and have a minimum of 10 years of experience as a principal investigator working with Native American archaeological sites in southern California. The Qualified Archaeologist shall ensure that all other personnel are appropriately trained and qualified.

CUL-2 Unanticipated Discovery of Tribal Cultural, Historical, and Archaeological Resources: Upon discovery of archaeological resources, cease construction activities in the immediate vicinity of the find until the find can be assessed by a qualified archaeologist. All archaeological resources unearthed by project construction activities shall be evaluated by the qualified archaeologist and tribal monitor approved by the Gabrieleño Band of Mission Indians-Kizh Nation. If the resources are Native American in origin, the Gabrieleño Band of Mission Indians-Kizh Nation shall coordinate with the landowner regarding treatment and curation of these resources. Typically, the Tribe will request reburial or preservation for educational purposes.

After the assessment is completed, the archaeologist shall submit a report to the State Water Board describing the significance of the discovery with cultural resource management recommendations. Work may continue on other parts of the Project while evaluation and, if necessary, mitigation takes place (CEQA Guidelines Section15064.5 [f]). If a resource is determined by the qualified archaeologist to constitute a “historical resource” or “unique archaeological resource”, time allotment and funding sufficient to allow for implementation of avoidance measures, or appropriate mitigation, must be available. The treatment plan established for the resources shall be in accordance with CEQA Guidelines Section 15064.5(f) for historical resources and Public Resources Code Sections 21083.2(b) for unique archaeological resources. Preservation in place (i.e., avoidance) is the preferred manner of treatment. If preservation in place is not feasible, treatment may include implementation of archaeological data recovery excavations to remove the resource along with subsequent laboratory processing and analysis. Any historic archaeological material that is not Native American in origin shall be curated at a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County or the Fowler Museum, if such an institution agrees to accept the material. If no institution accepts the archaeological material, they shall be offered to a local school or historical society in the area for educational purposes.

CUL-3 Retain a Native American Monitor: The Project Applicant will be required to obtain the services of a tribal monitor approved by the Gabrieleño Band of Mission Indians-Kizh Nation and will be present on-site during the construction phases that involve any ground disturbing activities. Ground disturbance is defined by the Gabrieleño Band of Mission Indians-Kizh Nation as activities that include, but are not limited to, pavement removal, pot- holing or auguring, grubbing, weed abatement, boring, grading, excavation, drilling, and trenching, within the Project area. The Tribal Monitor will complete monitoring logs on a daily basis that will provide descriptions of the daily activities, including construction activities, locations, soil, and any cultural materials identified. The on-site monitoring shall end when the Project site grading and excavation activities are completed, or when the Tribal Representatives and monitor have indicated that the site has a low potential for archeological resources.

CUL-4 Unanticipated Discovery of Human Remains and Associated Funerary Objects: Native American human remains are defined in PRC 5097.98 (d)(1) as an inhumation or cremation, and in any state of decomposition or skeletal completeness. Funerary objects, called “associated grave goods” in PRC 5097.98, are also to be treated according to this statute. Health and Safety Code

7050.5 dictates that any discoveries of human skeletal material shall be immediately reported to the County Coroner and excavation halted until the coroner has determined the nature of the remains. If the coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the Native American Heritage Commission and PRC 5097.98 shall be followed.

Upon discovery, the Tribal monitor will immediately divert work at minimum of 50 feet and place an exclusion zone around the burial. The monitor will then notify the qualified archaeologist and the construction manager who will call the coroner. Work will continue to be diverted while the coroner determines whether the remains are Native American. The discovery is to be kept confidential and secure to prevent any further disturbance. If Native American, the coroner will notify the NAHC as mandated by state law who will then appoint a Most Likely Descendent (MLD).

If the Gabrieleno Band of Mission Indians – Kizh Nation is designated MLD, the following treatment measures shall be implemented. To the Tribe, the term "human remains" encompasses more than human bones. In ancient as well as historic times, Tribal Traditions included, but were not limited to, the burial of funerary objects with the deceased, and the ceremonial burning of human remains. These remains are to be treated in the same manner as bone fragments that remain intact. Associated funerary objects are objects that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later; other items made exclusively for burial purposes or to contain human remains can also be considered as associated funerary objects.

Prior to the start of ground disturbing activities, the land owner shall arrange a designated site location within the footprint of the Project for the respectful reburial of the human remains and/or ceremonial objects. In the case where discovered human remains cannot be fully documented and recovered on the same day, the remains will be covered with muslin cloth and a steel plate that can be moved by heavy equipment placed over the excavation opening to protect the remains. If this type of steel plate is not available, a 24-hour guard should be posted outside of working hours. The Tribe will make every effort to recommend diverting the Project and keeping the remains in situ and protected. If the Project cannot be diverted, it may be determined that burials will be removed. The Tribe will work closely with the qualified archaeologist to ensure that the excavation is treated carefully, ethically and respectfully. If data recovery is approved by the Tribe, documentation shall be taken which includes at a minimum detailed descriptive notes and sketches. Additional types of documentation shall be approved by the Tribe for data recovery purposes. Cremations will either be removed in bulk or by means as necessary to ensure completely recovery of all material. If the discovery of human remains includes four or more burials, the location is considered a cemetery and a separate treatment plan shall be created. Once complete, a final report of all activities is to be submitted to the NAHC. The Tribe does not authorize any scientific study or the utilization of any invasive diagnostics on human remains.

Each occurrence of human remains and associated funerary objects will be stored using opaque cloth bags. All human remains, funerary objects, sacred objects and objects of cultural patrimony will be removed to a secure container on site if possible. These items should be retained and reburied within six months of recovery. The site of reburial/repatriation shall be on the Project site but at a location mitigated between the Tribe and the landowner at a site to be protected in perpetuity. There shall be no publicity regarding any cultural materials recovered.

Geology and Soils

GEO-1 SGVWC shall require the structural engineer to consider the effects of seismically-induced settlement when finalizing the foundation design for the new reservoir.

GEO-2 Based upon the geotechnical study (Appendix 4 of this document), all of the geotechnical findings identified in Appendix 4 (listed on Pages 13-29) shall be implemented by SGVWC.

Implementation of these specific measures will address all of the identified geotechnical constraints identified at the Project site, including seismic related hazards on future Project-related water storage reservoir.

GEO-3 Stored backfill material shall be covered with water resistant material during periods of heavy precipitation to reduce the potential for rainfall erosion of stored backfill material. If covering is not feasible, then measures such as the use of straw bales or sand bags shall be used to capture and hold eroded material on the Project site for future cleanup.

GEO-4 All exposed, disturbed soil (trenches, stored backfill, etc.) shall be sprayed with water or soil binders twice a day, or more frequently if fugitive dust is observed migrating from the site within which the new reservoir with associated water improvements is being constructed.

GEO-5 Should any paleontological resources be encountered during construction of these facilities, earthmoving or grading activities in the immediate area of the finds shall be halted and an onsite inspection should be performed immediately by a qualified paleontologist. Responsibility for making this determination shall be with SGVWC's onsite inspector. The paleontological professional shall assess the find, determine its significance, and make recommendations for appropriate mitigation measures.

Noise

NOI-1 SGVWC will require that all construction equipment be shut off when it is not in use.

NOI-2 SGVWC will require the use of construction equipment that is equipped with properly operating and maintained mufflers.

NOI-3 SGVWC will require the use of electrical power to run air compressors and similar power tools.

Transportation

TRAF-1 The construction contractor will provide adequate traffic management resources, as determined by the SGVWC. SGVWC shall require a construction traffic management plan for work in public roads that complies with the Work Area Traffic Control Handbook, or other applicable standard, to provide adequate traffic control and safety during excavation activities. The traffic management plan shall be prepared and approved by the County prior to initiation of excavation activities. At a minimum this plan shall include how to minimize the amount of time spent on construction activities; how to minimize disruption of vehicle and alternative modes of transport traffic at all times, but particularly during periods of high traffic volumes; how to maintain safe traffic flow on local streets affected by construction at all times, including through the use of adequate signage, protective devices, flag persons or police assistance to ensure that traffic can flow adequately during construction; the identification of alternative routes that can meet the traffic flow requirements of a specific area, including communication (signs, webpages, etc.) with drivers and neighborhoods where construction activities will occur; and at the end of each construction day roadways shall be prepared for continued utilization without any significant roadway hazards remaining.

Utilities and Service Systems

UTIL-1 The contract with demolition and construction contractors shall include the requirement that all materials that can feasibly be recycled shall be salvaged and recycled. This includes, but is not limited to, wood, metals, concrete, road base, and asphalt. The contractor shall submit a recycling plan to the County for review and approval prior to the start of demolition/construction activities to accomplish this objective.

REFERENCES

Converse Consultants, *"Updated Geotechnical Study Report, San Gabriel Valley Water Company Plant B14 Proposed 1.2 Million Gallon Reservoir, West End of Camino Del Tomasini, Hacienda Heights, Los Angeles County, California"* dated July 19, 2017

CRM TECH, *"Historical/Archaeological Resources Survey Report, 1.42-MG Reservoir and Improvements at Plant B14, Hacienda Heights Area, Los Angeles County, California"* dated October 18, 2018

Giroux & Associates, *"Air Quality and GHG Impact Analyses, San Gabriel Valley Water Company Plant B14 Project, San Bernardino County, California"* dated September 12, 2018

Giroux & Associates, *"Noise Impact Analysis, San Gabriel Valley Water Company Plant B14 Project, Hacienda Heights, California"* dated October 17, 2018

Jericho Systems, Inc., *"Biological Resources Assessment and Jurisdictional Delineation for the San Gabriel Valley Water Company's Plant B14 Facilities Improvement Project, Unincorporated Area of Hacienda Heights, Los Angeles County, California"* dated September 2017, updated 2019

San Gabriel Valley Water Company's 2012 Water System Master Plan Update (Master Plan)

USGS Topo 7.5-minute map for La Habra, CA

Fact Sheet for Applying CalEEMod to Localized Significance Thresholds. December 2013. http://aqmd.gov/ceqa/handbook/LST/CalEEModguidance.pdf

Los Angeles County Department of Regional Planning, Community Climate Action Plan, 2009, http://planning.lacounty.gov/CCAP

https://www.sce.com/about-us/reliability/meeting-demand

FIGURES

FIGURE 1
Regional Location

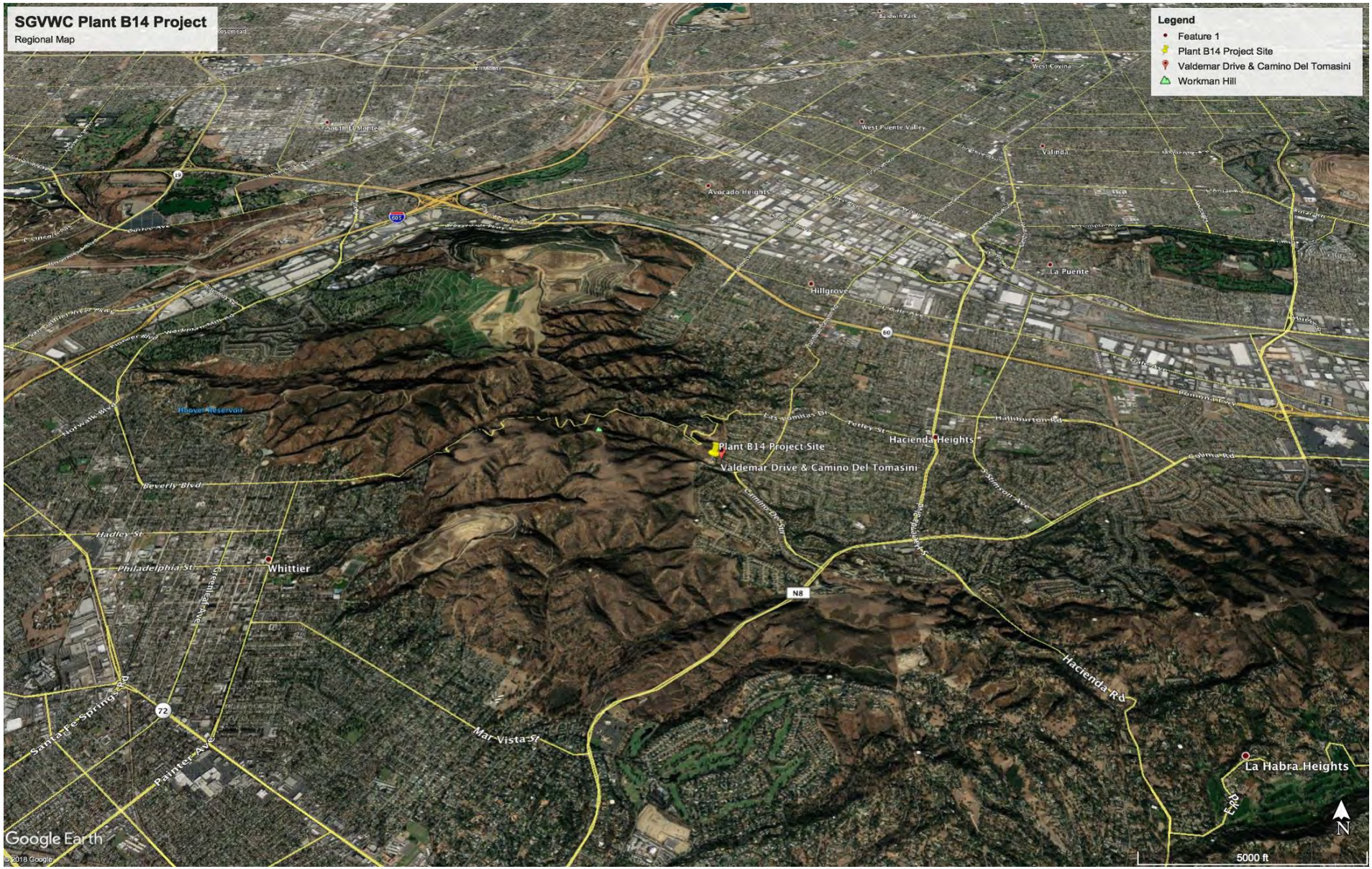


FIGURE 2
Site Location

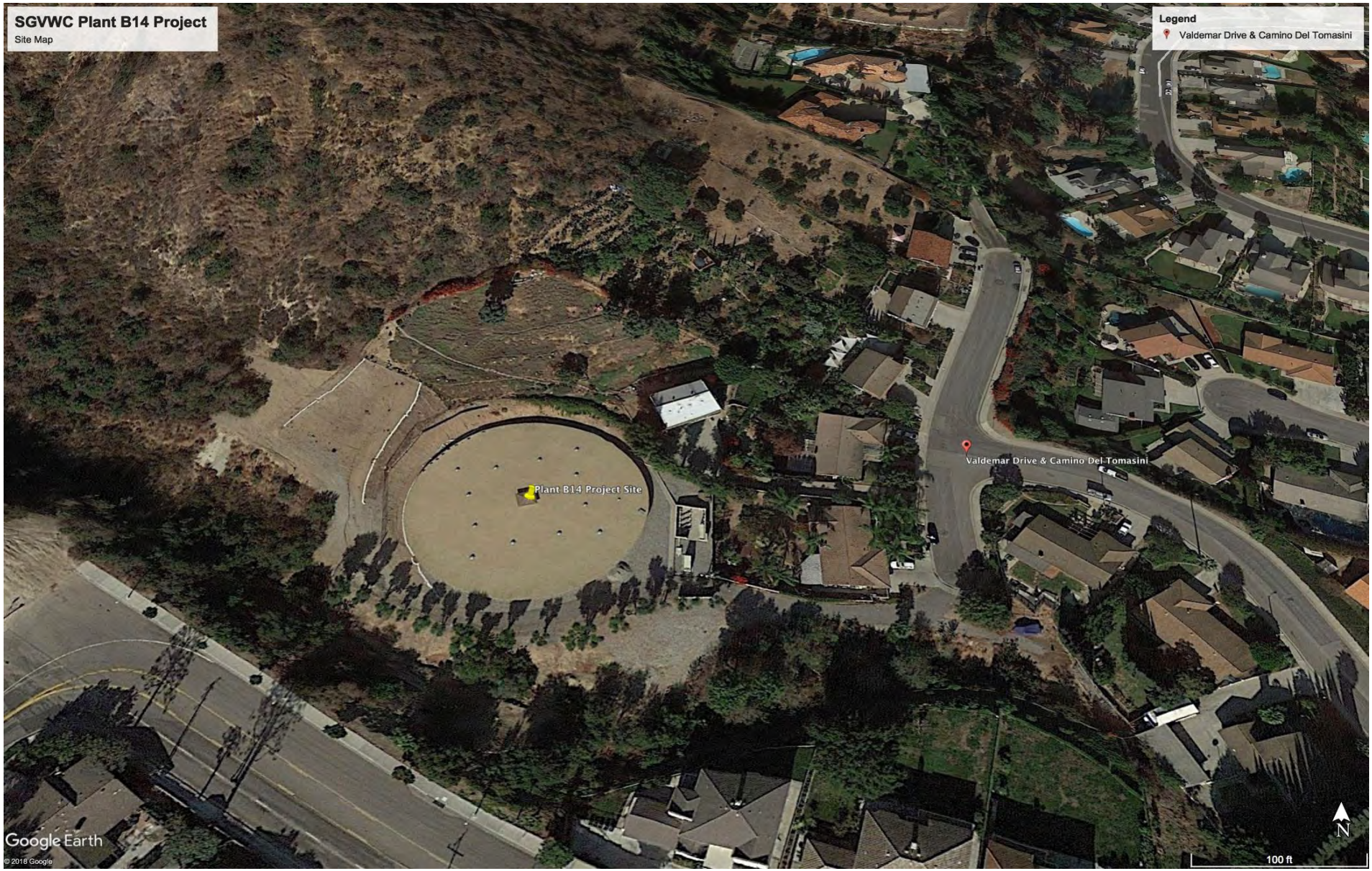


FIGURE 3
Site Photos from Various Angles



FIGURE 4
Site Photos from Various Angles



FIGURE 5
Site Photos from Various Angles



FIGURE 6
Site Photos from Various Angles



CONSTRUCTION NOTES:

1. PROPOSED 80' DIAMETER STEEL RESERVOIR PER RESERVOIR PLAN. (BY OTHERS)
2. CONSTRUCT RETAINING WALL PER SEPARATE PERMIT.
3. INSTALL 2' WIDE CONCRETE GUTTER PER CALTRANS STD PLAN B3-6. SEE GRADING & DRAINAGE PLAN FOR ELEVATIONS.
4. INSTALL 3' WIDE CONCRETE V-GUTTER, SEE DETAIL A, SHEET 7. SEE GRADING & DRAINAGE PLAN FOR ELEVATIONS.
5. PROPOSED RING WALL FOUNDATION (BY OTHERS)
6. CONSTRUCT 12' WIDE ACCESS ROAD PER DETAIL F, SHEET 7.
7. INSTALL PROPOSED DRAINAGE INLET. SEE GRADING & DRAINAGE PLANS
8. PROPOSED GROUND COVER PLANTS PER LANDSCAPE PLAN.
9. INSTALL WROUGHT IRON FENCE PER DETAILS, SHEET 8.
10. INSTALL PROP. DRY WELL AND PIPING, SEE GRADING & DRAINAGE PLAN ON SHEET 5
11. INSTALL 1' DIKE AT EDGE OF PROPOSED ACCESS ROAD, SEE DETAIL B, SHEET 7.
12. INSTALL CONCRETE STAIRS AND RAILING PER DETAILS ON SHEET 9 & SHEET 10.
13. INSTALL 18' WIDE WROUGHT IRON GATE PER DETAIL A, SHEET 8
14. INSTALL 8" PERFORATED UNDERDRAIN PIPE PER GRADING & DRAINAGE PLAN ON SHEET 5

NOTE: ALL RETAINING WALLS TO BE CONSTRUCTED PER SEPARATE PERMIT

737.75 TW
717.13 FS
N 1818840.9495
E 6564007.8668
STA 12+25.00
OFF 3.00' R
END ACCESS ROAD
729.00 TW
726.53 FS
N 1818795.0035
E 6563941.6867
N 1818749.1760
E 6563951.7725
N 1818747.5864
E 6563951.0156
PROP. RESERVOIR
DIA. = 80'
H= 32'
TOP OF FOOTING ELEV = 709.22'
EXIST. CONCRETE PAD
STA 10+94.82
PRC
STA 10+64.19
BC
STA 10+52.51
OFF 9.00' R
N 1818655.4417
E 6564049.2986
JOIN EXIST. FENCE
STA 10+10.00
BEGIN ACCESS ROAD
715.75 TW
712.33 FS
N 1818788.2194
E 6564128.8299
N 1818797.4518
E 6564152.3240
715.25 TW
702.61 FS
STA 21+16.07
OFF 1.40' R
STA 20+98.61 BC
OFF 1.40' R
728.25 TW
701.52 FS
N 1818695.0370
E 6564068.7281
STA 10+45.55
OFF 29.02' R
STA 30+00.00 BC
OFF 6.39' R
EXIST. CONC. RESERVOIR B14A
DIA. = 156'
H= 15'
BOT. ELEV. 694.58
RATED CAPACITY: 2.14 MG
USABLE CAPACITY: 1.19 MG
703.28 TW
700.42 FS
N 1818760.5919
E 6564236.9067
JOIN EXIST. FENCE
EXIST. CHAIN LINK FENCE
702.75 TW
698.96 FS
N 1818737.1789
E 6564245.9973
EXIST. WATER (TYP.)
EXIST. BOOSTER STATION
EXIST. V-GUTTER
EXIST. ACCESS ROAD
EXIST. 24" WATER
EXIST. 16" WATER
EXIST. 8" WATER
EXIST. ACCESS ROAD
EXIST. CHAIN LINK FENCE
EXIST. 15" WATER
CAMINO DEL TOMASINI
S. VALLECITO
VALLECITO DR.
R/W
PL
℄

SCALE 1"=20'
0 10' 20' 40' 60' 80'

CURVE DATA				
CURVE #	LENGTH	RADIUS	DELTA	TANGENT
C1	149.872	65.000	132.1084	146.365
C2	30.625	35.000	050.1332	16.370
C3	101.278	97.614	059.4467	55.731
C4	146.493	93.614	089.6602	93.060

Figure 7

PLAN CHECK NO. GR1810090003

REVISIONS	BY	APP. BY	DATE

REVIEWED BY SOIL ENGINEER:
NAME LICENSE No. DATE
REVIEWED BY GEOLOGIST:
NAME LICENSE No. DATE

REGISTERED PROFESSIONAL ENGINEER MARCO CANTA No. 69244 Ex. 6/30/2020 CIVIL STATE OF CALIFORNIA

PREPARED UNDER THE SUPERVISION OF:
MARCO CANTA RCE No. 69244 DATE
APPROVED BY:
MATT Y. YUCELEN RCE No. 68951 DATE

PLAN PREPARED BY:
PACRIM ENGINEERING, INC.
1820 E 1ST STREET, SUITE 110
SANTA ANA, CA 92705
(714) 683-0470

SAN GABRIEL VALLEY WATER COMPANY
11142 EAST GARVEY AVENUE
P.O. BOX 6010 EL MONTE, CALIFORNIA 91734

JOB NO. 8677L PART 1

PLANT B14 IMPROVEMENT
GRADING PLAN
PROPOSED SITE PLAN

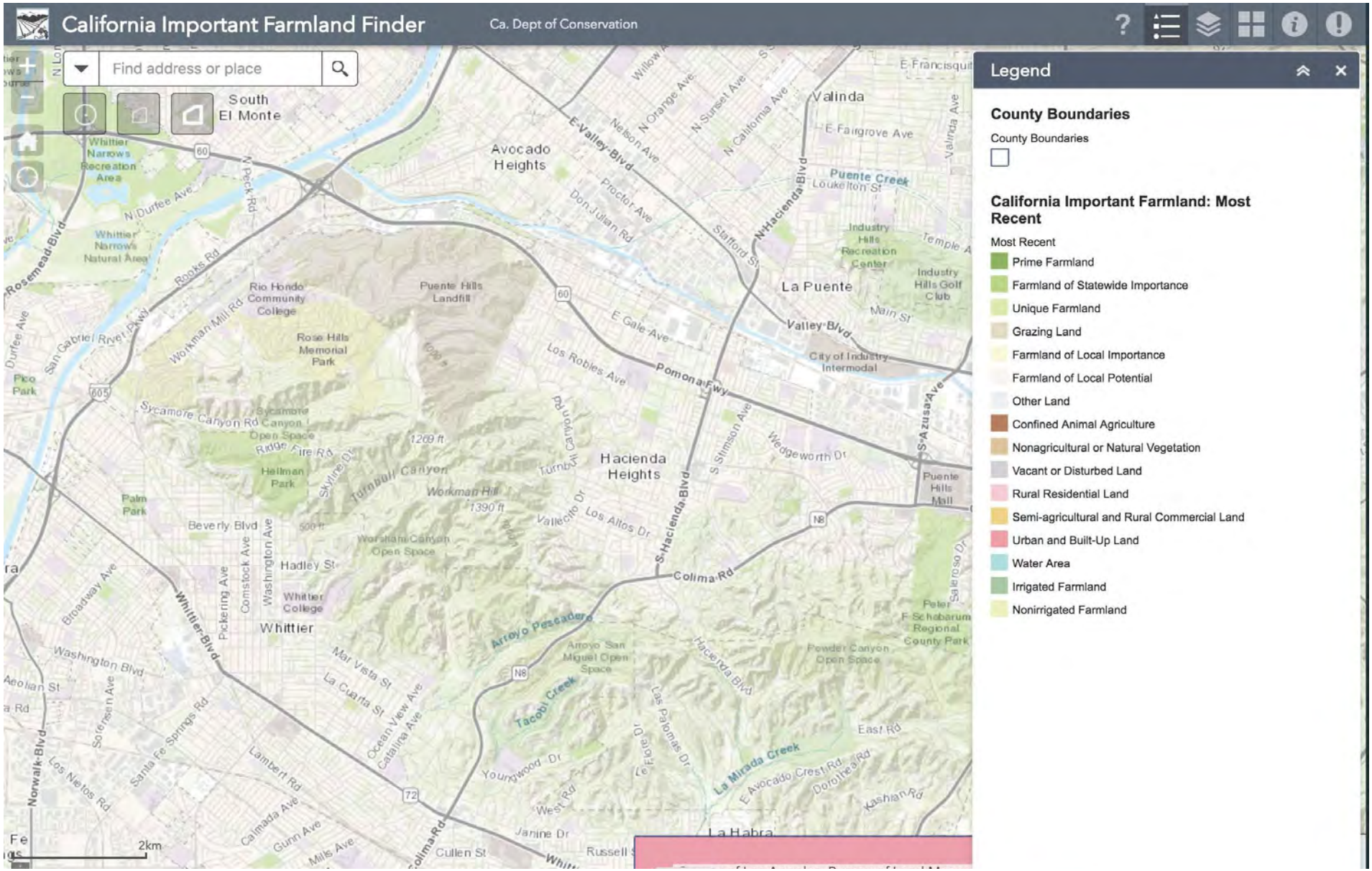
DRAWN BY:	DZ	DATE	9/27/18
DESIGNED BY:	MC		
REVIEWED BY:	LZ		
APPROVED BY:	MY		
START		COMP.	
TRACING CONFORMED			
SCALE	1"=20'	T.G. PG.	677-J5
MAP	528	GRID	4954

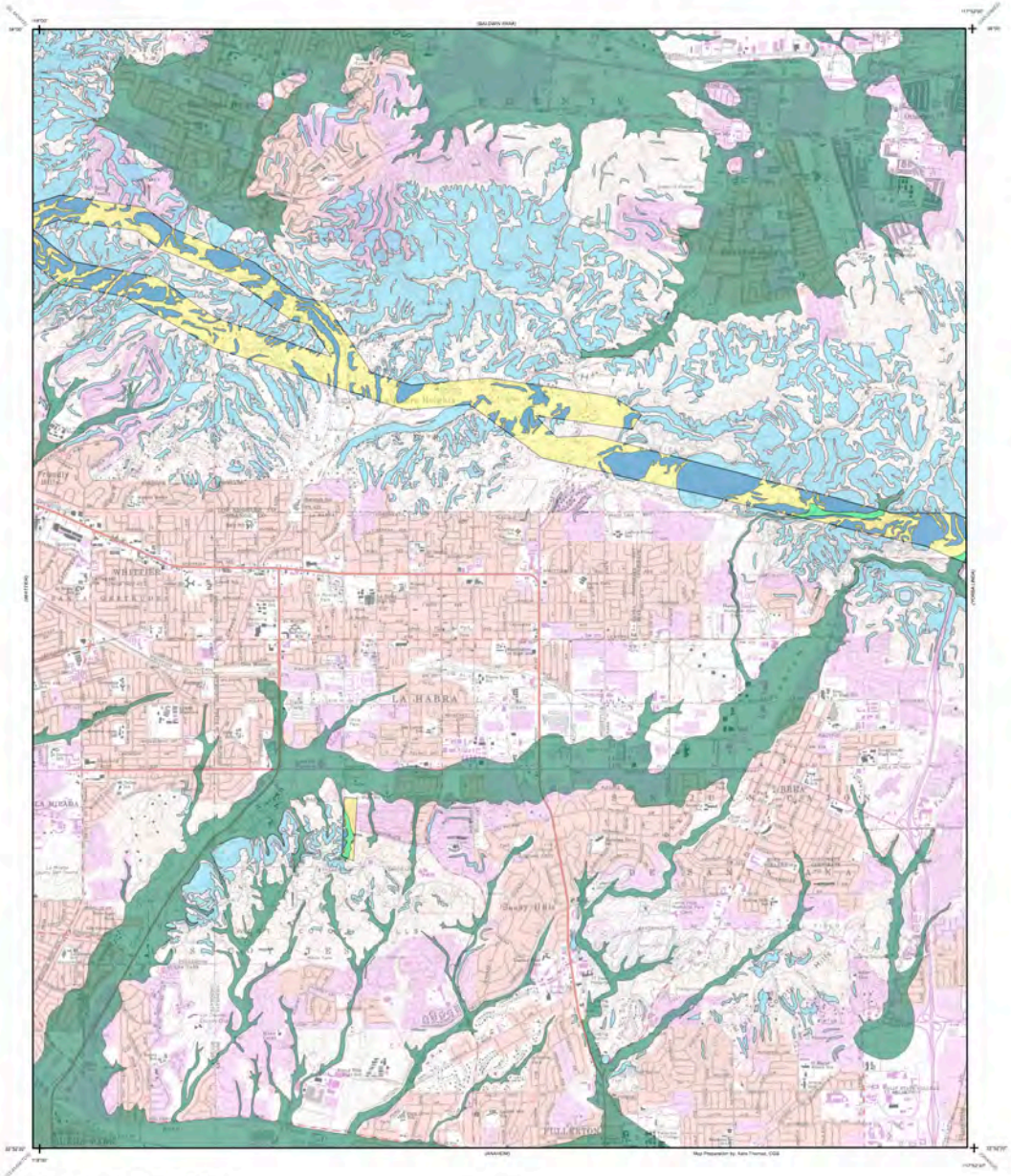
SHEET 4 OF 10 SHEETS LOCATION HACIENDA HEIGHTS, LOS ANGELES COUNTY

5/23/2019 1:43pm

Plotted: 23-MAY-2019 13:43 By: Dzhang
P:\PROJECTS\8677L\Design\Plan Sheets\Grading\8677L-GR-PLAN-SHEETS.dwg

FIGURE II-1
Farmland Map





Earthquake Zones of Required Investigation
La Habra Quadrangle

California Geological Survey

This Map Shows Both Alquist-Priolo Earthquake Fault Zones And Seismic Hazard Zones Issued For The La Habra Quadrangle

This map shows the location of Alquist-Priolo (AP) Earthquake Fault Zones and Seismic Hazard Zones, collectively referred to here as Earthquake Zones of Required Investigation. The Geographic Information System (GIS) digital files of these regulatory zones released by the California Geological Survey (CGS) are the "Official Maps." GIS files are available at the CGS website http://maps.conservation.ca.gov/cgs/informationwarehouse/. These zones will assist cities and counties in fulfilling their responsibilities for protecting the public from the effects of surface fault rupture and earthquake-triggered ground failure as required by the AP Earthquake Fault Zoning Act (Public Resources Code Sections 2621-2630) and the Seismic Hazards Mapping Act (Public Resources Code Sections 2690-2699.6). For information regarding the general approach and recommended methods for preparing these zones, see CGS Special Publication 42, *Earthquake Fault Zones, a Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California*, Appendix C, and CGS Special Publication 118, *Recommended Criteria for Delineating Seismic Hazard Zones in California*.

For information regarding the scope and recommended methods to be used in conducting required site investigations refer to CGS Special Publication 42, and CGS Special Publication 117A, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*. For a general description of the AP and Seismic Hazards Mapping acts, the zonation programs, and related information, please refer to the website at www.conservation.ca.gov/cgs/.

MAP EXPLANATION

EARTHQUAKE FAULT ZONES

Earthquake Fault Zones
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.

Active Fault Traces
Faults considered to have been active during Holocene time and to have potential for surface rupture: Solid Line in Black or Red where Accurately Located; Long Dash in Black or Solid Line in Purple where Approximately Located; Short Dash in Black or Solid Line in Orange where Inferred; Dotted Line in Black or Solid Line in Rose where Concealed; Query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

SEISMIC HAZARD ZONES

Liquefaction Zones
Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslide Zones
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

OVERLAPPING EARTHQUAKE FAULT AND SEISMIC HAZARD ZONES

Overlap of Earthquake Fault Zone and Liquefaction Zone
Areas that are covered by both Earthquake Fault Zone and Liquefaction Zone.

Overlap of Earthquake Fault Zone and Earthquake-induced Landslide Zone
Areas that are covered by both Earthquake Fault Zone and Earthquake-Induced Landslide Zone.

Note: Mitigation methods differ for each zone –
AP Act only allows avoidance; Seismic Hazard Mapping Act allows mitigation by engineering/geotechnical design as well as avoidance.

ADDITIONAL INFORMATION

For additional information on the zones of required investigation presented on this map, the data and methodology used to prepare them, and additional references consulted, please refer to the following:

The Whittier Fault Zone, in the La Habra Quadrangle, Los Angeles and Orange counties, California. California Geological Survey, Fault Evaluation Report FER-222.
http://gmw.conservation.ca.gov/SHP/EZRIM/Reports/FER/FER222/

The Norwalk, El Modeno, and Unnamed Faults in West Coyote Hills Faults, in the La Habra Quadrangle, Orange County, California. California Geological Survey, Fault Evaluation Report FER-42.
http://gmw.conservation.ca.gov/SHP/EZRIM/Reports/FER/FER42/

The Whittier Fault, in the Prado Dam, Yorba Linda, La Habra, and Whittier Quadrangles, Orange County, California. California Geological Survey, Fault Evaluation Report FER-41.
http://gmw.conservation.ca.gov/SHP/EZRIM/Reports/FER/FER41/

For more information on the Alquist-Priolo Earthquake Fault Zoning Act please refer to:
http://www.conservation.ca.gov/cgs/rghm/ap/Pages/main.aspx

Seismic Hazard Zone Report for the La Habra 7.5-minute Quadrangle, Los Angeles and Orange Counties, California. California Geological Survey, Seismic Hazard Zone Report 09.
http://gmw.conservation.ca.gov/SHP/EZRIM/Reports/SHZR/SHZR_009_La_Habra.pdf

For more information on the Seismic Hazards Mapping Act please refer to:
http://www.conservation.ca.gov/cgs/shzp/Pages/SHMPgminfo.aspx

Click the link below to learn how to take greater advantage of the GeoPDF format of this map after downloading.
http://gmw.conservation.ca.gov/SHP/EZRIM/Docs/TerragoUserGuide.pdf

LA HABRA QUADRANGLE

EARTHQUAKE FAULT ZONES

Delineated in compliance with
Chapter 7.5 Division 2 of the California Public Resources Code
(Alquist-Priolo Earthquake Fault Zoning Act)

REVISED OFFICIAL MAP

Released: November 1, 1991

STATE GEOLOGIST

SEISMIC HAZARD ZONES

Delineated in compliance with
Chapter 7.8 Division 2 of the California Public Resources Code
(Seismic Hazards Mapping Act)

OFFICIAL MAP

Released: April 15, 1998

STATE GEOLOGIST

IMPORTANT

PLEASE NOTE THE FOLLOWING FOR ZONES SHOWN ON THIS MAP

1) This map may not show all faults that have the potential for surface fault rupture, either within the Earthquake Fault Zones or outside their boundaries. Additionally, this map may not show all areas that have the potential for liquefaction, landsliding, strong earthquake ground shaking or other earthquake and geologic hazards. Also, a single earthquake capable of causing liquefaction or triggering landslide failure will not uniformly affect the entire area zoned.

2) Boundaries of Earthquake Fault Zones, if included on this map, are based on interpreted Holocene-active fault traces.

3) The identification and location of these faults are based on the best available data. However, the quality of data used is varied. Traces have been depicted as accurately as possible at a map scale of 1:24,000.

4) Liquefaction zones may also contain areas susceptible to the effects of earthquake-induced landslides. This situation typically exists at or near the toes of existing landslides, downslope from rockfall or debris flow source areas, or adjacent to steep stream banks.

5) Landslide zones on this map were determined, in part, by adapting methods first developed by the U.S. Geological Survey (USGS). Landslide hazard maps prepared by the USGS typically use experimental approaches to depict the overall probability of various types of landslide hazards. Although aspects of these new methodologies may be incorporated in future CGS seismic hazard zone maps, USGS maps should not be used as substitutes for these Official SEISMIC HAZARD ZONES maps.

6) USGS base map standards provide that 90 percent of cultural features be located within 40 feet (horizontal accuracy) at the scale of this map. The identification and location of liquefaction and earthquake-induced landslide zones are based on available data. However, the quality of data used is varied. The zone boundaries depicted have been drawn as accurately as possible at this scale.

7) Information on this map is not sufficient to serve as a substitute for the geologic and geotechnical site investigations required under Chapters 7.5 and 7.8 of Division 2 of the California Public Resources Code.

8) Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local building/planning department for information regarding the location of such mitigated areas.

9) DISCLAIMER: The State of California and the Department of Conservation make no representations or warranties regarding the accuracy of the data from which these maps were derived. Neither the State nor the Department shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.

Study area defined by USGS quadrangle boundaries using NAD 27, represented by the visible map extent. Data are maintained and distributed in California Albers (meters), NAD 83, [EPSG:3310] as shown by tics and coordinates.
Shaded topographic relief derived from USGS 10 meter NED, 2013.
Topographic base map from USGS 1964, photorevised, 1981.
Street data from US Census Bureau TIGER/Line, 2016.

Scale 1: 24000

Contour Interval 20 Feet



California Geological Survey
Geologic Information and Publications
801 K Street, MS 14-34
Sacramento, CA 95814-3532
www.conservation.ca.gov/cgs

FIGURE VII-1

FIGURE IX-1
GeoTracker

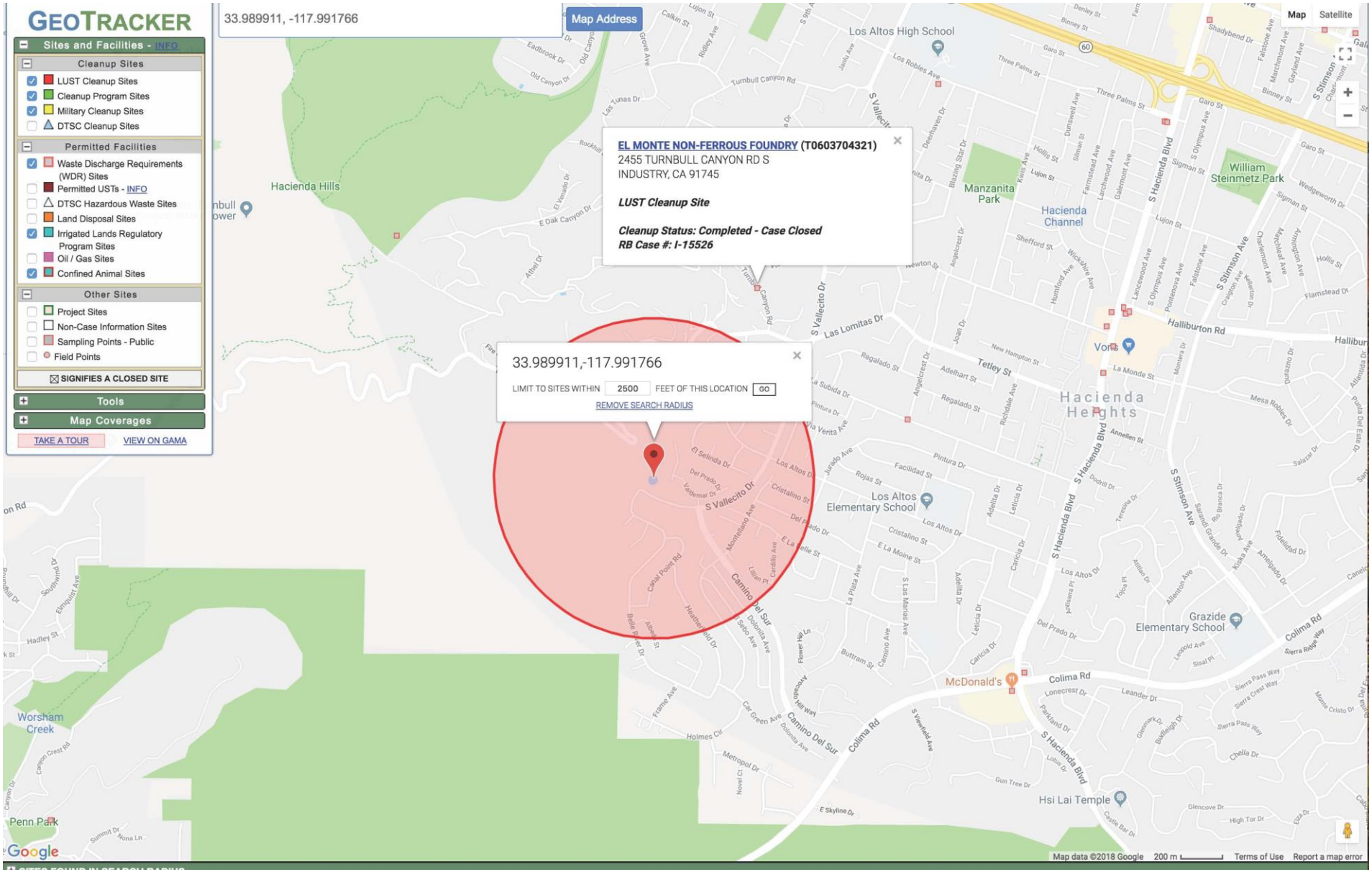
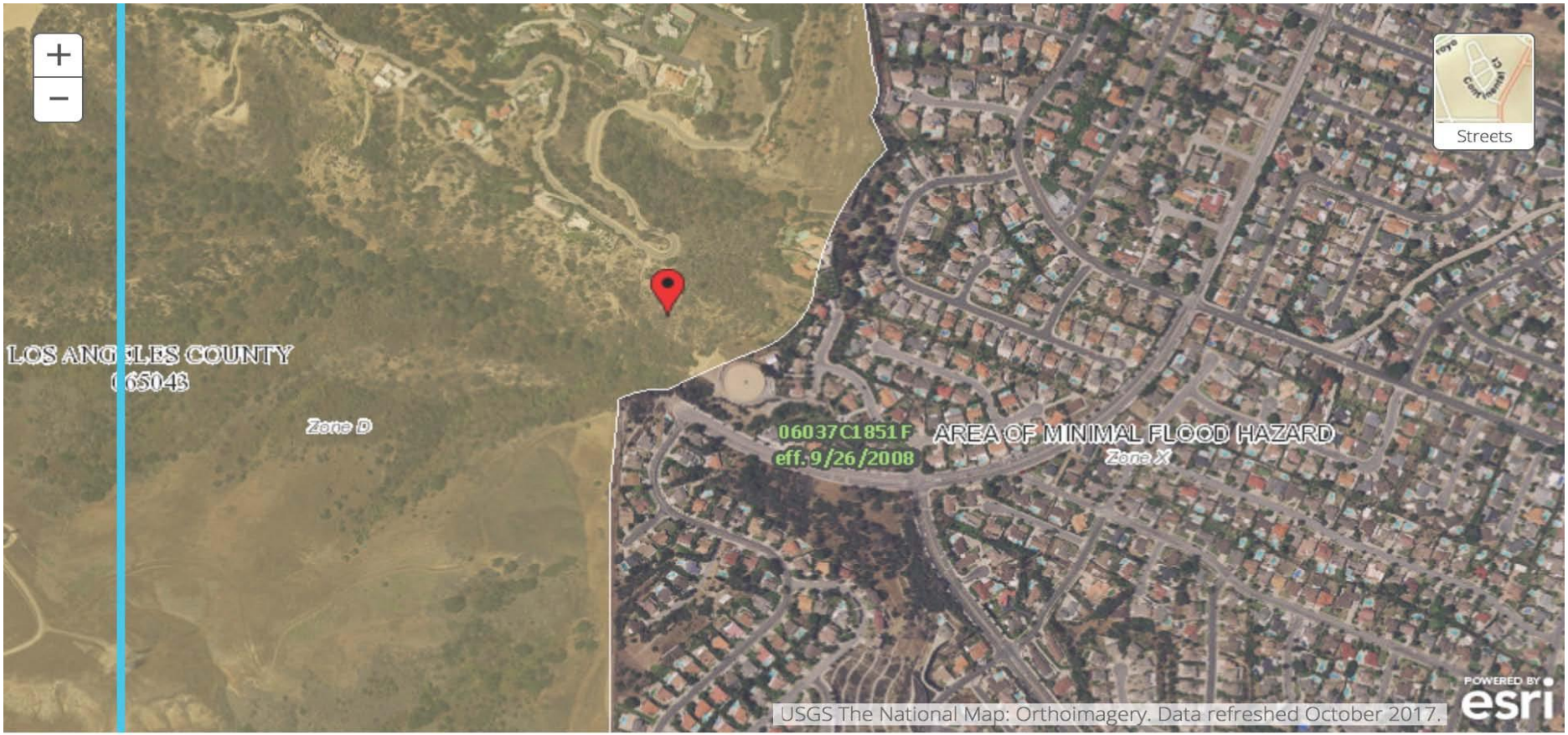


FIGURE X-1
FEMA Map



San Gabriel Valley P-C Region Showing MRZ-2 Areas and Active Mine Operations

By

Susan L. Kohler
(PG 3792)

2010

N

1 0 1 2 3
Miles

2 0 2
Kilometers

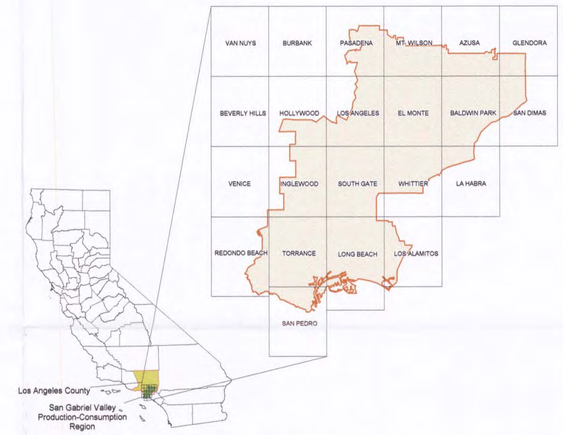
Scale: 1:100,000

Prepared in Compliance with the Surface Mining and Reclamation Act of 1975, Article 4, Section 2761

John G. Parrish
State Geologist

LEGEND

- San Gabriel Production-Consumption Region
- MRZ-2: Areas where geologic data indicate that significant PCC-Grade aggregate resources are present
- Lake
- Active Aggregate Mine
- County Boundary
- Interstate Route
- US Route
- State Route



Index of U.S.G.S. 7.5 Minute Quadrangles

Map Sources (Digital GIS Layers):

7.5-Minute Topographic Quadrangles: U.S.Geological Survey
Roads: GDT 2004

California Geological Survey Web Site: http://www.consrv.ca.gov/cgs/

FIGURE XII-1

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The California Department of Conservation makes no warranties as to the suitability of this product for any particular purpose.

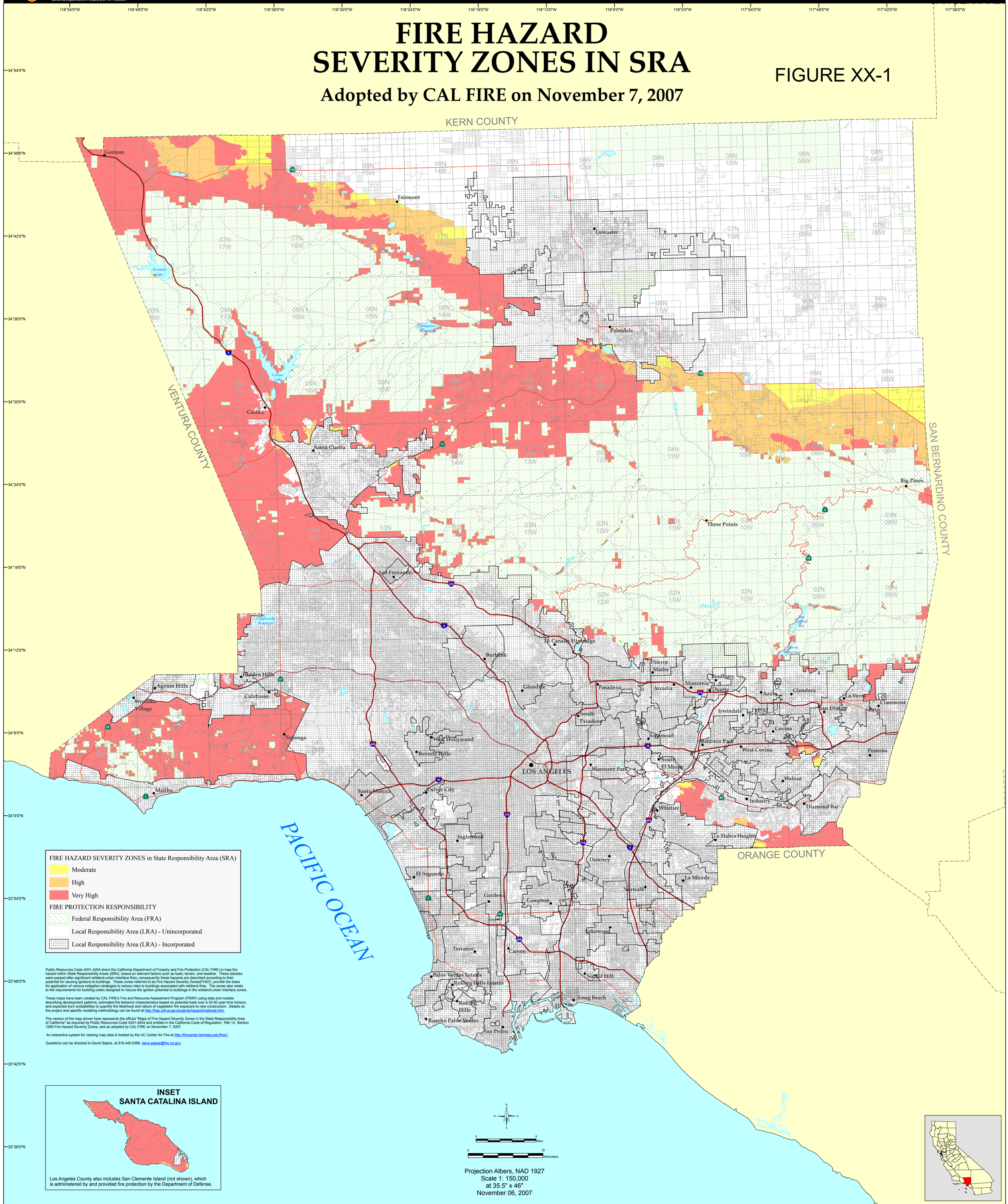
GIS Development and Map Layout by Milton Fonseca

LOS ANGELES COUNTY

FIRE HAZARD SEVERITY ZONES IN SRA

FIGURE XX-1

Adopted by CAL FIRE on November 7, 2007



Public Resources Code 4201-4204 direct the California Department of Forestry and Fire Protection (CAL FIRE) to map fire hazard within State Responsibility Areas (SRA), based on relevant factors such as fuels, terrain, and weather. These statutes were passed after significant wildland-urban interface fires; consequently these hazards are described according to their potential for causing ignitions to buildings. These zones referred to as Fire Hazard Severity Zones(FHSZ), provide the basis for application of various mitigation strategies to reduce risks to buildings associated with wildland fires. The zones also relate to the requirements for building codes designed to reduce the ignition potential to buildings in the wildland-urban interface zones.

These maps have been created by CAL FIRE's Fire and Resource Assessment Program (FRAP) using data and models describing development patterns, estimated fire behavior characteristics based on potential fuels over a 30-50 year time horizon, and expected burn probabilities to quantify the likelihood and nature of vegetation fire exposure to new construction. Details on the project and specific modeling methodology can be found at http://frap.cdf.ca.gov/projects/hazard/methods.htm.

The version of the map shown here represents the official "Maps of Fire Hazard Severity Zones in the State Responsibility Area of California" as required by Public Resources Code 4201-4204 and entitled in the California Code of Regulation, Title 14, Section 1280 Fire Hazard Severity Zones, and as adopted by CAL FIRE on November 7, 2007.

An interactive system for viewing map data is hosted by the UC Center for Fire at http://firecenter.berkeley.edu/fhsz/

Questions can be directed to David Sapsis, at 916.445.5369, dave.sapsis@fire.ca.gov,

Projection Albers, NAD 1927
Scale 1: 150,000
at 35.5" x 46"
November 06, 2007

The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of data or maps.

Obtain FRAP maps, data, metadata and publications on the Internet at http://frap.cdf.ca.gov
For more information, contact CAL FIRE-FRAP, PO Box 944246, Sacramento, CA 94244-2460, (916) 327-3939.

Arnold Schwarzenegger, Governor,
State of California
Mike Chrisman, Secretary for Resources,
The Resources Agency
Ruben Grijalva, Director,
Department of Forestry and Fire Protection

MAP ID: FHSZS_MAP

DATA SOURCES
CAL FIRE Fire Hazard Severity Zones (FHSZS06_3)
CAL FIRE State Responsibility Areas (SRA05_5)
CAL FIRE Incorporated Cities (Incorp07_3)
PLSS (1:100,000 USGS, Land Grants with CAL FIRE grid)

APPENDIX 1

AIR QUALITY and GHG IMPACT ANALYSES

SAN GABRIEL VALLEY WATER COMPANY
PLANT B14 PROJECT

HACIENDA HEIGHTS, CALIFORNIA

Prepared by:

Giroux & Associates
1800 E Garry St., #205
Santa Ana, CA 92705

Prepared for:

Tom Dodson & Associates
Attn: Kaitlyn Dodson
2150 N. Arrowhead Avenue
San Bernardino, California 92405

Date:

September 12, 2018

Project No.: P18-034 AQ

ATMOSPHERIC SETTING

The climate of Hacienda Heights, as with all of Southern California, is governed largely by the strength and location of the semi-permanent high-pressure center over the Pacific Ocean and the moderating effects of the nearby vast oceanic heat reservoir. Local climatic conditions are characterized by very warm summers, mild winters, infrequent rainfall, moderate daytime on-shore breezes, and comfortable humidities. Unfortunately, the same climatic conditions that create such a desirable living climate combine to severely restrict the ability of the local atmosphere to disperse the large volumes of air pollution generated by the population and industry attracted in part by the climate.

Hacienda Heights is situated in an area where the pollutants generated in coastal portions of the Los Angeles basin undergo photochemical reactions and then move inland across the project site during the daily sea breeze cycle. The resulting smog at times gives the western San Gabriel Valley some of the worst air quality in all of California. The worst air quality, however, has gradually been moving eastward. The area of heaviest ozone air pollution has gradually moved eastward from Pasadena in the 1960's to Glendora and even Upland/Ontario in the 1990's. Elevated smog levels nevertheless persist during the warmer months of the year. Despite dramatic improvement in air quality in the local area throughout the last several decades, the project site is expected to continue to experience some unhealthful air quality until beyond 2020.

Temperatures in the project vicinity average 62 degrees Fahrenheit annually with summer afternoons in the low 90s and winter mornings in the low 40s. Temperatures much above 100 or below 30 degrees occur infrequently only under unusual weather conditions and even then these limits are not far exceeded.

In contrast to the slow annual variation of temperature, precipitation is highly variable seasonally. Rainfall in the San Gabriel Valley averages 14 inches annually and falls almost exclusively from late October to early April. Summers are very dry with frequent periods of 4-5 months of no rain at all. Because much of the rainfall comes from the fringes of mid-latitude storms, a shift in the storm track of a few hundred miles can mean the difference between a very wet year and a year with drought conditions.

Winds across the project area are an important meteorological parameter because they control both the initial rate of dilution of locally generated air pollutant emissions as well as their regional trajectory. Local wind patterns show a fairly unidirectional daytime onshore flow from the SW-W with a very weak offshore return flow from the NE that is strongest on winter nights when the land is colder than the ocean. The onshore winds during the day average 6-8 mph, while the offshore flow is often calm or drifts slowly westward at 1-3 mph. During the daytime, any locally generated air emissions are thus transported eastward toward San Bernardino and Cajon Pass without generating any localized air quality impacts.

In conjunction with the two dominant wind regimes that affect the rate and orientation of horizontal pollutant transport, there are two similarly distinct types of temperature inversions that control the vertical depth through which pollutants are mixed. The summer on-shore flow is capped by a massive dome of warm, sinking air which caps a shallow layer of cooler ocean air.

These marine/subsidence inversions act like a giant lid over the basin. They allow for local mixing of emissions, but they confine the entire polluted air mass within the basin until it escapes into the desert or along the thermal chimneys formed along heated mountain slopes.

In winter, when the air near the ground cools while the air aloft remains warm, radiation inversions are formed that trap low-level emissions such as automobile exhaust near their source. As background levels of primary vehicular exhaust rise during the seaward return flow, the combination of rising non-local baseline levels plus emissions trapped locally by these radiation inversions creates micro-scale air pollution "hot spots" near freeways, shopping centers and other traffic concentrations. Because the incoming air draining off the mountains into the San Gabriel Valley during nocturnal radiation inversion conditions is relatively clean, the summer subsidence inversions are a far more critical factor in determining Hacienda Heights area air quality than the winter time local trapping inversions.

AIR QUALITY SETTING

AMBIENT AIR QUALITY STANDARDS (AAQS)

In order to gauge the significance of the air quality impacts of the proposed project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone (the primary ingredient in photochemical smog) may lead to adverse respiratory health even at concentrations close to the ambient standard.

National AAQS were established in 1971 for six pollution species with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. The initial attainment deadline of 1977 was extended several times in air quality problem areas like Southern California. In 2003, the Environmental Protection Agency (EPA) adopted a rule, which extended and established a new attainment deadline for ozone for the year 2021. Because the State of California had established AAQS several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table 1[i]. Sources and health effects of various pollutants are shown in Table 2[ii].

The Federal Clean Air Act Amendments (CAAA) of 1990 required that the U.S. Environmental Protection Agency (EPA) review all national AAQS in light of currently known health effects. EPA was charged with modifying existing standards or promulgating new ones where appropriate. EPA subsequently developed standards for chronic ozone exposure (8+ hours per day) and for very small diameter particulate matter (called "PM-2.5"). New national AAQS were adopted in 1997 for these pollutants.

Planning and enforcement of the federal standards for PM-2.5 and for ozone (8-hour) were challenged by trucking and manufacturing organizations. In a unanimous decision, the U.S. Supreme Court ruled that EPA did not require specific congressional authorization to adopt national clean air standards. The Court also ruled that health-based standards did not require preparation of a cost-benefit analysis. The Court did find, however, that there was some inconsistency between existing and "new" standards in their required attainment schedules. Such attainment-planning schedule inconsistencies centered mainly on the 8-hour ozone standard. EPA subsequently agreed to downgrade the attainment designation for a large number of communities to “non-attainment” for the 8-hour ozone standard.

Table 1

Ambient Air Quality Standards						
Pollutant	**Averaging Time**	**California Standards** [1]		**National Standards** [2]		
		Concentration [3]	**Method** [4]	**Primary** [3,5]	**Secondary** [3,6]	**Method** [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No National Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

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Table 1 (continued)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

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Table 2
Health Effects of Major Criteria Pollutants

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter.	• Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions.	• Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	• Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	• Contaminated soil.	• Impairment of blood function and nerve construction. • Behavioral and hearing problems in children.
Respirable Particulate Matter (PM-10)	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardio respiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.
Fine Particulate Matter (PM-2.5)	• Fuel combustion in motor vehicles, equipment, and industrial sources. • Residential and agricultural burning. • Industrial processes. • Also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.	• Increases respiratory disease. • Lung damage. • Cancer and premature death. • Reduces visibility and results in surface soiling.
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility. • Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.

Source: California Air Resources Board, 2002.

Evaluation of the most current data on the health effects of inhalation of fine particulate matter prompted the California Air Resources Board (ARB) to recommend adoption of the statewide PM-2.5 standard that is more stringent than the federal standard. This standard was adopted in 2002. The State PM-2.5 standard is more of a goal in that it does not have specific attainment planning requirements like a federal clean air standard, but only requires continued progress towards attainment.

Similarly, the ARB extensively evaluated health effects of ozone exposure. A new state standard for an 8-hour ozone exposure was adopted in 2005, which aligned with the exposure period for the federal 8-hour standard. The California 8-hour ozone standard of 0.07 ppm is more stringent than the federal 8-hour standard of 0.075 ppm. The state standard, however, does not have a specific attainment deadline. California air quality jurisdictions are required to make steady progress towards attaining state standards, but there are no hard deadlines or any consequences of non-attainment. During the same re-evaluation process, the ARB adopted an annual state standard for nitrogen dioxide ($NO_{2)}$ that is more stringent than the corresponding federal standard, and strengthened the state one-hour NO_2 standard.

As part of EPA's 2002 consent decree on clean air standards, a further review of airborne particulate matter (PM) and human health was initiated. A substantial modification of federal clean air standards for PM was promulgated in 2006. Standards for PM-2.5 were strengthened, a new class of PM in the 2.5 to 10 micron size was created, some PM-10 standards were revoked, and a distinction between rural and urban air quality was adopted. In December, 2012, the federal annual standard for PM-2.5 was reduced from 15 $\mu g/m^3$ to 12 $\mu g/m^3$ which matches the California AAQS. The severity of the basin's non-attainment status for PM-2.5 may be increased by this action and thus require accelerated planning for future PM-2.5 attainment.

In response to continuing evidence that ozone exposure at levels just meeting federal clean air standards is demonstrably unhealthful, EPA had proposed a further strengthening of the 8-hour standard. A new 8-hour ozone standard was adopted in 2015 after extensive analysis and public input. The adopted national 8-hour ozone standard is 0.07 ppm which matches the current California standard. It will require three years of ambient data collection, then 2 years of non-attainment findings and planning protocol adoption, then several years of plan development and approval. Final air quality plans for the new standard are likely to be adopted around 2022. Ultimate attainment of the new standard in ozone problem areas such as Southern California might be after 2025.

In 2010 a new federal one-hour primary standard for nitrogen dioxide (NO_2) was adopted. This standard is more stringent than the existing state standard. Based upon air quality monitoring data in the South Coast Air Basin, the California Air Resources Board has requested the EPA to designate the basin as being in attainment for this standard. The federal standard for sulfur dioxide (SO_2) was also recently revised. However, with minimal combustion of coal and mandatory use of low sulfur fuels in California, SO_2 is typically not a problem pollutant.

BASELINE AIR QUALITY

Long-term air quality monitoring is carried out by the South Coast Air Quality Management District (SCAQMD) at various monitoring stations. There are no nearby stations that monitor the full spectrum of pollutants. Ozone, carbon monoxide, PM-2.5 and nitrogen oxides are monitored at the Pico Rivera facility, while 10-micron diameter particulate matter (PM-10) is measured at the Azusa station. Table 3 summarizes the last four years of monitoring data from a composite of these data resources. The following conclusions can be drawn from this data:

a. Photochemical smog (ozone) levels occasionally exceed standards. The 8-hour state ozone standard as well as the 1-hour state standard have been exceeded on less than two percent of all days in the past four years. The 8-hour federal standard has been exceeded nine times for the same period. While ozone levels are still high, they are much lower than 10 to 20 years ago. Attainment of all clean air standards in the project vicinity is not likely to occur soon, but the severity and frequency of violations is expected to continue to slowly decline during the current decade

b. Measurements of carbon monoxide have shown very low baseline levels in comparison to the most stringent one- and eight-hour standards.

c. Respirable dust (PM-10) levels exceed the state standard on approximately 22 percent of measurement days, but the less stringent federal PM-10 standard has not been violated once for the same period. Year to year fluctuations of overall maximum 24-hour PM-10 levels seem to follow no discernable trend, though 2016 had the lowest maximum 24-hour concentration in recent history.

d. A substantial fraction of PM-10 is comprised of ultra-small diameter particulates capable of being inhaled into deep lung tissue (PM-2.5). Year 2013 showed the maximal concentration in recent years. Both the frequency of violations of particulate standards, as well as high percentage of PM-2.5, are occasional air quality concerns in the project area. Less than one percent of all days exceeded the current national 24-hour standard of 35 $\mu g/m^3$ from 2013-2016.

Although complete attainment of every clean air standard is not yet imminent, extrapolation of the steady improvement trend suggests that such attainment could occur within the reasonably near future.

Table 3

Air Quality Monitoring Summary (2013-2016)[iii]
(Number of Days Standards Were Exceeded, and Maximum Levels During Such Violations)
(Entries shown as ratios = samples exceeding standard/samples taken)

Pollutant/Standard	2013	2014	2015	2016
Ozone				
1-Hour > 0.09 ppm (S)	2	7	6	9
8-Hour > 0.07 ppm (S)	3	7	11	6
8- Hour > 0.075 ppm (F)	0	5	2	2
Max. 1-Hour Conc. (ppm)	0.10	0.12	0.11	0.11
Max. 8-Hour Conc. (ppm)	0.07	0.09	0.08	0.08
Carbon Monoxide				
1-Hour > 20. ppm (S)	0	0	0	0
1-Hour > 9. ppm (S, F)	0	0	0	0
Max 8-Hour Conc. (ppm)	2.0	2.5	1.7	1.7
Nitrogen Dioxide				
1-Hour > 0.18 ppm (S)	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.08	0.09	0.07	0.06
Inhalable Particulates (PM-10)				
24-Hour > 50 $\mu g/m^3$ (S)	6/61	22/60	12/59	12/60
24-Hour > 150 $\mu g/m^3$ (F)	0/61	0/60	0/59	0/60
Max. 24-Hr. Conc. ($\mu g/m^3$)	76.	96.	101.	74.
Ultra-Fine Particulates (PM-2.5)				
24-Hour > 35 $\mu g/m^3$ (F)	0/114	0/116	3/118	2/120
Max. 24-Hr. Conc. ($\mu g/m^3$)	29.1	35.1	52.7	46.6

S=State Standard
F=Federal Standard

Source: South Coast AQMD – Pico Rivera Air Monitoring Station for Ozone, CO, NOx and PM-2.5
Azusa Monitoring Station for PM-10
data: www.arb.ca.gov/adam/

AIR QUALITY PLANNING

The Federal Clean Air Act (1977 Amendments) required that designated agencies in any area of the nation not meeting national clean air standards must prepare a plan demonstrating the steps that would bring the area into compliance with all national standards. The SCAB could not meet the deadlines for ozone, nitrogen dioxide, carbon monoxide, or PM-10. In the SCAB, the agencies designated by the governor to develop regional air quality plans are the SCAQMD and the Southern California Association of Governments (SCAG). The two agencies first adopted an Air Quality Management Plan (AQMP) in 1979 and revised it several times as earlier attainment forecasts were shown to be overly optimistic.

The 1990 Federal Clean Air Act Amendment (CAAA) required that all states with air-sheds with "serious" or worse ozone problems submit a revision to the State Implementation Plan (SIP). Amendments to the SIP have been proposed, revised and approved over the past decade. The most current regional attainment emissions forecast for ozone precursors (ROG and NOx) and for carbon monoxide (CO) and for particulate matter are shown in Table 4.[iv] Substantial reductions in emissions of ROG, NOx and CO are forecast to continue throughout the next several decades. Unless new particulate control programs are implemented, PM-10 and PM-2.5 are forecast to slightly increase.

The Air Quality Management District (AQMD) adopted an updated clean air "blueprint" in August 2003. The 2003 Air Quality Management Plan (AQMP) was approved by the EPA in 2004. The AQMP outlined the air pollution measures needed to meet federal health-based standards for ozone by 2010 and for particulates (PM-10) by 2006. The 2003 AQMP was based upon the federal one-hour ozone standard which was revoked late in 2005 and replaced by an 8-hour federal standard. Because of the revocation of the hourly standard, a new air quality planning cycle was initiated.

With re-designation of the air basin as non-attainment for the 8-hour ozone standard, a new attainment plan was developed. This plan shifted most of the one-hour ozone standard attainment strategies to the 8-hour standard. As previously noted, the attainment date was to "slip" from 2010 to 2021. The updated attainment plan also includes strategies for ultimately meeting the federal PM-2.5 standard.

Because projected attainment by 2021 required control technologies that did not exist yet, the SCAQMD requested a voluntary "bump-up" from a "severe non-attainment" area to an "extreme non-attainment" designation for ozone. The extreme designation was to allow a longer time period for these technologies to develop. If attainment cannot be demonstrated within the specified deadline without relying on "black-box" measures, EPA would have been required to impose sanctions on the region had the bump-up request not been approved. In April 2010, the EPA approved the change in the non-attainment designation from "severe-17" to "extreme." This reclassification set a later attainment deadline (2024), but also required the air basin to adopt even more stringent emissions controls.

Table 4
South Coast Air Basin Emissions Forecasts (Emissions in tons/day)

Pollutant	2015[a]	2020[b]	2025[b]	2030[b]
NOx	357	289	266	257
VOC	400	393	393	391
PM-10	161	165	170	172
PM-2.5	67	68	70	71

[a]2015 Base Year.
[b]With current emissions reduction programs and adopted growth forecasts.
Source: California Air Resources Board, 2013 Almanac of Air Quality[v]

In other air quality attainment plan reviews, EPA had disapproved part of the SCAB PM-2.5 attainment plan included in the AQMP. EPA stated that the current attainment plan relied on PM-2.5 control regulations that had not yet been approved or implemented. It was expected that a number of rules that were pending approval would remove the identified deficiencies. If these issues were not resolved within the next several years, federal funding sanctions for transportation projects could result. The 2012 AQMP included in the current California State Implementation Plan (SIP) was expected to remedy identified PM-2.5 planning deficiencies.

The federal Clean Air Act requires that non-attainment air basins have EPA approved attainment plans in place. This requirement includes the federal one-hour ozone standard even though that standard was revoked almost ten years ago. There was no approved attainment plan for the one-hour federal standard at the time of revocation. Through a legal quirk, the SCAQMD is now required to develop an AQMP for the long since revoked one-hour federal ozone standard. Because the current SIP for the basin contains a number of control measures for the 8-hour ozone standard that are equally effective for one-hour levels, the 2012 AQMP was believed to satisfy hourly attainment planning requirements.

AQMPs are required to be updated every three years. The 2012 AQMP was adopted in early 2013. An updated AQMP was required for completion in 2016. The 2016 AQMP was adopted by the SCAQMD Board in March, 2017, and has been submitted the California Air Resources Board for forwarding to the EPA. The 2016 AQMP acknowledges that motor vehicle emissions have been effectively controlled and that reductions in NOx, the continuing ozone problem pollutant, may need to come from major stationary sources (power plants, refineries, landfill flares, etc.) . The current attainment deadlines for all federal non-attainment pollutants are now as follows:

8-hour ozone (70 ppb)	2032
Annual PM-2.5 (12 $\mu g/m^3$)	2025
8-hour ozone (75 ppb)	2024 (old standard)

1-hour ozone (120 ppb)	2023 (rescinded standard)
24-hour PM-2.5 (35 $\mu g/m^3$)	2019

The key challenge is that NOx emission levels, as a critical ozone precursor pollutant, are forecast to continue to exceed the levels that would allow the above deadlines to be met. Unless additional stringent NOx control measures are adopted and implemented, ozone attainment goals may not be met.

The proposed project does not directly relate to the AQMP in that there are no specific air quality programs or regulations governing water improvement projects. Conformity with adopted plans, forecasts and programs relative to population, housing, employment and land use is the primary yardstick by which impact significance of planned growth is determined. The SCAQMD, however, while acknowledging that the AQMP is a growth-accommodating document, does not favor designating regional impacts as less-than-significant just because the proposed development is consistent with regional growth projections. Air quality impact significance for the proposed project has therefore been analyzed on a project-specific basis.

AIR QUALITY IMPACT

STANDARDS OF SIGNIFICANCE

Air quality impacts are considered "significant" if they cause clean air standards to be violated where they are currently met, or if they "substantially" contribute to an existing violation of standards. Any substantial emissions of air contaminants for which there is no safe exposure, or nuisance emissions such as dust or odors, would also be considered a significant impact.

Appendix G of the California CEQA Guidelines offers the following five tests of air quality impact significance. A project would have a potentially significant impact if it:

a. Conflicts with or obstructs implementation of the applicable air quality plan.

b. Violates any air quality standard or contributes substantially to an existing or projected air quality violation.

c. Results in a cumulatively considerable net increase of any criteria pollutants for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

d. Exposes sensitive receptors to substantial pollutant concentrations.

e. Creates objectionable odors affecting a substantial number of people.

Primary Pollutants

Air quality impacts generally occur on two scales of motion. Near an individual source of emissions or a collection of sources such as a crowded intersection or parking lot, levels of those pollutants that are emitted in their already unhealthful form will be highest. Carbon monoxide (CO) is an example of such a pollutant. Primary pollutant impacts can generally be evaluated directly in comparison to appropriate clean air standards. Violations of these standards where they are currently met, or a measurable worsening of an existing or future violation, would be considered a significant impact. Many particulates, especially fugitive dust emissions, are also primary pollutants. Because of the non-attainment status of the South Coast Air Basin (SCAB) for PM-10, an aggressive dust control program is required to control fugitive dust during project construction.

Secondary Pollutants

Many pollutants, however, require time to transform from a more benign form to a more unhealthful contaminant. Their impact occurs regionally far from the source. Their incremental regional impact is minute on an individual basis and cannot be quantified except through complex photochemical computer models. Analysis of significance of such emissions is based

upon a specified amount of emissions (pounds, tons, etc.) even though there is no way to translate those emissions directly into a corresponding ambient air quality impact.

Because of the chemical complexity of primary versus secondary pollutants, the SCAQMD has designated significant emissions levels as surrogates for evaluating regional air quality impact significance independent of chemical transformation processes. Projects with daily emissions that exceed any of the following emission thresholds are recommended by the SCAQMD to be considered significant under CEQA guidelines[vi].

Table 5
Daily Emissions Thresholds

Pollutant	Construction	Operations
ROG	75	55
NOx	100	55
CO	550	550
PM-10	150	150
PM-2.5	55	55
SOx	150	150
Lead	3	3

Source: SCAQMD CEQA Air Quality Handbook, November, 1993 Rev.

Additional Indicators

In its CEQA Handbook, the SCAQMD also states that additional indicators should be used as screening criteria to determine the need for further analysis with respect to air quality. The additional indicators are as follows:

- Project could interfere with the attainment of the federal or state ambient air quality standards by either violating or contributing to an existing or projected air quality violation

- Project could result in population increases within the regional statistical area which would be in excess of that projected in the AQMP and in other than planned locations for the project's build-out year.

- Project could generate vehicle trips that cause a CO hot spot.

CONSTRUCTION ACTIVITY IMPACTS

CalEEMod was developed by the SCAQMD to provide a model by which to calculate both construction emissions and operational emissions from a variety of land use projects[vii]. It calculates both the daily maximum and annual average emissions for criteria pollutants as well as total or annual greenhouse gas (GHG) emissions.

The project entails grading and installation of a retaining wall for hillside stabilization and construction of a new 1 MG water storage reservoir and related piping. Estimated construction emissions were modeled using CalEEMod2016.3.2 to identify maximum daily emissions for each pollutant during project construction. Construction was modeled in CalEEMod2016.3.2 using construction equipment and schedule with input from the project engineer as shown in Table 6.

Table 6
CalEEMod Construction Activity Equipment Fleet and Schedule

Grading and Retaining Wall 4 months	1 Dozer
	1 Loader/Backhoe
	1 Grader
	1 Excavator
New Tank Construction 20 months	1 Crane/Hoe Ram
	1 Forklift
	2 Concrete Pumps
	1 Loader/Backhoe
	1 Generator Set
	4 Welders
	1 Stress Tower
Painting 3 months	2 Air Compressors
Drainage and Piping 3 months	1 Trencher
	1 Roller
	1 Loader/Backhoe
	1 Forklift

Utilizing this indicated equipment fleet and durations shown in Table 6 the following worst case daily construction emissions are calculated by CalEEMod and are listed in Table 7.

Table 7
Construction Activity Emissions
Maximum Daily Emissions (pounds/day)

Maximal Construction Emissions	ROG	NOx	CO	SO_2	PM-10	PM-2.5
2020						
Unmitigated	3.9	29.6	26.8	0.0	7.5	4.4
Mitigated	3.9	29.6	26.8	0.0	3.8	2.3
2021						
Unmitigated	3.5	27.2	26.2	0.0	1.8	1.4
Mitigated	3.5	27.2	26.2	0.0	1.8	1.4
2022						
Unmitigated	0.9	7.5	8.6	0.0	0.9	0.6
Mitigated	0.9	7.5	8.6	0.0	0.9	0.6
SCAQMD Thresholds	75	100	550	150	150	55

Peak daily construction activity emissions are estimated to be well below SCAQMD CEQA thresholds without the need for added mitigation. The only model-based mitigation measured applied for this project was watering exposed dirt surfaces at least three times per day to minimize the generation of fugitive dust generation during grading.

Construction equipment exhaust contains carcinogenic compounds within the diesel exhaust particulates. The toxicity of diesel exhaust is evaluated relative to a 24-hour per day, 365 days per year, 70-year lifetime exposure. The SCAQMD does not generally require the analysis of construction-related diesel emissions relative to health risk due to the short period for which the majority of diesel exhaust would occur. Health risk analyses are typically assessed over a 9-, 30-, or 70-year timeframe and not over a relatively brief construction period due to the lack of health risk associated with such a brief exposure.

LOCALIZED SIGNIFICANCE THRESHOLDS

The SCAQMD has developed analysis parameters to evaluate ambient air quality on a local level in addition to the more regional emissions-based thresholds of significance. These analysis elements are called Localized Significance Thresholds (LSTs).[viii] LSTs were developed in response to Governing Board's Environmental Justice Enhancement Initiative 1-4 and the LST methodology was provisionally adopted in October 2003 and formally approved by SCAQMD's Mobile Source Committee in February 2005.

Use of an LST analysis for a project is optional. For the proposed project, the only source of possible LST impact would be during construction. LSTs are applicable for a sensitive receptor where it is possible that an individual could remain for 24 hours such as a residence, hospital or convalescent facility.

LSTs are only applicable to the following criteria pollutants: oxides of nitrogen (NOx), carbon monoxide (CO), and particulate matter (PM-10 and PM-2.5). LSTs represent the maximum emissions from a project that are not expected to cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area and distance to the nearest sensitive receptor.

LST screening tables are available for 25, 50, 100, 200 and 500 meter source-receptor distances. The proposed reservoir is west of the existing reservoir and is more than 250 feet from the residential uses along Camino Del Tomasini and Valdemar Drive. Therefore a 50-meter separation distance was used.

The SCAQMD has issued guidance on applying CalEEMod to LSTs[ix]. LST pollutant screening level concentration data is currently published for 1, 2 and 5 acre sites for varying distances. For this project, the most stringent thresholds for a 1 acre site were applied.

The following thresholds and emissions in Table 8 are therefore determined (pounds per day):

Table 8
LST and Project Emissions (pounds/day)

LST 1 acre/50 meters West San Gabriel Valley	**CO**	**NOx**	**PM-10**	**PM-2.5**
LST Thresholds	783	69	11	4
Max On-Site Emissions				
Unmitigated	27	30	8	4
Mitigated	27	30	4	2

CalEEMod Output in Appendix

LSTs were compared to the maximum daily construction activities. As seen in Table 8, even without use of dust control (watering exposed surfaces 3 times daily), emissions meet the LST for construction thresholds. LST impacts are less-than-significant.

OPERATIONAL IMPACTS

Operational air pollution emissions will be minimal. Electrical generation of power will be used for pumping. Electrical consumption has no single uniquely related air pollution emissions source because power is supplied to and drawn from a regional grid. Electrical power is generated regionally by a combination of non-combustion (nuclear, hydroelectric, solar, wind, geothermal, etc.) and fossil fuel combustion sources. There is no direct nexus between consumption and the type of power source or the air basin where the source is located. Operational air pollution emissions from electrical generation are therefore not attributable on a project-specific basis.

Odor Impacts

Project operations (pumping, treatment and storage) are an essentially closed system with negligible odor potential. The reservoir will be designed with adequate freeboard (head space between the top of the water and the roof) to contain any surges without forcing the emergency vents to open. Odors will be briefly detectable during application of the interior epoxy coating and outdoor paint application on the reservoir shell. Good painting practice (low wind speeds and high efficiency sprayers) will minimize odor or overspray and paint transport.

CONSTRUCTION EMISSIONS MINIMIZATION

Construction activities are not anticipated to cause dust emissions to exceed SCAQMD CEQA thresholds. Nevertheless, emissions minimization through enhanced dust control measures is recommended for use because of the non-attainment status of the air and proximity of residential uses. Recommended measures include:

Fugitive Dust Control

- Apply soil stabilizers or moisten inactive areas.
- Water exposed surfaces as needed to avoid visible dust leaving the construction site (typically 2-3 times/day).
- Cover all stock piles with tarps at the end of each day or as needed.
- Provide water spray during loading and unloading of earthen materials.
- Minimize in-out traffic from construction zone
- Cover all trucks hauling dirt, sand, or loose material and require all trucks to maintain at least two feet of freeboard
- Sweep streets daily if visible soil material is carried out from the construction site

Similarly, ozone precursor emissions (ROG and NOx) are calculated to be below SCAQMD CEQA thresholds. However, because of the regional non-attainment for photochemical smog, the use of reasonably available control measures for diesel exhaust is recommended. Combustion emissions control options include:

Exhaust Emissions Control

- Utilize well-tuned off-road construction equipment.
- Establish a preference for contractors using Tier 3 or better rated heavy equipment.
- Enforce 5-minute idling limits for both on-road trucks and off-road equipment.

GREENHOUSE GAS EMISSIONS

"Greenhouse gases" (so called because of their role in trapping heat near the surface of the earth) emitted by human activity are implicated in global climate change, commonly referred to as "global warming." These greenhouse gases contribute to an increase in the temperature of the earth's atmosphere by transparency to short wavelength visible sunlight, but near opacity to outgoing terrestrial long wavelength heat radiation in some parts of the infrared spectrum. The principal greenhouse gases (GHGs) are carbon dioxide, methane, nitrous oxide, ozone, and water vapor. For purposes of planning and regulation, Section 15364.5 of the California Code of Regulations defines GHGs to include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. Fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) is the single largest source of GHG emissions, accounting for approximately half of GHG emissions globally. Industrial and commercial sources are the second largest contributors of GHG emissions with about one-fourth of total emissions.

California has passed several bills and the Governor has signed at least three executive orders regarding greenhouse gases. GHG statues and executive orders (EO) include AB 32, SB 1368, EO S-03-05, EO S-20-06 and EO S-01-07.

AB 32 is one of the most significant pieces of environmental legislation that California has adopted. Among other things, it is designed to maintain California's reputation as a "national and international leader on energy conservation and environmental stewardship." It will have wide-ranging effects on California businesses and lifestyles as well as far reaching effects on other states and countries. A unique aspect of AB 32, beyond its broad and wide-ranging mandatory provisions and dramatic GHG reductions are the short time frames within which it must be implemented. Major components of the AB 32 include:

- Require the monitoring and reporting of GHG emissions beginning with sources or categories of sources that contribute the most to statewide emissions.
- Requires immediate "early action" control programs on the most readily controlled GHG sources.
- Mandates that by 2020, California's GHG emissions be reduced to 1990 levels.
- Forces an overall reduction of GHG gases in California by 25-40%, from business as usual, to be achieved by 2020.
- Must complement efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminants.

Statewide, the framework for developing the implementing regulations for AB 32 is under way. Maximum GHG reductions are expected to derive from increased vehicle fuel efficiency, from greater use of renewable energy and from increased structural energy efficiency. Additionally, through the California Climate Action Registry (CCAR now called the Climate Action Reserve), general and industry-specific protocols for assessing and reporting GHG emissions have been

developed. GHG sources are categorized into direct sources (i.e. company owned) and indirect sources (i.e. not company owned). Direct sources include combustion emissions from on-and off-road mobile sources, and fugitive emissions. Indirect sources include off-site electricity generation and non-company owned mobile sources.

THRESHOLDS OF SIGNIFICANCE

In response to the requirements of SB97, the State Resources Agency developed guidelines for the treatment of GHG emissions under CEQA. These new guidelines became state laws as part of Title 14 of the California Code of Regulations in March, 2010. The CEQA Appendix G guidelines were modified to include GHG as a required analysis element. A project would have a potentially significant impact if it:

- Generates GHG emissions, directly or indirectly, that may have a significant impact on the environment, or,

- Conflicts with an applicable plan, policy or regulation adopted to reduce GHG emissions.

Section 15064.4 of the Code specifies how significance of GHG emissions is to be evaluated. The process is broken down into quantification of project-related GHG emissions, making a determination of significance, and specification of any appropriate mitigation if impacts are found to be potentially significant. At each of these steps, the new GHG guidelines afford the lead agency with substantial flexibility.

Emissions identification may be quantitative, qualitative or based on performance standards. CEQA guidelines allow the lead agency to "select the model or methodology it considers most appropriate." The most common practice for transportation/combustion GHG emissions quantification is to use a computer model such as CalEEMod, as was used in the ensuing analysis.

The significance of those emissions then must be evaluated; the selection of a threshold of significance must take into consideration what level of GHG emissions would be cumulatively considerable. The guidelines are clear that they do not support a zero net emissions threshold. If the lead agency does not have sufficient expertise in evaluating GHG impacts, it may rely on thresholds adopted by an agency with greater expertise.

On December 5, 2008 the SCAQMD Governing Board adopted an Interim quantitative GHG Significance Threshold for industrial projects where the SCAQMD is the lead agency (e.g., stationary source permit projects, rules, plans, etc.) of 10,000 Metric Tons (MT) CO_2 equivalent/year. In September 2010, the SCAQMD CEQA Significance Thresholds GHG Working Group released revisions which recommended a threshold of 3,000 MT CO_2e for all land use projects. This 3,000 MT/year recommendation has been used as a guideline for this analysis. In the absence of an adopted numerical threshold of significance, project related GHG emissions in excess of the guideline level are presumed to trigger a requirement for enhanced GHG reduction at the project level.

Construction Activity GHG Emissions

The project is assumed to be built in approximately 30 months. During project construction, the CalEEMod2016.3.2 computer model predicts that the construction activities will generate the annual CO_2e emissions identified below.

Construction Emissions (Metric Tons CO_2e)

Year	CO_2e
Year 2020	469.0
Year 201	491.6
Year 2022	67.0
Total	1,027.6
Amortized	**34.3**

CalEEMod Output provided in appendix

SCAQMD GHG emissions policy from construction activities is to amortize emissions over a 30-year lifetime. The amortized level is also provided. GHG impacts from construction are less-than-significant. Hence, the project will not result in generation of a significant level of greenhouse gases.

Consistency with GHG Plans, Programs and Policies

The County of Los Angeles (County) has developed the Community Climate Action Plan (CCAP)[x] to reduce greenhouse gas (GHG) emissions associated with community activities in the unincorporated areas of Los Angeles County. The CCAP addresses emissions from activities in the following sectors: building energy, transportation, water conveyance and wastewater processing, and waste generation. The CCAP also establishes a GHG reduction target consistent with the State's efforts to reduce GHG emissions and provides a roadmap for successfully implementing GHG reduction measures selected by the County. The County's GHG emissions reduction target of at least 11% below 2010 levels by 2020 is consistent with statewide reductions under AB 32.

Building energy consumption accounts for about 49% of the County's GHG inventory. Transportation emissions from on- and off-road vehicles are the second largest source of emissions (42%). The third largest source is community waste generation (7%). The remaining sources are water conveyance and wastewater generation (2%), agriculture (0.4%), and stationary sources (0.02%).

The County has identified local actions of which the majority include voluntary, incentive-based programs that will reduce emissions from both existing and new development in the County. Actions to address GHG emissions from building energy use are separated into two categories: energy efficiency and renewable energy. Energy efficiency measures reduce actual energy consumption through efficient design, whereas renewable energy measures reduce the carbon intensity of electricity generation.

This project is a water improvement use and the only applicable measure would be the following:

Waste Reduction, Reuse and Recycling

SW-1 Waste Diversion Goal

Effective in 2016 the California's Green Building Standards Code (CALGreen) required the diversion of at least 65 percent of the construction waste generated during non-residential "new construction" projects. Therefore, a plan will be developed whose goal would be that 65% of construction waste be diverted from landfills.

The County will track the CCAP's overall progress in terms of reducing GHG emissions in the unincorporated areas, as well as each CCAP action's progress and performance. Inventory updates will be incorporated into the General Plan Annual Progress Report and will provide information regarding overall trends in community emissions for the unincorporated areas.

The actions in the CCAP allow for the County to achieve its GHG reduction goal for 2020 for the unincorporated areas of LA County and satisfies the goal of meeting the recommendations for local governments in the Scoping Plan of Assembly Bill (AB) 32, California's Global Warming Solutions Act.

References

[i] Environmental Protection Agency, National Ambient Air Quality Standards, https://www.arb.ca.gov/research/aaqs/aaqs2.pdf

[ii] Air Resources Board Fact Sheet, 2009, https://www.arb.ca.gov/research/health/fs/fs2/fs2.htm

[iii] SCAQMD Historical Data by Year, https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year

[iv] South Coast Air Quality Management District. 2013 Air Quality Management Plan

[v] Almanac and Air Quality 2013 Edition, Regional Trends and Forecasts, https://www.arb.ca.gov/aqd/almanac/almanac13/chap413.htm

[vi] SCAQMD Air Quality Significance Thresholds,1993, http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2

[vii] CalEEMod, 2017, http://www.caleemod.com

[viii] South Coast Air Quality Management District. *Localized Significance Thresholds Methodology*. South Coast Air Quality Management District, 2003. http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/localized-significance-thresholds

[ix] Fact Sheet for Applying CalEEMod to Localized Significance Thresholds. December 2013. http://aqmd.gov/ceqa/handbook/LST/CalEEModguidance.pdf.

[x] Los Angeles County Department of Regional Planning, Community Climate Action Plan, 2009, http://planning.lacounty.gov/CCAP

CalEEMod2016.3.2 Computer Model Output

- **Daily Emissions**
- **Annual Emissions**

SGVWC Project

South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	4.02	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 4.02 acre site

Construction Phase - Grading: 4 months, Res Construction: 20 months, Coating: 3 months, Piping: 3 months

Trips and VMT - 40 worker trips/day

Off-road Equipment - Grading: 1 excavator, 1 loader/backhoe, 1 grader, 1 dozer

Off-road Equipment - Construction: 1 crane, 1 stress tower, 1 gen set, 2 concrete pumps, 1 loader/backhoe, 4 welders

Off-road Equipment - Coating: 2 air compressors

Off-road Equipment - Piping: 1 trencher, 1 roller, 1 loader/backhoe, 1 forklift

Construction Off-road Equipment Mitigation -

SGVWC Project - South Coast Air Basin, Summer

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	18.00	61.00
tblConstructionPhase	NumDays	230.00	413.00
tblConstructionPhase	NumDays	8.00	86.00
tblConstructionPhase	PhaseEndDate	2/22/2021	3/28/2022
tblConstructionPhase	PhaseEndDate	1/1/2021	11/30/2021
tblConstructionPhase	PhaseEndDate	2/14/2020	4/29/2020
tblConstructionPhase	PhaseStartDate	1/28/2021	1/1/2022
tblConstructionPhase	PhaseStartDate	2/15/2020	5/1/2020
tblConstructionPhase	PhaseStartDate	2/5/2020	1/1/2020
tblGrading	AcresOfGrading	43.00	4.00
tblLandUse	LotAcreage	0.00	4.02
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Forklifts
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	PhaseName		Building Construction
tblOffRoadEquipment	PhaseName		Piping
tblOffRoadEquipment	PhaseName		Piping
tblOffRoadEquipment	PhaseName		Piping

tblOffRoadEquipment	PhaseName		Piping
tblTripsAndVMT	PhaseName		Piping
tblTripsAndVMT	VendorTripNumber	0.00	1.00
tblTripsAndVMT	VendorTripNumber	0.00	1.00
tblTripsAndVMT	WorkerTripNumber	15.00	40.00
tblTripsAndVMT	WorkerTripNumber	0.00	40.00
tblTripsAndVMT	WorkerTripNumber	0.00	40.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	3.9173	29.6233	26.8315	0.0491	6.5185	1.5643	7.5291	3.4341	1.5158	4.3639	0.0000	4,572.9134	4,572.9134	0.7477	0.0000	4,590.3257
2021	3.5149	27.1510	26.1819	0.0490	0.4535	1.3489	1.8024	0.1204	1.3066	1.4270	0.0000	4,557.9617	4,557.9617	0.6707	0.0000	4,574.7293
2022	0.9125	7.4652	8.5949	0.0142	0.4535	0.4700	0.9235	0.1204	0.4324	0.5528	0.0000	1,394.5489	1,394.5489	0.3167	0.0000	1,402.4659
Maximum	**3.9173**	**29.6233**	**26.8315**	**0.0491**	**6.5185**	**1.5643**	**7.5291**	**3.4341**	**1.5158**	**4.3639**	**0.0000**	**4,572.9134**	**4,572.9134**	**0.7477**	**0.0000**	**4,590.3257**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	3.9173	22.5652	26.8315	0.0491	2.8150	1.5643	3.8256	1.4116	1.5158	2.3414	0.0000	4,572.9134	4,572.9134	0.7477	0.0000	4,590.3257
2021	3.5149	20.7310	26.1819	0.0490	0.4535	1.3489	1.8024	0.1204	1.3066	1.4270	0.0000	4,557.9617	4,557.9617	0.6707	0.0000	4,574.7293
2022	0.9125	2.9156	8.5949	0.0142	0.4535	0.4700	0.9235	0.1204	0.4324	0.5528	0.0000	1,394.5489	1,394.5489	0.3167	0.0000	1,402.4659
Maximum	**3.9173**	**22.5652**	**26.8315**	**0.0491**	**2.8150**	**1.5643**	**3.8256**	**1.4116**	**1.5158**	**2.3414**	**0.0000**	**4,572.9134**	**4,572.9134**	**0.7477**	**0.0000**	**4,590.3257**

SGVWC Project - South Coast Air Basin, Summer

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**28.06**	**0.00**	**0.00**	**49.88**	**0.00**	**36.11**	**55.03**	**0.00**	**31.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2020	4/29/2020	5	86	
2	Building Construction	Building Construction	5/1/2020	11/30/2021	5	413	
3	Architectural Coating	Architectural Coating	1/1/2022	3/28/2022	5	61	
4	Piping	Trenching	4/1/2022	6/29/2022	5	64	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	2	6.00	78	0.48
Building Construction	Pumps	2	8.00	84	0.74
Piping	Trenchers	1	8.00	78	0.50
Piping	Rollers	1	7.00	80	0.38
Building Construction	Cranes	2	7.00	231	0.29
Building Construction	Forklifts	1	8.00	89	0.20
Grading	Excavators	1	8.00	158	0.38
Piping	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Piping	Forklifts	1	7.00	89	0.20
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Generator Sets	1	8.00	84	0.74
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Building Construction	Welders	4	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Piping	0	40.00	1.00		14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	40.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	40.00	1.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	40.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0714	0.0000	6.0714	3.3156	0.0000	3.3156			0.0000			0.0000
Off-Road	2.0098	22.1756	11.4936	0.0234		1.0072	1.0072		0.9266	0.9266		2,270.9481	2,270.9481	0.7345		2,289.3099
Total	**2.0098**	**22.1756**	**11.4936**	**0.0234**	**6.0714**	**1.0072**	**7.0786**	**3.3156**	**0.9266**	**4.2422**		**2,270.9481**	**2,270.9481**	**0.7345**		**2,289.3099**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1794	0.1213	1.6303	4.5900e-003	0.4471	3.4100e-003	0.4505	0.1186	3.1400e-003	0.1217		457.5345	457.5345	0.0132		457.8642
Total	**0.1794**	**0.1213**	**1.6303**	**4.5900e-003**	**0.4471**	**3.4100e-003**	**0.4505**	**0.1186**	**3.1400e-003**	**0.1217**		**457.5345**	**457.5345**	**0.0132**		**457.8642**

3.2 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3679	0.0000	2.3679	1.2931	0.0000	1.2931			0.0000			0.0000
Off-Road	2.0098	22.1756	11.4936	0.0234		1.0072	1.0072		0.9266	0.9266	0.0000	2,270.9481	2,270.9481	0.7345		2,289.3099
Total	**2.0098**	**22.1756**	**11.4936**	**0.0234**	**2.3679**	**1.0072**	**3.3750**	**1.2931**	**0.9266**	**2.2197**	**0.0000**	**2,270.9481**	**2,270.9481**	**0.7345**		**2,289.3099**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1794	0.1213	1.6303	4.5900e-003	0.4471	3.4100e-003	0.4505	0.1186	3.1400e-003	0.1217		457.5345	457.5345	0.0132		457.8642
Total	**0.1794**	**0.1213**	**1.6303**	**4.5900e-003**	**0.4471**	**3.4100e-003**	**0.4505**	**0.1186**	**3.1400e-003**	**0.1217**		**457.5345**	**457.5345**	**0.0132**		**457.8642**

3.3 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.7345	29.3967	25.1756	0.0443		1.5603	1.5603		1.5122	1.5122		4,088.0998	4,088.0998	0.6816		4,105.1387
Total	**3.7345**	**29.3967**	**25.1756**	**0.0443**		**1.5603**	**1.5603**		**1.5122**	**1.5122**		**4,088.0998**	**4,088.0998**	**0.6816**		**4,105.1387**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	3.3200e-003	0.1053	0.0256	2.6000e-004	6.4000e-003	5.2000e-004	6.9200e-003	1.8400e-003	5.0000e-004	2.3400e-003		27.2791	27.2791	1.7500e-003		27.3228
Worker	0.1794	0.1213	1.6303	4.5900e-003	0.4471	3.4100e-003	0.4505	0.1186	3.1400e-003	0.1217		457.5345	457.5345	0.0132		457.8642
Total	**0.1827**	**0.2266**	**1.6559**	**4.8500e-003**	**0.4535**	**3.9300e-003**	**0.4574**	**0.1204**	**3.6400e-003**	**0.1241**		**484.8137**	**484.8137**	**0.0149**		**485.1870**

3.3 Building Construction - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.7345	22.3386	25.1756	0.0443		1.5603	1.5603		1.5122	1.5122	0.0000	4,088.0998	4,088.0998	0.6816		4,105.1387
Total	**3.7345**	**22.3386**	**25.1756**	**0.0443**		**1.5603**	**1.5603**		**1.5122**	**1.5122**	**0.0000**	**4,088.0998**	**4,088.0998**	**0.6816**		**4,105.1387**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	3.3200e-003	0.1053	0.0256	2.6000e-004	6.4000e-003	5.2000e-004	6.9200e-003	1.8400e-003	5.0000e-004	2.3400e-003		27.2791	27.2791	1.7500e-003		27.3228
Worker	0.1794	0.1213	1.6303	4.5900e-003	0.4471	3.4100e-003	0.4505	0.1186	3.1400e-003	0.1217		457.5345	457.5345	0.0132		457.8642
Total	**0.1827**	**0.2266**	**1.6559**	**4.8500e-003**	**0.4535**	**3.9300e-003**	**0.4574**	**0.1204**	**3.6400e-003**	**0.1241**		**484.8137**	**484.8137**	**0.0149**		**485.1870**

3.3 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3446	26.9461	24.6568	0.0443		1.3454	1.3454		1.3034	1.3034		4,088.1280	4,088.1280	0.6571		4,104.5555
Total	**3.3446**	**26.9461**	**24.6568**	**0.0443**		**1.3454**	**1.3454**		**1.3034**	**1.3034**		**4,088.1280**	**4,088.1280**	**0.6571**		**4,104.5555**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	2.8100e-003	0.0958	0.0233	2.5000e-004	6.4000e-003	2.0000e-004	6.5900e-003	1.8400e-003	1.9000e-004	2.0300e-003		27.0744	27.0744	1.6700e-003		27.1162
Worker	0.1674	0.1092	1.5019	4.4400e-003	0.4471	3.3100e-003	0.4504	0.1186	3.0500e-003	0.1216		442.7593	442.7593	0.0119		443.0577
Total	**0.1702**	**0.2050**	**1.5251**	**4.6900e-003**	**0.4535**	**3.5100e-003**	**0.4570**	**0.1204**	**3.2400e-003**	**0.1237**		**469.8337**	**469.8337**	**0.0136**		**470.1739**

3.3 Building Construction - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3446	20.5261	24.6568	0.0443		1.3454	1.3454		1.3034	1.3034	0.0000	4,088.1280	4,088.1280	0.6571		4,104.5555
Total	**3.3446**	**20.5261**	**24.6568**	**0.0443**		**1.3454**	**1.3454**		**1.3034**	**1.3034**	**0.0000**	**4,088.1280**	**4,088.1280**	**0.6571**		**4,104.5555**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	2.8100e-003	0.0958	0.0233	2.5000e-004	6.4000e-003	2.0000e-004	6.5900e-003	1.8400e-003	1.9000e-004	2.0300e-003		27.0744	27.0744	1.6700e-003		27.1162
Worker	0.1674	0.1092	1.5019	4.4400e-003	0.4471	3.3100e-003	0.4504	0.1186	3.0500e-003	0.1216		442.7593	442.7593	0.0119		443.0577
Total	**0.1702**	**0.2050**	**1.5251**	**4.6900e-003**	**0.4535**	**3.5100e-003**	**0.4570**	**0.1204**	**3.2400e-003**	**0.1237**		**469.8337**	**469.8337**	**0.0136**		**470.1739**

3.4 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4091	2.8170	3.6272	5.9400e-003		0.1634	0.1634		0.1634	0.1634		562.8961	562.8961	0.0367		563.8123
Total	**0.4091**	**2.8170**	**3.6272**	**5.9400e-003**		**0.1634**	**0.1634**		**0.1634**	**0.1634**		**562.8961**	**562.8961**	**0.0367**		**563.8123**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1571	0.0986	1.3889	4.2800e-003	0.4471	3.2100e-003	0.4503	0.1186	2.9600e-003	0.1215		426.9053	426.9053	0.0108		427.1750
Total	**0.1571**	**0.0986**	**1.3889**	**4.2800e-003**	**0.4471**	**3.2100e-003**	**0.4503**	**0.1186**	**2.9600e-003**	**0.1215**		**426.9053**	**426.9053**	**0.0108**		**427.1750**

3.4 Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4091	2.8170	3.6272	5.9400e-003		0.1634	0.1634		0.1634	0.1634	0.0000	562.8961	562.8961	0.0367		563.8123
Total	**0.4091**	**2.8170**	**3.6272**	**5.9400e-003**		**0.1634**	**0.1634**		**0.1634**	**0.1634**	**0.0000**	**562.8961**	**562.8961**	**0.0367**		**563.8123**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1571	0.0986	1.3889	4.2800e-003	0.4471	3.2100e-003	0.4503	0.1186	2.9600e-003	0.1215		426.9053	426.9053	0.0108		427.1750
Total	**0.1571**	**0.0986**	**1.3889**	**4.2800e-003**	**0.4471**	**3.2100e-003**	**0.4503**	**0.1186**	**2.9600e-003**	**0.1215**		**426.9053**	**426.9053**	**0.0108**		**427.1750**

3.5 Piping - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7528	7.2756	7.1840	9.7100e-003		0.4666	0.4666		0.4293	0.4293		940.8066	940.8066	0.3043		948.4135
Total	**0.7528**	**7.2756**	**7.1840**	**9.7100e-003**		**0.4666**	**0.4666**		**0.4293**	**0.4293**		**940.8066**	**940.8066**	**0.3043**		**948.4135**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	2.6400e-003	0.0910	0.0220	2.5000e-004	6.4000e-003	1.7000e-004	6.5700e-003	1.8400e-003	1.6000e-004	2.0000e-003		26.8370	26.8370	1.6200e-003		26.8774
Worker	0.1571	0.0986	1.3889	4.2800e-003	0.4471	3.2100e-003	0.4503	0.1186	2.9600e-003	0.1215		426.9053	426.9053	0.0108		427.1750
Total	**0.1597**	**0.1896**	**1.4109**	**4.5300e-003**	**0.4535**	**3.3800e-003**	**0.4569**	**0.1204**	**3.1200e-003**	**0.1235**		**453.7423**	**453.7423**	**0.0124**		**454.0524**

3.5 Piping - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7528	2.3879	7.1840	9.7100e-003		0.4666	0.4666		0.4293	0.4293	0.0000	940.8066	940.8066	0.3043		948.4135
Total	**0.7528**	**2.3879**	**7.1840**	**9.7100e-003**		**0.4666**	**0.4666**		**0.4293**	**0.4293**	**0.0000**	**940.8066**	**940.8066**	**0.3043**		**948.4135**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	2.6400e-003	0.0910	0.0220	2.5000e-004	6.4000e-003	1.7000e-004	6.5700e-003	1.8400e-003	1.6000e-004	2.0000e-003		26.8370	26.8370	1.6200e-003		26.8774
Worker	0.1571	0.0986	1.3889	4.2800e-003	0.4471	3.2100e-003	0.4503	0.1186	2.9600e-003	0.1215		426.9053	426.9053	0.0108		427.1750
Total	**0.1597**	**0.1896**	**1.4109**	**4.5300e-003**	**0.4535**	**3.3800e-003**	**0.4569**	**0.1204**	**3.1200e-003**	**0.1235**		**453.7423**	**453.7423**	**0.0124**		**454.0524**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.550339	0.043800	0.200255	0.122233	0.016799	0.005871	0.020633	0.029727	0.002027	0.001932	0.004726	0.000704	0.000955

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

SGVWC Project

South Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	4.02	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 4.02 acre site

Construction Phase - Grading: 4 months, Res Construction: 20 months, Coating: 3 months, Piping: 3 months

Trips and VMT - 40 worker trips/day

Off-road Equipment - Grading: 1 excavator, 1 loader/backhoe, 1 grader, 1 dozer

Off-road Equipment - Construction: 1 crane, 1 stress tower, 1 gen set, 2 concrete pumps, 1 loader/backhoe, 4 welders

Off-road Equipment - Coating: 2 air compressors

Off-road Equipment - Piping: 1 trencher, 1 roller, 1 loader/backhoe, 1 forklift

Construction Off-road Equipment Mitigation -

SGVWC Project - South Coast Air Basin, Annual

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	18.00	61.00
tblConstructionPhase	NumDays	230.00	413.00
tblConstructionPhase	NumDays	8.00	86.00
tblConstructionPhase	PhaseEndDate	2/22/2021	3/28/2022
tblConstructionPhase	PhaseEndDate	1/1/2021	11/30/2021
tblConstructionPhase	PhaseEndDate	2/14/2020	4/29/2020
tblConstructionPhase	PhaseStartDate	1/28/2021	1/1/2022
tblConstructionPhase	PhaseStartDate	2/15/2020	5/1/2020
tblConstructionPhase	PhaseStartDate	2/5/2020	1/1/2020
tblGrading	AcresOfGrading	43.00	4.00
tblLandUse	LotAcreage	0.00	4.02
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Forklifts
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	PhaseName		Building Construction
tblOffRoadEquipment	PhaseName		Piping
tblOffRoadEquipment	PhaseName		Piping
tblOffRoadEquipment	PhaseName		Piping

tblOffRoadEquipment	PhaseName		Piping
tblTripsAndVMT	PhaseName		Piping
tblTripsAndVMT	VendorTripNumber	0.00	1.00
tblTripsAndVMT	VendorTripNumber	0.00	1.00
tblTripsAndVMT	WorkerTripNumber	15.00	40.00
tblTripsAndVMT	WorkerTripNumber	0.00	40.00
tblTripsAndVMT	WorkerTripNumber	0.00	40.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.4367	3.5530	2.8975	5.4800e-003	0.3189	0.1803	0.4992	0.1579	0.1726	0.3306	0.0000	466.8423	466.8423	0.0844	0.0000	468.9518
2021	0.4181	3.2328	3.1032	5.8000e-003	0.0530	0.1605	0.2135	0.0141	0.1555	0.1696	0.0000	489.7598	489.7598	0.0724	0.0000	491.5686
2022	0.0464	0.3287	0.4218	7.5000e-004	0.0276	0.0201	0.0478	7.3400e-003	0.0189	0.0263	0.0000	66.7162	66.7162	0.0105	0.0000	66.9781
Maximum	**0.4367**	**3.5530**	**3.1032**	**5.8000e-003**	**0.3189**	**0.1803**	**0.4992**	**0.1579**	**0.1726**	**0.3306**	**0.0000**	**489.7598**	**489.7598**	**0.0844**	**0.0000**	**491.5686**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.4367	2.9354	2.8975	5.4800e-003	0.1596	0.1803	0.3400	0.0710	0.1726	0.2436	0.0000	466.8418	466.8418	0.0844	0.0000	468.9513
2021	0.4181	2.4689	3.1032	5.8000e-003	0.0530	0.1605	0.2135	0.0141	0.1555	0.1696	0.0000	489.7593	489.7593	0.0724	0.0000	491.5680
2022	0.0464	0.1723	0.4218	7.5000e-004	0.0276	0.0201	0.0478	7.3400e-003	0.0189	0.0263	0.0000	66.7161	66.7161	0.0105	0.0000	66.9780
Maximum	**0.4367**	**2.9354**	**3.1032**	**5.8000e-003**	**0.1596**	**0.1803**	**0.3400**	**0.0710**	**0.1726**	**0.2436**	**0.0000**	**489.7593**	**489.7593**	**0.0844**	**0.0000**	**491.5680**

SGVWC Project - South Coast Air Basin, Annual

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**21.62**	**0.00**	**0.00**	**39.86**	**0.00**	**20.94**	**48.49**	**0.00**	**16.52**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**1-1-2020**	**3-31-2020**	0.7968	0.7968
2	**4-1-2020**	**6-30-2020**	0.9843	0.8305
3	**7-1-2020**	**9-30-2020**	1.1020	0.8701
4	**10-1-2020**	**12-31-2020**	1.1030	0.8711
5	**1-1-2021**	**3-31-2021**	0.9866	0.7802
6	**4-1-2021**	**6-30-2021**	0.9966	0.7880
7	**7-1-2021**	**9-30-2021**	1.0076	0.7966
8	**10-1-2021**	**12-31-2021**	0.6687	0.5288
9	**1-1-2022**	**3-31-2022**	0.1090	0.1090
10	**4-1-2022**	**6-30-2022**	0.2693	0.1122
		Highest	1.1030	0.8711

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2020	4/29/2020	5	86	
2	Building Construction	Building Construction	5/1/2020	11/30/2021	5	413	
3	Architectural Coating	Architectural Coating	1/1/2022	3/28/2022	5	61	
4	Piping	Trenching	4/1/2022	6/29/2022	5	64	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	2	6.00	78	0.48
Building Construction	Pumps	2	8.00	84	0.74
Piping	Trenchers	1	8.00	78	0.50
Piping	Rollers	1	7.00	80	0.38
Building Construction	Cranes	2	7.00	231	0.29
Building Construction	Forklifts	1	8.00	89	0.20
Grading	Excavators	1	8.00	158	0.38
Piping	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Piping	Forklifts	1	7.00	89	0.20
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Generator Sets	1	8.00	84	0.74
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Building Construction	Welders	4	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Piping	0	40.00	1.00		14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	40.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	40.00	1.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	40.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2611	0.0000	0.2611	0.1426	0.0000	0.1426	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0864	0.9536	0.4942	1.0100e-003		0.0433	0.0433		0.0398	0.0398	0.0000	88.5873	88.5873	0.0287	0.0000	89.3036
Total	**0.0864**	**0.9536**	**0.4942**	**1.0100e-003**	**0.2611**	**0.0433**	**0.3044**	**0.1426**	**0.0398**	**0.1824**	**0.0000**	**88.5873**	**88.5873**	**0.0287**	**0.0000**	**89.3036**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.6600e-003	5.8900e-003	0.0653	1.9000e-004	0.0189	1.5000e-004	0.0190	5.0100e-003	1.4000e-004	5.1500e-003	0.0000	17.0044	17.0044	4.9000e-004	0.0000	17.0167
Total	**7.6600e-003**	**5.8900e-003**	**0.0653**	**1.9000e-004**	**0.0189**	**1.5000e-004**	**0.0190**	**5.0100e-003**	**1.4000e-004**	**5.1500e-003**	**0.0000**	**17.0044**	**17.0044**	**4.9000e-004**	**0.0000**	**17.0167**

3.2 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1018	0.0000	0.1018	0.0556	0.0000	0.0556	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0864	0.9536	0.4942	1.0100e-003		0.0433	0.0433		0.0398	0.0398	0.0000	88.5872	88.5872	0.0287	0.0000	89.3035
Total	**0.0864**	**0.9536**	**0.4942**	**1.0100e-003**	**0.1018**	**0.0433**	**0.1451**	**0.0556**	**0.0398**	**0.0954**	**0.0000**	**88.5872**	**88.5872**	**0.0287**	**0.0000**	**89.3035**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.6600e-003	5.8900e-003	0.0653	1.9000e-004	0.0189	1.5000e-004	0.0190	5.0100e-003	1.4000e-004	5.1500e-003	0.0000	17.0044	17.0044	4.9000e-004	0.0000	17.0167
Total	**7.6600e-003**	**5.8900e-003**	**0.0653**	**1.9000e-004**	**0.0189**	**1.5000e-004**	**0.0190**	**5.0100e-003**	**1.4000e-004**	**5.1500e-003**	**0.0000**	**17.0044**	**17.0044**	**4.9000e-004**	**0.0000**	**17.0167**

3.3 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3268	2.5722	2.2029	3.8800e-003		0.1365	0.1365		0.1323	0.1323	0.0000	324.5079	324.5079	0.0541	0.0000	325.8604
Total	**0.3268**	**2.5722**	**2.2029**	**3.8800e-003**		**0.1365**	**0.1365**		**0.1323**	**0.1323**	**0.0000**	**324.5079**	**324.5079**	**0.0541**	**0.0000**	**325.8604**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0000e-004	9.3800e-003	2.3700e-003	2.0000e-005	5.5000e-004	5.0000e-005	6.0000e-004	1.6000e-004	4.0000e-005	2.0000e-004	0.0000	2.1407	2.1407	1.4000e-004	0.0000	2.1442
Worker	0.0156	0.0120	0.1328	3.8000e-004	0.0384	3.0000e-004	0.0387	0.0102	2.7000e-004	0.0105	0.0000	34.6020	34.6020	1.0000e-003	0.0000	34.6269
Total	**0.0159**	**0.0214**	**0.1352**	**4.0000e-004**	**0.0390**	**3.5000e-004**	**0.0393**	**0.0104**	**3.1000e-004**	**0.0107**	**0.0000**	**36.7427**	**36.7427**	**1.1400e-003**	**0.0000**	**36.7712**

3.3 Building Construction - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3268	1.9546	2.2029	3.8800e-003		0.1365	0.1365		0.1323	0.1323	0.0000	324.5075	324.5075	0.0541	0.0000	325.8600
Total	**0.3268**	**1.9546**	**2.2029**	**3.8800e-003**		**0.1365**	**0.1365**		**0.1323**	**0.1323**	**0.0000**	**324.5075**	**324.5075**	**0.0541**	**0.0000**	**325.8600**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0000e-004	9.3800e-003	2.3700e-003	2.0000e-005	5.5000e-004	5.0000e-005	6.0000e-004	1.6000e-004	4.0000e-005	2.0000e-004	0.0000	2.1407	2.1407	1.4000e-004	0.0000	2.1442
Worker	0.0156	0.0120	0.1328	3.8000e-004	0.0384	3.0000e-004	0.0387	0.0102	2.7000e-004	0.0105	0.0000	34.6020	34.6020	1.0000e-003	0.0000	34.6269
Total	**0.0159**	**0.0214**	**0.1352**	**4.0000e-004**	**0.0390**	**3.5000e-004**	**0.0393**	**0.0104**	**3.1000e-004**	**0.0107**	**0.0000**	**36.7427**	**36.7427**	**1.1400e-003**	**0.0000**	**36.7712**

3.3 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3980	3.2066	2.9342	5.2700e-003		0.1601	0.1601		0.1551	0.1551	0.0000	441.3338	441.3338	0.0709	0.0000	443.1072
Total	**0.3980**	**3.2066**	**2.9342**	**5.2700e-003**		**0.1601**	**0.1601**		**0.1551**	**0.1551**	**0.0000**	**441.3338**	**441.3338**	**0.0709**	**0.0000**	**443.1072**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4000e-004	0.0116	2.9300e-003	3.0000e-005	7.5000e-004	2.0000e-005	7.7000e-004	2.2000e-004	2.0000e-005	2.4000e-004	0.0000	2.8894	2.8894	1.9000e-004	0.0000	2.8941
Worker	0.0198	0.0147	0.1661	5.0000e-004	0.0522	3.9000e-004	0.0526	0.0139	3.6000e-004	0.0142	0.0000	45.5366	45.5366	1.2300e-003	0.0000	45.5673
Total	**0.0201**	**0.0263**	**0.1691**	**5.3000e-004**	**0.0530**	**4.1000e-004**	**0.0534**	**0.0141**	**3.8000e-004**	**0.0145**	**0.0000**	**48.4260**	**48.4260**	**1.4200e-003**	**0.0000**	**48.4613**

3.3 Building Construction - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3980	2.4426	2.9342	5.2700e-003		0.1601	0.1601		0.1551	0.1551	0.0000	441.3333	441.3333	0.0709	0.0000	443.1067
Total	**0.3980**	**2.4426**	**2.9342**	**5.2700e-003**		**0.1601**	**0.1601**		**0.1551**	**0.1551**	**0.0000**	**441.3333**	**441.3333**	**0.0709**	**0.0000**	**443.1067**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4000e-004	0.0116	2.9300e-003	3.0000e-005	7.5000e-004	2.0000e-005	7.7000e-004	2.2000e-004	2.0000e-005	2.4000e-004	0.0000	2.8894	2.8894	1.9000e-004	0.0000	2.8941
Worker	0.0198	0.0147	0.1661	5.0000e-004	0.0522	3.9000e-004	0.0526	0.0139	3.6000e-004	0.0142	0.0000	45.5366	45.5366	1.2300e-003	0.0000	45.5673
Total	**0.0201**	**0.0263**	**0.1691**	**5.3000e-004**	**0.0530**	**4.1000e-004**	**0.0534**	**0.0141**	**3.8000e-004**	**0.0145**	**0.0000**	**48.4260**	**48.4260**	**1.4200e-003**	**0.0000**	**48.4613**

3.4 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0125	0.0859	0.1106	1.8000e-004		4.9800e-003	4.9800e-003		4.9800e-003	4.9800e-003	0.0000	15.5749	15.5749	1.0100e-003	0.0000	15.6002
Total	**0.0125**	**0.0859**	**0.1106**	**1.8000e-004**		**4.9800e-003**	**4.9800e-003**		**4.9800e-003**	**4.9800e-003**	**0.0000**	**15.5749**	**15.5749**	**1.0100e-003**	**0.0000**	**15.6002**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.7600e-003	3.4000e-003	0.0393	1.2000e-004	0.0134	1.0000e-004	0.0135	3.5500e-003	9.0000e-005	3.6500e-003	0.0000	11.2531	11.2531	2.8000e-004	0.0000	11.2602
Total	**4.7600e-003**	**3.4000e-003**	**0.0393**	**1.2000e-004**	**0.0134**	**1.0000e-004**	**0.0135**	**3.5500e-003**	**9.0000e-005**	**3.6500e-003**	**0.0000**	**11.2531**	**11.2531**	**2.8000e-004**	**0.0000**	**11.2602**

3.4 Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0125	0.0859	0.1106	1.8000e-004		4.9800e-003	4.9800e-003		4.9800e-003	4.9800e-003	0.0000	15.5748	15.5748	1.0100e-003	0.0000	15.6002
Total	**0.0125**	**0.0859**	**0.1106**	**1.8000e-004**		**4.9800e-003**	**4.9800e-003**		**4.9800e-003**	**4.9800e-003**	**0.0000**	**15.5748**	**15.5748**	**1.0100e-003**	**0.0000**	**15.6002**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.7600e-003	3.4000e-003	0.0393	1.2000e-004	0.0134	1.0000e-004	0.0135	3.5500e-003	9.0000e-005	3.6500e-003	0.0000	11.2531	11.2531	2.8000e-004	0.0000	11.2602
Total	**4.7600e-003**	**3.4000e-003**	**0.0393**	**1.2000e-004**	**0.0134**	**1.0000e-004**	**0.0135**	**3.5500e-003**	**9.0000e-005**	**3.6500e-003**	**0.0000**	**11.2531**	**11.2531**	**2.8000e-004**	**0.0000**	**11.2602**

3.5 Piping - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0241	0.2328	0.2299	3.1000e-004		0.0149	0.0149		0.0137	0.0137	0.0000	27.3115	27.3115	8.8300e-003	0.0000	27.5324
Total	**0.0241**	**0.2328**	**0.2299**	**3.1000e-004**		**0.0149**	**0.0149**		**0.0137**	**0.0137**	**0.0000**	**27.3115**	**27.3115**	**8.8300e-003**	**0.0000**	**27.5324**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.0000e-005	2.9500e-003	7.4000e-004	1.0000e-005	2.0000e-004	1.0000e-005	2.1000e-004	6.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.7701	0.7701	5.0000e-005	0.0000	0.7713
Worker	5.0000e-003	3.5700e-003	0.0413	1.3000e-004	0.0140	1.0000e-004	0.0142	3.7300e-003	9.0000e-005	3.8200e-003	0.0000	11.8066	11.8066	3.0000e-004	0.0000	11.8140
Total	**5.0900e-003**	**6.5200e-003**	**0.0420**	**1.4000e-004**	**0.0142**	**1.1000e-004**	**0.0144**	**3.7900e-003**	**1.0000e-004**	**3.8800e-003**	**0.0000**	**12.5767**	**12.5767**	**3.5000e-004**	**0.0000**	**12.5853**

3.5 Piping - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0241	0.0764	0.2299	3.1000e-004		0.0149	0.0149		0.0137	0.0137	0.0000	27.3115	27.3115	8.8300e-003	0.0000	27.5323
Total	**0.0241**	**0.0764**	**0.2299**	**3.1000e-004**		**0.0149**	**0.0149**		**0.0137**	**0.0137**	**0.0000**	**27.3115**	**27.3115**	**8.8300e-003**	**0.0000**	**27.5323**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.0000e-005	2.9500e-003	7.4000e-004	1.0000e-005	2.0000e-004	1.0000e-005	2.1000e-004	6.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.7701	0.7701	5.0000e-005	0.0000	0.7713
Worker	5.0000e-003	3.5700e-003	0.0413	1.3000e-004	0.0140	1.0000e-004	0.0142	3.7300e-003	9.0000e-005	3.8200e-003	0.0000	11.8066	11.8066	3.0000e-004	0.0000	11.8140
Total	**5.0900e-003**	**6.5200e-003**	**0.0420**	**1.4000e-004**	**0.0142**	**1.1000e-004**	**0.0144**	**3.7900e-003**	**1.0000e-004**	**3.8800e-003**	**0.0000**	**12.5767**	**12.5767**	**3.5000e-004**	**0.0000**	**12.5853**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.550339	0.043800	0.200255	0.122233	0.016799	0.005871	0.020633	0.029727	0.002027	0.001932	0.004726	0.000704	0.000955

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX 2

BIOLOGICAL RESOURCES ASSESSMENT AND JURISDICTIONAL DELINEATION FOR THE SAN GABRIEL VALLEY WATER COMPANY'S PLANT B14 FACILITIES IMPROVEMENT PROJECT

Unincorporated Area of Hacienda Heights
Los Angeles County, California

Prepared for:

Tom Dodson & Associates
Attn: Tom Dodson
2150 North Arrowhead Avenue
San Bernardino, CA 92405

Prepared September 2017

Prepared by:

Jericho Systems, Inc.
47 1st Street, Suite 1
Redlands, CA 92373-4601

Certification

Jericho Systems, Inc.
47 1st Street, Suite 1
Redlands, CA 92373-4601
(909) 915-5900

Contact: Shay Lawrey, President and Ecologist/Regulatory Specialist

Certification: I hereby certify that the statements furnished herein, and in the attached exhibits present data and information required for this Biological Resources Repot to the best of my ability, and the facts, statements, and information presented are true and correct to the best of my knowledge and belief. This report was prepared in accordance with professional requirements and standards. Fieldwork conducted for this assessment was performed by me. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project proponent and that I have no financial interest in the project.



_____
Shay Lawrey, Ecologist/Regulatory Specialist

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1 Introduction

Jericho Systems, Inc. (Jericho) is pleased to provide the results of the general biological resources assessment (BRA) and Jurisdictional Waters Delineation (JD) report for the San Gabriel Valley Water Company's planned Plant B14 Facilities Improvement Project (Project). The purpose of the assessment

was to identify biological resources that may potentially occur within or adjacent to the Project footprint and to determine if Project-related impacts may result to those resources.

This report is designed to address potential effects of the proposed Project to designated Critical Habitats and/or any species currently listed or formally proposed for listing as endangered or threatened under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA), or species designated as sensitive by the California Department of Fish and Wildlife (CDFW), or the California Native Plant Society (CNPS). Attention was focused on rare plants, documented listed species, and jurisdictional waters subject to the California Fish and Game Code (FGC) and Clean Water Act (CWA), because the potential for these resources exists on the site.

Special status species are native species that have been afforded special legal or management protection because of concern for their continued existence. There are several categories of protection at both federal and state levels, depending on the magnitude of threat to the continued existence and existing knowledge of population levels.

In addition to potential impacts to designated Critical Habitats and special status species, potential impacts to jurisdictional waters must be considered. Impacts to jurisdictional waters typically require regulatory approvals from one or more of the following regulatory agencies: U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and/or CDFW. Please refer to Appendix A for a complete summary of Regulatory Framework.

1.1 Project Description

The Project consists of constructing an additional water storage reservoir and related improvements adjacent to the existing water storage reservoir on site. The second reservoir will allow San Gabriel Valley Water Company operational flexibility to store additional water supplied from Plant B12 during periods of low demand. It will also allow for the existing reservoir to be taken out of service when required for routine maintenance. The proposed Project includes the construction of retaining walls and hillside stabilization improvements to divert current drainage problems. Additionally, required grading work will improve drainage conditions and eliminate the risk of sediments overflowing into the reservoir. Site improvements will include concrete swales, catch basins and drain pipes (Figure 3).

1.2 Project Location

The Project site is located on approximately 4.02 acres near the intersection of Camino del Tomasini and Valdemar Drive in an unincorporated area of Los Angeles County known as Hacienda Heights. The site is situated in the southwest corner of Section 13, Township 2 South, Range 11 West and is depicted on the U.S. Geological Survey's (USGS) *La Habra* 7.5-minute Quadrangle topographic map. There is one point of access to the Project site; it is easily accessible from a secondary paved road off the main road Camino del Tomasini. (Figures 1&2).

1.3 Area of Potential Effect

The Area of Potential Affect (APE) for the proposed Project encompasses all areas that may be affected directly or indirectly by the Project including the proposed construction footprint, stockpile and staging areas, as well as immediate adjacent areas outside of the proposed Project site. The disturbance limits will encompass an approximately 4.02-acre disturbed area adjacent existing water storage facilities. Most of the proposed Project site has been previously graded and is currently being utilized to direct water runoff; it consists of bare ground surrounded by dense vegetation on the north, south and western portions of the

site and existing facilities and residential development to the east. The APE is currently partially fenced in by a chain-link security fence.

2 Assessment Methodology

2.1 Biological Resources Assessment

Data regarding biological resources in the Project area were obtained through database review and field investigations. Background information was gathered prior to visiting this site to determine which species would be expected in the Project APE. The USFWS Information, Planning, and Conservation System (IPaC) was reviewed for an up to date list of federally-listed species and Critical Habitats occurring or expected to occur within the Project area. The California Natural Diversity Database (CNDDB) *Rarefind 5* and the CNPS *Electronic Inventory of Rare, Endangered, and Threatened Plants of California* were reviewed for the *La Habra, Whittier, El Monte* and *Baldwin Park* USGS quadrangles. The proposed Project site is situated in the northwestern portion of the *La Habra* quad. The site's proximity to the *Whittier, El Monte* and *Baldwin Park* quads lead to their inclusion in the review. These databases contain records of reported occurrences of State- and/or federally-listed endangered or threatened species, proposed endangered or threatened species, California Species of Special Concern (SSC), or otherwise sensitive species or habitats that may occur within or in the immediate vicinity of the Project APE. The results from these database searches are provided as Attachments to this letter report. Literature detailing biological resources previously observed near the Project APE and historical land uses were reviewed to understand the extent of disturbances to the habitats within the proposed reservoir construction site and surrounding area.

An initial site visit was done by Jericho field technicians Bailey Bingham and Laura Banning on August 30th, 2017 to survey existing plant communities and the potential for SSC species in the area. A second site visit was completed on September 15th, 2017 by Ms. Bingham and Ms. Banning along with Jericho biologist, Daniel Smith to inventory and evaluate the current extent and conditions of the vegetation communities found within the Project APE. The vegetation communities were evaluated for their potential to support sensitive plant and wildlife species. Special attention was given to any sensitive habitats and/or undeveloped areas, which have higher potentials to support sensitive flora and fauna species and areas where sensitive species have been documented.

2.2 Jurisdictional Delineation

On September 15th, 2017, Jericho biologist Daniel Smith, assisted by Ms. Bingham and Ms. Banning, evaluated the project site and adjacent areas for the presence of riverine/riparian/wetland habitat and jurisdictional waters, i.e. Waters of the U.S. (WoUS) as regulated by the USACE and RWQCB, and/or jurisdictional streambed and associated riparian habitat as regulated by the CDFW.

Prior to the field visit, historical aerial photographs were examined to gain an understanding of the impact of land-use on natural drainage patterns in the area. Where possible, surface drainage systems were traced using aerial imagery to downstream receiving waters. The USFWS National Wetland Inventory and Environmental Protection Agency (EPA) Water Program "My Waters" data layers were also reviewed to determine whether any hydrologic features and wetland areas had been documented within the vicinity of the site. Similarly, the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey was used to identify the soil series in the area and to check these soils to determine whether they are regionally identified as hydric soils. A complete list of references is provided as part of this report.

The delineation was conducted on foot and was based on aerial maps; global positioning units were used to assist in determining the limits of jurisdictional waters. All areas identified as supporting jurisdictional waters were measured to the nearest foot. Suspected jurisdictional areas were checked for the presence of definable channels and/or wetland vegetation, riparian habitat, soils, and hydrology. The JD was conducted in accordance with regulations set forth in 33CFR part 328 and the USACE guidance documents referenced below:

- *USACE Wetlands Research Program Technical Report Y-87-1 (on-line edition), Wetlands Delineation Manual, Environmental Laboratory, 1987 (Wetland Delineation Manual);*
- *USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0), September 2008;*
- *USACE Minimum Standards for Acceptance of Preliminary Wetlands Delineations, November 30, 2001 (Minimum Standards);*
- *USACE Jurisdictional Determination Form Instructional Guidebook, May 30, 2007 (JD Form Guidebook); and*
- *USACE A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, August 2008 (Delineation Manual).*

The lateral extent of USACE jurisdiction is measured at the Ordinary High Watermark (OHWM), which is indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris.

Evaluation of CDFW jurisdiction followed guidance in the FGC. Specifically, CDFW jurisdiction was delineated by measuring the elevations of land that confine a stream to a definite course when its waters rise to their highest level and to the extent of associated riparian vegetation.

Other data recorded included bank height and morphology, substrate type, and all vegetation within the streambed and riparian vegetation adjacent to streambeds. Upon completion of fieldwork, all data collected in the field were incorporated into a Geographic Information System (GIS) along with base map data. The GIS was then used to quantify the extent of jurisdictional waters. Upstream and downstream connectivity of waterways was reviewed in the field and on aerial photographs and topographic maps to determine jurisdictional status per the CWA.

The site was carefully assessed for indicators of active surface flow (presence of hydrophytic vegetation, staining, cracked soil, ponding, etc.). Potential wetland areas were assessed by searching for hydrophytes and depressions/ponded areas where water would likely collect. Potential wetland areas were assessed to the outer reach of the applicable vegetative community, or if hydrophytes were present, then to the transition to upland species. Plant species were identified and given an indicator status as prescribed in the 2016 National Wetland Plant List (Arid West Region) (Lichvar, 2016). Vegetation nomenclature follows The Jepson Manual, Vascular Plants of California, 2nd Edition (Baldwin, 2012). When The Jepson Manual does not list a common name, common name nomenclature follows the USDA, NRCS Plants Database (USDA, 2014a).

To be considered a *jurisdictional wetland* under Section 404, an area must possess three (3) wetland characteristics: hydrophytic *vegetation*, hydric *soils*, and wetland *hydrology*.

- ► <u>*Hydrophytic vegetation*</u>: Hydrophytic vegetation is plant life that grows, and is typically adapted for life, in permanently or periodically saturated soils. The hydrophytic vegetation criterion is met if more than 50 percent of the dominant plant species from all strata (tree, shrub, and herb layers)

is considered hydrophytic. Hydrophytic species are those included on the 2016 National Wetland Plant List (Arid West Region) (Lichvar, 2016). Each species on the list is rated per a wetland indicator category, as shown in Table 1. To be considered hydrophytic, the species must have *wetland indicator status*, i.e., be rated as OBL, FACW or FAC.

Table 1: Wetland Indicator Vegetation Categories

Category	Probability
Obligate Wetland (OBL)	Almost always occur in wetlands (estimated probability >99%)
Facultative Wetland (FACW)	Usually occur in wetlands (estimated probability 67 to 99%)
Facultative (FAC)	Equally likely to occur in wetlands and non-wetlands (estimated probability 34 to 66%)
Facultative Upland (FACU)	Usually occur in non-wetlands (estimated probability 67 to 99%)
Obligate Upland (UPL)	Almost always occur in non-wetlands (estimated probability >99%)

- *Hydric Soil*: Soil maps from the USDA-NRCS Web Soil Survey (USDA 2016) were reviewed for soil types found within the project area. Hydric soils are saturated or inundated long enough during the growing season to develop anaerobic conditions that favor growth and regeneration of hydrophytic vegetation. There are several indirect indicators that may signify the presence of hydric soils including hydrogen sulfide generation, the presence of iron and manganese concretions, certain soil colors, gleying, and the presence of mottling. Generally, hydric soils are dark in color or may be gleyed (bluish, greenish, or grayish), resulting from soil development under anoxic (without oxygen) conditions. Bright mottles within an otherwise dark soil matrix indicate periodic saturation with intervening periods of soil aeration. Hydric indicators are particularly difficult to observe in sandy soils, which are often recently deposited soils of flood plains (entisols) and usually lack sufficient fines (clay and silt) and organic material to allow use of soil color as a reliable indicator of hydric conditions. Hydric soil indicators in sandy soils include accumulations of organic matter in the surface horizon, vertical streaking of subsurface horizons by organic matter, and organic pans.

  The hydric soil criterion is satisfied at a location if soils in the area can be inferred or observed to have a high groundwater table, if there is evidence of prolonged soil saturation, or if there are any indicators suggesting a long-term reducing environment in the upper part of the soil profile. Reducing conditions are most easily assessed using soil color. Soil colors were evaluated using the Munsell Soil Color Charts (Gretag/Macbeth, 2000). Soil pits were dug to an approximate depth of 18 inches to evaluate soil profiles for indications of anaerobic and redoximorphic (hydric) conditions in the subsurface.

- *Wetland Hydrology*: The wetland hydrology criterion is satisfied at a location based upon conclusions inferred from field observations that indicate an area has a high probability of being inundated or saturated (flooded, ponded, or tidally influenced) long enough during the growing season to develop anaerobic conditions in the surface soil environment, especially the root zone (USACE, 1987 and 2008b).

3 Results

3.1 Biological and Physical Conditions

The APE is within disturbed area adjacent existing water storage facilities. The proposed Project site consists almost entirely of bare ground comprised of compacted dirt and gravel, with several large eucalyptus trees landscaping the south side of the existing facilities. Adjacent land to the east consists of existing water storage facilities and residential development. Adjacent land to the north and west consists of upland habitat that is best described as a mix of *Malosma laurina* Shrubland Alliance (laurel sumac scrub) and *Eriogonum fasciculatum* Shrubland Alliance (California buckwheat scrub). Adjacent the south side of the Project is an ephemeral stream with associated riparian habitat comprised mostly of *Baccharis salicifolia* Shrubland Alliance (mulefat thicket).

3.1.1 Habitat

There is little to no vegetative cover on most of the site, which only encroaches into the surrounding habitats along the northern, western and southern edges of the proposed Project boundary. Native plant species common within the laurel sumac and California buckwheat scrub habitats to the north and west include California sagebrush (*Artemisia californica*), turkey-mullein (*Croton setiger*), California buckwheat (*Eriogonum fasciculatum*), toyon (*Heteromeles arbutifolia*), laurel sumac (*Malosma laurina*), bush monkey flower (*Mimulus aurantiacus*), black sage (*Salvia mellifera*), and poison oak (*Toxicodendron diversilobum*). Native plant species common within the mulefat thicket habitat to the south include mulefat (*Baccharis salicifolia*), laurel sumac, chilicothe (*Marah macrocarpa*), and black elderberry (*Sambucus nigra*). There are also several scattered California live oaks (*Quercus agrifolia*) south of the Project site, along the southern slope of the adjacent ephemeral stream, and southeast (downstream) of the site there are several willows (*Salix* ssp.) within the riparian habitat. Much of the habitat surrounding the site is impacted by invasive, non-native species including ailanthus (*Ailanthus altissima*), sweet fennel (*Foeniculum vulgare*), short podded mustard (*Hirschfeldia incana*), tree tobacco (*Nicotiana glauca*) and castor bean (*Ricinus communis*).

3.1.2 Wildlife

Birds were the only wildlife observed onsite during field survey. Common avian species observed on site and surrounding area included scrub jay (*Aphelocoma californica*), red-tailed hawk (*Buteo jamaicensis*), Anna's hummingbird (*Calypte anna*), common raven (*Corvus corax*), wrentit (*Chamaea fasciata*), house finch (*Haemorhous mexicanus*), song sparrow (*Melospiza melodia*), northern mockingbird *(Mimus polyglottos*), bushtit (*Psaltriparus minimus*), Cassin's kingbird (*Tyrannus vociferans*) and mourning dove (*Zenaida macroura*). Since the proposed Project footprint consists of a disturbed site adjacent existing water storage facilities and residential development, only those wildlife species tolerant of urban environments are expected to occur in or adjacent to the Project site.

3.2 Special Status Species and Habitats

No State- and/or federally-listed threatened or endangered species, or other sensitive species were observed on site during the reconnaissance-level field survey. There is some habitat within the APE that is suitable for two of the listed species identified in the database review. Furthermore, several special status species have been documented within the vicinity (approximately 3 miles) of the proposed Project site. Table 2 (below) provides a list of all State- and/or federally-listed threatened and endangered species documented within the Project vicinity, where they are found (locally, adjacent to the Project APE, or within the Project APE), if suitable habitat for that species exists on site and if the Project may affect that species.

Table 2. Listed Species Documented within the Project Vicinity

Common Name	Scientific Name	Status	Found Locally	Found Adjacent	Found Within	Suitable Habitat	Project Affect
Birds:							
Coastal California gnatcatcher	*Polioptila californica californica*	FT	Yes	No	No	Yes; adjacent upland habitat	May Affect; not likely to adversely affect
Least Bell's vireo	*Vireo bellii pusillus*	FE/SE	Yes	No	No	Yes; adjacent riparian habitat	May Affect; not likely to adversely affect

3.2.1 US Fish and Wildlife – IPaC Database

Listed Species

According to the USFWS IPaC list, two federally-listed species are documented in the Project vicinity (approximately 3 miles):

1. *Coastal California gnatcatcher*

The federally-listed as threatened coastal California gnatcatcher (CAGN) is a resident, small songbird (passerine), which typically nests and forages in coastal sage scrub vegetation in southern California year-round. CAGN occur in dynamic and successional sage scrub habitats and non-sage scrub habitats such as chaparral, grassland, riparian areas, in proximity to sage scrub habitats. The CAGN was federally listed as threatened on March 30, 1993 (58 FR 16742 16757) and final Critical Habitat for this species was designated by the USFWS on December 19, 2007 (72 FR 72010 72213). The primary constituent elements (PCEs) identified by the USFWS for CAGN consist of the following: 1) Dynamic and successional sage scrub habitats: Venturan coastal sage scrub, Diegan coastal sage scrub, Riversidean sage scrub, Riversidean alluvial fan sage scrub, maritime succulent scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub in Ventura, Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties that provide space for individual and population growth, normal behavior, breeding, reproduction, nesting, dispersal and foraging; and 2) Non-sage scrub habitats such as chaparral, grassland, riparian areas, in proximity to sage scrub habitats as described for PCE 1 above that provide space for dispersal, foraging, and nesting.

Findings: Per the database review, the nearest documented CAGN occurrences are approximately 0.5 miles southwest (2005) and 0.65 miles west (2007) of the Project site, within suitable sage scrub habitat. USFWS designated Critical Habitat for this species is addressed below. CAGN were not observed during the reconnaissance-level survey, however no focused protocol-level surveys were conducted. Although Project site is within an already disturbed area consisting almost entirely of bare ground comprised of compacted dirt and gravel, the PCEs for CAGN including mixed California buckwheat and laurel sumac scrub habitats are present within the Project APE, in the upland areas adjacent to the north and west of the Project site. Furthermore, CAGN have been documented within 0.5 mile of the Project site.

Recommendations: Based on the proximity of the Project to past documented occurrences and that PCEs are present in the Project area, focused surveys are recommended to determine if CAGN are present within the Project APE and what potential Project-related impacts may occur to this species.

2. *Least Bell's vireo*

The State- and federally-listed as endangered least Bell's vireo (LBVI) is a small, olive-gray migratory songbird that nests and forages almost exclusively in riparian woodland habitats. LBVI nesting habitat typically consists of well-developed overstory, understory, and low densities of aquatic and herbaceous cover. The understory frequently contains dense sub-shrub or shrub thickets. These thickets are often dominated by plants such as narrow-leaf willow (*Salix exigua*), mulefat (*Baccharis salicifolia*), young individuals of other willow species such as arroyo willow (*Salix lasiolepis*) or black willow (*Salix gooddingii*), and one or more herbaceous species. LBVI generally begin to arrive from their wintering range in southern Baja California and establish breeding territories by mid-March to late-March. The LBVI was listed as federally endangered on May 2, 1986, under the ESA (51 FR 16474 16482) and final Critical Habitat for this species was designated by the USFWS on February 2, 1994 (59 FR 4845 4867).

Findings: Per the database review, the nearest documented LBVI occurrence (2010) is approximately 1.5 miles west of the Project site, within suitable riparian habitat. USFWS designated Critical Habitat for this species is addressed below. LBVI were not observed during the reconnaissance-level survey, however no focused protocol-level surveys were conducted. Although Project site is within an already disturbed area consisting almost entirely of bare ground comprised of compacted dirt and gravel, there is some suitable riparian habitat (i.e. mulefat thicket) for this species within the Project APE, along the southern boundary of the Project site. Furthermore, LBVI have been documented within 1.5 miles west of the Project site.

Recommendations: Based on the proximity of the Project to past documented occurrences and that PCEs are present in the Project area, focused surveys are recommended to determine if LBVI are present within the Project APE and what potential Project-related impacts may occur to this species.

USFWS Designated Critical Habitat

Aside from conserving and protecting fish, wildlife and plants and their habitats through the enforcement of Federal wildlife laws, the USFWS is also required to designate Critical Habitat for species protected under the Endangered Species Act. Critical habitat is supposed to include the areas essential for these species' conservation. It also provides an additional layer of protection when activities are undertaken or permitted by the federal government within the designated habitat area.

The Project APE is not located within or immediately adjacent any USFWS designated Critical Habitat. However, the site is within approximately 0.05 miles (280 feet) east of the East Los Angeles County – Matrix NCCP Subregion of Orange County Unit (Unit 9) of CAGN Critical Habitat.

There is no Critical Habitat for LBVI within the Project vicinity.

Migratory Birds

The IPaC also lists 30 migratory birds that are considered USFWS Birds of Conservation Concern that could potentially be affected by activities at the Project location. Although the Project site is mostly devoid of suitable nesting habitat for the migratory bird species identified on the USFWS IPaC list, there is vegetation that would provide suitable nesting habitat for some within the adjacent habitat. The complete list of migratory Birds of Conservation Concern identified by the USFWS IPaC is provided as an Attachment to this letter report.

3.2.2 California Natural Diversity Database (CNDDB)

According to the CNDDB, 43 sensitive species (17 plant species and 26 animal species) and three sensitive habitats have been documented in the *La Habra, Whittier, El Monte* and *Baldwin Park* USGS quadrangles. This list of sensitive species and habitats includes any State- and/or federally-listed threatened or endangered species, CDFW designated SSC, and otherwise Special Animals. "Special Animals" is a general term that refers to all the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special status species." The CDFW considers the taxa on this list to be those of greatest conservation need. Refer to Table 4 (attached) for a complete list of the CNDDB sensitive species documented within the *La Habra, Whittier, El Monte* and *Baldwin Park* quads and a determination for their potential to occur within the Project area.

Of the approximately 43 sensitive species identified in the *La Habra, Whittier, El Monte* and *Baldwin Park* quads, eight are State- and/or federally-listed threatened or endangered species. However, of the eight State- and/or federally-listed species identified in the CNDDB search, only two species have been documented within the Project vicinity (approximately 3 miles): coastal California gnatcatcher and least Bell's vireo. These species were discussed above, in IPaC results.

Although not a State- or federally-listed as threatened or endangered species, burrowing owl (*Athene cunicularia*) are considered a State and federal SSC and are a migratory bird protected by the international treaty under the Migratory Bird Treaty Act of 1918 and by State law under the California Fish and Game Code (CDFG Code #3513 & #3503.5). Furthermore, burrowing owl have been documented within the vicinity of the Project site and therefore, will be discussed below.

Burrowing owl

The burrowing owl (BUOW) is a ground dwelling owl typically found in arid prairies, fields, and open areas where vegetation is sparse and low to the ground. The BUOW is heavily dependent upon the presence of mammal burrows, with ground squirrel burrows being a common choice, in its habitat to provide shelter from predators, inclement weather and to provide a nesting place (Coulombe 1971). They are also known to make use of human-created structures, such as cement culverts and pipes, for burrows. BUOW spend a great deal of time standing on dirt mounds at the entrance to a burrow, or perched on a fence post or other low to the ground perch from which they hunt for prey. They feed primarily on insects such as grasshoppers, June beetles and moths, but will also take small rodents, birds, and reptiles. They are active during the day and night, but are considered a crepuscular owl; generally observed in the early morning hours or at twilight. The breeding season for BUOW is February 1 through August 31.

Throughout its range, the BUOW is vulnerable to habitat loss, predation, vehicular collisions, and destruction of burrow sites and poisoning of ground squirrels (Grinnell and Miller 1944, Zarn 1974, Remsen 1978). BUOW have disappeared from significant portions of their range in the last 15 years and, overall, nearly 60% of the breeding groups of owls known to have existed in California during the 1980s had

disappeared by the early 1990s (Burrowing Owl Consortium 1993). The BUOW is not listed under the State or federal ESA, but is considered both a State and federal SSC. The BUOW is a migratory bird protected by the international treaty under the Migratory Bird Treaty Act of 1918 and by State law under the California Fish and Game Code (CDFG Code #3513 & #3503.5).

Findings: Per the literature review, the nearest documented BUOW occurrence (2010) is approximately 2.8 miles west of the Project site. There are no BUOW occurrences documented in the Project area. Furthermore, the conditions present within the Project APE are would not be considered suitable for BUOW.

The assessment survey was structured, in part, to detect BUOW. The survey consisted of walking transects spaced to provide 100 percent visual coverage of the Project site. The result of the survey was that no evidence of BUOW was found in the survey area. No BUOW individuals or sign including pellets, feathers or white wash were observed. Per the definition provided in the *2012 CDFG Staff Report on Burrowing Owl Mitigation*, "Burrowing owl habitat generally includes, but is not limited to, short or sparse vegetation (at least at some time of year), presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey." Although the Project site and immediate vicinity does contain short or sparse vegetation and friable soils, the Project APE would not be considered suitable for BUOW for the following reasons:

- *No appropriately sized mammal burrows or burrow surrogates were observed within the Project area during survey; and*
- *No BUOW host burrowers were observed within the Project area during survey.*

Recommendations: Based on the proximity of the Project to past documented occurrences and that PCEs are absent in the Project area, the Project APE is currently not suitable to support BUOW and this species is considered absent from the Project area. No further studies are recommended.

3.2.3 California Native Plant Society Database (CNPS)

According to the CNPS, 20 sensitive plant species have been documented to occur in the *La Habra, Whittier, El Monte* and *Baldwin Park USGS quadrangles*. No sensitive plant species were identified on site during the reconnaissance-level survey. The Project site is mostly devoid of vegetation and due to the disturbed nature of the site, no sensitive plant species are expected to occur within the proposed Project APE. The complete list of sensitive plant species identified by the CNPS Electronic Inventory is provided as an Attachment to this letter report.

3.2.4 Jurisdictional Delineation

The Project site is within an undefined Hydrologic Sub-Area (HSA 405.20), which comprises a 101,715-acre drainage area within the larger San Gabriel Watershed (HUC 18070106). This watershed is primarily within Los Angeles County with a small portion of San Bernardino and Orange Counties. The San Gabriel Watershed is bound on the west by the Los Angeles and Santa Monica Bay Watersheds, on the east by the Santa Ana and Seal Beach Watersheds, on the north by the Antelope-Fremont Valleys and Mojave Watersheds and on the south by the Pacific Ocean. The San Gabriel River is the major hydrogeomorphic feature within the San Gabriel Watershed. The San Gabriel River receives drainage from a 689-square mile area of eastern Los Angeles County and has a main channel length of approximately 58 miles, which originates in the San Gabriel Mountains to the north and empties to the Pacific Ocean at the Los Angeles/Orange Counties boundary in Long Beach. The closest tributary to the San Gabriel River is San

Jose Creek, which flows generally northeast to southwest from the southern foothills of the San Gabriel Mountains and converges with the San Gabriel River approximately 4 miles northwest of the Project site.

Waters of the U.S.

The USACE has authority to permit the discharge of dredged or fill material in waters of the U.S. under Section 404 CWA. WoUS are defined as: "All waters used in interstate or foreign commerce; all interstate waters including interstate wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent and ephemeral streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, where the use, degradation, or destruction of which could affect interstate commerce; impoundments of these waters; tributaries of these waters; or wetlands adjacent to these waters" (Section 404 of the CWA; 33 CFR 328.3 (a). CWA jurisdiction exists over the following:

1. all traditional navigable waters (TNWs);
2. all wetlands adjacent to TNWs;
3. non-navigable tributaries of TNWs that are relatively permanent waters (RPWs) i.e., tributaries that typically flow year-round or have continuous flow at least seasonally; and
4. every water body determined to have a significant nexus with TNWs.

There is one unnamed intermittent stream within the Project APE, which parallels the south side of the existing and proposed water storage facilities. This drainage is classified as a temporarily-flooded intermittent stream that likely has surface water present for only brief periods during growing season, typically immediately following storm events, and would therefore be classified as a non-relatively permanent water (non-RPW) by the USACE. This unnamed intermittent stream originates in the hills immediately adjacent the western end of the Project area and flows generally west to east along the southern boundary of the Project site, before entering the Los Angeles County Storm Drain System approximately 300 feet east of the existing water storage facility. Approximately 3.15 miles northeast (downstream) of the Project site, the County's storm drain system outflows into the San Jose Creek Diversion Channel, which converges with the San Gabriel River approximately 4 miles northwest of the Project site. The San Gabriel River terminates approximately 22.75 miles south (downstream) of the San Jose Creek/San Gabriel River confluence at the Pacific Ocean, a TNW. The unnamed intermittent stream has a surface water connection or "significant nexus" with a TNW, and therefore would be considered a jurisdictional WoUS.

The stream is outside of the Project foot print and no impacts will result to USACE jurisdictional waters of the US.

USACE Wetlands

Areas meeting all three parameters (i.e. hydrophytic vegetation, hydric soils, and wetland hydrology) would be designated as USACE wetlands. There are no areas meeting all three wetland characteristics within the Project APE. Although hydrophytic vegetation, including mulefat, is present within the area of the proposed drainage outlets, hydric soils and wetland hydrology are not present within the Project APE. Therefore, no USACE wetlands were identified in the Project APE during this investigation, based on the absence of hydric soil indicators or wetland hydrology.

State Lake/Streambed

The unnamed intermittent stream meets the criteria of streambed subject to CDFW jurisdiction because defined channel bed and banks and associated riparian vegetation (i.e. mulefat) are present.

The Jurisdictional Delineation Maps (Figures 5 & 6) identify the jurisdictional areas and their geographic relation to the proposed Project footprint. As previously stated, the proposed Project includes the construction of retaining walls and hillside stabilization improvements to divert current drainage problems.

The stream is outside of the Project foot print and no impacts will result to CDFW jurisdictional streambed waters.

3.3 Special Status Species and Habitats

Special Status Species

The Project area lies within the range of several sensitive species including several that have been documented in the Project vicinity (approximately 3 miles), namely: the federally-listed as threatened CAGN and the State- and federally-listed as endangered LBVI. Although Project site is within an already disturbed area consisting almost entirely of bare ground comprised of compacted dirt and gravel, there is some suitable habitat present for these species within the Project APE. Furthermore, CAGN have been documented within approximately 0.5 mile of the Project site and LBVI have been documented approximately 1.5 miles of the Project site. Therefore, either these species must be assumed present (not recommended) within the Project APE, or focused protocol-level surveys (recommended) need to be conducted to determine presence or absence. Regardless, potential Project-related impacts to CAGN and/or LBVI would be considered minimal given that the Project site is within an already disturbed site and mostly within unvegetated bare ground. No suitable CAGN habitat will be removed and any impacts to this species would be indirect. The Project will permanently impact only 0.004 acres of suitable LBVI habitat (i.e. mulefat thicket). Therefore, the Project **may affect, but is not likely to adversely affect** CAGN and LBVI.

USFWS Designated Critical Habitat

The Project APE is not located within or adjacent any USFWS designated Critical Habitat, or otherwise sensitive habitat. Therefore, the proposed Project **will not impact** any sensitive habitat, including USFWS designated Critical Habitat.

Nesting Birds

Vegetation suitable for nesting birds does exist within the Project APE and adjacent areas. As discussed, most birds are protected by the MBTA. In general, impacts to all bird species (common and special status) can be avoided by conducting work outside of the nesting season, which is generally January/February to August/September, and by conducting a worker environmental awareness training. However, if all work cannot be conducted outside of nesting season, a Project-specific Nesting Bird Management Plan can be prepared to determine suitable buffers.

<u>*Recommendations*</u>: Preconstruction Nesting Bird Surveys are recommended prior to the commencement of any Project activities that may occur within the nesting season (February to September), to avoid any potential Project-related impacts to nesting birds within the Project area.

3.4 Jurisdictional Waters

The unnamed intermittent stream is a jurisdictional water feature that is subject to the CWA and FGC under the jurisdictions of USACE, RWQCB, and CDFW respectively.

No Project-related impacts to this intermittent stream will result. Therefore, no regulatroy permits such as a Streambed Alteration Agreement from the CDFW or CWA Sections 401/404 permits from the RWQCB and Corps respectively are required.

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ADDITIONAL TABLES

Table 4. CNDDB Sensitive Species Occurrence Potential

Scientific Name	Common Name	Listing Status	Other Status	Habitat	Occurrence Potential
Accipiter cooperii	Cooper's hawk	None/ None	G5; S4; CDFW: WL	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	Some suitable habitat for this species exists adjacent the Project site. Occurrence potential is **moderate**.
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	None/ None	G5T3; S3; CDFW: WL	Resident in Southern California coastal sage scrub and sparse mixed chaparral. Frequents relatively steep, often rocky hillsides with grass and forb patches.	Some suitable habitat for this species exists adjacent the Project site. Occurrence potential is **moderate**.
Ammodramus savannarum	grasshopper sparrow	None/ None	G5; S3; CDFW: SSC	Dense grasslands on rolling hills, lowland plains, in valleys and on hillsides on lower mountain slopes. Favors native grasslands with a mix of grasses, forbs and scattered shrubs. Loosely colonial when nesting.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.
Antrozous pallidus	pallid bat	None/ None	G5; S3; CDFW: SSC	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	No suitable roosting habitat for this species exists in the Project APE and there is a high level of human disturbance, due to adjacent residential development. Occurrence potential is **low**.
Arizona elegans occidentalis	California glossy snake	None/ None	G5T2; S2; CDFW: SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.
Aspidoscelis tigris stejnegeri	coastal whiptail	None/ None	G5T5; S3; CDFW: SSC	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland and riparian areas. Ground may be firm soil, sandy, or rocky.	Some suitable habitat for this species exists within the Project APE. Occurrence potential is **moderate**.
Athene cunicularia	burrowing owl	None/ None	G4; S3; CDFW: SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.

Scientific Name	Common Name	Listing Status	Other Status	Habitat	Occurrence Potential
Atriplex parishii	Parish's brittlescale	None/ None	G1G2; S1; CNPS: 1B.1	Vernal pools, chenopod scrub, playas. Usually on drying alkali flats with fine soils. 5-1420 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Berberis nevinii	Nevin's barberry	Endangered/ Endangered	G1; S1; CNPS: 1B.1	Chaparral, cismontane woodland, coastal scrub, riparian scrub. On steep, North facing slopes or in low grade sandy washes. 290-1575 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Bombus crotchii	Crotch bumble bee	None/ None	G3G4; S1S2	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include *Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia,* and *Eriogonum*.	Some suitable habitat for this species exists within the Project APE. Occurrence potential is **moderate**.
Buteo swainsoni	Swainson's hawk	None/ Threatened	G5; S3	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	No suitable foraging habitat for this species exists in the Project APE and the breeding population for this species is considered extirpated from the regional vicinity. Occurrence potential is **low**.
California Walnut Woodland		None/ None	G2; S2.1		This habitat does not exist within the Project APE.
Calochortus plummerae	Plummer's mariposa-lily	None/ None	G4; S4; CNPS: 4.2	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. Occurs on rocky and sandy sites, usually of granitic or alluvial material. Can be very common after fire. 60-2500 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Calochortus weedii var. *intermedius*	intermediate mariposa-lily	None/ None	G3G4T2; S2; CNPS: 1B.2	Coastal scrub, chaparral, valley and foothill grassland. Dry, rocky open slopes and rock outcrops. 60-1575 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Calystegia felix	lucky morning-glory	None/ None	GHQ; SH; CNPS: 3.1	Meadows and seeps, riparian scrub. Sometimes alkaline, alluvial. 30-215 m.	Some habitat this species is associated with exists within the Project APE. However, the only documented occurrence within these quads is a historical collection (1902) located approx. 6 miles W of the Project site. Occurrence potential is **low**.
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	None/ None	G5T3Q; S3; CDFW: SSC	Southern California coastal sage scrub. Wrens require tall opuntia cactus for nesting and roosting.	No suitable nesting habitat for this species exists in the Project APE. Occurrence potential is **low**.

Scientific Name	Common Name	Listing Status	Other Status	Habitat	Occurrence Potential
Centromadia parryi ssp. *australis*	southern tarplant	None/ None	G3T2; S2; CNPS: 1B.1	Marshes and swamps (margins), valley and foothill grassland, vernal pools. Often in disturbed sites near the coast at marsh edges; also in alkaline soils sometimes with saltgrass. Sometimes on vernal pool margins. 0-975 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Threatened/ Endangered	G5T2T3; S1	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.
Cuscuta obtusiflora var. *glandulosa*	Peruvian dodder	None/ None	G5T4T5; SH; CNPS: 2B.2	Marshes and swamps (freshwater). Freshwater marsh. 15-280 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Dudleya multicaulis	many-stemmed dudleya	None/ None	G2; S2; CNPS: 1B.2	Chaparral, coastal scrub, valley and foothill grassland. In heavy, often clayey soils or grassy slopes. 15-790 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Empidonax traillii extimus	southwestern willow flycatcher	Endangered/ Endangered	G5T2; S1	Riparian woodlands in Southern California.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.
Emys marmorata	western pond turtle	None/ None	G3G4; S3; CDFW: SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft. elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.
Eumops perotis californicus	western mastiff bat	None/ None	G5T4; S3S4; CDFW: SSC	Many open, semi-arid to arid habitats, including conifer & deciduous woodlands, coastal scrub, grasslands, chaparral, etc. Roosts in crevices in cliff faces, high buildings, trees and tunnels.	Some suitable habitat for this species exists adjacent the Project site. Occurrence potential is **moderate**.
Horkelia cuneata var. *puberula*	mesa horkelia	None/ None	G4T1; S1; CNPS: 1B.1	Chaparral, cismontane woodland, coastal scrub. Sandy or gravelly sites. 15-1645 m.	Some habitat this species is associated with exists within the Project APE. However, the only extant documented occurrence within these quads (1992) is located approx. 9.1 miles N of the Project site. Occurrence potential is **low**.

Scientific Name	Common Name	Listing Status	Other Status	Habitat	Occurrence Potential
Icteria virens	yellow-breasted chat	None/ None	G5; S3; CDFW: SSC	Summer resident; inhabits riparian thickets of willow and other brushy tangles near watercourses. Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forages and nests within 10 ft. of ground.	Some suitable habitat for this species exists adjacent the Project site. Occurrence potential is **moderate**.
Lasiurus cinereus	hoary bat	None/ None	G5; S4	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	Some suitable habitat for this species exists adjacent the Project site. Occurrence potential is **moderate**.
Lasiurus xanthinus	western yellow bat	None/ None	G5; S3; CDFW: SSC	Found in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in trees, particularly palms. Forages over water and among trees.	Some suitable habitat for this species exists adjacent the Project site. Occurrence potential is **moderate**.
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	None/ None	G4T2; S2; CNPS: 1B.1	Coastal salt marshes, playas, vernal pools. Usually found on alkaline soils in playas, sinks, and grasslands. 1-1375 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Lepus californicus bennettii	San Diego black-tailed jackrabbit	None/ None	G5T3T4; S3S4; CDFW: SSC	Intermediate canopy stages of shrub habitats and open shrub/herbaceous and tree/herbaceous edges. Coastal sage scrub habitats in Southern California.	Some suitable habitat for this species exists within the Project APE. Occurrence potential is **moderate**.
Navarretia prostrata	prostrate vernal pool navarretia	None/ None	G2; S2; CNPS: 1B.1	Coastal scrub, valley and foothill grassland, vernal pools, meadows and seeps. Alkaline soils in grassland, or in vernal pools. Mesic, alkaline sites. 3-1235 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Nyctinomops femorosaccus	pocketed free-tailed bat	None/ None	G4; S3; CDFW: SSC	Variety of arid areas in Southern California; pine-juniper woodlands, desert scrub, palm oasis, desert wash, desert riparian, etc. Rocky areas with high cliffs.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.
Nyctinomops macrotis	big free-tailed bat	None/ None	G5; S3; CDFW: SSC	Low-lying arid areas in Southern California. Need high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths.	No suitable roosting habitat for this species exists in the Project APE. Occurrence potential is **low**.
Orcuttia californica	California Orcutt grass	Endangered/ Endangered	G1; S1; CNPS: 1B.1	Vernal pools. 10-660 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Phacelia stellaris	Brand's star phacelia	None/ None	G1; S1; CNPS: 1B.1	Coastal scrub, coastal dunes. Open areas. 3-370 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.

Scientific Name	Common Name	Listing Status	Other Status	Habitat	Occurrence Potential
Phrynosoma blainvillii	coast horned lizard	None/ None	G3G4; S3S4; CDFW: SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	Some suitable habitat for this species exists within the Project APE and this species has been documented approx. 2 miles NW of the Project site. Occurrence potential is **moderate**.
Polioptila californica californica	coastal California gnatcatcher	Threatened/ None	G4G5T2Q; S2; CDFW: SSC	Obligate, permanent resident of coastal sage scrub below 2500 ft. in Southern California. Low, coastal sage scrub in arid washes, on mesas and slopes. Not all areas classified as coastal sage scrub are occupied.	Some suitable habitat for this species exists adjacent the Project site and this species has been documented approx. 0.5 miles SW (2005) and 0.65 miles W (2007) of the Project site. Occurrence potential is **moderate**.
Pseudognaphalium leucocephalum	white rabbit-tobacco	None/ None	G4; S2; CNPS: 2B.2	Riparian woodland, cismontane woodland, coastal scrub, chaparral. Sandy, gravelly sites. 35-515 m.	Some habitat this species is associated with exists within the Project APE. However, the only documented occurrence within these quads is an extirpated historical collection (1881) located approx. 10.5 miles NW of the Project site. Occurrence potential is **low**.
Ribes divaricatum var. *parishii*	Parish's gooseberry	None/ None	G4TX; SX; CNPS: 1A	Riparian woodland. *Salix* swales in riparian habitats. 65-300 m.	The habitats this species is associated with are not present within the Project APE. Occurrence potential is **low**.
Riparia riparia	bank swallow	None/ Threatened	G5; S2	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	No suitable nesting habitat for this species exists in the Project APE. Occurrence potential is **low**.
Riversidian Alluvial Fan Sage Scrub		None/ None	G1; S1.1		This habitat does not exist within the Project APE.
Scutellaria bolanderi ssp. *austromontana*	southern mountains skullcap	None/ None	G4T3; S3; CNPS: 1B.2	Chaparral, cismontane woodland, lower montane coniferous forest. In gravelly soils on streambanks or in mesic sites in oak or pine woodland. 425-2000 m.	The Project area is outside the elevation range for this species. Occurrence potential is **low**.
Spea hammondii	western spadefoot	None/ None	G3; S3; CDFW: SSC	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	No suitable habitat for this species exists in the Project APE. Occurrence potential is **low**.

Scientific Name	Common Name	Listing Status	Other Status	Habitat	Occurrence Potential
Symphyotrichum defoliatum	San Bernardino aster	None/ None	G2; S2; CNPS: 1B.2	Meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland. Vernally mesic grassland or near ditches, streams and springs; disturbed areas. 2-2040 m.	Some habitat this species is associated with exists within the Project APE. However, there are no extant occurrences for this species documented in these quads. Occurrence potential is **low**.
Taxidea taxus	American badger	None/ None	G5; S3; CDFW: SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	No suitable habitat for this species exists in the Project APE for this species, which is highly sensitive to human disturbance. Occurrence potential is **low**.
Vireo bellii pusillus	least Bell's vireo	Endangered/ Endangered	G5T2; S2	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, *Baccharis*, mesquite.	Some suitable habitat for this species exists within the Project APE and this species has been documented approx. 1.5 miles W (2010) of the Project site. Occurrence potential is **moderate**.
Walnut Forest		None/ None	G1; S1.1		This habitat does not exist within the Project APE.

Coding and Terms

E = Endangered T = Threatened C = Candidate FP = Fully Protected SSC = Species of Special Concern R = Rare

State Species of Special Concern: An administrative designation given to vertebrate species that appear to be vulnerable to extinction because of declining populations, limited acreages, and/or continuing threats. Raptor and owls are protected under section 3502.5 of the California Fish and Game code: "It is unlawful to take, possess or destroy any birds in the orders Falconiformes or Strigiformes or to take, possess or destroy the nest or eggs of any such bird."

State Fully Protected: The classification of Fully Protected was the State's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, mammals, amphibians and reptiles. Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.

Global Rankings (Species or Natural Community Level):

G1 = Critically Imperiled – At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2 = Imperiled – At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 = Vulnerable – At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4 = Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 = Secure – Common; widespread and abundant.

Subspecies Level: Taxa which are subspecies or varieties receive a taxon rank (T-rank**)** attached to their G-rank. Where the G-rank reflects the condition of the entire species, the T-rank reflects the global situation of just the subspecies. For example: the Point Reyes mountain beaver, *Aplodontia rufa* ssp. *phaea* is ranked G5T2. The G-rank refers to the whole species range i.e., *Aplodontia rufa.* The T-rank refers only to the global condition of ssp. *phaea*.

State Ranking:

S1 = Critically Imperiled – Critically imperiled in the State because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the State.
S2 = Imperiled – Imperiled in the State because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the State.
S3 = Vulnerable – Vulnerable in the State due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the State.
S4 = Apparently Secure – Uncommon but not rare in the State; some cause for long-term concern due to declines or other factors.
S5 = Secure – Common, widespread, and abundant in the State.

California Rare Plant Rankings (CNPS List):

1A = Plants presumed extirpated in California and either rare or extinct elsewhere.
1B = Plants rare, threatened, or endangered in California and elsewhere.
2A = Plants presumed extirpated in California, but common elsewhere.
2B = Plants rare, threatened, or endangered in California, but more common elsewhere.
3 = Plants about which more information is needed; a review list.
4 = Plants of limited distribution; a watch list.

Threat Ranks:

.1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 = Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
.3 = Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

FIGURES

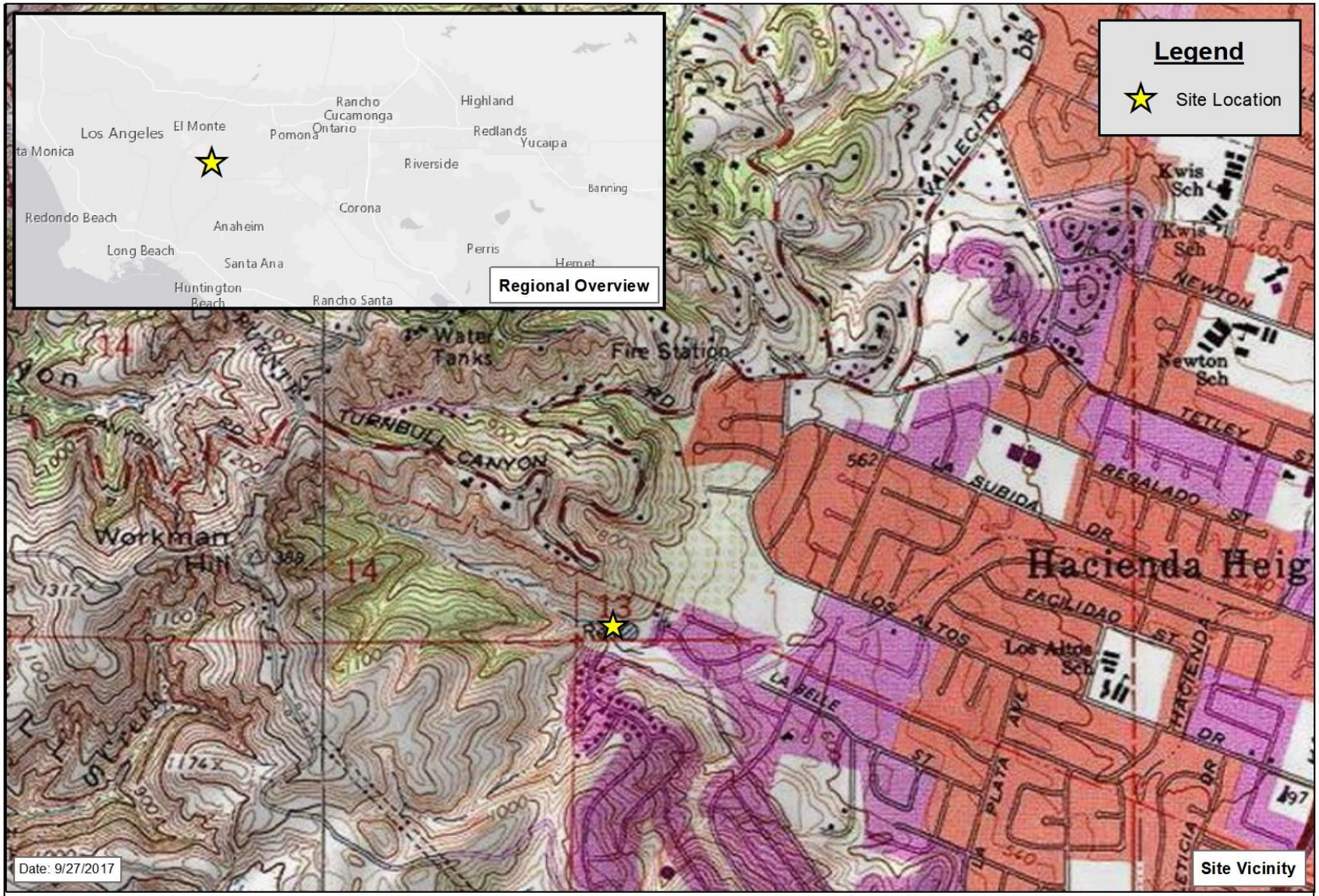
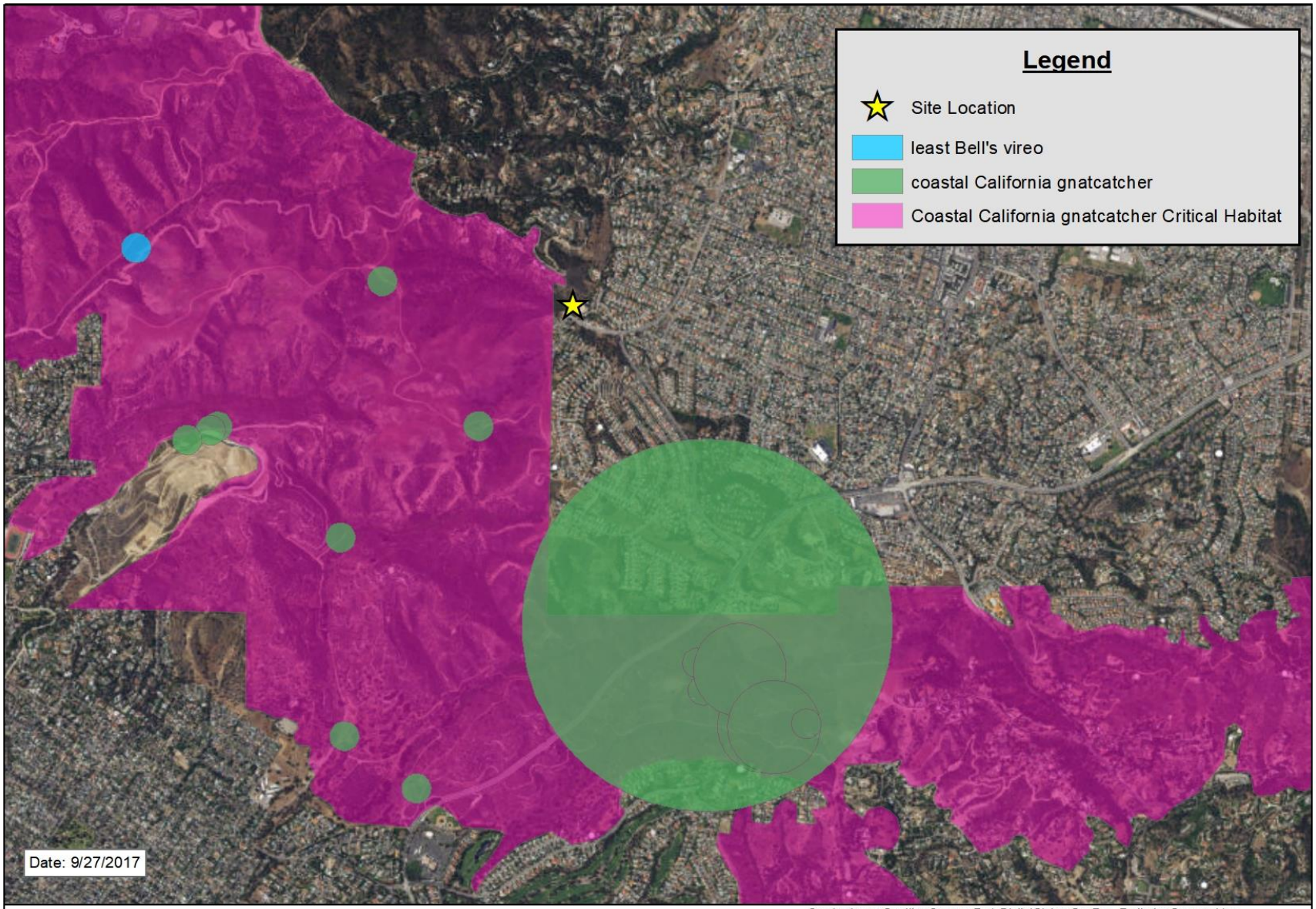


Figure 1 - Regional Overivew and Site Vicinity

B-14 Well
San Gabriel Valley Water Company


Legend
Site Location
least Bell's vireo
coastal California gnatcatcher
Coastal California gnatcatcher Critical Habitat
Date: 9/27/2017
0 1,250 2,500 5,000 7,500 10,000
Feet
Imagery Date:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
1 inch = 2,563 feet
Figure 2 - USFWS Species Occurrence and Critical Habitat Overlay
B-14 Well
San Gabriel Valley Water Company



0 0.005 0.01 0.02 0.03 0.04 Miles

1 inch = 67 feet

Imagery Date: 8/6/2017

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

Figure 3
Jurisdictional Water Limits

B-14 Well
San Gabriel Valley Water Company

SITE PHOTOGRAPHS



Photo 1. Looking south from the northern corner of the Project site. Existing water storage facility on the left.



Photo 2. Looking north from the southern corner of the Project site.



Photo 3. Looking northwest from the southern corner of the Project site. Adjacent unnamed drainage on the left.



Photo 4. Looking southeast from the western corner of the Project site. Adjacent unnamed drainage on the right.



Photo 5. Looking southwest at unnamed drainage from western corner of the Project site, where rip rap outfall protection will be installed at bottom of existing concrete slope.



Photo 6. Looking northwest from southern bank of unnamed drainage, where outfall structure will be constructed, and rip rap outfall protection will be installed.

Appendix A

Regulatory Framework

Federal Endangered Species Act (ESA)

The U.S. Fish and Wildlife Service (USFWS) administers the federal ESA of 1973. The ESA provides a legal mechanism for listing species as either threatened or endangered, and a process of protection for those species listed. Section 9 of the ESA prohibits "take" of threatened or endangered species. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. "Take" can include adverse modification of habitats used by a threatened or endangered species during any portion of its life history. Under the regulations of the ESA, the USFWS may authorize "take" when it is incidental to, but not the purpose of, an otherwise lawful act. Take authorization can be obtained under Section 7 or Section 10 of the act.

California Endangered Species Act (CESA)

The CDFW, formerly Fish and Game, administers the State CESA. The State of California considers an endangered species one whose prospects of survival and reproduction are in immediate jeopardy. A threatened species is one present in such small numbers throughout its range that it is likely to become an endangered species soon, in the absence of special protection or management. And a rare species is one present in such small numbers throughout its range that it may become endangered if its present environment worsens. Rare species applies to California native plants. Further, all raptors and their nests are protected under Section 3503.5 of the California Fish and Game Code (FGC). Species that are California fully protected include those protected by special legislation for various reasons, such as the California condor. Species of Special Concern (SSC) is an informal designation used by CDFW for some declining wildlife species that are not proposed for listing as threatened or endangered. This designation does not provide legal protection, but signifies that these species are recognized as sensitive by CDFW.

Migratory Bird Treaty Act (MBTA)

Nesting birds are protected under the federal Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C 703-711). The MBTA provides protection for nesting birds that are both residents and migrants whether or not they are considered sensitive by resource agencies. The MBTA prohibits take of nearly all native birds. The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed under 50 CFR 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). The direct injury or death of a migratory bird, due to construction activities or other construction-related disturbance that causes nest abandonment, nestling abandonment, or forced fledging would be considered take under federal law. The USFWS, in coordination with the CDFW administers the MBTA. CDFW's authoritative nexus to MBTA is provided in FGC Sections 3503.5 which protects all birds of prey and their nests and FGC Section 3800 which protects all non-game birds that occur naturally in the State.

Clean Water Act (CWA)

The CWA is the principal federal law that governs pollution in the nation's lakes, rivers, and coastal waters. Originally enacted in 1972 as a series of amendments to the Federal Water Pollution Control Act of 1948, the Act was last amended in 1987. The overriding purpose of the CWA is to "restore and maintain the chemical, physical and biological integrity of the nation's waters." The statute employs a variety of regulatory and non-regulatory tools to eliminate the discharge of pollutants into the nation's waters and achieve water quality that is both "swimmable and fishable".

Under Section 404 of the CWA, the Corps has primary federal responsibility for administering regulations

that concern the discharge of dredged or fill material into WoUS (including wetlands). WoUS are defined as: "All waters used in interstate or foreign commerce; all interstate waters including interstate wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent and ephemeral streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, where the use, degradation, or destruction of which could affect interstate commerce; impoundments of these waters; tributaries of these waters; or wetlands adjacent to these waters" (Section 404 of the CWA; 33 CFR 328).

The limit of the Corps jurisdiction for non-tidal waters (including non-tidal perennial and intermittent watercourses and tributaries to such watercourses) in the absence of adjacent wetlands is defined by the ordinary high water mark (OHWM). The OHWM is defined as: "The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (Section 404 of the CWA; 33 CFR 328). Wetlands are defined as: "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Section 404 of the CWA; 33 CFR 328).

Porter-Cologne Water Quality Control Act (Porter-Cologne)

The Porter-Cologne Water Quality Control Act (Porter-Cologne) is the principal State law that governs water protection efforts in California. Porter-Cologne establishes the State Water Resources Control Board (SWRCB) and each of the nine Regional Water Quality Control Boards (RWQCBs) as the principal state agencies for coordinating and controlling water quality in California. The RWQCB's regulatory jurisdiction is pursuant to Section 401 of the Federal CWA. The RWQCB typically regulates discharges of dredged or fill material into WoUS. However, they also have regulatory authority over waste discharges into Waters of the State, which may be isolated, under Porter-Cologne. In the absence of a nexus with the Corps, the RWQCB requires the submittal of a Waste Discharge Requirement (WDR) application, which must include a copy of the project Storm Water Pollution Prevention Plan (SWPPP) and a copy of the project Water Quality Management Plan (WQMP), otherwise called a Standard Urban Stormwater Management Plan (SUSMP). The RWQCB's role is to ensure that disturbances in the stream channel do not cause water quality degradation.

California Fish and Game Code (FGC)

Sections 1600 to 1616 of the California FGC require any person, state, or local government agency or public utility to notify the CDFW before beginning any activity that will substantially modify a river, stream, or lake. If it is determined that the activity could substantially adversely impact an existing fish and wildlife resource, then a Lake or Streambed Alteration Agreement is required.

Like the Corps and RWQCB, the CDFW also regulates discharges of dredged or fill material. The regulatory jurisdiction of CDFW is much broader however, than Corps or RWQCB jurisdictions. CDFW regulates **all** activities that alter streams and lakes and their associated habitats. The CDFW, through provisions of the FGC Sections 1601-1603 is empowered to issue agreements for any alteration of a river, stream, or lake where fish or wildlife resources may be adversely affected. Streams (and rivers) are defined by the presence of a channel bed and banks and at least an intermittent flow of water. The CDFW typically extends the limits of their jurisdiction laterally beyond the channel banks for streams that support riparian vegetation. In these situations, the outer edge of the riparian vegetation is generally used as the lateral extent of the stream and CDFW jurisdiction. CDFW regulates wetland areas only to the extent that those wetlands are a part of a river, stream, or lake as defined by CDFW.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Los Angeles County, California



Local office

Carlsbad Fish And Wildlife Office

(760) 431-9440
(760) 431-5901

2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385

http://www.fws.gov/carlsbad/

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Coastal California Gnatcatcher *Polioptila californica californica* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8178	Threatened
Least Bell's Vireo *Vireo bellii pusillus* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/5945	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service[3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured. Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

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Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are USFWS Birds of Conservation Concern that might be affected by activities in this location. The list does not contain every bird you may find in this location, nor is it guaranteed that all of the birds on the list will be found on or near this location. To get a better idea of the specific locations where certain species have been reported and their level of occurrence, please refer to resources such as the E-bird data mapping tool (year-round bird sightings by birders and the general public) and Breeding Bird Survey (relative abundance maps for breeding birds). Although it is important to try to avoid and minimize impacts to all birds, special attention should be given to the birds on the list below. To get a list of all birds potentially present in your project area, visit the E-bird Explore Data Tool.

NAME	BREEDING SEASON
Allen's Hummingbird Selasphorus sasin https://ecos.fws.gov/ecp/species/9637	Breeds Feb 1 to Jul 15
Ashy Storm-petrel Oceanodroma homochroa https://ecos.fws.gov/ecp/species/7237	Breeds May 1 to Jan 15
Black Oystercatcher Haematopus bachmani https://ecos.fws.gov/ecp/species/9591	Breeds Apr 15 to Oct 31
Black Skimmer Rynchops niger https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Black Swift Cypseloides niger https://ecos.fws.gov/ecp/species/8878	Breeds Jun 15 to Sep 10
Black Turnstone Arenaria melanocephala	Breeds elsewhere
Black-chinned Sparrow Spizella atrogularis https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31
Burrowing Owl Athene cunicularia https://ecos.fws.gov/ecp/species/9737	Breeds Mar 15 to Aug 31
California Spotted Owl Strix occidentalis occidentalis https://ecos.fws.gov/ecp/species/7266	Breeds Mar 10 to Jun 15
California Thrasher Toxostoma redivivum	Breeds Jan 1 to Jul 31
Common Yellowthroat Geothlypis trichas sinuosa https://ecos.fws.gov/ecp/species/2084	Breeds May 20 to Jul 31
Costa's Hummingbird Calypte costae https://ecos.fws.gov/ecp/species/9470	Breeds Jan 15 to Jun 10
Gull-billed Tern Gelochelidon nilotica https://ecos.fws.gov/ecp/species/9501	Breeds May 1 to Jul 31
Lawrence's Goldfinch Carduelis lawrencei https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
Le Conte's Thrasher toxostoma lecontei https://ecos.fws.gov/ecp/species/8969	Breeds Feb 15 to Jun 20
Lewis's Woodpecker Melanerpes lewis https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30

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Long-billed Curlew Numenius americanus https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere
Marbled Godwit Limosa fedoa https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Mountain Plover Charadrius montanus https://ecos.fws.gov/ecp/species/3638	Breeds elsewhere
Nuttall's Woodpecker Picoides nuttallii https://ecos.fws.gov/ecp/species/9410	Breeds Apr 1 to Jul 20
Oak Titmouse Baeolophus inornatus https://ecos.fws.gov/ecp/species/9656	Breeds Mar 15 to Jul 15
Red Knot Calidris canutus ssp. roselaari https://ecos.fws.gov/ecp/species/8880	Breeds elsewhere
Rufous Hummingbird selasphorus rufus https://ecos.fws.gov/ecp/species/8002	Breeds elsewhere
Short-billed Dowitcher Limnodromus griseus https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Snowy Plover Charadrius alexandrinus	Breeds Mar 5 to Sep 15
Song Sparrow Melospiza melodia pusillula https://ecos.fws.gov/ecp/species/3509	Breeds Feb 20 to Sep 5
Spotted Towhee Pipilo maculatus clementae https://ecos.fws.gov/ecp/species/4243	Breeds Apr 15 to Jul 20
Tricolored Blackbird Agelaius tricolor https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Whimbrel Numenius phaeopus https://ecos.fws.gov/ecp/species/9483	Breeds elsewhere
White Headed Woodpecker Picoides albolarvatus https://ecos.fws.gov/ecp/species/9411	Breeds May 1 to Aug 15

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in your project's counties during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

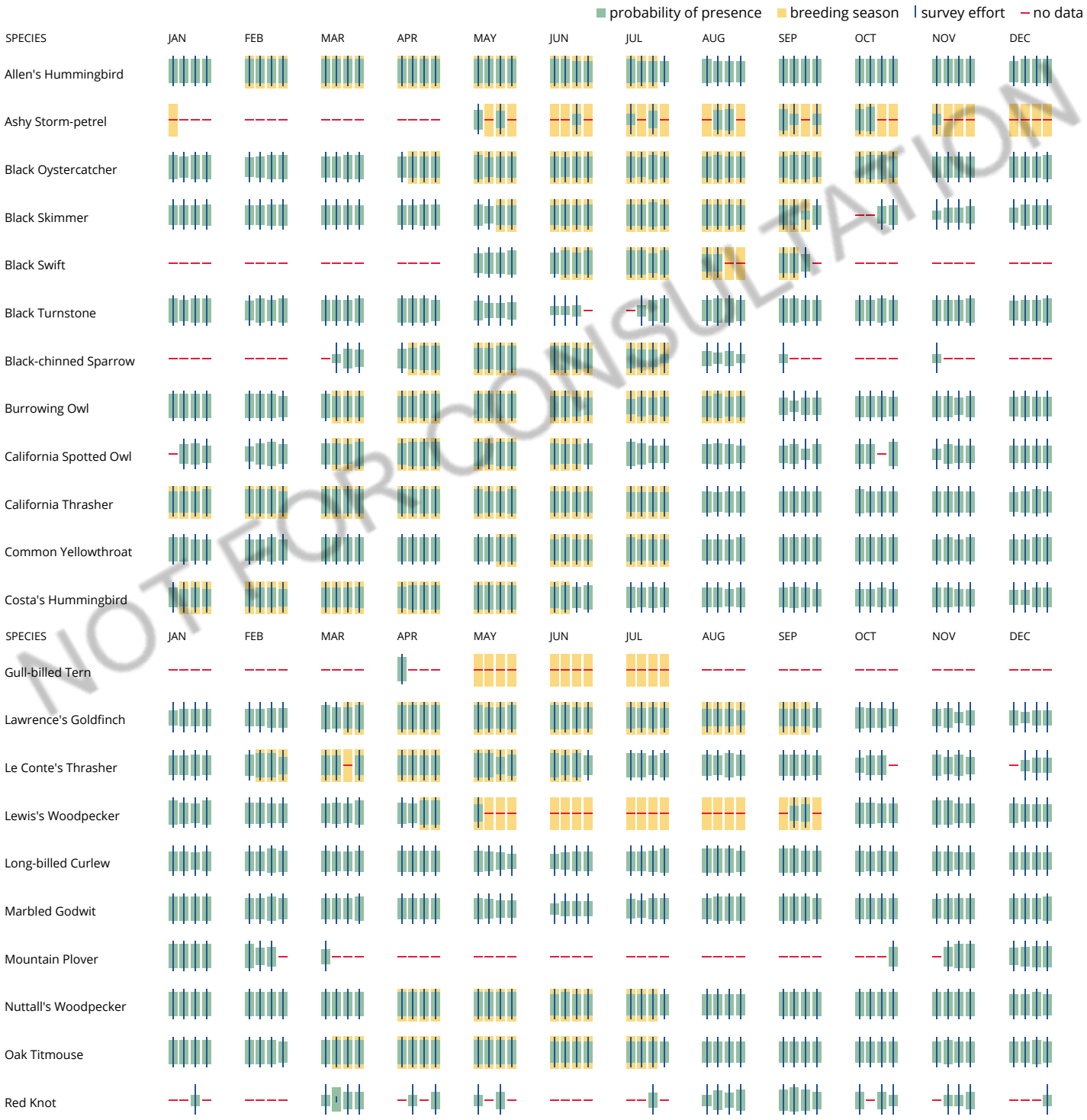
Breeding Season (▪)
Yellow bars denote when the bird breeds in the Bird Conservation Region(s) in which your project lies. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the counties of your project area. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

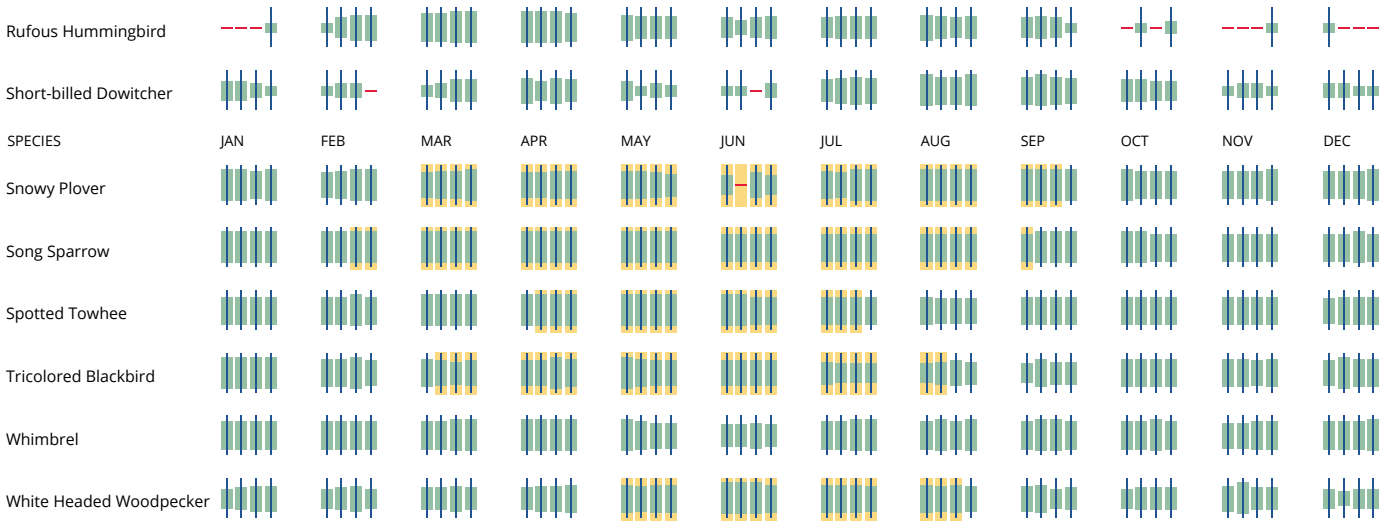
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information.



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Such measures are particularly important when birds are most likely to occur in the project area. To see when birds are most likely to occur in your project area, view the Probability of Presence Summary. Special attention should be made to look for nests and avoid nest destruction during the breeding season. The best information about when birds are breeding can be found in Birds of North America (BNA) Online under the "Breeding Phenology" section of each species profile. Note that accessing this information may require a subscription. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) that might be affected by activities in your project location. These birds are of priority concern because it has been determined that without additional conservation actions, they are likely to become candidates for listing under the Endangered Species Act (ESA).

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets. The AKN list represents all birds reported to be occurring at some level throughout the year in the counties in which your project lies. That list is then narrowed to only the Birds of Conservation Concern for your project area.

Again, the Migratory Bird Resource list only includes species of particular priority concern, and is not representative of all birds that may occur in your project area. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird entry on your migratory bird species list indicates a breeding season, it is probable the bird breeds in your project's counties at some point within the time-frame specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Facilities

Wildlife refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGES AT THIS LOCATION.

Fish hatcheries

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THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (La Habra (3311788) OR Whittier (3311881) OR El Monte (3411811) OR Baldwin Park (3411718))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Aimophila ruficeps canescens southern California rufous-crowned sparrow	ABPBX91091	None	None	G5T3	S3	WL
Ammodramus savannarum grasshopper sparrow	ABPBXA0020	None	None	G5	S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Arizona elegans occidentalis California glossy snake	ARADB01017	None	None	G5T2	S2	SSC
Aspidoscelis tigris stejnegeri coastal whiptail	ARACJ02143	None	None	G5T5	S3	SSC
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Atriplex parishii Parish's brittlescale	PDCHE041D0	None	None	G1G2	S1	1B.1
Berberis nevinii Nevin's barberry	PDBER060A0	Endangered	Endangered	G1	S1	1B.1
Bombus crotchii Crotch bumble bee	IIHYM24480	None	None	G3G4	S1S2	
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
California Walnut Woodland California Walnut Woodland	CTT71210CA	None	None	G2	S2.1	
Calochortus plummerae Plummer's mariposa-lily	PMLIL0D150	None	None	G4	S4	4.2
Calochortus weedii var. intermedius intermediate mariposa-lily	PMLIL0D1J1	None	None	G3G4T2	S2	1B.2
Calystegia felix lucky morning-glory	PDCON040P0	None	None	GHQ	SH	3.1
Campylorhynchus brunneicapillus sandiegensis coastal cactus wren	ABPBG02095	None	None	G5T3Q	S3	SSC
Centromadia parryi ssp. australis southern tarplant	PDAST4R0P4	None	None	G3T2	S2	1B.1
Coccyzus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
Cuscuta obtusiflora var. glandulosa Peruvian dodder	PDCUS01111	None	None	G5T4T5	SH	2B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Dudleya multicaulis many-stemmed dudleya	PDCRA040H0	None	None	G2	S2	1B.2
Empidonax traillii extimus southwestern willow flycatcher	ABPAE33043	Endangered	Endangered	G5T2	S1	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Eumops perotis californicus western mastiff bat	AMACD02011	None	None	G5T4	S3S4	SSC
Horkelia cuneata var. puberula mesa horkelia	PDROS0W045	None	None	G4T1	S1	1B.1
Icteria virens yellow-breasted chat	ABPBX24010	None	None	G5	S3	SSC
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Lasiurus xanthinus western yellow bat	AMACC05070	None	None	G5	S3	SSC
Lasthenia glabrata ssp. coulteri Coulter's goldfields	PDAST5L0A1	None	None	G4T2	S2	1B.1
Lepus californicus bennettii San Diego black-tailed jackrabbit	AMAEB03051	None	None	G5T3T4	S3S4	SSC
Navarretia prostrata prostrate vernal pool navarretia	PDPLM0C0Q0	None	None	G2	S2	1B.1
Nyctinomops femorosaccus pocketed free-tailed bat	AMACD04010	None	None	G4	S3	SSC
Nyctinomops macrotis big free-tailed bat	AMACD04020	None	None	G5	S3	SSC
Orcuttia californica California Orcutt grass	PMPOA4G010	Endangered	Endangered	G1	S1	1B.1
Phacelia stellaris Brand's star phacelia	PDHYD0C510	None	None	G1	S1	1B.1
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
Polioptila californica californica coastal California gnatcatcher	ABPBJ08081	Threatened	None	G4G5T2Q	S2	SSC
Pseudognaphalium leucocephalum white rabbit-tobacco	PDAST440C0	None	None	G4	S2	2B.2
Ribes divaricatum var. parishii Parish's gooseberry	PDGRO020F3	None	None	G4TX	SX	1A
Riparia riparia bank swallow	ABPAU08010	None	Threatened	G5	S2	
Riversidian Alluvial Fan Sage Scrub Riversidian Alluvial Fan Sage Scrub	CTT32720CA	None	None	G1	S1.1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Scutellaria bolanderi ssp. austromontana	PDLAM1U0A1	None	None	G4T3	S3	1B.2
southern mountains skullcap						
Spea hammondii	AAABF02020	None	None	G3	S3	SSC
western spadefoot						
Symphyotrichum defoliatum	PDASTE80C0	None	None	G2	S2	1B.2
San Bernardino aster						
Taxidea taxus	AMAJF04010	None	None	G5	S3	SSC
American badger						
Vireo bellii pusillus	ABPBW01114	Endangered	Endangered	G5T2	S2	
least Bell's vireo						
Walnut Forest	CTT81600CA	None	None	G1	S1.1	
Walnut Forest						

Record Count: 46

CNPS California Native Plant Society **Inventory of Rare and Endangered Plants**

Plant List

20 matches found. *Click on scientific name for details*

Search Criteria
Found in Quads 3411811, 3411718 3311788 and 3311881;

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Remove Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank	Photo
Berberis nevinii	Nevin's barberry	Berberidaceae	perennial evergreen shrub	(Feb)Mar-Jun	1B.1	S1	G1	 2006 Chris Wagner, SBNF
Calochortus catalinae	Catalina mariposa lily	Liliaceae	perennial bulbiferous herb	(Feb)Mar-Jun	4.2	S4	G4	 2005 Noah Elhardt
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	perennial bulbiferous herb	May-Jul	4.2	S4	G4	 2009 Thomas Stoughton
Calochortus weedii var. intermedius	intermediate mariposa lily	Liliaceae	perennial bulbiferous herb	May-Jul	1B.2	S2	G3G4T2	 2009 Halleh Paymard

Calystegia felix	lucky morning-glory	Convolvulaceae	annual rhizomatous herb	Mar-Sep	3.1	SH	GHQ	 2013 Anuja Parikh and Nathan Gale
Centromadia parryi ssp. australis	southern tarplant	Asteraceae	annual herb	May-Nov	1B.1	S2	G3T2	 2003 Lynn Watson
Convolvulus simulans	small-flowered morning-glory	Convolvulaceae	annual herb	Mar-Jul	4.2	S4	G4	 2012 Neal Kramer
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	Convolvulaceae	annual vine (parasitic)	Jul-Oct	2B.2	SH	G5T4T5	no photo available
Dudleya multicaulis	many-stemmed dudleya	Crassulaceae	perennial herb	Apr-Jul	1B.2	S2	G2	 2001 Jeffrey Crain
Horkelia cuneata var. puberula	mesa horkelia	Rosaceae	perennial herb	Feb-Jul(Sep)	1B.1	S1	G4T1	 2011 Chris Winchell
Juglans californica	Southern California black walnut	Juglandaceae	perennial deciduous tree	Mar-Aug	4.2	S3	G3	

								 2003 Michael Charters
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	1B.1	S2	G4T2	 2003 Dean Wm. Taylor
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2	G2	 2007 Janell Hillman
Phacelia ramosissima var. austrolitoralis	south coast branching phacelia	Hydrophyllaceae	perennial herb	Mar-Aug	3.2	S3	G5?T3	no photo available
Phacelia stellaris	Brand's star phacelia	Hydrophyllaceae	annual herb	Mar-Jun	1B.1	S1	G1	 2007 Halleh Paymard
Pseudognaphalium leucocephalum	white rabbit-tobacco	Asteraceae	perennial herb	(Jul)Aug-Nov(Dec)	2B.2	S2	G4	 2015 Anuja Parikh and Nathan Gale
Quercus engelmannii	Engelmann oak	Fagaceae	perennial deciduous tree	Mar-Jun	4.2	S3	G3	

								 2015 Keir Morse
Ribes divaricatum var. parishii	Parish's gooseberry	Grossulariaceae	perennial deciduous shrub	Feb-Apr	1A	SX	G4TX	no photo available
Scutellaria bolanderi ssp. austromontana	southern mountains skullcap	Lamiaceae	perennial rhizomatous herb	Jun-Aug	1B.2	S3	G4T3	 2013 Ron Vanderhoff
Symphyotrichum defoliatum	San Bernardino aster	Asteraceae	perennial rhizomatous herb	Jul-Nov	1B.2	S2	G2	 2009 Bob Allen

Suggested Citation

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 11 October 2017].

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APPENDIX 3
(CONFINDENTIAL)

APPENDIX 4

Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

UPDATED GEOTECHNICAL STUDY REPORT
San Gabriel Valley Water Company Plant B14
Proposed 1.2 Million Gallon Reservoir
West End of Camino Del Tomasini
Hacienda Heights, Los Angeles County, California

Converse Project No. 14-31-303-02

Prepared For:

San Gabriel Valley Water Company
15966 Arrow Route
Fontana, California 92335

Prepared By:

Converse Consultants
717 South Myrtle Avenue
Monrovia, California 91016

July 19, 2017

Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

July 19, 2017

Mr. Kristofer Olsen, PE
Chief Engineer
Engineering Department
San Gabriel Valley Water Company
15966 Arrow Route
Fontana, California 92335

Subject: **UPDATED GEOTECHNICAL STUDY REPORT**
San Gabriel Valley Water Company Plant B14
Proposed 1.2 Million Gallon Reservoir B14B
West End of Camino Del Tomasini
Hacienda Heights, Los Angeles County, California
Converse Project No. 14-31-303-02

Dear Mr. Olsen:

Converse Consultants (Converse) is pleased to present this Updated Geotechnical Study Report for the San Gabriel Valley Water Company Plant B14 site in Hacienda Heights, Los Angeles County, California.

The purpose of the study was to investigate the geotechnical site conditions and provide recommendations for the proposed 1.2 million gallon buried concrete water storage reservoir No. B14B and associated site improvements at the above-referenced project site.

Our services were performed in accordance with our proposal dated March 23, 2017. This geotechnical study report updates our original Geotechnical Study Report for the original proposed reservoir dated March 4, 2015.

Based on our field exploration, laboratory testing, geologic evaluation and geotechnical analysis, the site is suitable from a geotechnical standpoint for the proposed project, provided that our conclusions and recommendations are implemented during design and construction.

We appreciate the opportunity to be of continued service to the San Gabriel Valley Water Company. If you should have any questions, please do not hesitate to contact us at (626) 930-1275.

CONVERSE CONSULTANTS

Siva K. Sivathasan, PhD, PE, GE, DGE, QSD, F. ASCE
Senior Vice President / Principal Engineer

Dist: 4/Addressee

REGISTERED PROFESSIONAL ENGINEER
KATHIRAVETPILLAI SIVATHASAN
No 2708
Exp 6-30-18
GEOTECHNICAL
STATE OF CALIFORNIA

717 South Myrtle Avenue, Monrovia, California 91016
Telephone: (626) 930-1200 ♦ Facsimile: (626) 930-1212 ♦ www.converseconsultants.com

PROFESSIONAL CERTIFICATION

This updated report for the San Gabriel Valley Water Company at the Plant B14 site located in Hacienda Heights, Los Angeles County, California, has been prepared by the staff of Converse Consultants under the professional supervision of the individuals whose seals and signatures appear hereon.

The findings, recommendations, specifications or professional opinions contained in this report were prepared in accordance with generally accepted professional engineering and engineering geologic principles and practice in this area of Southern California. There is no warranty, either expressed or implied.

In the event that changes to the property occur, or additional, relevant information about the property is brought to our attention, the conclusions contained in this report may not be valid unless these changes and additional relevant information are reviewed and the recommendations of this report are modified or verified in writing.

Parameswaran Ariram, EIT
Senior Staff Engineer



Mark B. Schluter, PG, CEG, CHG
Senior Engineering Geologist



Siva K. Sivathasan, PhD, PE, GE, DGE, QSD, F. ASCE
Senior Vice President / Principal Engineer

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EXECUTIVE SUMMARY

The following is a summary of our updated geotechnical investigation, conclusions and recommendations, as presented in the body of this report. Please refer to the appropriate sections of this report for complete conclusions and recommendations. In the event of a conflict between this summary and the report, or an omission in the summary, the report shall prevail.

- The subject site is located at the west end of Camino Del Tomasini and Valdemar Drive in the community of Hacienda Heights, Los Angeles County, California. It is our understanding that the planned development on the site will be a single new 1.2 million gallon buried concrete water storage reservoir measuring approximately 80 feet in diameter and 32 feet high and associated improvements. The bottom elevation of the new reservoir will founded at approximate elevation 694.5 feet similar to that of existing concrete reservoir B14A.

- Two (2) exploratory borings (BH-5 through BH-6) were drilled within the project site on June 26, 2017. One boring (Boring BH-6) was drilled to evaluate the foundation bedrock materials for the new proposed reservoir tank and the other (Boring BH-5) was a 10-foot deep boring drilled at the proposed infiltration site location for percolation testing. The borings were advanced using a truck mounted drill rig with 8-inch diameter hollow stem augers to depths ranging from 10 to 51.5 feet below the existing ground surface (bgs).

- There are no known active faults projecting toward or extending across the proposed site. The project site is not located within a currently designated State of California Earthquake Fault Zone (formerly Alquist-Priolo Special Studies Zones) for surface fault rupture. The project site is located approximately 250 feet north of the mapped trace of the Workman Hill fault.

- The site is located within a mapped Seismic Hazard Zone for liquefaction. Liquefaction analyses were performed for the upper 50 feet below ground surface utilizing BH-6. The results of liquefaction analyses indicate the project site is not susceptible to liquefaction. The estimated potential liquefaction induced settlement is on the order of 0.26 inches with potential differential settlement of 0.13 inches.

- Groundwater was not encountered in our exploratory borings to a maximum depth of 51.5 feet. Groundwater is not anticipated during construction, however, localized perched groundwater seepage may be encountered during excavations.

- Undocumented fill soils up to 5 feet bgs were encountered in the borings. The undocumented fill is not considered suitable for slab or foundation support.

- The surficial site soils at the site exhibit a “Very Low” expansive potential. Mitigation for expansive soil is not considered necessary. However, any on-site clayey soils with

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an expansion index exceeding 20 should not be re-used for compaction within 2 feet below the proposed foundations.

- Based on our review of soil corrosivity test results (see Appendix B), the soluble sulfate concentration, chloride content and pH are not in the corrosive range to concrete in accordance with the Caltrans Corrosive Guidelines (2012). The minimum saturated resistivity is in the corrosive range to ferrous metal. Protections of underground metal pipe should be considered.

- The earth materials at the site should be excavatable with conventional heavy-duty earth moving equipment. The on-site materials contain gravels up to 3 inches in maximum dimension. Earthwork should be performed with suitable equipment for gravelly materials.

- Based on the proposed plan, cut-and-fill grading operations are required to achieve the planned finished grades.

- No shallow foundation should be supported on both bedrock and engineered fill in order to minimize the effect of differential settlement.

- Different earth materials should be anticipated at excavation bottoms for the planned storage reservoir. In order to provide a relative uniform bearing material below the foundations, over-excavation and re-compaction of two (2) feet below the bottom of foundations and slab-on-grades are recommended. We recommend the foundations should be supported on a minimum 2 feet of compacted fill blanket benched into native materials for the storage reservoir.

- Shallow spread, continuous and ring footings are considered suitable for structure support provided the recommendations in this report are incorporated into the project plans and specifications and are followed during site construction.

Results of our investigation indicate that the site is suitable from a geotechnical standpoint for the proposed development, provided that the recommendations contained in this report are incorporated into the design and construction of the project.

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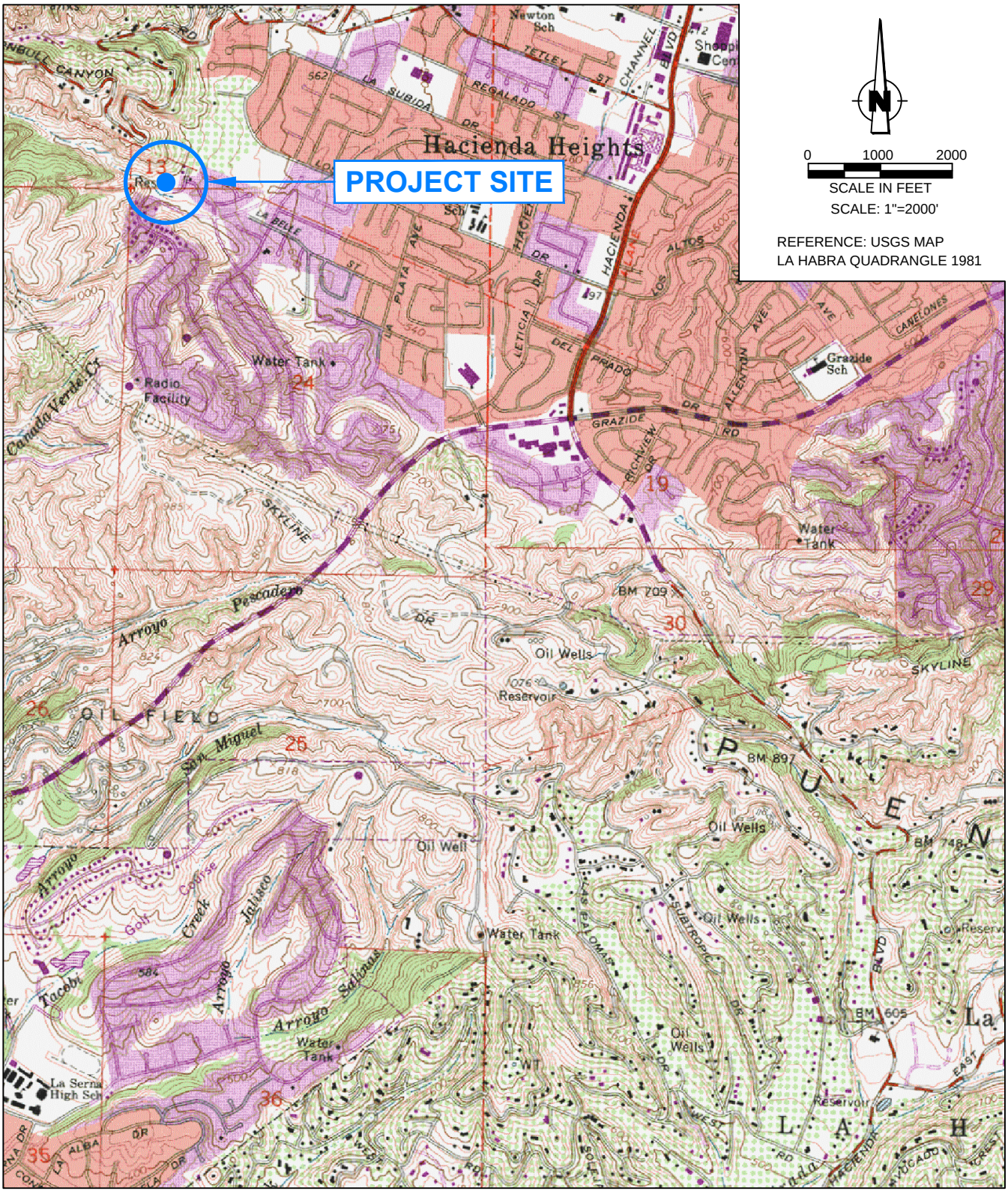
1.0 INTRODUCTION

This report contains the findings and recommendations of our updated geotechnical study performed for the planned water storage reservoir and site improvements at the San Gabriel Valley Water Company Plant B14 Site in Hacienda Heights, California, as shown on Drawing No. 1, *Site Location Map.*

The purpose of the study was to evaluate the subsurface soil, sedimentary bedrock and site stability conditions and provide geotechnical recommendations of the proposed project, including current standard of practice seismic and geotechnical engineering interpretations.

This report presents geologic and geotechnical recommendations for the project described herein is intended for use solely by the San Gabriel Valley Water Company and their design team. This report should not be used as a bidding document but may be made available to the potential contractors for information on factual data only. For bidding purposes, the contractors should be responsible for making their own interpretation of the data contained in this report.

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SITE LOCATION MAP

SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No.
14-31-303-02

Drawing No.
1

Converse Consultants

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2.0 SITE AND PROJECT DESCRIPTION

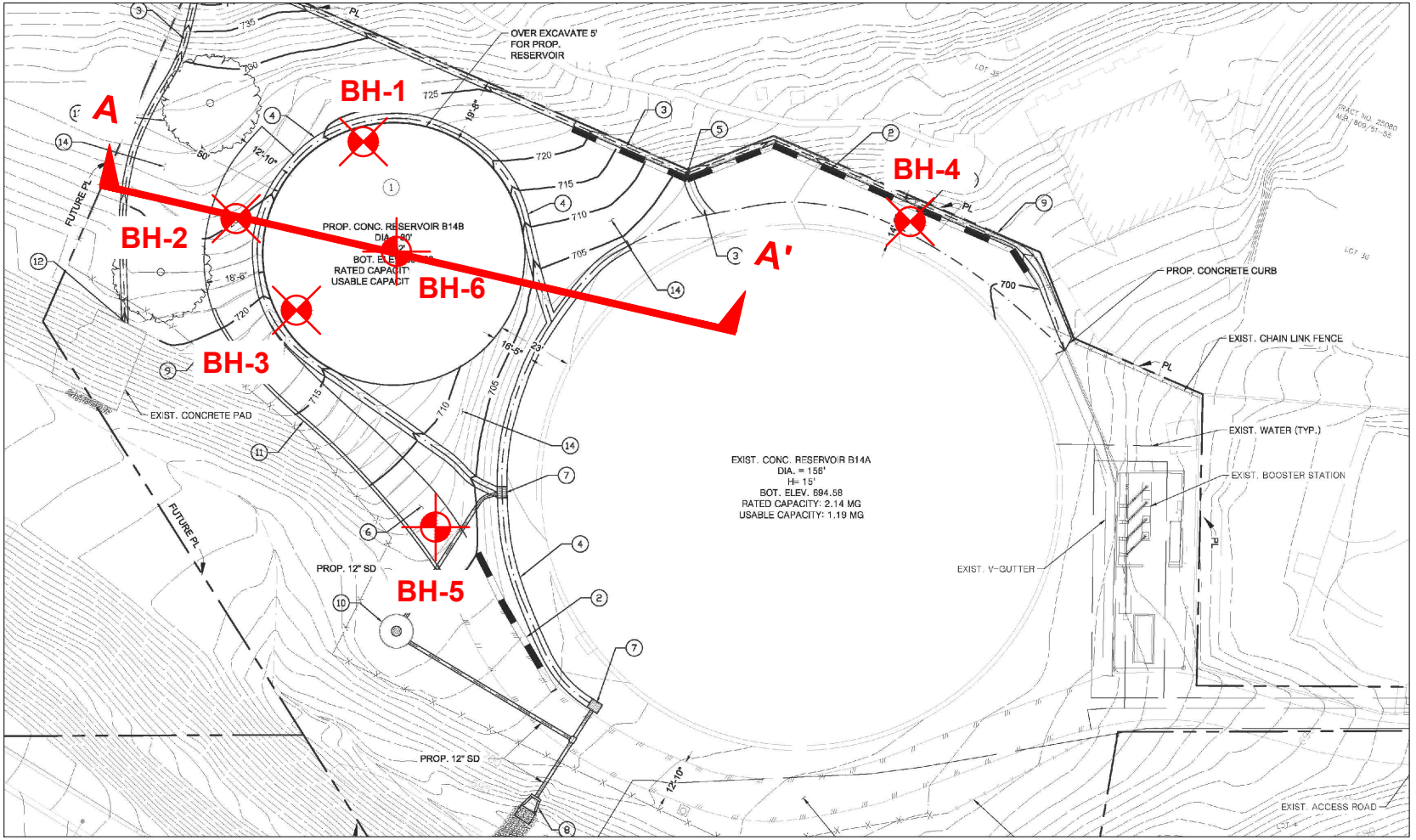
2.1 Site Description

The subject site is located at the west end of Camino Del Tomasini and Valdemar Drive in the community of Hacienda Heights, Los Angeles County, California. An existing 2.14 MG concrete water storage Reservoir B14A is located on the eastern portion of the project site. Reservoir B14A is approximately 156 feet in diameter and 15 feet in height with a usable capacity of approximately 1.19 million gallons. Along with this reservoir, a booster pump station lies on the eastern portion of the site with an existing access road along the southern portion of the site. The project site is located approximately 695 feet to 730 feet above mean sea level (MSL). The coordinates of the subject site are North Latitude: 33.9999; and West Longitude: 117.9920. The plot plan of the project site is shown on Drawing No. 2, *Site Plan and Boring Location Map.*

2.2 Project Description

Based on the information provided by the San Gabriel Valley Water Company, it is our understanding the planned development on the site will be the addition of a new 1.2 MG buried concrete water storage reservoir measuring approximately 80 feet in diameter and 32 feet high, and associated improvements constructed on the western portion of the project site as shown on Drawing No. 2, *Site Plan and Boring Location Map.* The proposed tank will be located northwest and upslope of the existing 2.14 MG Reservoir B14A. The bottom of the new buried concrete reservoir will be founded at approximate elevation 694.5 feet similar to that of existing concrete reservoir B14A. The structural loads are anticipated to be moderate to high.

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LEGEND

- APPROXIMATE LOCATION OF BORING (2017)
- APPROXIMATE LOCATION OF BORING (2015)
- GEOLOGIC CROSS SECTION

N

0 50 100

APPROXIMATE SCALE IN FEET

SITE PLAN AND BORING LOCATION MAP

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SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. 14-31-303-02

Drawing No. 2

3.0 SCOPE OF WORK

The scope of our present study includes a review of the existing site plan, site reconnaissance, subsurface exploration, soil sampling, laboratory testing, preliminary engineering analysis, and preparation of this report. Details of the tasks are addressed in the following sections:

3.1 Site Reconnaissance

As a part of our project set-up task, available published geotechnical and geologic data were reviewed for the project area to ascertain regional geologic and groundwater conditions, and to screen for potential geologic hazards.

Converse representatives also visited the site prior to drilling to assess the site accessibility for drilling equipment, and to mark the boring locations. Site access was coordinated with the SGVWC representative on June 22, 2017. Boring locations were marked within the proposed site. Underground Service Alert of Southern California was notified of our proposed drilling locations more than 48 hours in advance of the field work.

3.2 Subsurface Exploration and Percolation Testing

Four (4) exploratory borings (BH-1 through BH-4) were drilled within the project site on January 8, 2015. The borings were advanced using a truck mounted drill rig with 8-inch diameter hollow stem augers to depths ranging from 22.5 to 51.5 feet below existing ground surface (bgs). Each boring was visually logged by a Converse engineer and sampled at regular intervals and at changes in subsurface soils. Detailed descriptions of the field exploration and sampling program are presented in Appendix A, Field Exploration.

Two (2) additional exploratory borings (BH-5 through BH-6) were drilled within the project site on June 26, 2017. The borings were advanced using a truck mounted drill rig with 8-inch diameter hollow stem augers to depths ranging from 10 to 51.5 feet below the existing ground surface (bgs). The 10-foot deep boring (Boring BH-5) was also utilized for percolation testing. Each boring was visually logged by a Converse engineer and sampled at regular intervals and at changes in subsurface soils. Detailed descriptions of the field exploration and sampling program are presented in Appendix A, *Field Exploration*.

California Modified Sampler (Ring samples), Standard Penetration Test samples, and bulk soil samples were obtained for laboratory testing. Standard Penetration Tests (SPTs) were performed in selected borings at selected intervals using a standard (1.4 inches inside diameter and 2.0 inches outside diameter) split-barrel sampler. The bore holes were backfilled and compacted with soil cuttings by reverse spinning of the auger following the completion of drilling and patched with rapid set concrete or asphalt where necessary to match existing conditions.

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The approximate locations of the exploratory borings are shown in Drawing No. 2, *Site Plan and Boring Location Map* and Drawing No. 3, *Geologic Cross Section A-A'*. Detailed descriptions of the field exploration and sampling program are presented in Appendix A, *Field Exploration*.

3.3 Laboratory Testing

Representative samples of the site soils were tested in the laboratory to aid in the classification and to evaluate relevant engineering properties. The tests performed included:

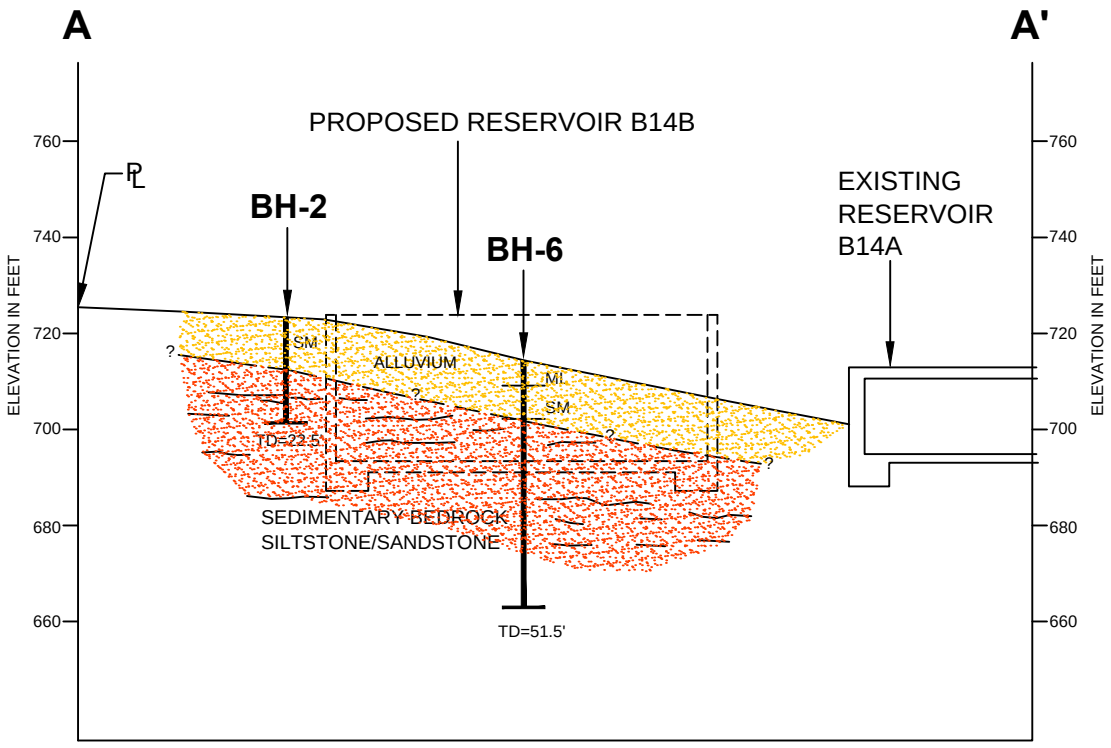
- In situ moisture contents and dry densities (ASTM Standard D2216)
- Grain Size Distribution (ASTM Standard C136)
- Percent finer than Sieve No. 200 (ASTM Standard D1140)
- Maximum dry density and optimum-moisture content relationship (ASTM Standard D1557)
- Direct shear (ASTM Standard D3080)
- Consolidation (ASTM Standard D2435)
- Soil corrosivity tests (Caltrans 643, 422, 417, and 532)

For a description of the laboratory test methods and test results, see Appendix B, *Laboratory Testing Program*. For *in-situ* moisture and density data, see the Logs of Borings in Appendix A, *Field Exploration*.

3.4 Engineering Analyses and Report

Data obtained from the exploratory fieldwork and laboratory-testing program were analyzed and evaluated. This report was prepared to provide the findings, conclusions and recommendations developed during our investigation and evaluation.

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PROFILE
VERTICAL: 1"=40'
HORIZONTAL: 1"=40'

GEOLOGIC CROSS SECTION A-A'

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SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. 14-31-303-02

Drawing No. 3

4.0 GEOLOGIC CONDITIONS

4.1 Regional Geologic Setting

The subject site is located in the northern Puente Hills along the southeastern edge of the San Gabriel Basin within the Transverse Ranges geomorphic province of California. The Geologic Map of the Whittier and La Habra Quadrangle prepared by Thomas W. Dibblee, Jr. (DF-74, dated March, 2001) was reviewed. The map shows the location of project site is located on a hillside consisting of sedimentary bedrock of Sycamore Canyon Formation as shown on Drawing No. 4, *Regional Geologic Map* (map symbol "Tscg" and "Tscs"). The bedrock bedding structure dips northward and eastward at approximately 30 to 47 degrees. No faults are shown running through or projecting through the project site.

4.2 Subsurface Profile of Subject Site

The earth materials encountered during our investigation consist of existing fill soils placed during previous site grading operations, natural alluvial soils and sedimentary bedrock of the Sycamore Canyon Formation to a maximum depth of 51.5 feet bgs. Undocumented fills, up to 5 feet in thickness were encountered in the borings. Deeper artificial fill may exist at the site. The fill encountered consists primarily of silty sand. The alluvial soil deposits below the fill primarily consist of silty sand, clayey sand and sandy clay. The bedrock beneath the fill consists of sandstone and sandstone pebble conglomerate of the Sycamore Canyon Formation (Tscs,Tscg). Sampling blow-counts correlate to moderately dense conditions near surface, and generally become denser with depth.

4.3 Groundwater

Groundwater was not encountered in our exploratory borings to a maximum depth of 51.5 feet. In accordance with the Seismic Hazard Zone Report for the La Habra Quadrangle (CDMG, 1997), the historically highest groundwater level is reported at depths of approximately 25 feet. Groundwater is not anticipated to be encountered during construction.

Wet weather periods may produce groundwater seepage in the bedrock fractures and along less permeable layers from infiltration of rainfall, surface flow and runoff and should be anticipated during grading and construction. In general, groundwater levels fluctuate with the seasons. Groundwater conditions below any given site vary depending on numerous factors including seasonal rainfall, local irrigation, storm water infiltration and groundwater pumping, among other factors. The regional groundwater table is not expected to be encountered during the planned construction. However, the possibility of perched groundwater or local seepage encountered during future grading and excavation cannot be completely precluded.

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0 1000 2000

SCALE IN FEET

SCALE: 1"=2000'

WHITTIER AND LA HABRA QUADRANGLES
(Western Puente Hills)
MAP DF-74
LEGEND

af / Qg / Qa

SURFICIAL SEDIMENTS
undissected alluvial deposits
af *artificial fill, some recent areas may not be shown*
Qg *gravel and sand of major stream channels*
Qa *alluvial gravel, sand and silt of valleys and floodplains*

Qls

LANDSLIDE DEBRIS
see also landslides mapped by Tan, 1998

Qae / Qoa

OLDER SURFICIAL SEDIMENTS
Qae *slightly elevated and locally dissected alluvial gravel and sand, on north side of Puente Hills*
Qoa *elevated, dissected remnants of alluvial sand and gravel*

--UNCONFORMITY--

Qlhc / Qlh

LA HABRA FORMATION
(of Yerkes, 1972)
terrestrial, weakly indurated; Pleistocene age, includes Coyote Hills Formation of Yerkes, 1972 (in Coyote Hills)
Qlh *tan to light gray sandstone and pebble conglomerate, vaguely bedded; includes abundant siliceous shale pebbles south of Puente Hills;* **Qlhc** *similar to* **Qlh**, *but includes interbedded siltstone in middle part of unit*

-LOCAL UNCONFORMITY-

Qsp

SAN PEDRO FORMATION
(of Yerkes, 1972, in Coyote Hills)
shallow marine clastic, weakly indurated; early Pleistocene age
Qsp *sandstone, tan to light gray, soft, vaguely bedded, contains molluscan fossils, locally pebbly; base unexposed*

Tfs / Tf / Tfr

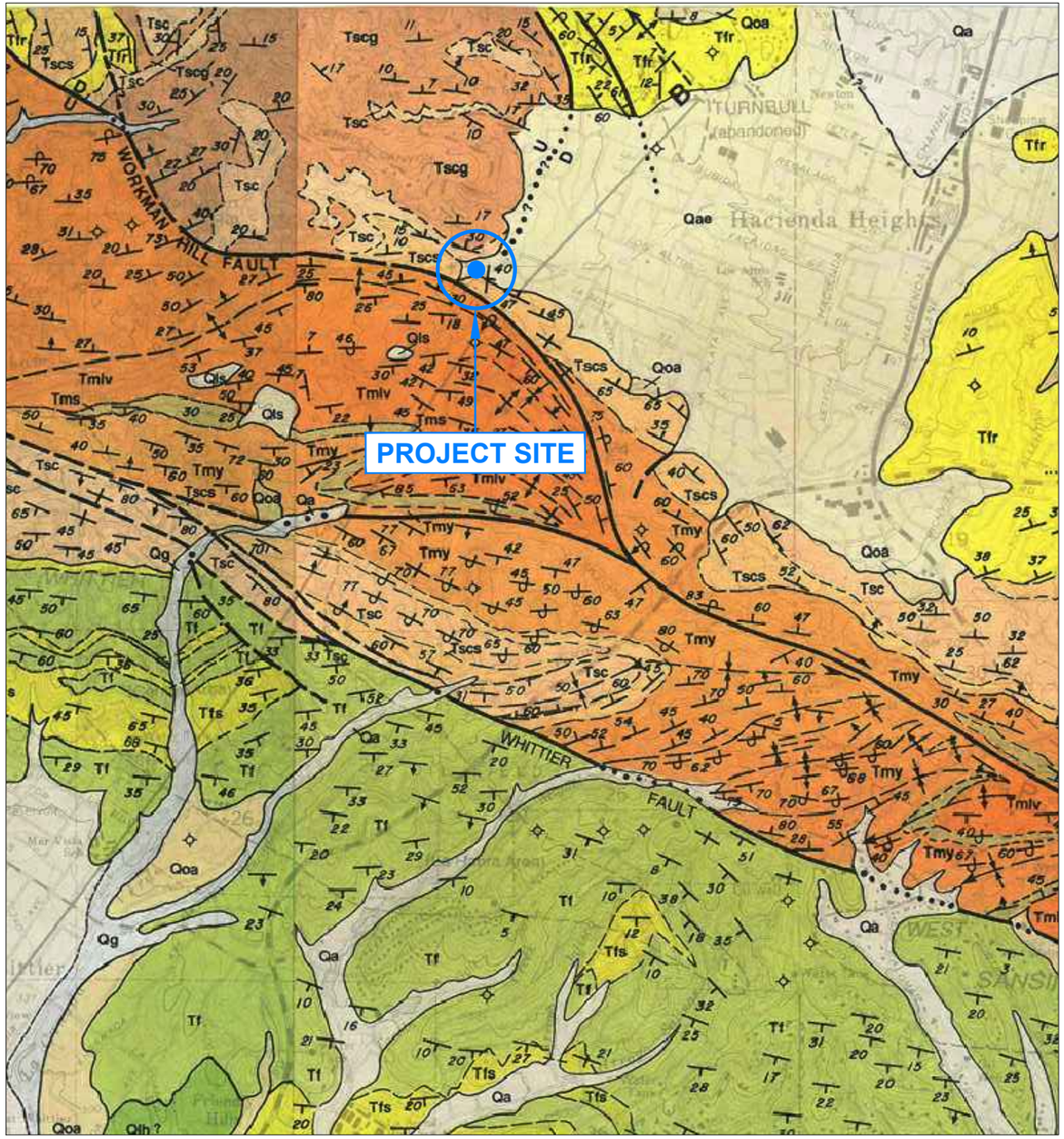
FERNANDO FORMATION
(of Daviess and Woodford, 1949; Yerkes, 1972)
mostly marine clastic, weakly indurated; Pliocene to early Pleistocene age
Tfs ***sandstone facies:*** *light gray, weathers light brown, fine to coarse-grained, bedded, locally fossiliferous; includes pebble conglomerate; locally includes minor gray siltstone*
Tf ***siltstone to claystone facies:*** *gray, vaguely bedded, commonly finely sandy, micaceous, locally includes thin layers of sandstone*
Tfr *similar to and equivalent to* **Tf**, *but commonly assigned to "Repetto" Stage, early Pliocene, in northwest Puente Hills (Dibblee 1999)*

Tsc / Tscs / Tscg

SYCAMORE CANYON FORMATION
(named by Daviess and Woodford, 1949, as uppermost member of Puente Formation; adopted by Durham and Yerkes, 1964, and Yerkes, 1972, in Puente Hills; equivalent to "Unnamed Shale" in Los Angeles quad [map DF-23, Dibblee, 1989], and to Sisquoc Formation in Ventura basin)
mostly marine clastic, moderately indurated; late Miocene age
Tsc ***gray silty clay shale:*** *micaceous, vaguely bedded to locally thin bedded, nodular, in places includes thin layers of fine-grained sandstone*
Tscs ***mostly sandstone:*** *rusty-brown, coarse to fine-grained, arkosic, contains minor conglomerate similar to* **Tscc**
Tscg ***conglomerate and sandstone:*** *gray to rusty brown conglomerate, crudely bedded, composed of cobbles and pebbles of mostly light-colored granitic rocks and others of gray quartz diorite, gneiss, a few of andesitic porphyry and quartzite, in arkosic sandstone matrix; sandstone rusty brown, lenticular, coarse to fine-grained, arkosic*

Tmy / Tmss / Tms / Tmlv

MONTEREY FORMATION
(major part of Puente Fm. of Eldridge and Arnold, 1907; Daviess and Woodford, 1949; Yerkes, 1972)
marine biogenic and clastic, moderately lithified; middle Miocene age, Molnian Stage
Tmy ***Yorba Shale Member:*** *thin-bedded, white-weathering, platy, siliceous, to light gray, semi-siliceous to silty, locally with thin layers of fine-grained sandstone; locally includes few thin layers of hard, yellowish-gray dolomite*
Tmss ***Soquel Sandstone Member and facies:*** *mostly bedded sandstone, light gray, weathering tan, mostly medium-grained, arkosic, locally ranging to coarse, pebbly, with minor biotite; includes minor silty clay shale*
Tmlv La Vida Shale Member: *thin-bedded, cream-white weathering, platy, siliceous to semi-siliceous shale, with some thin layers of gray siltstone, also some layers of hard, yellow-gray dolomite, and thin layers of sandstone; + + + + + = thin tuff bed (of Yerkes, 1972)*
Tms *unassigned sandstone; similar to unit* **Tmss**
Tm *unassigned shale; similar to units* **Tmlv** & **Tmy**



REFERENCE: THOMAS W. DIBBLE, JR.
WHITTIER AND LA HABRA QUADRANGLE
(WESTERN PUENTE HILLS) 2001

REGIONAL GEOLOGIC MAP

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SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. 14-31-303-02

Drawing No. 4

4.4 Subsurface Variations

Based on results of the subsurface exploration and our experience with the subject area, some variations in the continuity and nature of subsurface conditions within the project site are anticipated. Because of the uncertainties involved in the nature and depositional characteristics of the earth material at the site, care should be exercised in interpolating or extrapolating subsurface conditions between or beyond the boring locations. If, during construction, subsurface conditions different from those presented in this report are encountered, this office should be notified immediately so that recommendations can be modified, if necessary.

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5.0 FAULTING AND SEISMIC HAZARDS

Geologic hazards are defined as geologically related conditions that may present a potential danger to life and property. Typical geologic hazards in Southern California include ground shaking, fault surface rupture, landslides, and earthquake-related phenomena including liquefaction and tsunamis.

Results of a site-specific evaluation for each type of possible seismic hazards are discussed in the following sections.

5.1 Fault Surface Rupture and Active Faults

The project site is not located within a currently designated State of California Earthquake Fault Zone (Alquist-Priolo Special Studies Zones) for surface fault rupture. No surface faults are known to project through or towards the site. The closest known fault to the project site with a mappable surface expression is the Workman Hill Fault which converges with the active Whittier Fault to the south in the Puente Hills as shown on Drawing No. 4, *Regional Geologic Map*. The mapped trace of the Workman Hill Fault is located approximately 250 feet south of the project site. The Workman Hill Fault is currently not delineated by the California Geologic Survey with earthquake fault zone boundaries that encompass active faults such as the Whittier Fault.

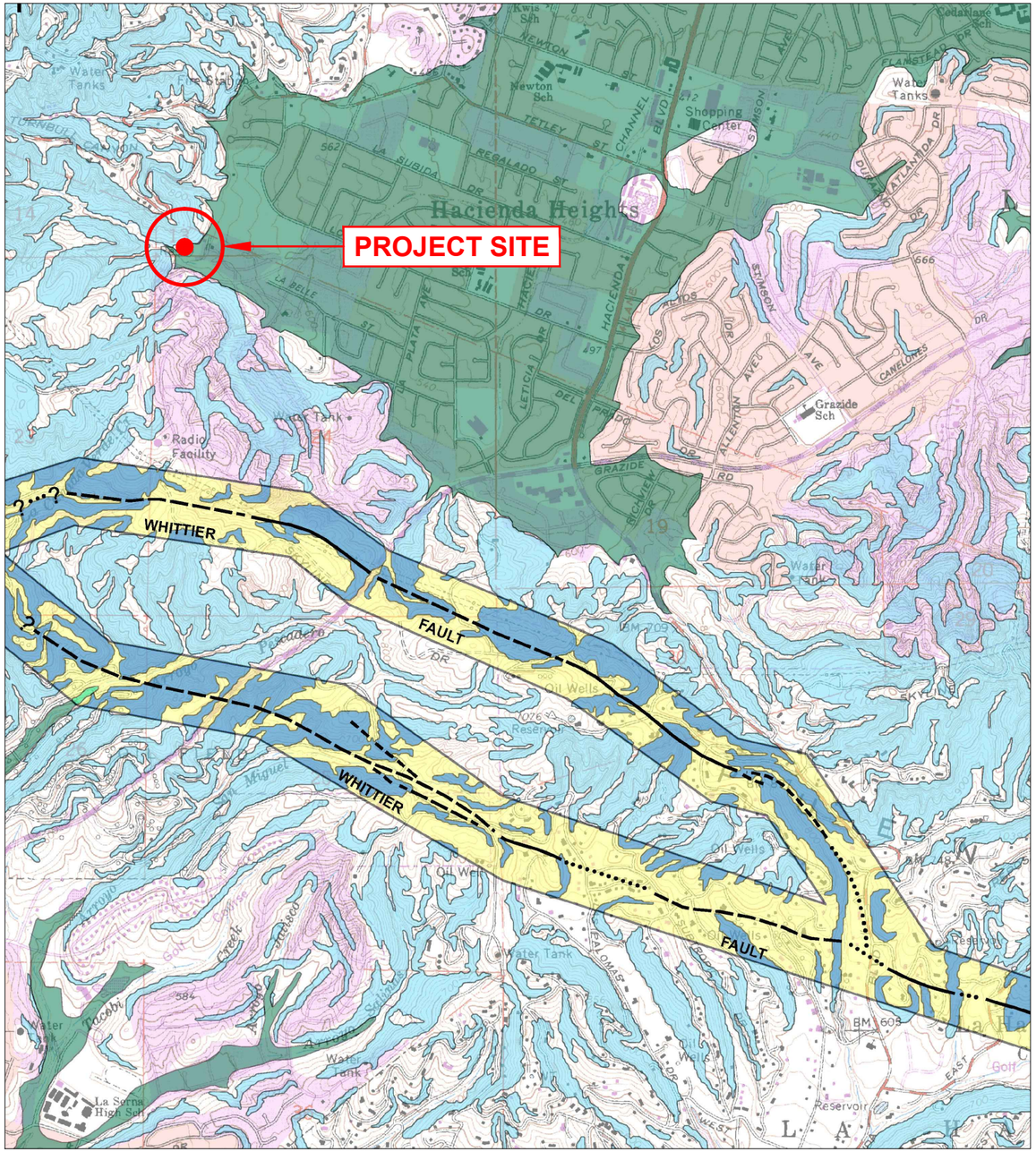
The mapped trace of the active Whittier fault is located approximately 0.70 miles south of the project site along the southern flank of the Puente Hills. The location of the Whittier fault with respect to the project site is shown on Drawing No. 5, *Seismic Hazard and Earthquake Fault Zone Map*. The Whittier fault is considered part of the Elsinore fault system, which is one of the major right-lateral strike slip faults of the Pennisular Ranges geomorphic province. The Elsinore fault splits northwestward into the Chino fault and westward into the Whittier fault near the City of Corona. The Whittier fault is considered capable of producing a Mw 6.8 earthquake.

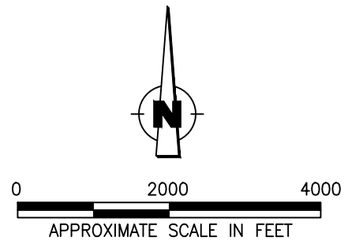
5.2 Liquefaction Potential and Seismically-Induced Settlement

Liquefaction is the sudden decrease in the strength of cohesionless soils due to dynamic or cyclic shaking. Saturated soils behave temporarily as a viscous fluid (liquefaction) and, consequently, lose their capacity to support the structures founded on them. The potential for liquefaction decreases with increasing clay and gravel content, but increases as the ground acceleration and duration of shaking increase. Liquefaction potential has been found to be the greatest where the groundwater level and loose sands occur within 50 feet of the ground surface.

According to the State of California Seismic Hazard Zones Map, the site is partially located within an area of potential liquefaction as shown on Drawing No. 5, *Seismic Hazard and Earthquake Fault Zone Map*. Liquefaction analyses were performed using *LiquefyPro,* Version 5.8n, 2012, by Civil Tech Software for the upper 50 feet below ground

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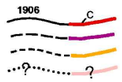




MAP EXPLANATION

ALQUIST-PRIOLO EARTHQUAKE FAULT ZONES

Earthquake Fault Zones
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.



Active Fault Traces
Faults considered to have been active during Holocene time and to have potential for surface rupture: Solid Line in Black or Red where Accurately Located; Long Dash in Black or Solid Line in Purple where Approximately Located; Short Dash in Black or Solid Line in Orange where Inferred; Dotted Line in Black or Solid Line in Rose where Concealed; Query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

SEISMIC HAZARD ZONES

Liquefaction Zones
Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslide Zones
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

OVERLAPPING ALQUIST-PRIOLO AND SEISMIC HAZARD ZONES

Overlap of Earthquake Fault Zone and Liquefaction Zone
Areas that are covered by both Earthquake Fault Zone and Liquefaction Zone.

Overlap of Earthquake Fault Zone and Earthquake-Induced Landslide Zone
Areas that are covered by both Earthquake Fault Zone and Earthquake-Induced Landslide Zone.

Note: Mitigation methods differ for each zone –
AP Act only allows avoidance; Seismic Hazard Mapping Act allows mitigation by engineering/geotechnical design as well as avoidance.

REFERENCE: CALIFORNIA GEOLOGICAL SURVEY
ALQUIST-PRIOLO EARTHQUAKE FAULT ZONES AND SEISMIC HAZARD ZONES FOR THE LA HABRA QUADRANGLE

SEISMIC HAZARD AND EARTHQUAKE FAULT ZONE MAP

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SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. 14-31-303-02

Drawing No. 5

surface utilizing BH-6. The results of the liquefaction analysis and a summary of the methods used are presented in Appendix C, *Liquefaction/Seismic Settlement Analysis*.

The results of liquefaction analyses indicate the project site is not susceptible to liquefaction. The estimated potential seismically induced settlement is on the order of 0.91 inches with potential differential settlement of approximately 0.46 inches. The project structural engineer should consider the effects of seismically-induced settlement in the foundation design.

5.3 Landslides

The project site is located along the edge of a zone for an earthquake-induced landslide zones as shown on Drawing No. 5, *Seismic Hazard and Earthquake Fault Zone Map*.

A number of landslides and slope stability problems have been reported in the surrounding residential developments. These landslides and slope stability problems have been associated with above normal rainfall years and the increased infiltration of water into the underlying earth materials. There has been a direct correlation between heavy rainfall years and slope stability problems. Marginally stable slope areas become unstable with increased water infiltration. Most earth movement problems are generally associated with water and site drainage. Good surface drainage should be maintained around the reservoir pad and on the adjoining slopes to prevent ponding of water and subsequent infiltration of water into the underlying earth materials.

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6.0 SEISMIC ANALYSIS

6.1 CBC Seismic Design Parameters

Seismic parameters based on the 2016 California Building Code are calculated using the United States Geological Survey *U.S. Seismic Design Maps* website application and the site coordinates (33.9900 degrees North Latitude, 117.9922 degrees West Longitude). The seismic parameters are presented below.

Table No. 1, CBC Seismic Design Parameters

Seismic Parameters	2016 CBC
Site Class	C
Mapped Short period (0.2-sec) Spectral Response Acceleration, S_S	2.264 g
Mapped 1-second Spectral Response Acceleration, S_1	0.811 g
Site Coefficient (from Table 1613.5.3(1)), F_a	1.0
Site Coefficient (from Table 1613.5.3(2)), F_v	1.3
MCE 0.2-sec period Spectral Response Acceleration, S_{MS}	2.264 g
MCE 1-second period Spectral Response Acceleration, S_{M1}	1.055 g
Design Spectral Response Acceleration for short period, S_{DS}	1.509 g
Design Spectral Response Acceleration for 1-second period, S_{D1}	0.703 g
Seismic Design Category	E

6.2 Site-Specific Ground Motion Response Spectrum

The subject site is located in a Seismic Hazard Zone. Based on 2016 CBC Section 1616A.1.3, a site-specific ground motion analysis is required. A site-specific response spectrum was developed for the project for a Maximum Considered Earthquake (MCE), defined as a horizontal peak ground acceleration that has a 2 percent probability of being exceeded in 50 years (return period of approximately 2,475 years). Active faults were evaluated. The controlling sources were determined to be the Puente Hills Fault, with an MCE of Mw 6.3 and a deterministic peak ground acceleration (PGA) of 0.877 g.

In accordance with ASCE 7-10, Section 21.2 the site specific response spectra can be taken as the lesser of the probabilistic maximum rotated component of MCE ground motion and the 84th percentile of deterministic maximum rotated component of MCE ground motion response spectra. The design response spectra can be taken as 2/3 of site-specific MCE response spectra, but should not be lower than 80 percent of CBC general response spectra. The risk coefficient CR has been incorporated at each spectral response period for which the acceleration was computed in accordance with ASCE 7-10, Section 21.2.1.1.

The 2016 CBC mapped acceleration parameters are provided in the following table. These parameters were determined using the United States Geological Survey *U.S.*

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Seismic Design Maps website application, and in accordance with ASCE 7-10 Sections 11.4, 11.6, 11.8 and 21.2.

Table No. 2, 2016 CBC Mapped Acceleration Parameters

Site Class	C	Seismic Design Category	IV
S_s	2.264	C_{RS}	0.924
S_1	0.811	C_{R1}	0.943
F_a	1	**0.08 F_v/F_a**	0.104
F_v	1.3	**0.4 F_v/F_a**	0.520
S_{MS}	2.264	T_0	0.093
S_{M1}	1.054	T_S	0.466
S_{DS}	1.509	T_L	8
S_{D1}	0.703		

A site-specific response analysis, using faults within 200 kilometers of the site, was developed using the computer program EZ-FRISK (Risk Engineering, 2012) and the 2008 USGS Fault Model database. Attenuation relationships proposed by Boore and Atkinson, Campbell and Bozorgnia, Chiou and Youngs were used in the analysis. These attenuation relationships are based on Next Generation Attenuation (NGA) project model. Maximum rotated components were determined using Huang (2008) method. An average shear wave velocity at upper 30 meters of soil profile (Vs30) of 540 meters per second, depth to bedrock of with a shear wave velocity 1,000 meters per second at 50 meters below grade, and depth of bedrock where the shear wave velocity is 3,500 meters per second at 3,000 meters below grade were selected for use in our analysis.

The probabilistic response spectrum results and peak ground acceleration for each attenuation relationship are presented in the following table.

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Table No. 3, Site-Specific Response Spectrum Data

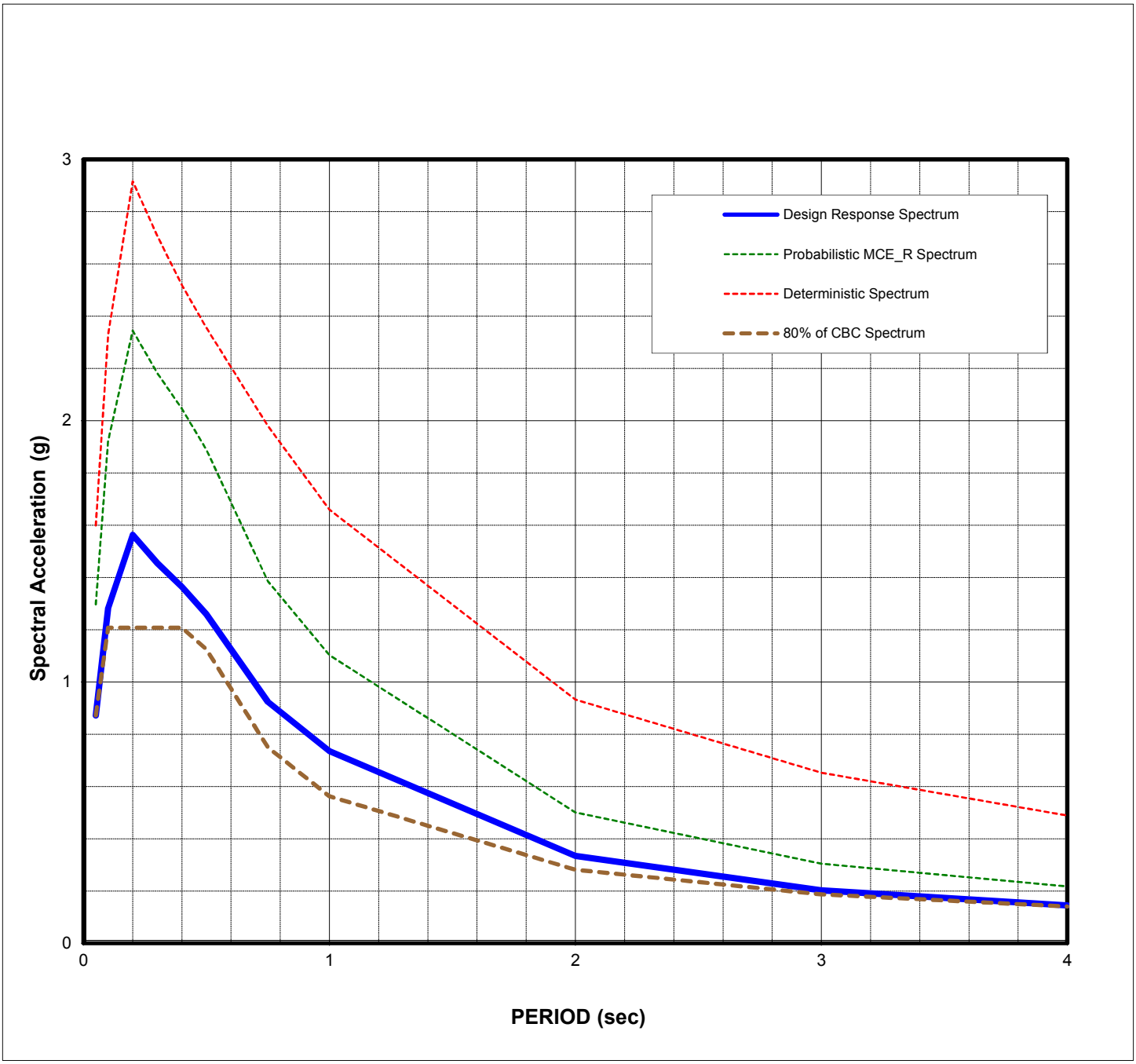
Attenuation Relationship	Boore-Atkinson (2008)	Campbell-Bozorgnia (2008)	Chiou-Youngs (2007)	Probabilistic Mean
Peak Ground Acceleration (g)	1.005	1.151	1.122	1.095
Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)			
0.05	1.244	1.457	1.483	1.399
0.10	1.833	2.095	2.230	2.073
0.20	2.262	2.644	2.655	2.529
0.30	2.094	2.517	2.415	2.348
0.40	2.009	2.939	2.176	2.197
0.50	1.765	2.282	1.944	2.025
0.75	1.342	1.693	1.398	1.477
1.00	1.068	1.324	1.116	1.169
2.00	0.532	0.595	0.457	5.312
3.00	0.338	0.350	0.266	3.224
4.00	0.240	0.255	0.185	2.305

Response spectra data are presented in the following table and on Drawing No. 6, *Site-Specific Design Response Spectrum*. These curves correspond to the mean of the response values from above attenuation relations for horizontal elastic single-degree-of-freedom systems with equivalent viscous damping of 5 percent of critical damping. Vertical acceleration at the site may be calculated using the ASCE 7-10, Section 12.4.

Table No. 4, Site-Specific Design Parameters

Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)	Risk Coefficient C_R	Probabilistic MCE_R Spectral Acceleration (g)	84th Percentile Deterministic MCE Response Spectra (g)	Deterministic CBC Lower Level (g)	Site Specific MCE_R Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.05	1.399	0.927	1.297	1.599	0.433	1.297	0.872	**0.87**
0.10	2.073	0.927	1.922	2.329	0.865	1.922	1.207	**1.28**
0.20	2.529	0.927	2.344	2.916	1.500	2.344	1.207	**1.56**
0.30	2.348	0.929	2.181	2.707	1.500	2.181	1.207	**1.45**
0.40	2.197	0.931	2.045	2.518	1.500	2.045	1.207	**1.36**
0.50	2.025	0.933	1.889	2.356	1.500	1.889	1.125	**1.26**
0.75	1.477	0.938	1.385	1.980	1.040	1.385	0.750	**0.92**
1.00	1.169	0.943	1.102	1.659	0.780	1.102	0.562	**0.73**
2.00	0.531	0.943	0.501	0.932	0.390	0.501	0.281	**0.33**
3.00	0.322	0.943	0.304	0.653	0.260	0.304	0.187	**0.20**
4.00	0.231	0.943	0.217	0.489	0.195	0.217	0.141	**0.14**

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Note: Calculated using EZFRISK program Risk Engineering, version 7.62
and USGS 2008 fault model database.

SITE SPECIFIC DESIGN RESPONSE SPECTRUM

SGVWC Plant B14
Hacienda Heights, California

Project Number:

14-31-303-02

For : San Gabriel Valley Water Company

Converse Consultants

Figure No.

6

The site-specific design response parameters are provided in the following table. These parameters were determined from Design Response Spectra presented in table above, and following guidelines of ASCE Section 21.4.

Table No. 5, Site-Specific Seismic Design Parameters

Parameter	Value (5% Damping)	Lower Limit, 80% of CBC Design Spectra
Site-Specific 0.2-second period Spectral Response Acceleration, S_{MS}	2.344	1.811
Site-Specific1-second period Spectral Response Acceleration, S_{M1}	1.102	0.843
Site-Specific Design Spectral Response Acceleration for short period S_{DS}	1.563	1.207
Site-Specific Design Spectral Response Acceleration for 1-second period, S_{D1}	0.735	0.562

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7.0 GEOTECHNICAL EVALUATIONS AND CONCLUSIONS

Based on the results of our background review, subsurface exploration, laboratory testing, geotechnical analyses, and understanding of the planned site re-development, it is our opinion that the proposed project is feasible from a geotechnical standpoint, provided the following conclusions and recommendations are incorporated into the project plans, specifications, and are followed during site construction. The following geotechnical findings should be considered for the planned storage reservoir and associated site improvements project:

- Undocumented fills, up to 2 feet in thickness were encountered in the borings. Deeper artificial fill may exist at the site. The fill encountered consists primarily of silty sand. The alluvial soil deposits below the fill primarily consist of silty sand. The bedrock beneath the fill consists of massive sandstone pebble conglomerate of the Puente Formation.

- There are no active faults projecting toward or extending across the proposed site. The site is not located within a currently designated State of California Earthquake Fault Zone (previously Alquist-Priolo Special Studies Zones) for surface fault rupture. Moderate to strong ground shaking from earthquakes associated with the Whittier Fault and other nearby and distant faults may occur during the lifetime of the project.

- The site is partially located within a mapped Seismic Hazard Zone for liquefaction. Liquefaction analyses were performed for the upper 50 feet below ground surface utilizing BH-6. Based on the results of liquefaction analyses indicate the project site is not susceptible to liquefaction. The estimated potential liquefaction induced settlement is on the order of 0.26 inches with potential differential settlement of 0.13 inches.

- Groundwater was not encountered in our exploratory borings to a maximum depth of 51.5 feet. Groundwater is not anticipated during construction, however localized perched groundwater seepage may be encountered during excavations.

- The earth materials at the site should be excavatable with conventional heavy-duty earth moving equipment. The on-site materials may contain gravels up to 3 inches in maximum dimension. Larger gravels and possible cobbles may exist at the site. Earthwork should be performed with suitable equipment for gravelly materials.

- Based on the proposed plan, cut-and-fill grading operations are required to achieve the planned finished grades.

- No shallow foundation should be supported on both bedrock and engineered fill in order to minimize the effect of differential settlement.

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- Different earth materials should be anticipated at excavation bottoms for the planned storage reservoir. In order to provide a relative uniform bearing material below shallow foundations, over-excavation and re-compaction of 2 feet below the bottom of foundations and slab-on-grades are recommended. We recommend the shallow foundations should be supported on a minimum 2 feet of compacted fill blanket benched into native materials for the storage reservoir.

- Shallow spread, continuous and ring footings are considered suitable for structure support provided the recommendations in this report are incorporated into the project plans, specifications, and are followed during site construction.

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8.0 EARTHWORK RECOMMENDATIONS

8.1 General Evaluation

Site earthwork recommendations provided in this section are based on our experience with similar projects and our evaluation of this study. Based on our understanding of the proposed project and the results of our field exploration, laboratory testing, and analysis of subsurface conditions at the site, we anticipate that the main earthwork activities associated with construction will be remedial grading (over-excavation), foundation excavations and trench excavation/backfill for utilities.

Excavated site soils, free of deleterious materials and rock particles larger than three (3) inches in the largest dimension, should be suitable for placement as compacted fill. Any import fill should be tested and approved by Converse. Any import fill should have an expansion potential less than 20. All compacted fill soils should be observed and tested by a Converse representative in accordance with the specifications presented in this section.

Clayey soils and with an expansion index exceeding 20 should not be used for compaction within 3 feet below the proposed foundations or for retaining wall backfill. Soils containing organic materials should not be used as structural fill. The extent of removal should be determined by the geotechnical representative based on soil observation during grading

8.2 Over-Excavation/Removal

Prior to the start of construction, all loose soil, undocumented fill and soil disturbed during demolition should be removed to firm acceptable native material or compacted fill. We recommend over-excavation be to the depth of fill or at least 2 feet below bottom of footing, whichever is deeper. Deeper removals will be needed if firm and natural soil conditions are not exposed on the excavation bottoms. The lateral limits of the over-excavation should extend at least 5 feet beyond the footing areas, where space is available.

Different earth materials should be anticipated at excavation bottoms for the planned storage reservoir. No shallow foundation should be supported on both bedrock and engineered fill in order to minimize the effect of differential settlement. In order to provide a relative uniform bearing material below shallow foundations, over-excavation and re-compaction of two (2) feet below the bottom of foundations and slab-on-grades are recommended. We recommend the shallow ring foundations supporting the storage reservoir should be supported on a minimum 2 feet of compacted fill blanket benched into native materials for the storage reservoir.

For pavement and concrete flatwork, we recommend over-excavation be at least 2 feet below finished subgrade and 2 feet laterally beyond the footprints, where space is

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available. Over-excavation for retaining walls, if any, should be two (2) feet below bottom of footings and should extend three (3) feet laterally beyond the retaining wall footing footprint.

The exposed bottom of the over-excavation area should be scarified at least 6 inches, moisture conditioned as needed to near-optimum moisture content, and compacted to 90 percent relative compaction. Over-excavation should not undermine adjacent off-site improvements or slopes. Remedial grading should not extend within a projected 1:1 (horizontal to vertical) plane projected down from the outer edge of adjacent off-site improvements. Excavation activities should not disturb adjacent utilities or undermine any adjacent buildings and structures to remain. Existing utilities should be removed and adequately capped at the project boundary line, or salvaged/rerouted as designed.

If loose, yielding soil conditions are encountered at the excavation bottom, the following options can be considered:

a. Over-excavate until reach firm bottom.

b. Scarify or over-excavate additional 18 inches deep, and then place at least 18-inch-thick compacted base material (CAB or equivalent) to bridge the soft bottom. Base should be compacted to 95% relative compaction.

c. Over-excavate additional 18 inches deep, and then place a layer of geofabric (i.e. Mirafi HP570, X600 or equivalent), place 18-inch-thick compacted base material (CAB or equivalent) to bridge the soft bottom. Base should be compacted to 95% relative compaction. An additional layer of geofabric may be needed on top of base depending on the actual site conditions.

The actual depth of removal should be based on recommendations and observations made during grading. Therefore, some variations in the depth and lateral extent of over-excavation recommended in this report should be anticipated.

8.3 Engineered Fill

All engineered fill should be placed on competent, scarified and compacted bottom as evaluated by the geotechnical engineer and in accordance with the specifications presented in this section. Excavated site soils, free of deleterious materials and rock particles larger than three (3) inches in the largest dimension, should be suitable for placement as compacted fill. Any proposed import fill should be evaluated and approved by Converse prior to import to the site. Import fill material should have an expansion index less than 20.

Prior to compaction, fill materials should be thoroughly mixed and moisture conditioned to within approximately three (3) percent of the optimum moisture content. Fill soils shall be evenly spread in maximum 8-inch loose lifts, watered or dried as necessary, mixed

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and compacted to at least the density specified below. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer. All fill, if not specified otherwise elsewhere in this report, should be compacted to at least 90 percent of the laboratory dry density in accordance with the ASTM Standard D1557 test method.

Fills exceeding five (5) feet in height shall not be placed on native slopes that are steeper than 5:1 horizontal:vertical (H:V). Where native slopes are steeper than 5:1 H:V, and the height of the fill is greater than five (5) feet, the fill shall be keyed and benched into competent materials. Typically the benching should be 2 to 3 feet in height and minimum 3 feet in width. All new fill should be compacted to at least 90 percent of the maximum dry density in accordance with the ASTM Standard D1557 test method. Appropriate means and methods of placement will be required to achieve these compaction requirements.

8.4 Excavatability

Based on our field exploration, the earth materials at the site should be excavatable with conventional heavy-duty earth moving and trenching equipment. The onsite materials contain gravels up to 3 inches in maximum dimension. Larger gravels, cobbles and possible boulders may exist at the site. The pebble conglomerate bedrock materials are cemented and moderately hard to hard. The excavation and rippability of this bedrock will be more difficult and should be anticipated during grading. Deeper soil borings drilled for the project encountered difficult drilling and/or refusal in the conglomerate and sandstone bedrock materials. Standard Penetration Tests (SPT) blow counts in the conglomerate and sandstone bedrock materials were high and often times met refusal to sampler penetration. Localized areas of very hard bedrock requiring very hard ripping should be anticipated. Directional ripping and downsizing breakers may be required in cemented sandstone and conglomerate beds. Earthwork should be performed with suitable equipment for gravelly materials.

8.5 Expansive Soil

Based on our laboratory testing results, the on-site earth materials are considered to have a low expansion potential. The on-site soil materials will be mixed during the grading and the expansion potential might change. Therefore, the expansion potential of site soils should be verified after the grading as slabs, foundations and pavement placed directly on expansive subgrade soil will likely crack over time.

To mitigate the expansive soils, on-site soils with an Expansion Index higher than 20 should not be re-used for compaction within 2 feet below the proposed foundations or for retaining wall backfill. The extent of removal should be determined by the geotechnical representative based on soil observation during grading.

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8.6 Pipeline Backfill Recommendations

Any soft and/or unsuitable material encountered at the pipe invert should be removed and replaced with an adequate bedding material. The pipe subgrade should be level, firm, uniform, and free of loose materials and properly graded to provide uniform bearing and support to the entire section of the pipe placed on bedding material. Protruding oversize particles larger than two (2) inches in the largest dimension, if any, should be removed from the trench bottom and replaced with compacted materials. During the digging of depressions for proper sealing of the pipe joints, the pipe should rest on a prepared bottom for as near its full length as is practicable. The bedding zone is defined as that portion of the pipe trench from four inches below the pipe invert to one foot above the top of pipe, in accordance with Section 306-1.2.1 of the Latest Edition of the *Standard Specifications for Public Works Construction* (SSPWC).

8.7 Trench Zone Backfill

The following specifications are recommended to provide a basis for quality control during the placement of trench backfill.

Trench excavations to receive backfill shall be free of trash, debris or other unsatisfactory materials at the time of backfill placement. Excavated on-site soils free of oversize particles, defined as larger than one (1) inch in maximum dimension in the upper 12 inches of subgrade soils, and larger than three (3) inches in the largest dimension in the trench backfill below, and deleterious matter after proper processing may be used to backfill the trench zone. Imported trench backfill, if used, should be approved by the project soils consultant prior to delivery at the site. No more than 30 percent of the backfill volume should be larger than ¾ inch in the largest dimension.

Trench backfill shall be compacted to 90 percent of the laboratory maximum dry density as per ASTM Standard D1557 test method. At least the upper twelve (12) inches of trench underlying pavements should be compacted to at least 95 percent of the laboratory maximum dry density.

Trench backfill shall be compacted by mechanical methods, such as sheepsfoot, vibrating or pneumatic rollers, or mechanical tampers, to achieve the density specified herein. The backfill materials shall be brought to within two (2) percent of optimum moisture content and then placed in horizontal layers if the expansion index is less than or equal to 20. Should the expansion index be greater than 20, backfill materials shall be brought to approximately 2 percent above optimum moisture content. The thickness of uncompacted layers should not exceed eight (8) inches. Each layer shall be evenly spread, moistened or dried as necessary, and then tamped or rolled until the specified density has been achieved.

The contractor shall select the equipment and processes to be used to achieve the specified density without damage to adjacent ground and completed work. The field

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density of the compacted soil shall be measured by the ASTM Standard D1556 or ASTM Standard D2922 test methods or equivalent. Observation and field tests should be performed by Converse during construction to confirm that the required degree of compaction has been obtained. Where compaction is less than that specified, additional compactive effort shall be made with adjustment of the moisture content as necessary, until the specified compaction is obtained. It should be the responsibility of the contractor to maintain safe conditions during cut and/or fill operations. Trench backfill shall not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by the project's geotechnical consultant indicate that the moisture content and density of the fill are as previously specified.

Imported soils, if any, used as compacted trench backfill should be predominantly granular and meet the following criteria:

- Expansion Index less than 20
- Free of all deleterious materials
- Contain no particles larger than 3 inches in the largest dimension
- Contain less than 30 percent by weight retained on ¾-inch sieve
- Contain at least 15 percent fines (passing #200 sieve)
- Have a Plasticity Index of 10 or less

Any import fill should be tested and approved by the geotechnical representative prior to delivery to the site.

8.8 Shrinkage and Subsidence

Soil shrinkage and/or bulking as a result of remedial grading depends on several factors including the depth of over-excavation, and the grading method and equipment utilized, and average relative compaction. For preliminary estimation, bulking and shrinkage factors for various units of earth material at the site may be taken as presented below:

- The approximate shrinkage factor for the undocumented fill soils is estimated to range from ten (10) to fifteen (15) percent.

- The approximate shrinkage factor for the native alluvial soils is estimated to range from five (5) to ten (10) percent.

- For estimation purposes, ground subsidence may be taken as 0.1 feet as a result of remedial grading.

Although these values are only approximate, they represent our best estimates of the factors to be used to calculate lost volume that may occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field-testing using the actual equipment and grading techniques be conducted.

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8.9 Subgrade Preparation

Final subgrade soils for structures should be uniform and non-yielding. To obtain a uniform subgrade, soils should be well mixed and uniformly compacted. The subgrade soils should be non-expansive and well-drained. The near-surface site soils should be free draining. We recommend that at least the upper two (2) inches of subgrade soils underneath the slab-on-grade should be comprised of well-drained granular soils such as sands, gravel or crushed aggregate satisfying the following criteria:

- Maximum size $\leq$ 1.5 inches
- Percent passing U.S. #200 sieve $\leq$ 12 percent
- Sand equivalent $\geq$ 30

The subgrade soils should be moisture conditioned before placing concrete.

The various design recommendations provided in this section are based on the assumptions that in preparing the site, the earthwork and site grading recommendations provided in this report will be followed. The proposed structures may be supported by shallow continuous and isolated square footings.

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9.0 DESIGN RECOMMENDATIONS

9.1 Shallow Foundations

9.1.1 Vertical Capacity

The proposed storage reservoir and associated site improvements can be supported by conventional shallow spread, continuous, and ring footings. We recommend continuous and square footings be founded at least 24 inches below lowest adjacent final grade entirely into compacted fill or into native soil. A minimum footing width of 24 inches is recommended for continuous and square footings. The allowable bearing value for footings with above minimum sizes founded on compacted fill and competent native soils may be designed for a net bearing pressure of 3,500 pounds per square foot (psf) for dead-plus-live-loads. The net allowable bearing pressure can be increased by 300 psf for each additional foot of excavation depth and by 100 psf for every additional foot of width up to a maximum value of 5,000 psf.

The net allowable bearing values indicated above are for the dead loads and frequently applied live loads and are obtained by applying a factor of safety of 3.0 to the net ultimate bearing capacity.

9.1.2 Lateral Capacity

Resistance to lateral loads can be provided by friction acting at the base of the foundation and by passive earth pressure. A coefficient of friction of 0.35 may be assumed with normal dead load forces. An allowable passive earth pressure of 200 psf per foot of depth up to a maximum of 2,000 psf may be used for footings poured against properly compacted fill. The values of coefficient of friction and allowable passive earth pressure include a factor of safety of 1.5.

9.1.3 Settlement

The static settlement of structures supported on continuous and/or spread footings founded on compacted fill and native soil will depend on the actual footing dimensions and the imposed vertical loads. Most of the footing settlement at the project site is expected to occur immediately after the application of the load. Based on the maximum allowable net bearing pressures presented above, static settlement is anticipated to be less than 1 inch. Differential settlement is expected to be up to one-half of the total settlement over a 40 feet span.

9.1.4 Dynamic Increases

Bearing values indicated above are for total dead load and frequently applied live loads. The above vertical bearing may be increased by 33% for short durations of loading which

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will include the effect of wind or seismic forces. The allowable passive pressure may be increased by 33% for lateral loading due to wind or seismic forces.

9.2 Slabs-on-grade

Slabs-on-grade should have a minimum thickness of four inches nominal for support of normal ground-floor live loads. Minimum reinforcement for slabs-on-grade should be No. 3 reinforcing bars, spaced at 18 inches on-center each way. The thickness and reinforcement of more heavily loaded slabs will be dependent upon the anticipated loads and should be designed by a structural engineer. A static modulus of subgrade reaction equal to 150 pounds per square inch per inch may be used in structural design of concrete slabs-on-grade.

It is critical that the exposed subgrade soils should not be allowed to desiccate prior to the slab pour. Care should be taken during concrete placement to avoid slab curling. Slabs should be designed and constructed as promulgated by the ACI and Portland Cement Association (PCA). Prior to the slab pour, all utility trenches should be properly backfilled and compacted.

In areas where a moisture-sensitive floor covering (such as vinyl tile or carpet) is used, a 10-mil-thick moisture retarder/barrier between the bottom of slab and subgrade that meets the performance criteria of ASTM E 1745 Class A material. Retarder/barrier sheets should be overlapped a minimum of six inches, and should be taped or otherwise sealed per the product specifications.

9.3 Modulus of Subgrade Reaction

For the subject project, design of the structures supported on compacted fill subgrade prepared in accordance with the recommendations provided in this report may be based on a soil modulus of subgrade reaction of (k_s) of 150 pounds per square inch per inch.

9.4 Lateral Earth Pressure

The following design values can be used for the design of the planned retaining structures up to 12 feet in height. The earth pressure behind any buried wall depends primarily on the allowable wall movement, type of soil behind the wall, backfill slopes, wall inclination, surcharges, and any hydrostatic pressure. The following earth pressures are recommended for vertical walls with no hydrostatic pressure.

Table No. 6, Lateral Earth Pressures for Retaining Wall Design

Backfill Slope (H:V)	Cantilever Wall Equivalent Fluid Pressure (psf)	Restrained Wall Equivalent Fluid Pressure (psf)
Level	39 (triangular pressure distribution)	59 (triangular pressure distribution)

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The recommended lateral pressures assume that the walls are fully back-drained to prevent build-up of hydrostatic pressure. Adequate drainage shall be provided by means of permeable drainage materials wrapped in filter fabric installed behind the walls. The drainage system should consist of perforated subdrain pipe surrounded by a minimum one (1) square feet per lineal feet of free draining, uniformly graded, crushed aggregate, permeable material (Caltrans Class 2 Permeable Material or equivalent) wrapped in filter fabric such as Mirafi 140N or equivalent. The filter fabric should overlap approximately 12 inches or more at the joints. The subdrain pipe should consist of perforated, four-inch diameter, rigid ABS (SDR-35) or Schedule 40 PVC pipe, or equivalent, with perforations placed down. Alternatively, a prefabricated drainage composite system such as the MiraDrain G100N or equivalent can be used. The subdrain should be connected to multiple solid pipe outlets, with a maximum outlet spacing of 100 feet. Waterproofing membranes should be added to the subterranean wall levels for moisture sensitive areas to mitigate moisture migration through the walls.

In addition, walls with inclined backfill should be designed for an additional equivalent fluid pressure of one (1) pound per cubic foot for every two (2) degrees of slope inclination. Walls subjected to surcharge loads located within a distance equal to the height of the wall should be designed for an additional uniform lateral pressure equal to one-third or one-half the anticipated surcharge load for unrestrained or restrained walls, respectively. These values are applicable for backfill placed between the wall stem and an imaginary plane rising 45 degrees from below the edge (heel) of the wall footings.

Retaining walls taller than 6 feet should be designed to resist additional earth pressure caused by seismic ground shaking based on Section 1615A.1.6 of CBC 2016. A seismic earth pressure of 26H (psf), based on an inverted triangular distribution, can be used for design of wall.

9.5 Soil Corrosivity Evaluation

Based on our review of soil corrosivity test results (see Appendix B), the soluble sulfate concentration, chloride content and pH are not in the corrosive range to concrete in accordance with the Caltrans Corrosive Guidelines (2012). The minimum saturated resistivity is in the corrosive range to ferrous metal. Protections of underground metal pipe should be considered. Since the soluble sulfate concentrations tested for this project are less than 2,000 ppm in the soil, mitigation measures to protect concrete in contact with the soils are not anticipated. Type I or II Portland Cement may be used for the construction of the foundations and slabs.

The test results presented herein are considered preliminary. Additional testing and evaluation of the as-graded soils is recommended. A corrosion engineer may be consulted for appropriate mitigation procedures and construction design, if needed. Conventional corrosion mitigation measures may include the following:

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- Steel and wire concrete reinforcement should have at least three inches of concrete cover where cast against soil, unformed. Below-grade ferrous metals should be given a high-quality protective coating, such as 18-mil plastic tape, extruded polyethylene, coal-tar enamel, or Portland cement mortar.

- Below-grade metals should be electrically insulated (isolated) from above-grade metals by means of dielectric fittings in ferrous utilities and/or exposed metal structures breaking grade.

9.6 Site Drainage

Adequate positive drainage should be provided away from the structures to prevent ponding and to reduce percolation of water into structural backfill. Most soil movement problems are associated with water and site drainage. We recommend that the landscape area immediately adjacent to the foundation shall be designed sloped away from the building with a minimum 5% slope gradient for at least 10 feet measured perpendicular to the face of the wall. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 percent away from the building per 2016 CBC.

Planters and landscaped areas adjacent to the reservoir perimeter should be designed to minimize water infiltration into the subgrade soils. Gutters and downspouts should be installed on the roof, and runoff should be directed to the storm drain through non-erosive devices. Drainage devices should be kept clean of debris and maintained in good working order.

Slope areas should be provided with non-erosive drainage control devices to prevent water from flowing uncontrolled over the slopes and walls. Slope brow drains, interceptor drains, terrace drains, down drains, toe drains, drain pipes, catch basins and drainage devices should be kept clean of debris and maintained in good working order to provide adequate drainage for the slope areas. Control joints and cracks in these drainage devices should be sealed and/or resealed to prevent infiltration of surface water into the slope materials and reservoir backfill soils.

Slope planting should be maintained for erosion control. Jute netting should be placed on the new slopes and maintained on the slopes until a dense growth of vegetation has been established. Graded slopes and bedrock slopes may require more time to establish plant growth. Bare spots, areas of little growth, and areas with deteriorated jute mesh may have to be re-seeded and re-covered with new mesh for erosion control.

Rodent activity should be controlled to prevent loosening of soils and water penetration. Animal burrows should be filled with compacted soils since they cause diversion of surface runoff, promote accelerated erosion, or cause shallow soil slips and slope failures.

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10.0 CONSTRUCTION RECOMMENDATIONS

10.1 General

Site soils should be excavatable using conventional heavy-duty excavating equipment. Temporary sloped excavation is feasible if performed in accordance with the slope ratios provided in Section 10.2, *Temporary Excavations*. Existing utilities should be accurately located and either protected or removed as required. For steeper temporary construction slopes or deeper excavations, shoring should be provided by the contractor as necessary, to protect the workers in the excavation.

10.2 Temporary Excavations

Based on the materials encountered in the exploratory borings, sloped temporary excavations may be constructed according to the slope ratios presented in Table No. 7, *Slope Ratios for Temporary Excavation*. Any loose utility trench backfill or other fill encountered in excavations will be less stable than the native soils. Temporary cuts encountering loose fill or loose dry sand may have to be constructed at a flatter gradient than presented in the following table:

Table No. 7, Slope Ratios for Temporary Excavation

Maximum Depth of Cut (feet)	Maximum Slope Ratio* (horizontal: vertical)
0 – 4	Vertical
4 – 8	1 : 1
8+	1.5 : 1

*Slope ratio assumed to be uniform from top to toe of slope.

Any loose utility trench backfill or other fill encountered in excavations will be less stable than the native soils. Temporary cuts encountering loose fill or loose dry sand should be constructed at a flatter gradient than presented in the table above. Surfaces exposed in slope excavations should be kept moist but not saturated to minimize raveling and sloughing during construction. Adequate provisions should be made to protect the slopes from erosion during periods of rainfall. Surcharge loads, including construction, should not be placed within five (5) feet of the unsupported excavation edge. The above maximum slopes are based on a maximum height of six (6) feet of stockpiled soils placed at least five (5) feet from the excavation edge.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1987 and current amendments, and the Construction Safety Act should be met. The soils exposed in cuts should be observed during excavation by the project's geotechnical consultant. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

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If the excavation occurs near existing structures, special construction considerations would be required during excavation to protect these existing structures during construction. The proposed excavation should not cause loss of bearing and/or lateral supports of the existing structures.

10.3 Shoring Design

Temporary shoring may be required for the recommended excavation due to space limitations and property line boundaries and because of nearby existing structures or facilities and traffic loading. Temporary shoring may consist of the use of a trench box (where feasible), or conventional soldier piles and lagging. Shoring should ultimately be designed by a qualified structural engineer considering the recommendations below in their final design and others which are applicable.

Drilled excavations for soldier piles, which are recommended to create the proposed 40 foot high excavation, may require the use of drilling fluids to prevent caving and to maintain an opened hole for pile installation. Casing may be needed if granular earth material is located behind the existing retaining wall.

10.3.1 Cantilevered Shoring

Cantilevered shoring systems may include soldier piles with lagging to maintain temporary support of vertical wall excavations. Shoring design must consider the support of adjacent underground utilities and/or structures, and should consider the effects of shoring deflection on supported improvements. Due to sandy nature of on-site soils, some caving during the drilling of soldier-pile borings should be anticipated. A soldier pile system will require continuous lagging to control caving and sloughing in the excavation between soldier piles.

Temporary cantilevered shoring should be designed to resist a lateral earth pressure equivalent to a fluid density of 39 pounds per cubic foot (pcf) for non-surcharged condition. This pressure is valid only for shoring retaining level ground. This equivalent fluid pressure is valid only for shoring supporting level ground.

In addition to the lateral earth pressure, surcharge pressures due to miscellaneous loads, such as soil stockpiles, vehicular traffic or construction equipment located adjacent to the shoring, should be included in the design of the shoring. A uniform lateral pressure of 100 psf should be included in the upper 10 feet of the shoring to account for normal vehicular and construction traffic within 10 feet of the trench excavation. Surcharge pressures from the existing structures should be added to the above earth pressures for surcharges within a horizontal distance less than or equal to the wall height. Surcharge coefficients of 50% of any uniform vertical surcharge should be added as a horizontal earth pressure for shoring design. All shoring should be designed and installed in accordance with state and federal safety regulations.

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The minimum embedment depth for piles is ten (10) feet from the lowest adjacent grade into firm alluvium, below the bottom of the excavation. Vertical skin friction against soldier piles for may be taken as 350 psf. Fixity may be assumed at two (2) feet below the excavation into firm native alluvium or bedrock. For the design of soldier piles spaced at least 3.0 diameters on-center, the passive resistance of the soils adjacent to the piles may be assumed to be 300 psf per foot of embedment depth. Soldier pile members placed in drilled holes should be properly backfilled with a sand/cement slurry or lean concrete in order to develop the required passive resistance.

Caving soils should be anticipated between the piles. To limit local sloughing, caving soils can be supported by continuous lagging or guniting. The lagging between the soldier piles may consist of pressure-treated wood members or solid steel sheets. In our opinion, steel sheeting is expected to be more expedient than wood lagging to install. Although soldier piles and any bracing used should be designed for the full-anticipated earth pressures and surcharge pressures, the pressures on the lagging are less because of the effect of arching between the soldier piles. Accordingly, the lagging between the piles may be designed for a nominal pressure of up to a maximum of 350 psf. All lumber to be left in the ground should be treated in accordance with Section 204-2 of the "Standard Specifications for Public Works Construction" (Latest Edition).

10.3.2 Tie-Back Shoring

A tie-back soldier-pile shoring system may be used to maintain temporary support of deep vertical walled excavations. Braced or tied-back shoring, retaining a level ground surface, should be designed for a uniform pressure of 20H psf, where H is the height of the retained cut in feet.

Surcharge pressures should be added to this earth pressure for surcharges within a distance from the top of the shoring less than or equal to the shoring height. A surcharge coefficient of 50 percent of any uniform vertical surcharge should be added as a horizontal shoring pressure for braced shoring. A uniform lateral pressure of 100 psf should be included in the upper 10 feet of the shoring to account for normal vehicular and construction traffic within 10 feet of the trench excavation.

10.3.3 Tie-Backs

For design of tie-back shoring, it should be assumed that the potential wedge of failure is determined by a plane at 30 degrees from the vertical, through the bottom of the excavation. Tie-back anchors may be installed at angles of 15 to 40 degrees below a horizontal plane. Tie-back installation and testing guidelines and procedures are presented in Appendix E, *"Guide Specifications for Installation and Acceptance of Tie-back Anchors".* Soil friction values, for estimating the allowable capacity of drilled friction anchors, may be computed using the following equation:

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$q = 40H$; $q \leq 500$ *pounds-per-square-foot (psf)*

where:

H = average depth of anchor below ground surface, shown on Drawing No. 7, *Schematic Tie-Back Design*
q = anchor surface area resistance, in psf (excluding tip),

Only the frictional resistance developed beyond the assumed failure plane should be included in the tie-back design for resisting lateral loads. After shoring/tie-back is no longer needed to support the excavation, stress should be carefully released and shoring system including tieback may be able to be left in place.

All shoring and tie-back should be designed by experienced California licensed Civil Engineer and installed by experienced contractors. Shoring/tie-back design should also be reviewed by a geotechnical consultant to verify the soil parameters used in the design are in conformance with geotechnical report.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1987 and current amendments, and the Construction Safety Act should be met. The soils exposed in cuts should be observed during excavation by a competent person employed by the contractor. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

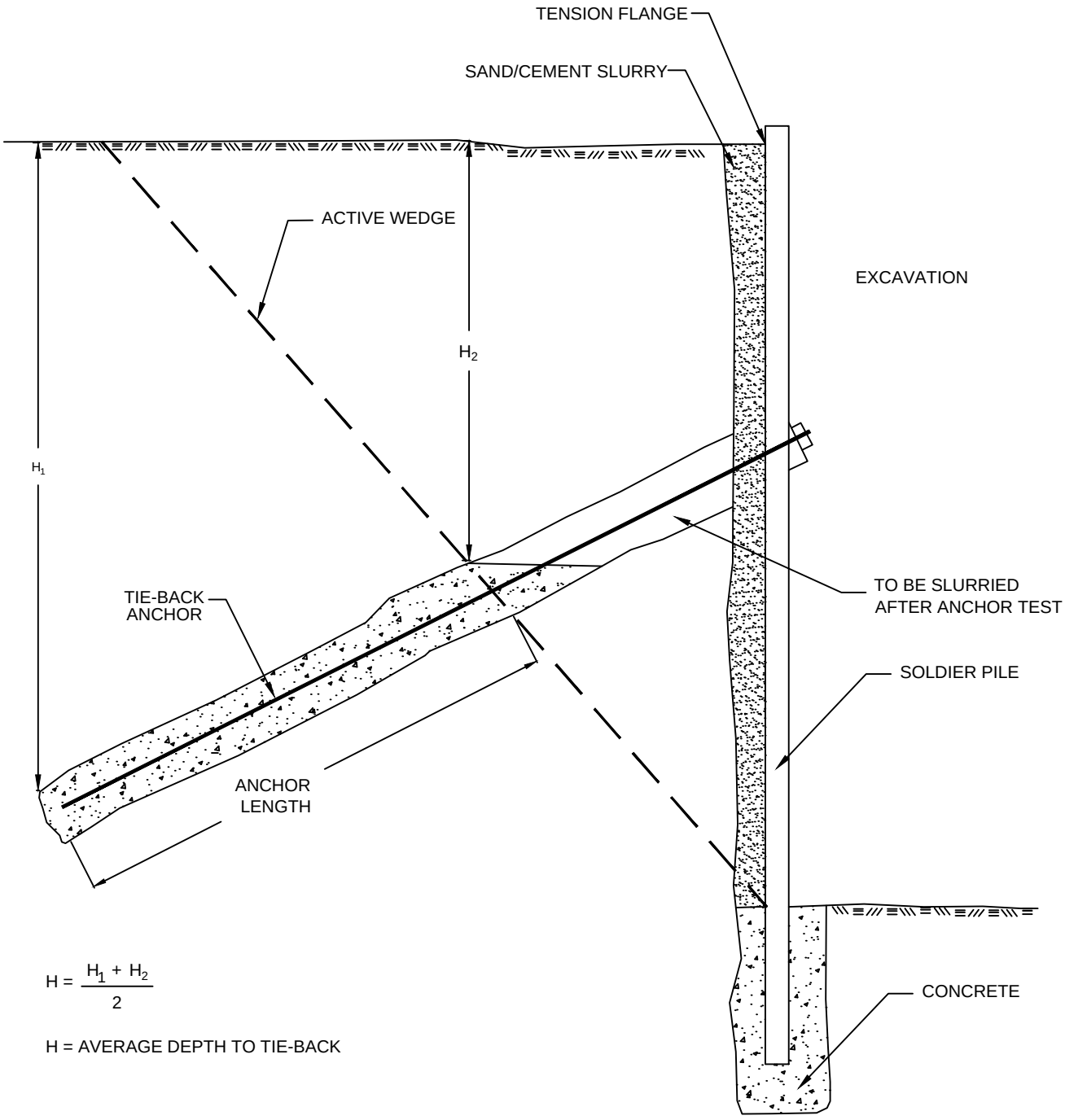
It is recommended that Converse review plans and specifications for proposed shoring and that a Converse representative observes the installation of shoring. A licensed surveyor should be retained to establish monuments on shoring and the surrounding ground prior to excavation. Such monuments should be monitored for horizontal and vertical movement during construction. Results of the monitoring program should be provided immediately to the project Structural (shoring) Engineer and Converse for review and evaluation. Adjacent building elements should be photo-documented prior to construction.

10.4 Geotechnical Services during Construction

This report has been prepared to aid in the foundation plans and specifications, and to assist the architect, civil and structural engineers in the design of the proposed structures. It is recommended that this office be provided an opportunity to review final design drawings and specifications to verify that the recommendations of this report have been properly implemented.

Recommendations presented herein are based upon the assumption that adequate earthwork monitoring will be provided by Converse. Footing excavations should be observed by Converse prior to placement of steel and concrete so that footings are

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$$H = \frac{H_1 + H_2}{2}$$

H = AVERAGE DEPTH TO TIE-BACK

SCHEMATIC SECTION VIEW
NOT TO SCALE

SCHEMATIC TIE-BACK DESIGN

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SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. 14-31-303-01

Drawing No. 7

founded on satisfactory materials and excavations are free of loose and disturbed materials. Trench backfill should be placed and compacted with observation and field density testing provided by this office.

During construction, the geotechnical engineer and/or their authorized representatives should be present at the site to provide a source of advice to the client regarding the geotechnical aspects of the project and to observe and test the earthwork performed. Their presence should not be construed as an acceptance of responsibility for the performance of the completed work, since it is the sole responsibility of the contractor performing the work to ensure that it complies with all applicable plans, specifications, ordinances, etc.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and cannot be responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any recommended actions presented herein to be unsafe.

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11.0 CLOSURE

The findings and recommendations of this report were prepared in accordance with generally accepted professional engineering and engineering geologic principles and practice. We make no other warranty, either expressed or implied. Our conclusions and recommendations are based on the results of the field and laboratory investigations, combined with an interpolation and extrapolation of soil conditions between and beyond boring locations. If conditions encountered during construction appear to be different from those shown by the borings, this office should be notified.

Design recommendations given in this report are based on the assumption that the earthwork and site grading recommendations contained in this report are implemented. Additional consultation may be prudent to interpret Converse's findings for contractors, or to possibly refine these recommendations based upon the review of the final site grading and actual site conditions encountered during construction. If the scope of the project changes, if project completion is to be delayed, or if the report is to be used for another purpose, this office should be consulted.

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Appendix A

Field Exploration

APPENDIX A: FIELD EXPLORATION

Field exploration included a site reconnaissance and subsurface exploration program. During the site reconnaissance, the surface conditions were noted, and the approximate locations of the boring were determined. The exploratory borings were approximately located using existing boundary and other features as a guide and should be considered accurate only to the degree implied by the method used. The various field study methods performed are discussed below.

A1.1 Exploratory Borings

Four (4) exploratory borings (BH-1 through BH-4) were drilled within the project site on January 8, 2015. The borings were advanced using a truck mounted drill rig with an 8-inch diameter hollow stem auger to depths up to 51.5 feet below the existing ground surface. Each boring was visually logged by a Converse engineer and sampled at regular intervals and at changes in subsurface soils. Where appropriate, field descriptions and classifications have been modified to reflect laboratory test results.

Two (2) additional exploratory borings (BH-5 and BH-6) were drilled within the project site on June 26, 2017. The borings were advanced using a truck mounted drill rig with an 8-inch diameter hollow stem auger to depths up to 10 feet and 51.5 feet respectively below the existing ground surface (bgs). Each boring was visually logged by a Converse engineer and sampled at regular intervals and at changes in subsurface soils. Where appropriate, field descriptions and classifications have been modified to reflect laboratory test results.

Ring samples of the subsurface materials were obtained at frequent intervals in the exploratory borings using a drive sampler (2.4-inch inside diameter and 3.0-inch outside diameter) lined with sample rings. The steel ring sampler was driven into the bottom of the borehole with successive drops of a 140-pound driving weight falling 30 inches, using an automatic hammer. Samples were retained in brass rings (2.4-inch inside diameter and 1.0-inch in height). The central portion of the sample was retained and carefully sealed in waterproof plastic containers for shipment to the Converse laboratory. Blow counts for each sample interval are presented on the logs of borings. Bulk samples of typical soil types were also obtained.

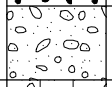
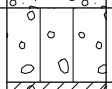
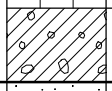
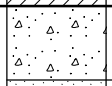
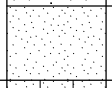
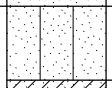
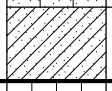
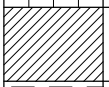
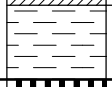
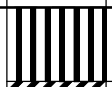
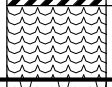
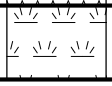
Standard Penetration Tests (SPTs) were also performed. In this test, a standard split-spoon sampler (1.4 inches inside diameter and 2.0 inches outside diameter) was driven into the ground with successive drops of a 140-pound hammer falling 30 inches by means of an automatic hammer. The number of successive drops of the driving weight ("blows") required for every 6-inch of penetration of the sampler are shown on the Logs of Borings in the "blows" column. The soil retrieved from the spoon sampler was carefully sealed in waterproof plastic containers for shipment to the laboratory.

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It should be noted that the exact depths at which material changes occur cannot always be established accurately. Changes in material conditions that occur between driven samples are indicated in the logs at the top of the next drive sample. A key to soil symbols and terms is presented as Drawing No. A-1, *Soil Classification Chart*. The log of the exploratory boring is presented in Drawing Nos. A-2 through A-7b, *Log of Borings*.

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SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE			GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE			SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SAMPLE TYPE

STANDARD PENETRATION TEST
Split barrel sampler in accordance with ASTM D-1586-84 Standard Test Method

DRIVE SAMPLE 2.42" I.D. sampler.

DRIVE SAMPLE No recovery

BULK SAMPLE

GRAB SAMPLE

GROUNDWATER WHILE DRILLING

GROUNDWATER AFTER DRILLING

BORING LOG SYMBOLS

LABORATORY TESTING ABBREVIATIONS

TEST TYPE
(Results shown in Appendix B)

CLASSIFICATION

Plasticity	pi
Grain Size Analysis	ma
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	max
Hydrometer	h

STRENGTH

Pocket Penetrometer	p
Direct Shear	ds
Direct Shear (single point)	ds*
Unconfined Compression	uc
Triaxial Compression	tx
Vane Shear	vs
Consolidation	c
Collapse Test	col
Resistance (R) Value	r
Chemical Analysis	ca
Electrical Resistivity	er

UNIFIED SOIL CLASSIFICATION AND KEY TO BORING LOG SYMBOLS

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Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-02**

Figure No. **A-1**

Log of Boring No. BH-1

Dates Drilled: 1/8/2015 Logged by: Abraham Eng Checked By: SKS

Equipment: CME 75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 728 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	TEST
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM (Qal): **SILTY SAND (SM):** fine to medium-grained, with gravels up to 2" in maximum dimension, olive brown.	■	▨	26/25/21	3	112	ma wa(fc=30%)
5		- gravel up to 1.5" in maximum dimension, olive	■		13/8/9	5	101	ds
10		**BEDROCK-SYCAMORE CANYON FORMATION (Tscg):** **CONGLOMERATE WITH SANDSTONE:** weathered, massive, breaks down to clayey sand (SC) fine to medium-grained, gravel up to 2.5" in maximum dimension, olive	■		25/50-5"	3	114	
15			■		50-5.5"	4	104	
20		-cobbles and possible boulders	▬		50-2"			
		End of boring at 22.5 feet due to refusal from large cobbles and boulders. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and tamped on 1/8/15.						

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Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-01**

Figure No. **A-2**

Log of Boring No. BH-2

Dates Drilled: 1/8/2015 Logged by: Abraham Eng Checked By: SKS

Equipment: CME 75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 730 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	TEST
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM (Qal): **SILTY SAND WITH GRAVEL (SM):** fine to medium-grained, gravel up to 2.5" in maximum dimension, trace clay, olive brown.	■	▨	8/7/10	8	112	ei,ca,er max
5		- gravel up to 1" maximum dimension,	■		7/14/19	5	116	
10		**BEDROCK-SYCAMORE CANYON FORMATION (Tscg):** **CONGLOMERATE WITH SANDSTONE:** weathered, massive, breaks down to silty sand (SM), fine to medium-grained, with gravel up to 2.5" in maximum dimension, trace clay, olive brown	■		50-6"	3		disturbed
15			■		50-5"	2		disturbed
20		- no recovery, cobbles and possible boulders			50-4"			
		End of boring at 22.5 feet due to refusal from large cobbles or boulders. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and tamped on 1/8/15.						

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Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-01**

Figure No. **A-3**

Log of Boring No. BH-3

Dates Drilled: 1/8/2015 Logged by: Abraham Eng Checked By: SKS

Equipment: CME 75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 717 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	TEST
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM (Qal): **SILTY SAND WITH GRAVEL (SM):** fine to medium-grained, gravel up to 1" in maximum dimension, olive brown.	■	▒	16/20/20	6	111	r
5			■		6/8/11	3	115	
10		- olive	■		5/6/7	4	99	wa(fc=27%)
15		**BEDROCK-SYCAMORE CANYON FORMATION (Tscg):** **CONGLOMERATE WITH SANDSTONE:** weathered, massive, breaksdown to silty sand (SM), fine to medium grained, with gravel up to 1" in maximum dimension, olive brown	■		13/21/50	4	111	
20		- no recovery			50-5"			
25		- no recovery			50-3"			
		- fine to medium-grained, few gravel up to 1.5" in maximum dimension, trace clay, olive	⊠		16/8/7			
30			■		19/20/33	4	121	wa(fc=14%)

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Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-01**

Figure No. **A-4a**

Log of Boring No. BH-3

Dates Drilled: 1/8/2015 Logged by: Abraham Eng Checked By: SKS

Equipment: CME 75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 717 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	TEST
		BEDROCK-SYCAMORE CANYON FORMATION (Tscg): **CONGLOMERATE WITH SANDSTONE:** weathered, massive	X		21/26/35			
40		-breaksdown to sandy clay (CL) fine to medium grained sand, gravel up to 1" in maximum dimension, olive brown	■		7/5/7	28	99	
45			X		9/21/27			
50		- olive gray	■		50-6"	18	108	
		End of boring at 51.5 feet. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and tamped on 1/8/15.						

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FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-01**

Figure No. **A-4b**

Log of Boring No. BH-4

Dates Drilled: 1/8/2015 Logged by: Abraham Eng Checked By: SKS

Equipment: CME 75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 707 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	TEST
		ALLUVIUM (Qal): **SILTY SAND (SM):** fine to coarse-grained, olive brown.	■		18/19/14			ei,ca,er max
5			■		4/4/5	7	92	ds,c
10		**BEDROCK-SYCAMORE CANYON FORMATION (Tscg):** **CONGLOMERATE WITH SANDSTONE:** weathered, massive, breaksdown to silty sand (SM), fine to coarse-grained, with gravel up to 1.5" in maximum dimension, olive brown	■		18/50-6"	5	103	
15		- gravel up to 2.5" in maximum dimension	■		15/12/13	8	109	
20		-breaksdown to sandy clay (CL), fine to medium grained sand, few gravel, olive brown to reddish streaks	■		8/11/26	13	106	
25		-breaksdown to clayey sand (SC), fine to coarse-grained, some caliche present, olive yellow	⊠		15/21/19			
30			■		32/50-4"	16	115	
		End of boring at 30.8 feet. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and tamped on 1/8/15.						

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Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
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HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-01**

Figure No. **A-5**

Log of Boring No. BH-5

Dates Drilled: 6/26/2017 Logged by: RAM Checked By: MBS

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 715 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		FILL (Af): **SILT (ML):** medium-grained, brown.						
		ALLUVIUM (Qal): **SILTY SAND (SM):** medium-grained, brown.	■		7/8/9	5	108	max
5		-medium-grained, brown	■		2/2/2	6	105	
		-with gravel, brown	■		7/9/12	6	107	
10			■		9/17/17	4	96	
		End of boring at 10.5 feet. Percolation test permorfed. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and taped on 6-26-17.						

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HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-02**

Figure No. **A-6**

Log of Boring No. BH-6

Dates Drilled: 6/26/2017 Logged by: RAM Checked By: MBS

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 715 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.						
		ALLUVIUM (Qal): **SILTY SAND (SM):** with gravel, slightly moist, brown.		■				wa,ma
5		-trace fine sand with gravel, brown	■		3/4/5	3	102	
10		-brownish with light brown	■		31/26/20	4	114	
		SEDIMENTARY BEDROCK-PUENTE FORMATION: **SILTSTONE/SANDSTONE** interbedded, weathered bedrock, light brownish						
15			■		13/50(6")	4	97	
20		**GRAVEL (GM):** sandstones, low hardness, weathered.	■		50(4")			
25		**SILTSTONE/SANDSTONE:** some gravel, brown	⊠		27(5")			
30		**SANDSTONE/SILTSTONE:** becoming less weathered, white brown	■		45/50(3")	5	104	

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Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-02**

Figure No. **A-7a**

Log of Boring No. BH-6

Dates Drilled: 6/26/2017 Logged by: RAM Checked By: MBS

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 715 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		SEDIMENTARY BEDROCK-PUENTE FORMATION: **SILTSTONE/SANDSTONE:** white brown	X		50(4")			
40		**SILTSTONE/CLAYSTONE:** hard, dense, yellowish brown	■		50(3")	7	109	c
45		**SANDSTONE:** oxidized, yellowish brown	X		50(6")			
50			■		50(3")			ds
		End of boring at 51.5 feet. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and taped on 6-26-17.						

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Project Name
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WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
FOR: SAN GABRIEL VALLEY WATER COMPANY

Project No. **14-31-303-02**

Figure No. **A-7b**

Appendix B

Laboratory Testing Program

APPENDIX B: LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their relevant physical characteristics and engineering properties. The amount and selection of tests were based on the geotechnical requirements of the project. Test results are presented herein and on the Logs of Borings in Appendix A, *Field Exploration*. The following is a summary of the laboratory tests conducted for this project.

B1.1 Moisture Content and Dry Density

Results of moisture content and dry density tests, performed on relatively undisturbed ring samples were used to aid in the classification of the soils and to provide quantitative measure of the *in situ* dry density. Data obtained from this test provides qualitative information on strength and compressibility characteristics of site soils. For test results, see the Logs of Borings in Appendix A, *Field Exploration*.

B1.2 Grain-Size Analysis

To assist in classification of soils, mechanical grain-size analysis was performed on one (1) selected sample. Testing was performed in general accordance with the ASTM Standard C136 test method. Grain-size curves are shown in Drawing Nos. B-1a and B-1b, *Grain Size Distribution Results*.

B1.3 Percent Passing No. 200 Sieve

Four (3) representative soil samples were tested in accordance with the ASTM D1140 test method to determine the percent of fine soil particles passing the No. 200 sieve. The test results are presented in the following table.

Table No. B-1, Passing No. 200 Sieve Test Results

Boring No.	Depth (feet)	Soil Description	Percent (%) Passing No. 200 Sieve
BH-6	20	Bedrock (Tscg) Gravel/ Trace fines (GM)	1
BH-6	35	Silty sand with Gravel (Reddish Brown)	20
BH-6	45	Silty Sand (SM) (Reddish Brown)	20

B1.4 Maximum Dry Density Test

One (1) laboratory maximum dry density-moisture content relationship test was performed on representative bulk samples. The test was conducted in accordance with ASTM Standard D1557 laboratory procedure. The test result is presented on Drawing Nos. B-2a and B-2b, *Moisture-Density Relationship Results*.

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B1.5 Direct Shear

Direct shear test was performed on one (1) relatively undisturbed samples at soaked moisture conditions. For each test, three samples contained in brass sampler rings were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were then sheared at a constant strain rate of 0.01 inch/minute. Shear deformation was recorded until a maximum of about 0.50-inch shear displacement was achieved. Ultimate strength was selected from the shear-stress deformation data and plotted to determine the shear strength parameters. For test data, including sample density and moisture content, see Drawing Nos. B-3a, B-3b and B-3c, *Direct Shear Test Results,* and in the following table:

Table No. B-2, Direct Shear Test Results

Boring No.	Depth (feet)	Soil Classification	Peak Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
BH-6	50	Bedrock (Tscs) Siltstone / Sandstone	29	250

B1.6 Consolidation Test

Consolidation test was performed on one (1) selected sample. Data obtained from this test performed on a relatively undisturbed soil sample was used to evaluate the settlement characteristics of the foundation soils under load. Preparation for this test involved trimming the sample and placing the one-inch high brass ring into the test apparatus, which contained porous stones, both top and bottom, to accommodate drainage during testing. Normal axial loads were applied to one end of the sample through the porous stones, and the resulting deflections were recorded at various time periods. The load was increased after the sample reached a reasonable state of equilibrium. Normal loads were applied at a constant load-increment ratio, successive loads being generally twice the preceding load. The sample was tested at field and submerged conditions. The test results, including sample density and moisture content, are presented in Drawing Nos. B-4a and B-4b, *Consolidation Test Results*.

B1.7 Soil Corrosivity

One (1) representative soil sample was tested to determine minimum electrical resistivity, pH, and chemical content, including chloride concentrations, and soluble sulfate. The purpose of these tests is to determine the corrosion potential of site soils when placed in contact with common construction materials. These tests were performed by HDR in Claremont, California. The test results received from HDR are included in the following table:

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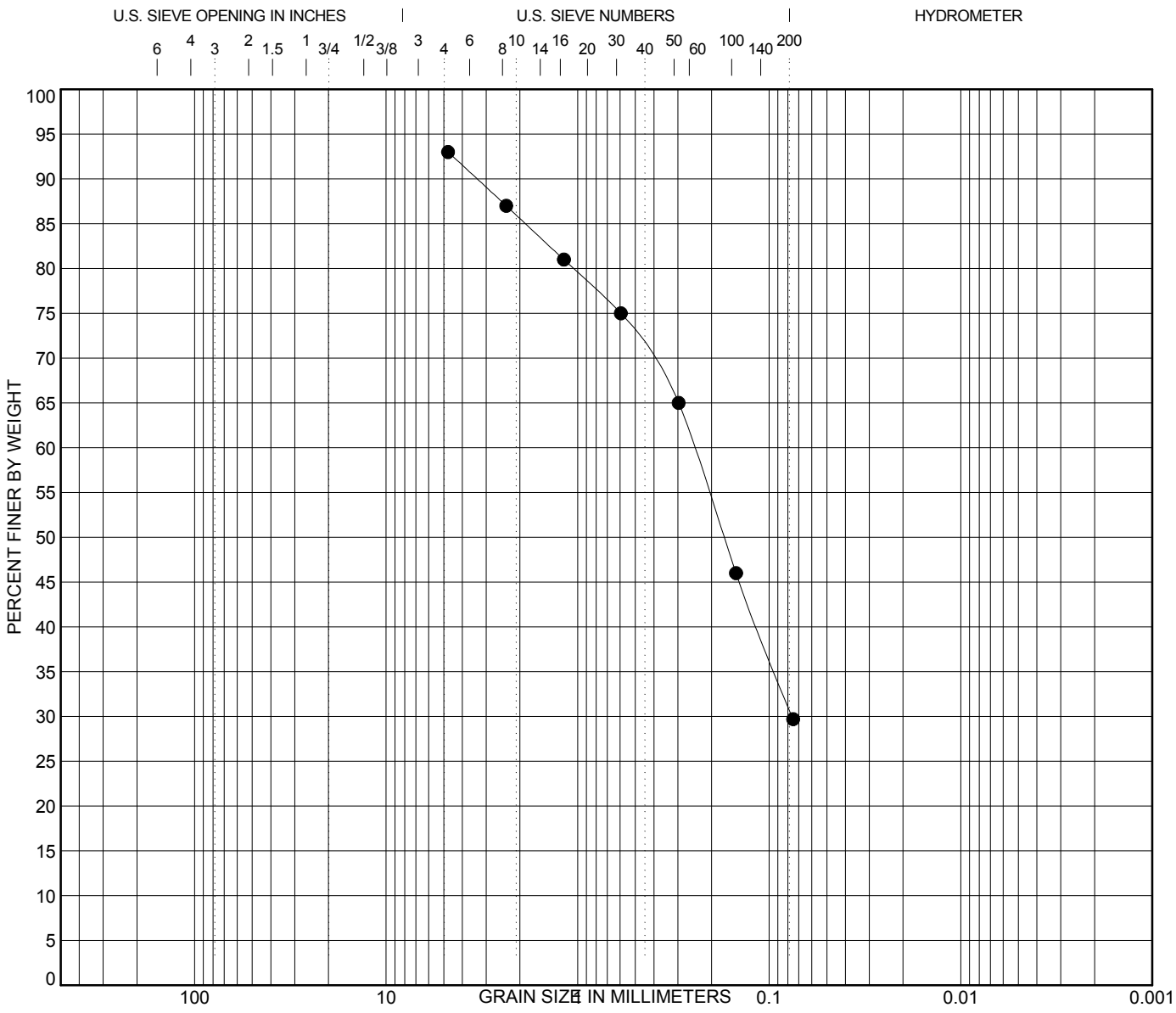
Table No. B-3, Corrosivity Test Results

Boring No.	Sample Depth (feet)	pH (Caltrans 643)	Soluble Chlorides (Caltrans 422) ppm	Soluble Sulfate (Caltrans 417) % by weight	Saturated Resistivity (Caltrans 643) Ohm-cm
BH-6	0-5	7.79	105	0.001	2,000

B1.8 Sample Storage

Soil samples presently stored in our laboratory will be discarded 30 days after the date of this report, unless this office receives a specific request to retain the samples for a longer period of time.

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	**BH-1**	**0-5**	**SILTY SAND (SM)**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH-1**	**0-5**	**4.75**	**0.248**	**0.076**		**0.0**	**63.3**	**29.7**	

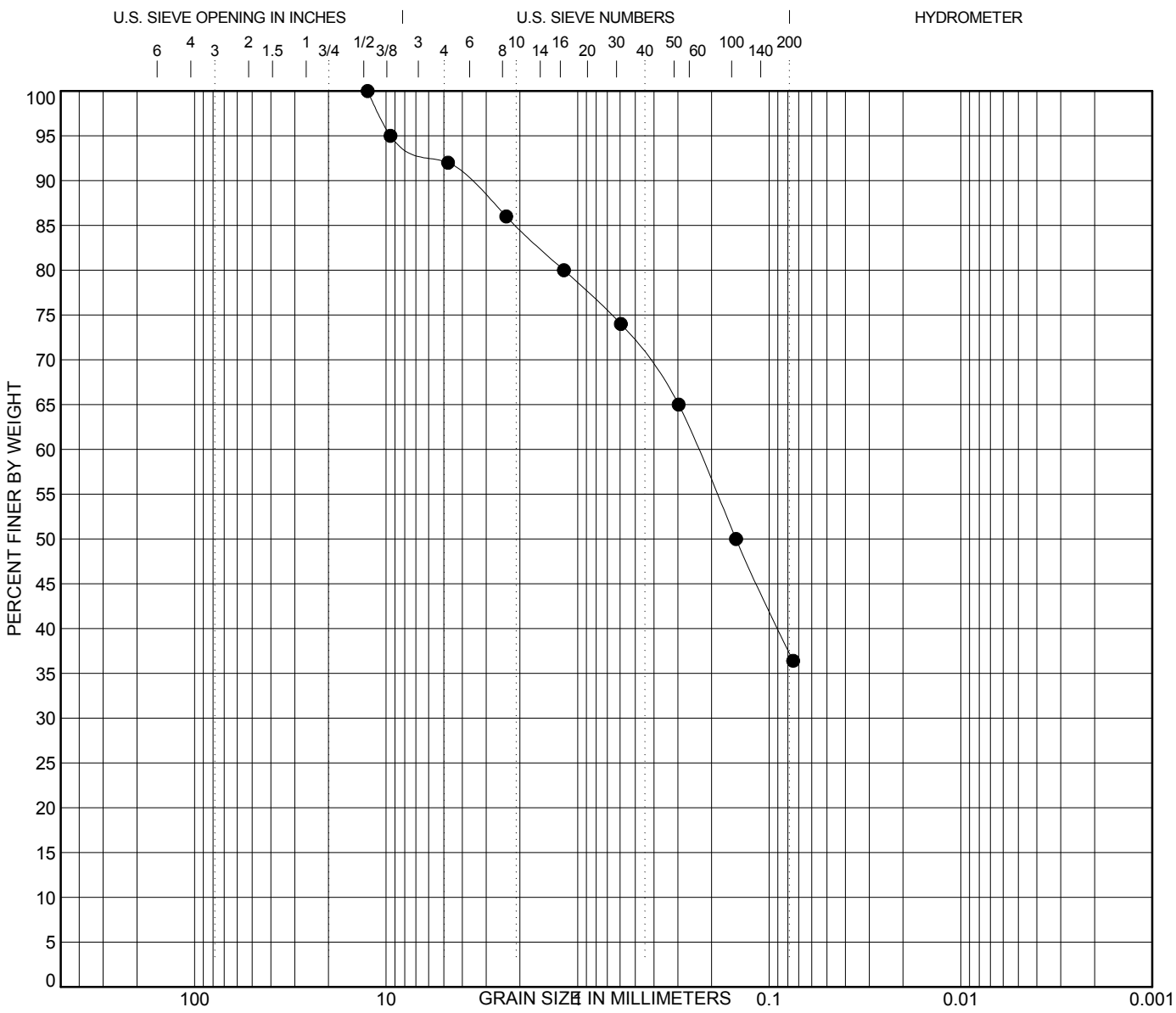
GRAIN SIZE DISTRIBUTION RESULTS

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Project Name
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WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
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Figure No. **B-1a**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	**BH-6**	**0-5**	**SILTY SAND (SM)**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH-6**	**0-5**	**12.5**	**0.236**			**8.0**	**55.6**	**36.4**	

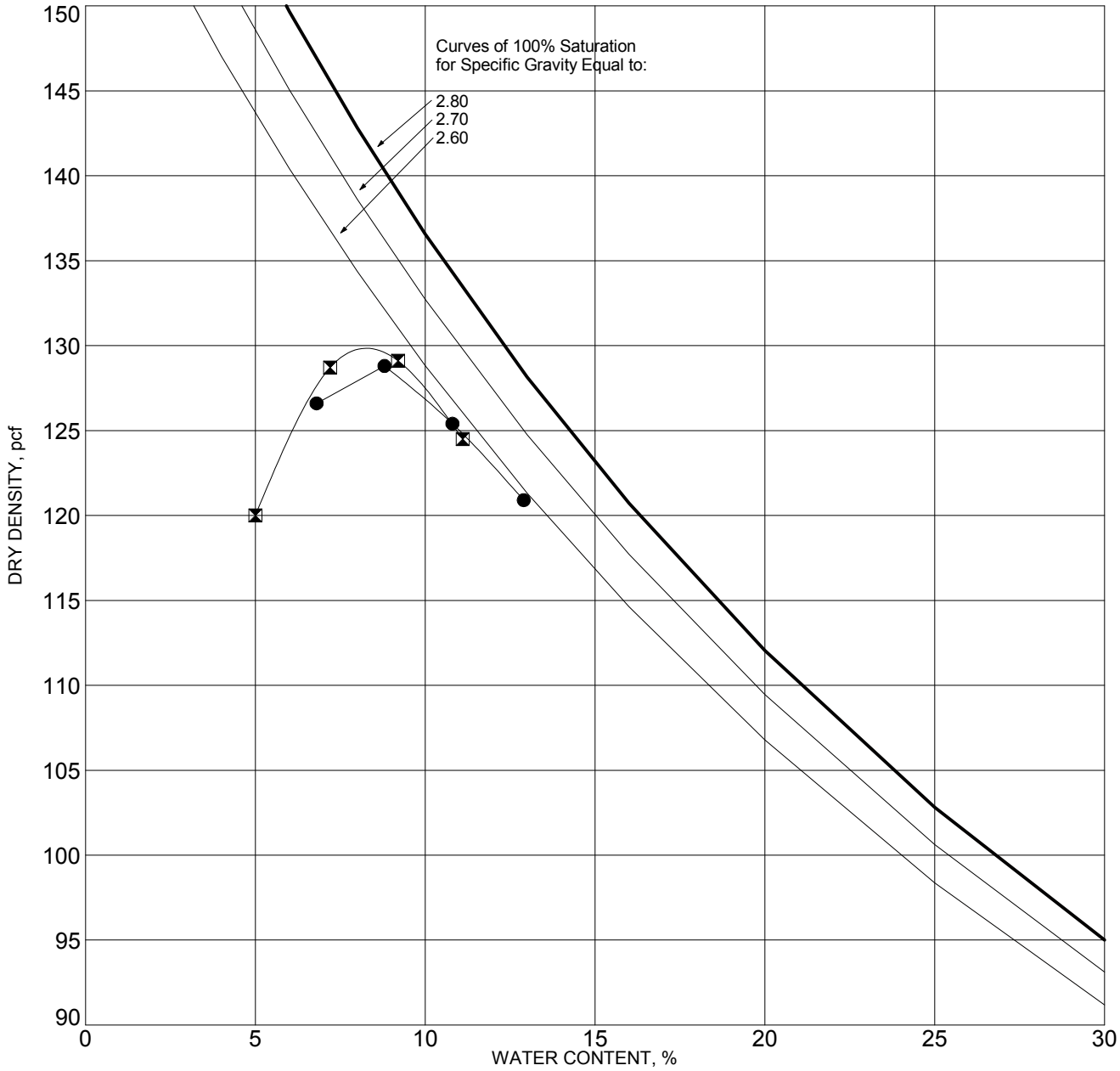
GRAIN SIZE DISTRIBUTION RESULTS

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WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
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Figure No. **B-1b**



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	BH-2	0-5	SILTY SAND (SM)	D1557 Method B	9	129
⊠	BH-4	0-5	SILTY SAND (SM)	D1557 Method B	8.5	130

NOTE:

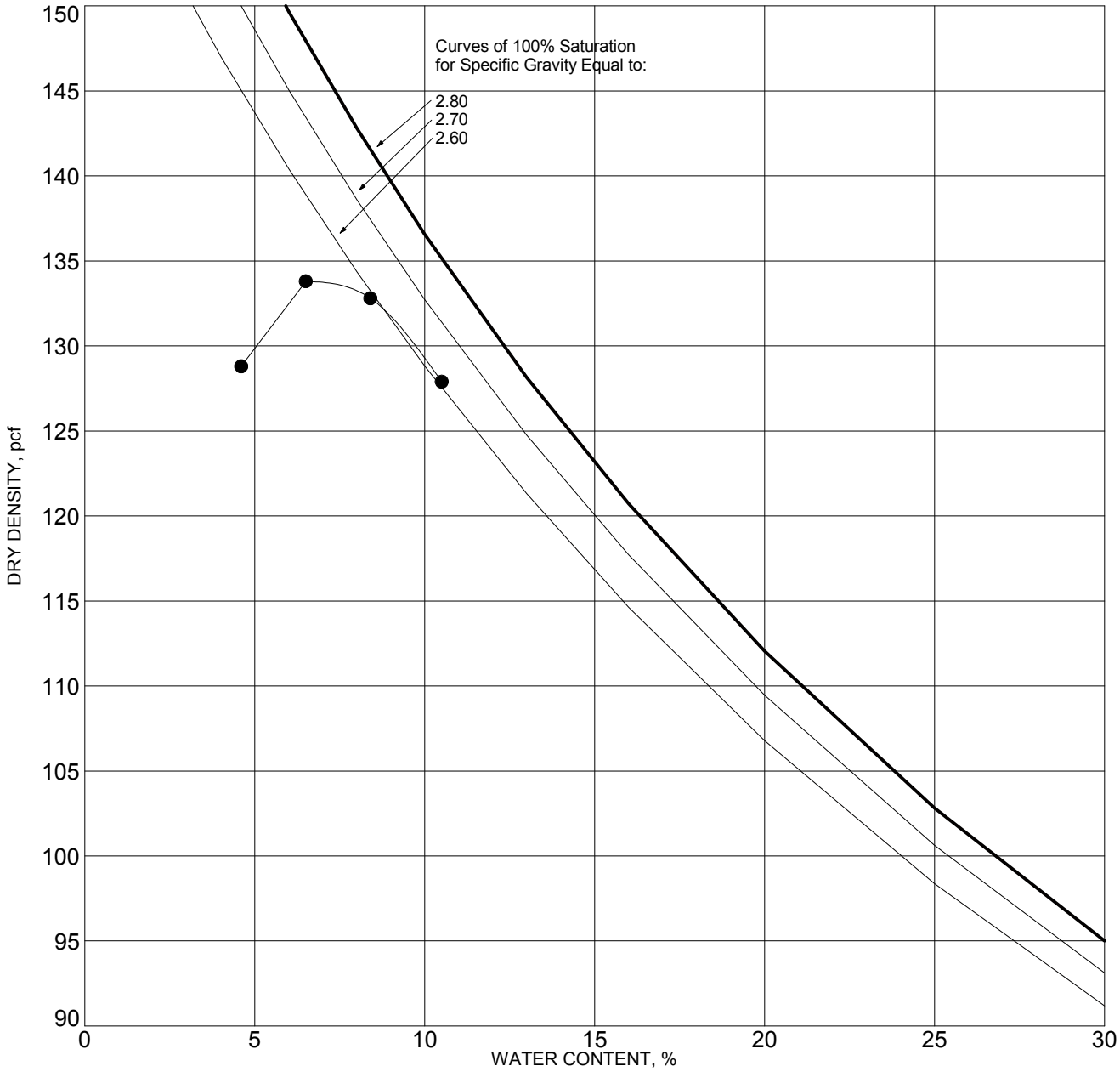
MOISTURE-DENSITY RELATIONSHIP RESULTS

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WEST END OF CAMINO DEL TOMASINI
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Figure No.
B-2a



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	BH-5	0-5	SILTY SAND (SM)	D1557 Method C	7.1	134.8

NOTE:

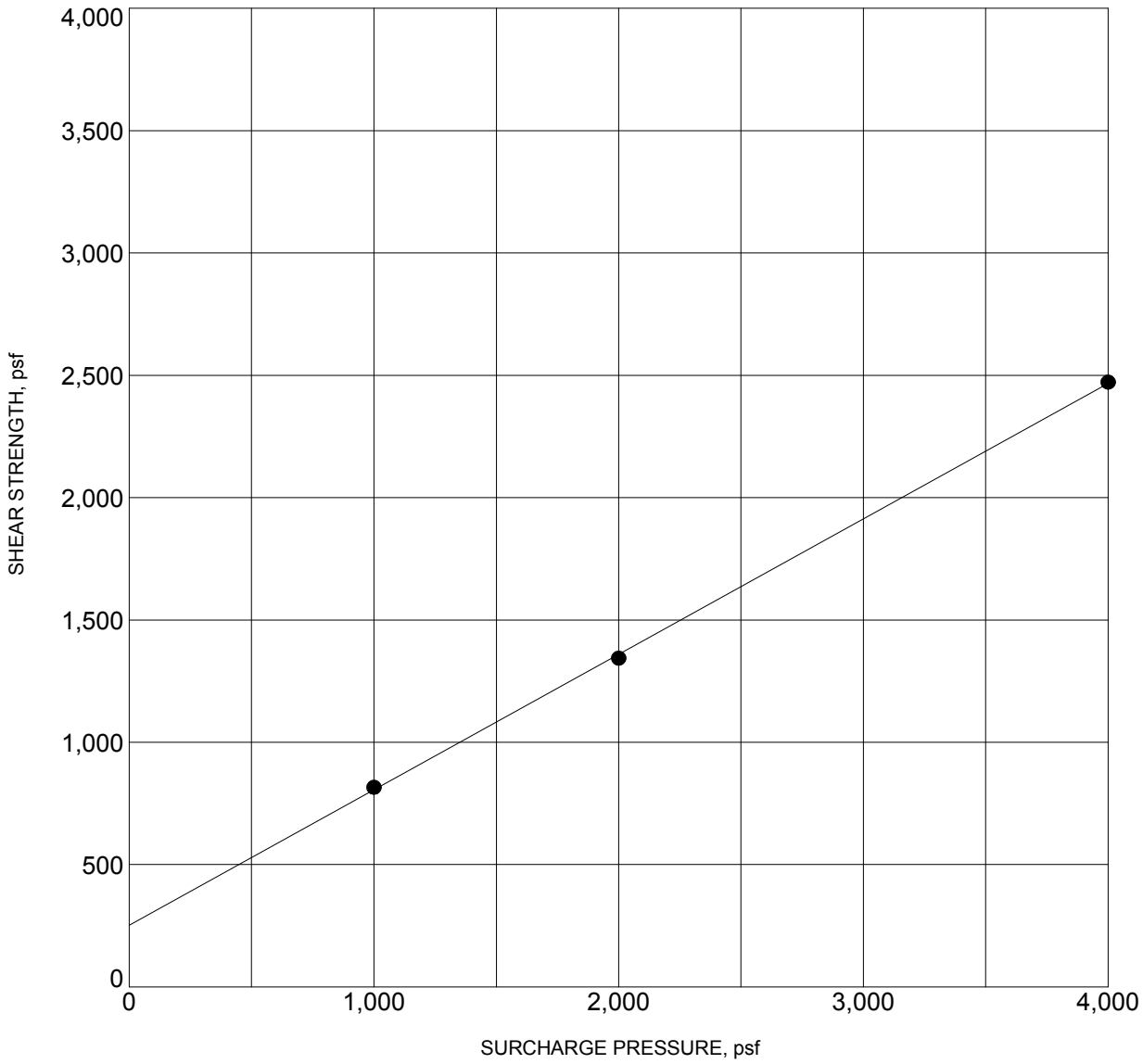
MOISTURE-DENSITY RELATIONSHIP RESULTS

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Figure No.
B-2b



BORING NO.	:	**BH-1**	DEPTH (ft)	:	**5**
DESCRIPTION	:	**SILTY SAND (SM)**			
COHESION (psf)	:	**250**	FRICTION ANGLE (degrees):		**29**
MOISTURE CONTENT (%)	:	**4.9**	DRY DENSITY (pcf)	:	**101.4**

NOTE: Ultimate Strength.

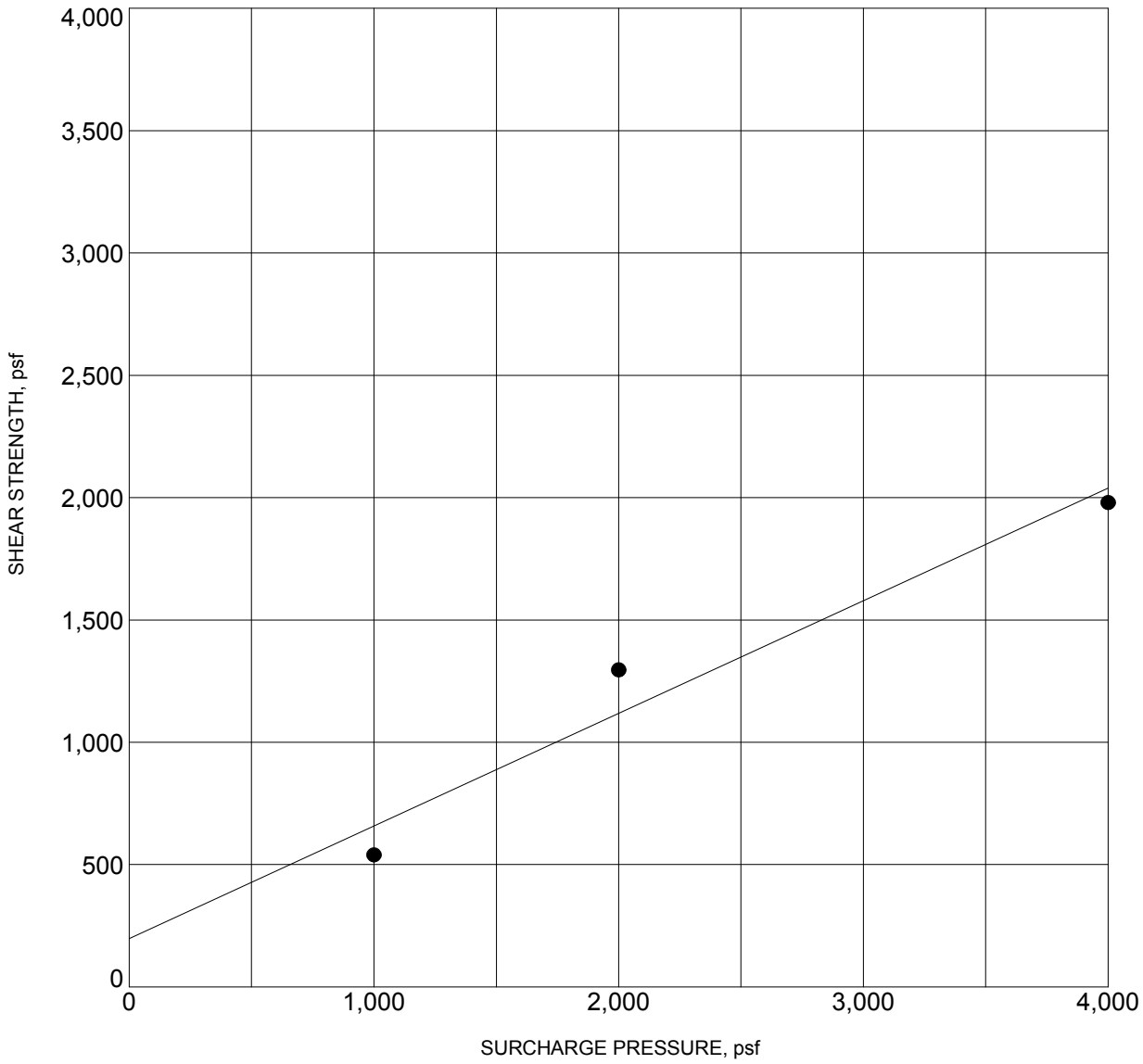
DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
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Figure No. **B-3a**



BORING NO.	:	**BH-4**	DEPTH (ft)	:	**5**
DESCRIPTION	:	**SILTY SAND (SM)**			
COHESION (psf)	:	**200**	FRICTION ANGLE (degrees):		**25**
MOISTURE CONTENT (%)	:	**7.3**	DRY DENSITY (pcf)	:	**91.8**

NOTE: Ultimate Strength.

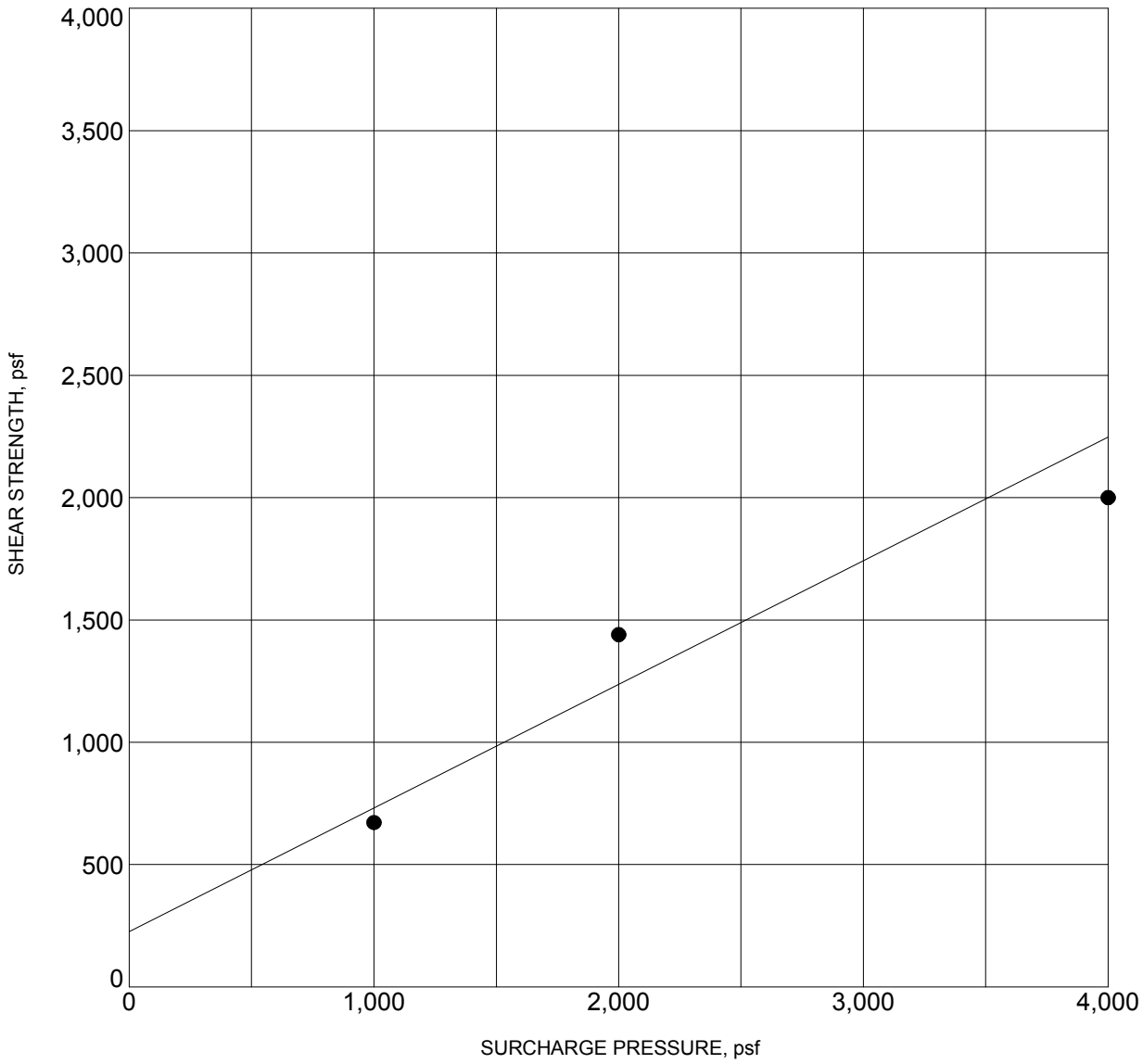
DIRECT SHEAR TEST RESULTS

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Figure No. **B-3b**



BORING NO.	:	**BH-6**	DEPTH (ft)	:	**50**
DESCRIPTION	:	**SILTSTONE/CLAYSTONE: Sedimentary Bedrock**			
COHESION (psf)	:	**250**	FRICTION ANGLE (degrees):		**29**
MOISTURE CONTENT (%)	:	**9.5**	DRY DENSITY (pcf)	:	**107.0**

NOTE: Ultimate Strength.

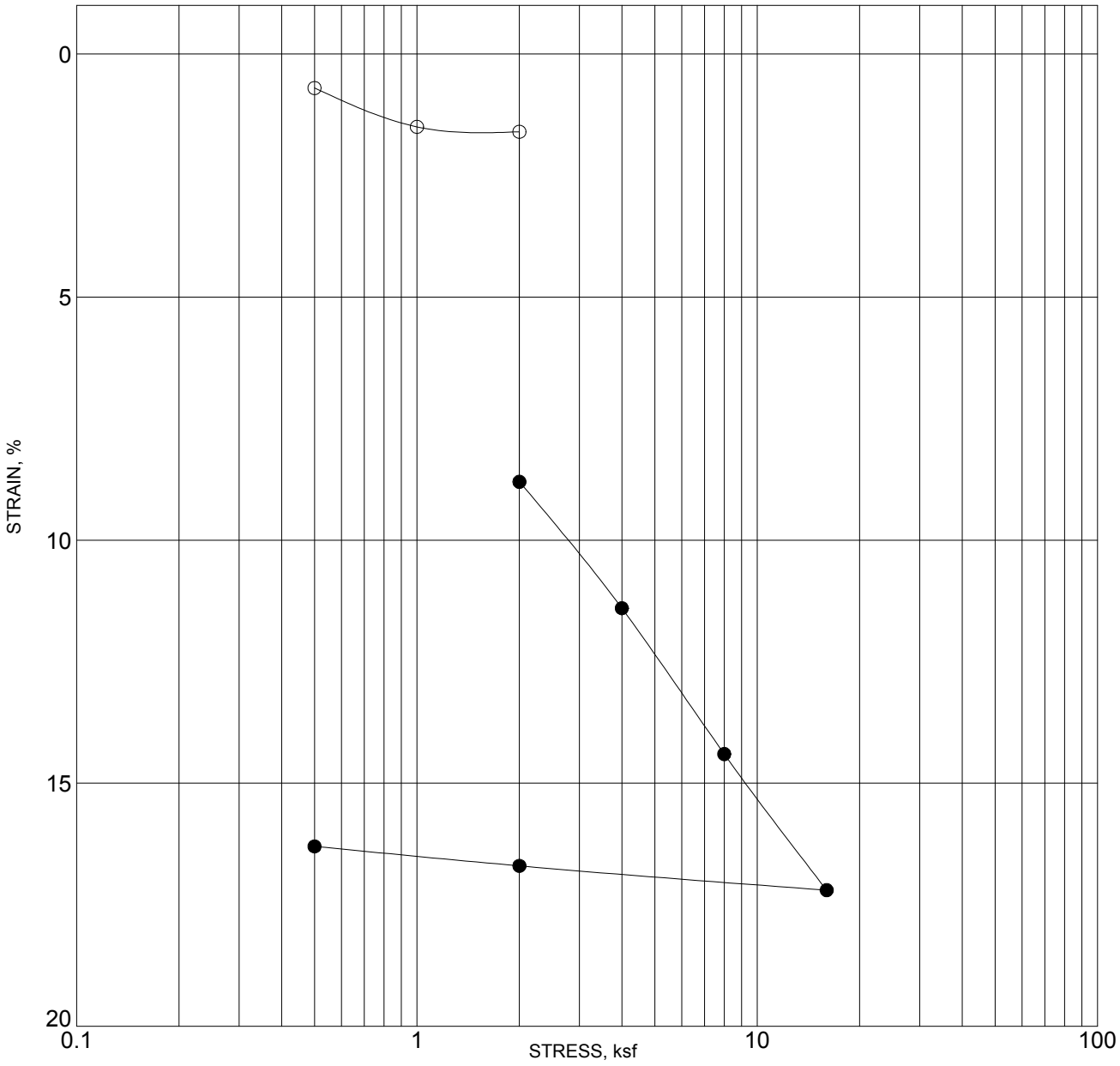
DIRECT SHEAR TEST RESULTS

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Figure No. **B-3c**



BORING NO. :	**BH-4**	DEPTH (ft) :	**5**
DESCRIPTION :	**SILTY SAND (SM)**		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	**7**	**96.7**		
FINAL	**14.2**	**112.5**		

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

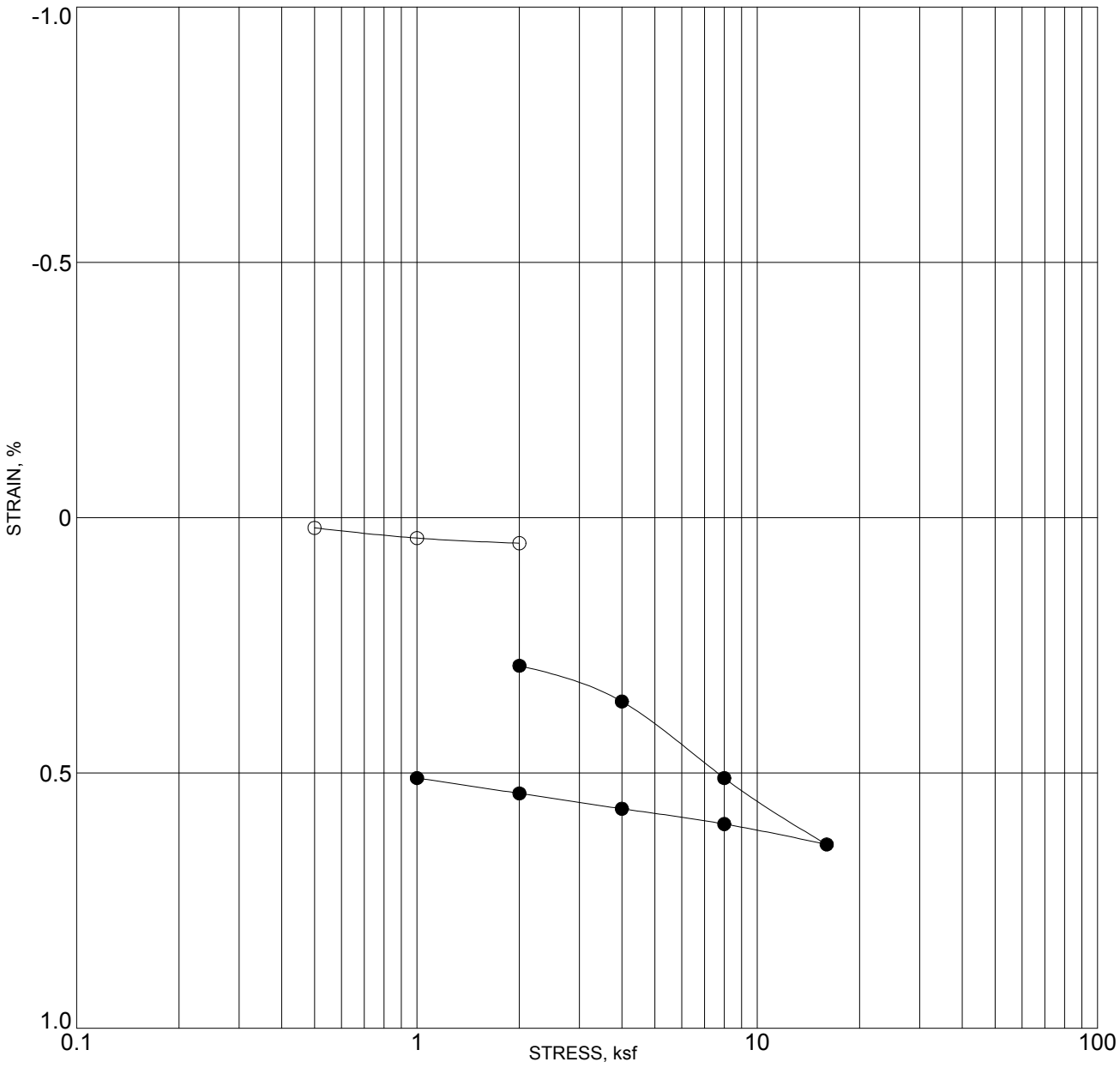
CONSOLIDATION TEST RESULTS

Converse Consultants

Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
HACIENDA HEIGHTS, LOS ANGELES COUNTY, CA
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Project No. **14-31-303-01**

Figure No. **B-4a**



BORING NO. :	**BH-6**	DEPTH (ft) :	**40**
DESCRIPTION :	**SILTSTONE/CLAYSTONE: Sedimentary Bedrock**		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	**11**	**100.39**	**45**	**0.643**
FINAL				

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

CONSOLIDATION TEST RESULTS

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Project Name
SAN GABRIEL VALLEY WATER COMPANY PLANT B-14
WEST END OF CAMINO DEL TOMASINI
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Project No. **14-31-303-02**

Figure No. **B-4b**

Appendix C

Liquefaction/Seismic Settlement Analysis

APPENDIX C: LIQUEFACTION/SEISMIC SETTLEMENT ANALYSIS

Liquefaction is defined as the phenomenon where a soil mass exhibits a substantial reduction in its shear strength. This strength reduction is due to the development of excess pore pressure in a soil mass caused by earthquake induced ground motions. Saturated soils behave temporarily as a viscous fluid (liquefaction) and, consequently, lose their capacity to support the structures founded on them. The potential for liquefaction decreases with increasing clay and gravel content, but increases as the ground acceleration and duration of shaking increase. Liquefaction potential has been found to be the greatest where the groundwater level and loose sands occur within 50 feet of the ground surface.

Our liquefaction analyses are based on the *Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California* (9/2008), *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California* (3/1999), and *2016 California Building Code*.

The subsurface data obtained from exploratory borings were used to evaluate the liquefaction/seismic settlement potential of the area. The Log of Borings is presented in Appendix A, *Field Exploration*. The liquefaction potential and seismic settlement analyses were performed utilizing data obtained from boring BH-6 for the upper 50 feet of soil. The analyses were performed using *LiquefyPro,* Version 5.8n, 2012, by Civil Tech Software. The following seismic parameters are used for liquefaction potential analyses.

Table No. C-1 Seismic Parameters Used in Liquefaction Analysis

Groundwater Depth* (feet)	Earthquake Magnitude** Mw	Peak Ground Acceleration*** (g)
25	6.25	0.877

* Based on historically highest groundwater from La Habra Quadrangle Seismic Hazard Zone Report
** Based on the 2008 NSHMP PSHA Interactive Deaggregation web site for a return period of 2475 years
*** Based on PGA_M per section 21.5 of ASCE 7-10

The results of liquefaction analyses indicate the project site is not susceptible to liquefaction. The estimated potential seismically induced settlement is on the order of 0.26 inches with potential differential settlement of approximately 0.13 inches. The project structural engineer should consider the effects of seismically-induced settlement in the foundation design.

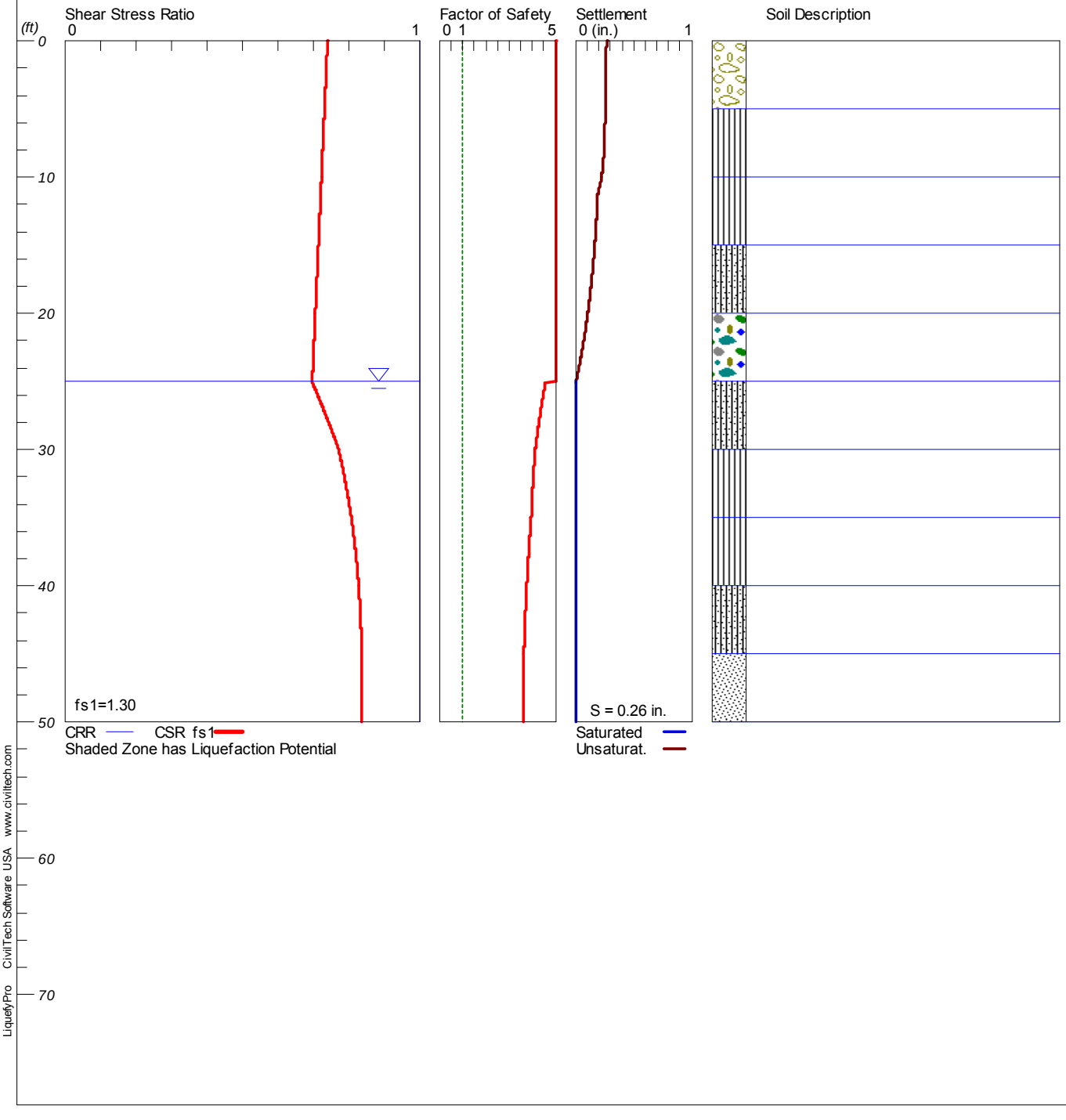
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LIQUEFACTION ANALYSIS

SGVWC

Hole No.=BH-6 Water Depth=25 ft

Magnitude=6.25
Acceleration=0.877g



LiquefyPro CivilTech Software USA www.civiltech.com

****

LIQUEFACTION ANALYSIS SUMMARY
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Font: Courier New, Regular, Size 8 is recommended for this report.
Licensed to , 7/18/2017 10:43:12 AM

Input File Name: Z:\Projects\14-31-303-00 (02)\Test results\Liquefy2.liq
Title: SGVWC
Subtitle: 14-31-303-02

Surface Elev.=
Hole No.=BH-6
Depth of Hole= 50.00 ft
Water Table during Earthquake= 25.00 ft
Water Table during In-Situ Testing= 45.00 ft
Max. Acceleration= 0.88 g
Earthquake Magnitude= 6.25

Input Data:
Surface Elev.=
Hole No.=BH-6
Depth of Hole=50.00 ft
Water Table during Earthquake= 25.00 ft
Water Table during In-Situ Testing= 45.00 ft
Max. Acceleration=0.88 g
Earthquake Magnitude=6.25
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	100.00	101.00	36.40
5.00	100.00	99.00	36.40
10.00	100.00	110.00	30.00
15.00	100.00	84.00	10.00
20.00	100.00	90.00	1.00
25.00	100.00	90.00	10.00
30.00	100.00	99.00	15.00
35.00	50.00	100.00	20.00
40.00	50.00	101.00	20.00
45.00	50.00	100.00	20.00
50.00	50.00	100.00	20.00

Output Results:
Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.26 in.
Total Settlement of Saturated and Unsaturated Sands=0.26 in.
Differential Settlement=0.132 to 0.174 in.

Depth	CRRm	CSRfs	F.S.	S_sat.	S_dry	S_all

ft				in.	in.	in.
0.00	3.19	0.74	5.00	0.00	0.26	0.26
0.05	3.19	0.74	5.00	0.00	0.26	0.26
0.10	3.19	0.74	5.00	0.00	0.26	0.26
0.15	3.19	0.74	5.00	0.00	0.26	0.26
0.20	3.19	0.74	5.00	0.00	0.26	0.26
0.25	3.19	0.74	5.00	0.00	0.26	0.26
0.30	3.19	0.74	5.00	0.00	0.26	0.26
0.35	3.19	0.74	5.00	0.00	0.26	0.26
0.40	3.19	0.74	5.00	0.00	0.26	0.26
0.45	3.19	0.74	5.00	0.00	0.26	0.26
0.50	3.19	0.74	5.00	0.00	0.26	0.26
0.55	3.19	0.74	5.00	0.00	0.26	0.26
0.60	3.19	0.74	5.00	0.00	0.26	0.26
0.65	3.19	0.74	5.00	0.00	0.26	0.26
0.70	3.19	0.74	5.00	0.00	0.26	0.26
0.75	3.19	0.74	5.00	0.00	0.26	0.26
0.80	3.19	0.74	5.00	0.00	0.26	0.26
0.85	3.19	0.74	5.00	0.00	0.26	0.26
0.90	3.19	0.74	5.00	0.00	0.26	0.26
0.95	3.19	0.74	5.00	0.00	0.26	0.26
1.00	3.19	0.74	5.00	0.00	0.26	0.26
1.05	3.19	0.74	5.00	0.00	0.26	0.26
1.10	3.19	0.74	5.00	0.00	0.26	0.26
1.15	3.19	0.74	5.00	0.00	0.26	0.26
1.20	3.19	0.74	5.00	0.00	0.26	0.26
1.25	3.19	0.74	5.00	0.00	0.26	0.26
1.30	3.19	0.74	5.00	0.00	0.26	0.26
1.35	3.19	0.74	5.00	0.00	0.26	0.26
1.40	3.19	0.74	5.00	0.00	0.26	0.26
1.45	3.19	0.74	5.00	0.00	0.26	0.26
1.50	3.19	0.74	5.00	0.00	0.26	0.26
1.55	3.19	0.74	5.00	0.00	0.26	0.26
1.60	3.19	0.74	5.00	0.00	0.26	0.26
1.65	3.19	0.74	5.00	0.00	0.26	0.26
1.70	3.19	0.74	5.00	0.00	0.26	0.26
1.75	3.19	0.74	5.00	0.00	0.26	0.26
1.80	3.19	0.74	5.00	0.00	0.26	0.26
1.85	3.19	0.74	5.00	0.00	0.26	0.26
1.90	3.19	0.74	5.00	0.00	0.26	0.26
1.95	3.19	0.74	5.00	0.00	0.26	0.26
2.00	3.19	0.74	5.00	0.00	0.26	0.26
2.05	3.19	0.74	5.00	0.00	0.26	0.26
2.10	3.19	0.74	5.00	0.00	0.26	0.26
2.15	3.19	0.74	5.00	0.00	0.26	0.26
2.20	3.19	0.74	5.00	0.00	0.26	0.26
2.25	3.19	0.74	5.00	0.00	0.26	0.26
2.30	3.19	0.74	5.00	0.00	0.26	0.26
2.35	3.19	0.74	5.00	0.00	0.26	0.26
2.40	3.19	0.74	5.00	0.00	0.26	0.26
2.45	3.19	0.74	5.00	0.00	0.26	0.26
2.50	3.19	0.74	5.00	0.00	0.26	0.26
2.55	3.19	0.74	5.00	0.00	0.26	0.26
2.60	3.19	0.74	5.00	0.00	0.26	0.26
2.65	3.19	0.74	5.00	0.00	0.26	0.26
2.70	3.19	0.74	5.00	0.00	0.26	0.26
2.75	3.19	0.74	5.00	0.00	0.26	0.26
2.80	3.19	0.74	5.00	0.00	0.26	0.26
2.85	3.19	0.74	5.00	0.00	0.26	0.26
2.90	3.19	0.74	5.00	0.00	0.26	0.26
2.95	3.19	0.74	5.00	0.00	0.26	0.26
3.00	3.19	0.74	5.00	0.00	0.26	0.26
3.05	3.19	0.74	5.00	0.00	0.26	0.26
3.10	3.19	0.74	5.00	0.00	0.26	0.26
3.15	3.19	0.74	5.00	0.00	0.26	0.26
3.20	3.19	0.74	5.00	0.00	0.26	0.26

3.25	3.19	0.74	5.00	0.00	0.26	0.26
3.30	3.19	0.74	5.00	0.00	0.26	0.26
3.35	3.19	0.74	5.00	0.00	0.26	0.26
3.40	3.19	0.74	5.00	0.00	0.26	0.26
3.45	3.19	0.74	5.00	0.00	0.26	0.26
3.50	3.19	0.74	5.00	0.00	0.26	0.26
3.55	3.19	0.73	5.00	0.00	0.26	0.26
3.60	3.19	0.73	5.00	0.00	0.26	0.26
3.65	3.19	0.73	5.00	0.00	0.26	0.26
3.70	3.19	0.73	5.00	0.00	0.26	0.26
3.75	3.19	0.73	5.00	0.00	0.26	0.26
3.80	3.19	0.73	5.00	0.00	0.26	0.26
3.85	3.19	0.73	5.00	0.00	0.26	0.26
3.90	3.19	0.73	5.00	0.00	0.26	0.26
3.95	3.19	0.73	5.00	0.00	0.26	0.26
4.00	3.19	0.73	5.00	0.00	0.26	0.26
4.05	3.19	0.73	5.00	0.00	0.26	0.26
4.10	3.19	0.73	5.00	0.00	0.26	0.26
4.15	3.19	0.73	5.00	0.00	0.26	0.26
4.20	3.19	0.73	5.00	0.00	0.26	0.26
4.25	3.19	0.73	5.00	0.00	0.26	0.26
4.30	3.19	0.73	5.00	0.00	0.26	0.26
4.35	3.19	0.73	5.00	0.00	0.26	0.26
4.40	3.19	0.73	5.00	0.00	0.26	0.26
4.45	3.19	0.73	5.00	0.00	0.26	0.26
4.50	3.19	0.73	5.00	0.00	0.26	0.26
4.55	3.19	0.73	5.00	0.00	0.26	0.26
4.60	3.19	0.73	5.00	0.00	0.26	0.26
4.65	3.19	0.73	5.00	0.00	0.26	0.26
4.70	3.19	0.73	5.00	0.00	0.26	0.26
4.75	3.19	0.73	5.00	0.00	0.26	0.26
4.80	3.19	0.73	5.00	0.00	0.25	0.25
4.85	3.19	0.73	5.00	0.00	0.25	0.25
4.90	3.19	0.73	5.00	0.00	0.25	0.25
4.95	3.19	0.73	5.00	0.00	0.25	0.25
5.00	3.19	0.73	5.00	0.00	0.25	0.25
5.05	3.19	0.73	5.00	0.00	0.25	0.25
5.10	3.19	0.73	5.00	0.00	0.25	0.25
5.15	3.19	0.73	5.00	0.00	0.25	0.25
5.20	3.19	0.73	5.00	0.00	0.25	0.25
5.25	3.19	0.73	5.00	0.00	0.25	0.25
5.30	3.19	0.73	5.00	0.00	0.25	0.25
5.35	3.19	0.73	5.00	0.00	0.25	0.25
5.40	3.19	0.73	5.00	0.00	0.25	0.25
5.45	3.19	0.73	5.00	0.00	0.25	0.25
5.50	3.19	0.73	5.00	0.00	0.25	0.25
5.55	3.19	0.73	5.00	0.00	0.25	0.25
5.60	3.19	0.73	5.00	0.00	0.25	0.25
5.65	3.19	0.73	5.00	0.00	0.25	0.25
5.70	3.19	0.73	5.00	0.00	0.25	0.25
5.75	3.19	0.73	5.00	0.00	0.25	0.25
5.80	3.19	0.73	5.00	0.00	0.25	0.25
5.85	3.19	0.73	5.00	0.00	0.25	0.25
5.90	3.19	0.73	5.00	0.00	0.25	0.25
5.95	3.19	0.73	5.00	0.00	0.25	0.25
6.00	3.19	0.73	5.00	0.00	0.25	0.25
6.05	3.19	0.73	5.00	0.00	0.25	0.25
6.10	3.19	0.73	5.00	0.00	0.25	0.25
6.15	3.19	0.73	5.00	0.00	0.25	0.25
6.20	3.19	0.73	5.00	0.00	0.25	0.25
6.25	3.19	0.73	5.00	0.00	0.25	0.25
6.30	3.19	0.73	5.00	0.00	0.25	0.25
6.35	3.19	0.73	5.00	0.00	0.25	0.25
6.40	3.19	0.73	5.00	0.00	0.25	0.25
6.45	3.19	0.73	5.00	0.00	0.25	0.25
6.50	3.19	0.73	5.00	0.00	0.25	0.25
6.55	3.19	0.73	5.00	0.00	0.25	0.25

6.60	3.19	0.73	5.00	0.00	0.25	0.25
6.65	3.19	0.73	5.00	0.00	0.25	0.25
6.70	3.19	0.73	5.00	0.00	0.25	0.25
6.75	3.19	0.73	5.00	0.00	0.25	0.25
6.80	3.19	0.73	5.00	0.00	0.25	0.25
6.85	3.19	0.73	5.00	0.00	0.25	0.25
6.90	3.19	0.73	5.00	0.00	0.25	0.25
6.95	3.19	0.73	5.00	0.00	0.25	0.25
7.00	3.19	0.73	5.00	0.00	0.25	0.25
7.05	3.19	0.73	5.00	0.00	0.25	0.25
7.10	3.19	0.73	5.00	0.00	0.25	0.25
7.15	3.19	0.73	5.00	0.00	0.25	0.25
7.20	3.19	0.73	5.00	0.00	0.25	0.25
7.25	3.19	0.73	5.00	0.00	0.25	0.25
7.30	3.19	0.73	5.00	0.00	0.25	0.25
7.35	3.19	0.73	5.00	0.00	0.25	0.25
7.40	3.19	0.73	5.00	0.00	0.25	0.25
7.45	3.19	0.73	5.00	0.00	0.25	0.25
7.50	3.19	0.73	5.00	0.00	0.25	0.25
7.55	3.19	0.73	5.00	0.00	0.25	0.25
7.60	3.19	0.73	5.00	0.00	0.25	0.25
7.65	3.19	0.73	5.00	0.00	0.25	0.25
7.70	3.19	0.73	5.00	0.00	0.24	0.24
7.75	3.19	0.73	5.00	0.00	0.24	0.24
7.80	3.19	0.73	5.00	0.00	0.24	0.24
7.85	3.19	0.73	5.00	0.00	0.24	0.24
7.90	3.19	0.73	5.00	0.00	0.24	0.24
7.95	3.19	0.73	5.00	0.00	0.24	0.24
8.00	3.19	0.73	5.00	0.00	0.24	0.24
8.05	3.19	0.73	5.00	0.00	0.24	0.24
8.10	3.19	0.73	5.00	0.00	0.24	0.24
8.15	3.19	0.73	5.00	0.00	0.24	0.24
8.20	3.19	0.73	5.00	0.00	0.24	0.24
8.25	3.19	0.73	5.00	0.00	0.24	0.24
8.30	3.19	0.73	5.00	0.00	0.24	0.24
8.35	3.19	0.73	5.00	0.00	0.24	0.24
8.40	3.19	0.73	5.00	0.00	0.24	0.24
8.45	3.19	0.73	5.00	0.00	0.24	0.24
8.50	3.19	0.73	5.00	0.00	0.24	0.24
8.55	3.19	0.73	5.00	0.00	0.24	0.24
8.60	3.19	0.73	5.00	0.00	0.24	0.24
8.65	3.19	0.73	5.00	0.00	0.24	0.24
8.70	3.19	0.73	5.00	0.00	0.24	0.24
8.75	3.19	0.73	5.00	0.00	0.24	0.24
8.80	3.19	0.73	5.00	0.00	0.24	0.24
8.85	3.19	0.73	5.00	0.00	0.24	0.24
8.90	3.19	0.73	5.00	0.00	0.24	0.24
8.95	3.19	0.73	5.00	0.00	0.24	0.24
9.00	3.19	0.73	5.00	0.00	0.24	0.24
9.05	3.19	0.73	5.00	0.00	0.23	0.23
9.10	3.19	0.73	5.00	0.00	0.23	0.23
9.15	3.19	0.73	5.00	0.00	0.23	0.23
9.20	3.19	0.73	5.00	0.00	0.23	0.23
9.25	3.19	0.73	5.00	0.00	0.23	0.23
9.30	3.19	0.72	5.00	0.00	0.23	0.23
9.35	3.19	0.72	5.00	0.00	0.23	0.23
9.40	3.19	0.72	5.00	0.00	0.23	0.23
9.45	3.19	0.72	5.00	0.00	0.23	0.23
9.50	3.19	0.72	5.00	0.00	0.23	0.23
9.55	3.19	0.72	5.00	0.00	0.23	0.23
9.60	3.19	0.72	5.00	0.00	0.23	0.23
9.65	3.19	0.72	5.00	0.00	0.23	0.23
9.70	3.19	0.72	5.00	0.00	0.23	0.23
9.75	3.19	0.72	5.00	0.00	0.23	0.23
9.80	3.19	0.72	5.00	0.00	0.22	0.22
9.85	3.19	0.72	5.00	0.00	0.22	0.22
9.90	3.19	0.72	5.00	0.00	0.22	0.22

9.95	3.19	0.72	5.00	0.00	0.22	0.22
10.00	3.19	0.72	5.00	0.00	0.22	0.22
10.05	3.19	0.72	5.00	0.00	0.22	0.22
10.10	3.19	0.72	5.00	0.00	0.22	0.22
10.15	3.19	0.72	5.00	0.00	0.22	0.22
10.20	3.19	0.72	5.00	0.00	0.22	0.22
10.25	3.19	0.72	5.00	0.00	0.22	0.22
10.30	3.19	0.72	5.00	0.00	0.22	0.22
10.35	3.19	0.72	5.00	0.00	0.21	0.21
10.40	3.19	0.72	5.00	0.00	0.21	0.21
10.45	3.19	0.72	5.00	0.00	0.21	0.21
10.50	3.19	0.72	5.00	0.00	0.21	0.21
10.55	3.19	0.72	5.00	0.00	0.21	0.21
10.60	3.19	0.72	5.00	0.00	0.21	0.21
10.65	3.19	0.72	5.00	0.00	0.21	0.21
10.70	3.19	0.72	5.00	0.00	0.20	0.20
10.75	3.19	0.72	5.00	0.00	0.20	0.20
10.80	3.19	0.72	5.00	0.00	0.20	0.20
10.85	3.19	0.72	5.00	0.00	0.20	0.20
10.90	3.19	0.72	5.00	0.00	0.20	0.20
10.95	3.19	0.72	5.00	0.00	0.20	0.20
11.00	3.19	0.72	5.00	0.00	0.19	0.19
11.05	3.19	0.72	5.00	0.00	0.19	0.19
11.10	3.19	0.72	5.00	0.00	0.19	0.19
11.15	3.19	0.72	5.00	0.00	0.19	0.19
11.20	3.19	0.72	5.00	0.00	0.19	0.19
11.25	3.19	0.72	5.00	0.00	0.19	0.19
11.30	3.19	0.72	5.00	0.00	0.19	0.19
11.35	3.19	0.72	5.00	0.00	0.19	0.19
11.40	3.19	0.72	5.00	0.00	0.19	0.19
11.45	3.19	0.72	5.00	0.00	0.19	0.19
11.50	3.19	0.72	5.00	0.00	0.19	0.19
11.55	3.19	0.72	5.00	0.00	0.19	0.19
11.60	3.19	0.72	5.00	0.00	0.19	0.19
11.65	3.19	0.72	5.00	0.00	0.19	0.19
11.70	3.19	0.72	5.00	0.00	0.19	0.19
11.75	3.19	0.72	5.00	0.00	0.19	0.19
11.80	3.19	0.72	5.00	0.00	0.19	0.19
11.85	3.19	0.72	5.00	0.00	0.19	0.19
11.90	3.19	0.72	5.00	0.00	0.19	0.19
11.95	3.19	0.72	5.00	0.00	0.19	0.19
12.00	3.19	0.72	5.00	0.00	0.19	0.19
12.05	3.19	0.72	5.00	0.00	0.19	0.19
12.10	3.19	0.72	5.00	0.00	0.18	0.18
12.15	3.19	0.72	5.00	0.00	0.18	0.18
12.20	3.19	0.72	5.00	0.00	0.18	0.18
12.25	3.19	0.72	5.00	0.00	0.18	0.18
12.30	3.19	0.72	5.00	0.00	0.18	0.18
12.35	3.19	0.72	5.00	0.00	0.18	0.18
12.40	3.19	0.72	5.00	0.00	0.18	0.18
12.45	3.19	0.72	5.00	0.00	0.18	0.18
12.50	3.19	0.72	5.00	0.00	0.18	0.18
12.55	3.19	0.72	5.00	0.00	0.18	0.18
12.60	3.19	0.72	5.00	0.00	0.18	0.18
12.65	3.19	0.72	5.00	0.00	0.18	0.18
12.70	3.19	0.72	5.00	0.00	0.18	0.18
12.75	3.19	0.72	5.00	0.00	0.18	0.18
12.80	3.19	0.72	5.00	0.00	0.18	0.18
12.85	3.19	0.72	5.00	0.00	0.18	0.18
12.90	3.19	0.72	5.00	0.00	0.18	0.18
12.95	3.19	0.72	5.00	0.00	0.18	0.18
13.00	3.19	0.72	5.00	0.00	0.18	0.18
13.05	3.19	0.72	5.00	0.00	0.18	0.18
13.10	3.19	0.72	5.00	0.00	0.18	0.18
13.15	3.19	0.72	5.00	0.00	0.18	0.18
13.20	3.19	0.72	5.00	0.00	0.18	0.18
13.25	3.19	0.72	5.00	0.00	0.18	0.18

13.30	3.19	0.72	5.00	0.00	0.18	0.18
13.35	3.19	0.72	5.00	0.00	0.18	0.18
13.40	3.19	0.72	5.00	0.00	0.18	0.18
13.45	3.19	0.72	5.00	0.00	0.18	0.18
13.50	3.19	0.72	5.00	0.00	0.18	0.18
13.55	3.19	0.72	5.00	0.00	0.17	0.17
13.60	3.19	0.72	5.00	0.00	0.17	0.17
13.65	3.19	0.72	5.00	0.00	0.17	0.17
13.70	3.19	0.72	5.00	0.00	0.17	0.17
13.75	3.19	0.72	5.00	0.00	0.17	0.17
13.80	3.19	0.72	5.00	0.00	0.17	0.17
13.85	3.19	0.72	5.00	0.00	0.17	0.17
13.90	3.19	0.72	5.00	0.00	0.17	0.17
13.95	3.19	0.72	5.00	0.00	0.17	0.17
14.00	3.19	0.72	5.00	0.00	0.17	0.17
14.05	3.19	0.72	5.00	0.00	0.17	0.17
14.10	3.19	0.72	5.00	0.00	0.17	0.17
14.15	3.19	0.72	5.00	0.00	0.17	0.17
14.20	3.19	0.72	5.00	0.00	0.17	0.17
14.25	3.19	0.72	5.00	0.00	0.17	0.17
14.30	3.19	0.72	5.00	0.00	0.17	0.17
14.35	3.19	0.72	5.00	0.00	0.17	0.17
14.40	3.19	0.72	5.00	0.00	0.17	0.17
14.45	3.19	0.72	5.00	0.00	0.17	0.17
14.50	3.19	0.72	5.00	0.00	0.17	0.17
14.55	3.19	0.72	5.00	0.00	0.17	0.17
14.60	3.19	0.72	5.00	0.00	0.17	0.17
14.65	3.19	0.72	5.00	0.00	0.17	0.17
14.70	3.19	0.72	5.00	0.00	0.17	0.17
14.75	3.19	0.72	5.00	0.00	0.16	0.16
14.80	3.19	0.72	5.00	0.00	0.16	0.16
14.85	3.19	0.72	5.00	0.00	0.16	0.16
14.90	3.19	0.72	5.00	0.00	0.16	0.16
14.95	3.19	0.72	5.00	0.00	0.16	0.16
15.00	3.19	0.72	5.00	0.00	0.16	0.16
15.05	3.19	0.72	5.00	0.00	0.16	0.16
15.10	3.19	0.71	5.00	0.00	0.16	0.16
15.15	3.19	0.71	5.00	0.00	0.16	0.16
15.20	3.19	0.71	5.00	0.00	0.16	0.16
15.25	3.19	0.71	5.00	0.00	0.16	0.16
15.30	3.19	0.71	5.00	0.00	0.16	0.16
15.35	3.19	0.71	5.00	0.00	0.16	0.16
15.40	3.19	0.71	5.00	0.00	0.16	0.16
15.45	3.19	0.71	5.00	0.00	0.16	0.16
15.50	3.19	0.71	5.00	0.00	0.16	0.16
15.55	3.19	0.71	5.00	0.00	0.16	0.16
15.60	3.19	0.71	5.00	0.00	0.16	0.16
15.65	3.19	0.71	5.00	0.00	0.16	0.16
15.70	3.19	0.71	5.00	0.00	0.16	0.16
15.75	3.19	0.71	5.00	0.00	0.16	0.16
15.80	3.19	0.71	5.00	0.00	0.15	0.15
15.85	3.19	0.71	5.00	0.00	0.15	0.15
15.90	3.19	0.71	5.00	0.00	0.15	0.15
15.95	3.19	0.71	5.00	0.00	0.15	0.15
16.00	3.19	0.71	5.00	0.00	0.15	0.15
16.05	3.19	0.71	5.00	0.00	0.15	0.15
16.10	3.19	0.71	5.00	0.00	0.15	0.15
16.15	3.19	0.71	5.00	0.00	0.15	0.15
16.20	3.19	0.71	5.00	0.00	0.15	0.15
16.25	3.19	0.71	5.00	0.00	0.15	0.15
16.30	3.19	0.71	5.00	0.00	0.15	0.15
16.35	3.19	0.71	5.00	0.00	0.15	0.15
16.40	3.19	0.71	5.00	0.00	0.15	0.15
16.45	3.19	0.71	5.00	0.00	0.15	0.15
16.50	3.19	0.71	5.00	0.00	0.15	0.15
16.55	3.19	0.71	5.00	0.00	0.15	0.15
16.60	3.19	0.71	5.00	0.00	0.15	0.15

16.65	3.19	0.71	5.00	0.00	0.15	0.15
16.70	3.19	0.71	5.00	0.00	0.15	0.15
16.75	3.19	0.71	5.00	0.00	0.14	0.14
16.80	3.19	0.71	5.00	0.00	0.14	0.14
16.85	3.19	0.71	5.00	0.00	0.14	0.14
16.90	3.19	0.71	5.00	0.00	0.14	0.14
16.95	3.19	0.71	5.00	0.00	0.14	0.14
17.00	3.19	0.71	5.00	0.00	0.14	0.14
17.05	3.19	0.71	5.00	0.00	0.14	0.14
17.10	3.19	0.71	5.00	0.00	0.14	0.14
17.15	3.19	0.71	5.00	0.00	0.14	0.14
17.20	3.19	0.71	5.00	0.00	0.14	0.14
17.25	3.19	0.71	5.00	0.00	0.14	0.14
17.30	3.19	0.71	5.00	0.00	0.14	0.14
17.35	3.19	0.71	5.00	0.00	0.14	0.14
17.40	3.19	0.71	5.00	0.00	0.14	0.14
17.45	3.19	0.71	5.00	0.00	0.14	0.14
17.50	3.19	0.71	5.00	0.00	0.14	0.14
17.55	3.19	0.71	5.00	0.00	0.14	0.14
17.60	3.19	0.71	5.00	0.00	0.14	0.14
17.65	3.19	0.71	5.00	0.00	0.13	0.13
17.70	3.19	0.71	5.00	0.00	0.13	0.13
17.75	3.19	0.71	5.00	0.00	0.13	0.13
17.80	3.19	0.71	5.00	0.00	0.13	0.13
17.85	3.19	0.71	5.00	0.00	0.13	0.13
17.90	3.19	0.71	5.00	0.00	0.13	0.13
17.95	3.19	0.71	5.00	0.00	0.13	0.13
18.00	3.19	0.71	5.00	0.00	0.13	0.13
18.05	3.19	0.71	5.00	0.00	0.13	0.13
18.10	3.19	0.71	5.00	0.00	0.13	0.13
18.15	3.19	0.71	5.00	0.00	0.13	0.13
18.20	3.19	0.71	5.00	0.00	0.13	0.13
18.25	3.19	0.71	5.00	0.00	0.13	0.13
18.30	3.19	0.71	5.00	0.00	0.13	0.13
18.35	3.19	0.71	5.00	0.00	0.13	0.13
18.40	3.19	0.71	5.00	0.00	0.13	0.13
18.45	3.19	0.71	5.00	0.00	0.12	0.12
18.50	3.19	0.71	5.00	0.00	0.12	0.12
18.55	3.19	0.71	5.00	0.00	0.12	0.12
18.60	3.19	0.71	5.00	0.00	0.12	0.12
18.65	3.19	0.71	5.00	0.00	0.12	0.12
18.70	3.19	0.71	5.00	0.00	0.12	0.12
18.75	3.19	0.71	5.00	0.00	0.12	0.12
18.80	3.19	0.71	5.00	0.00	0.12	0.12
18.85	3.19	0.71	5.00	0.00	0.12	0.12
18.90	3.19	0.71	5.00	0.00	0.12	0.12
18.95	3.19	0.71	5.00	0.00	0.12	0.12
19.00	3.19	0.71	5.00	0.00	0.12	0.12
19.05	3.19	0.71	5.00	0.00	0.12	0.12
19.10	3.19	0.71	5.00	0.00	0.12	0.12
19.15	3.19	0.71	5.00	0.00	0.11	0.11
19.20	3.19	0.71	5.00	0.00	0.11	0.11
19.25	3.19	0.71	5.00	0.00	0.11	0.11
19.30	3.19	0.71	5.00	0.00	0.11	0.11
19.35	3.19	0.71	5.00	0.00	0.11	0.11
19.40	3.19	0.71	5.00	0.00	0.11	0.11
19.45	3.19	0.71	5.00	0.00	0.11	0.11
19.50	3.19	0.71	5.00	0.00	0.11	0.11
19.55	3.19	0.71	5.00	0.00	0.11	0.11
19.60	3.19	0.71	5.00	0.00	0.11	0.11
19.65	3.19	0.71	5.00	0.00	0.11	0.11
19.70	3.19	0.71	5.00	0.00	0.11	0.11
19.75	3.19	0.71	5.00	0.00	0.11	0.11
19.80	3.19	0.71	5.00	0.00	0.11	0.11
19.85	3.19	0.71	5.00	0.00	0.10	0.10
19.90	3.19	0.71	5.00	0.00	0.10	0.10
19.95	3.19	0.71	5.00	0.00	0.10	0.10

20.00	3.19	0.71	5.00	0.00	0.10	0.10
20.05	3.19	0.71	5.00	0.00	0.10	0.10
20.10	3.19	0.71	5.00	0.00	0.10	0.10
20.15	3.19	0.71	5.00	0.00	0.10	0.10
20.20	3.19	0.71	5.00	0.00	0.10	0.10
20.25	3.19	0.71	5.00	0.00	0.10	0.10
20.30	3.19	0.71	5.00	0.00	0.10	0.10
20.35	3.19	0.71	5.00	0.00	0.10	0.10
20.40	3.19	0.71	5.00	0.00	0.10	0.10
20.45	3.19	0.71	5.00	0.00	0.10	0.10
20.50	3.19	0.71	5.00	0.00	0.09	0.09
20.55	3.19	0.71	5.00	0.00	0.09	0.09
20.60	3.19	0.71	5.00	0.00	0.09	0.09
20.65	3.19	0.71	5.00	0.00	0.09	0.09
20.70	3.19	0.71	5.00	0.00	0.09	0.09
20.75	3.19	0.71	5.00	0.00	0.09	0.09
20.80	3.19	0.71	5.00	0.00	0.09	0.09
20.85	3.19	0.71	5.00	0.00	0.09	0.09
20.90	3.19	0.70	5.00	0.00	0.09	0.09
20.95	3.19	0.70	5.00	0.00	0.09	0.09
21.00	3.19	0.70	5.00	0.00	0.09	0.09
21.05	3.19	0.70	5.00	0.00	0.09	0.09
21.10	3.19	0.70	5.00	0.00	0.08	0.08
21.15	3.19	0.70	5.00	0.00	0.08	0.08
21.20	3.19	0.70	5.00	0.00	0.08	0.08
21.25	3.19	0.70	5.00	0.00	0.08	0.08
21.30	3.19	0.70	5.00	0.00	0.08	0.08
21.35	3.19	0.70	5.00	0.00	0.08	0.08
21.40	3.19	0.70	5.00	0.00	0.08	0.08
21.45	3.19	0.70	5.00	0.00	0.08	0.08
21.50	3.19	0.70	5.00	0.00	0.08	0.08
21.55	3.19	0.70	5.00	0.00	0.08	0.08
21.60	3.19	0.70	5.00	0.00	0.08	0.08
21.65	3.19	0.70	5.00	0.00	0.07	0.07
21.70	3.19	0.70	5.00	0.00	0.07	0.07
21.75	3.19	0.70	5.00	0.00	0.07	0.07
21.80	3.19	0.70	5.00	0.00	0.07	0.07
21.85	3.19	0.70	5.00	0.00	0.07	0.07
21.90	3.19	0.70	5.00	0.00	0.07	0.07
21.95	3.19	0.70	5.00	0.00	0.07	0.07
22.00	3.19	0.70	5.00	0.00	0.07	0.07
22.05	3.19	0.70	5.00	0.00	0.07	0.07
22.10	3.19	0.70	5.00	0.00	0.07	0.07
22.15	3.19	0.70	5.00	0.00	0.06	0.06
22.20	3.19	0.70	5.00	0.00	0.06	0.06
22.25	3.19	0.70	5.00	0.00	0.06	0.06
22.30	3.19	0.70	5.00	0.00	0.06	0.06
22.35	3.19	0.70	5.00	0.00	0.06	0.06
22.40	3.19	0.70	5.00	0.00	0.06	0.06
22.45	3.19	0.70	5.00	0.00	0.06	0.06
22.50	3.19	0.70	5.00	0.00	0.06	0.06
22.55	3.19	0.70	5.00	0.00	0.06	0.06
22.60	3.19	0.70	5.00	0.00	0.06	0.06
22.65	3.19	0.70	5.00	0.00	0.05	0.05
22.70	3.19	0.70	5.00	0.00	0.05	0.05
22.75	3.19	0.70	5.00	0.00	0.05	0.05
22.80	3.19	0.70	5.00	0.00	0.05	0.05
22.85	3.19	0.70	5.00	0.00	0.05	0.05
22.90	3.19	0.70	5.00	0.00	0.05	0.05
22.95	3.19	0.70	5.00	0.00	0.05	0.05
23.00	3.19	0.70	5.00	0.00	0.05	0.05
23.05	3.19	0.70	5.00	0.00	0.05	0.05
23.10	3.19	0.70	5.00	0.00	0.05	0.05
23.15	3.19	0.70	5.00	0.00	0.04	0.04
23.20	3.19	0.70	5.00	0.00	0.04	0.04
23.25	3.19	0.70	5.00	0.00	0.04	0.04
23.30	3.19	0.70	5.00	0.00	0.04	0.04

23.35	3.19	0.70	5.00	0.00	0.04	0.04
23.40	3.19	0.70	5.00	0.00	0.04	0.04
23.45	3.19	0.70	5.00	0.00	0.04	0.04
23.50	3.19	0.70	5.00	0.00	0.04	0.04
23.55	3.19	0.70	5.00	0.00	0.04	0.04
23.60	3.19	0.70	5.00	0.00	0.03	0.03
23.65	3.19	0.70	5.00	0.00	0.03	0.03
23.70	3.19	0.70	5.00	0.00	0.03	0.03
23.75	3.19	0.70	5.00	0.00	0.03	0.03
23.80	3.19	0.70	5.00	0.00	0.03	0.03
23.85	3.19	0.70	5.00	0.00	0.03	0.03
23.90	3.19	0.70	5.00	0.00	0.03	0.03
23.95	3.19	0.70	5.00	0.00	0.03	0.03
24.00	3.19	0.70	5.00	0.00	0.03	0.03
24.05	3.19	0.70	5.00	0.00	0.02	0.02
24.10	3.19	0.70	5.00	0.00	0.02	0.02
24.15	3.19	0.70	5.00	0.00	0.02	0.02
24.20	3.19	0.70	5.00	0.00	0.02	0.02
24.25	3.19	0.70	5.00	0.00	0.02	0.02
24.30	3.19	0.70	5.00	0.00	0.02	0.02
24.35	3.19	0.70	5.00	0.00	0.02	0.02
24.40	3.19	0.70	5.00	0.00	0.02	0.02
24.45	3.19	0.70	5.00	0.00	0.01	0.01
24.50	3.19	0.70	5.00	0.00	0.01	0.01
24.55	3.19	0.70	5.00	0.00	0.01	0.01
24.60	3.19	0.70	5.00	0.00	0.01	0.01
24.65	3.19	0.70	5.00	0.00	0.01	0.01
24.70	3.19	0.70	5.00	0.00	0.01	0.01
24.75	3.19	0.70	5.00	0.00	0.01	0.01
24.80	3.19	0.70	5.00	0.00	0.01	0.01
24.85	3.19	0.70	5.00	0.00	0.01	0.01
24.90	3.19	0.70	5.00	0.00	0.00	0.00
24.95	3.19	0.70	5.00	0.00	0.00	0.00
25.00	3.19	0.70	5.00	0.00	0.00	0.00
25.05	3.19	0.70	4.57	0.00	0.00	0.00
25.10	3.19	0.70	4.56	0.00	0.00	0.00
25.15	3.19	0.70	4.56	0.00	0.00	0.00
25.20	3.19	0.70	4.55	0.00	0.00	0.00
25.25	3.19	0.70	4.55	0.00	0.00	0.00
25.30	3.19	0.70	4.54	0.00	0.00	0.00
25.35	3.19	0.70	4.54	0.00	0.00	0.00
25.40	3.19	0.70	4.53	0.00	0.00	0.00
25.45	3.19	0.70	4.53	0.00	0.00	0.00
25.50	3.19	0.71	4.52	0.00	0.00	0.00
25.55	3.19	0.71	4.52	0.00	0.00	0.00
25.60	3.19	0.71	4.51	0.00	0.00	0.00
25.65	3.19	0.71	4.51	0.00	0.00	0.00
25.70	3.19	0.71	4.50	0.00	0.00	0.00
25.75	3.19	0.71	4.50	0.00	0.00	0.00
25.80	3.19	0.71	4.49	0.00	0.00	0.00
25.85	3.19	0.71	4.49	0.00	0.00	0.00
25.90	3.19	0.71	4.48	0.00	0.00	0.00
25.95	3.19	0.71	4.48	0.00	0.00	0.00
26.00	3.19	0.71	4.47	0.00	0.00	0.00
26.05	3.19	0.71	4.47	0.00	0.00	0.00
26.10	3.19	0.71	4.46	0.00	0.00	0.00
26.15	3.19	0.72	4.46	0.00	0.00	0.00
26.20	3.19	0.72	4.45	0.00	0.00	0.00
26.25	3.19	0.72	4.45	0.00	0.00	0.00
26.30	3.19	0.72	4.44	0.00	0.00	0.00
26.35	3.19	0.72	4.44	0.00	0.00	0.00
26.40	3.19	0.72	4.43	0.00	0.00	0.00
26.45	3.19	0.72	4.43	0.00	0.00	0.00
26.50	3.19	0.72	4.42	0.00	0.00	0.00
26.55	3.19	0.72	4.42	0.00	0.00	0.00
26.60	3.19	0.72	4.41	0.00	0.00	0.00
26.65	3.19	0.72	4.41	0.00	0.00	0.00

26.70	3.19	0.72	4.40	0.00	0.00	0.00
26.75	3.19	0.72	4.40	0.00	0.00	0.00
26.80	3.19	0.73	4.39	0.00	0.00	0.00
26.85	3.19	0.73	4.39	0.00	0.00	0.00
26.90	3.19	0.73	4.38	0.00	0.00	0.00
26.95	3.19	0.73	4.38	0.00	0.00	0.00
27.00	3.19	0.73	4.37	0.00	0.00	0.00
27.05	3.19	0.73	4.37	0.00	0.00	0.00
27.10	3.19	0.73	4.37	0.00	0.00	0.00
27.15	3.19	0.73	4.36	0.00	0.00	0.00
27.20	3.19	0.73	4.36	0.00	0.00	0.00
27.25	3.19	0.73	4.35	0.00	0.00	0.00
27.30	3.19	0.73	4.35	0.00	0.00	0.00
27.35	3.19	0.73	4.34	0.00	0.00	0.00
27.40	3.19	0.73	4.34	0.00	0.00	0.00
27.45	3.19	0.74	4.33	0.00	0.00	0.00
27.50	3.19	0.74	4.33	0.00	0.00	0.00
27.55	3.19	0.74	4.32	0.00	0.00	0.00
27.60	3.19	0.74	4.32	0.00	0.00	0.00
27.65	3.19	0.74	4.32	0.00	0.00	0.00
27.70	3.19	0.74	4.31	0.00	0.00	0.00
27.75	3.19	0.74	4.31	0.00	0.00	0.00
27.80	3.19	0.74	4.30	0.00	0.00	0.00
27.85	3.19	0.74	4.30	0.00	0.00	0.00
27.90	3.19	0.74	4.29	0.00	0.00	0.00
27.95	3.19	0.74	4.29	0.00	0.00	0.00
28.00	3.19	0.74	4.29	0.00	0.00	0.00
28.05	3.19	0.74	4.28	0.00	0.00	0.00
28.10	3.19	0.75	4.28	0.00	0.00	0.00
28.15	3.19	0.75	4.27	0.00	0.00	0.00
28.20	3.19	0.75	4.27	0.00	0.00	0.00
28.25	3.19	0.75	4.26	0.00	0.00	0.00
28.30	3.19	0.75	4.26	0.00	0.00	0.00
28.35	3.19	0.75	4.26	0.00	0.00	0.00
28.40	3.19	0.75	4.25	0.00	0.00	0.00
28.45	3.19	0.75	4.25	0.00	0.00	0.00
28.50	3.19	0.75	4.24	0.00	0.00	0.00
28.55	3.19	0.75	4.24	0.00	0.00	0.00
28.60	3.19	0.75	4.24	0.00	0.00	0.00
28.65	3.19	0.75	4.23	0.00	0.00	0.00
28.70	3.19	0.75	4.23	0.00	0.00	0.00
28.75	3.19	0.75	4.22	0.00	0.00	0.00
28.80	3.19	0.76	4.22	0.00	0.00	0.00
28.85	3.19	0.76	4.22	0.00	0.00	0.00
28.90	3.19	0.76	4.21	0.00	0.00	0.00
28.95	3.19	0.76	4.21	0.00	0.00	0.00
29.00	3.19	0.76	4.20	0.00	0.00	0.00
29.05	3.19	0.76	4.20	0.00	0.00	0.00
29.10	3.19	0.76	4.20	0.00	0.00	0.00
29.15	3.19	0.76	4.19	0.00	0.00	0.00
29.20	3.19	0.76	4.19	0.00	0.00	0.00
29.25	3.19	0.76	4.18	0.00	0.00	0.00
29.30	3.19	0.76	4.18	0.00	0.00	0.00
29.35	3.19	0.76	4.18	0.00	0.00	0.00
29.40	3.19	0.76	4.17	0.00	0.00	0.00
29.45	3.19	0.76	4.17	0.00	0.00	0.00
29.50	3.19	0.77	4.16	0.00	0.00	0.00
29.55	3.19	0.77	4.16	0.00	0.00	0.00
29.60	3.19	0.77	4.16	0.00	0.00	0.00
29.65	3.19	0.77	4.15	0.00	0.00	0.00
29.70	3.19	0.77	4.15	0.00	0.00	0.00
29.75	3.19	0.77	4.15	0.00	0.00	0.00
29.80	3.19	0.77	4.14	0.00	0.00	0.00
29.85	3.19	0.77	4.14	0.00	0.00	0.00
29.90	3.19	0.77	4.13	0.00	0.00	0.00
29.95	3.19	0.77	4.13	0.00	0.00	0.00
30.00	3.19	0.77	4.13	0.00	0.00	0.00

30.05	3.19	0.77	4.13	0.00	0.00	0.00
30.10	3.19	0.77	4.12	0.00	0.00	0.00
30.15	3.19	0.77	4.12	0.00	0.00	0.00
30.20	3.19	0.77	4.12	0.00	0.00	0.00
30.25	3.19	0.77	4.12	0.00	0.00	0.00
30.30	3.19	0.77	4.11	0.00	0.00	0.00
30.35	3.19	0.78	4.11	0.00	0.00	0.00
30.40	3.19	0.78	4.11	0.00	0.00	0.00
30.45	3.19	0.78	4.11	0.00	0.00	0.00
30.50	3.19	0.78	4.11	0.00	0.00	0.00
30.55	3.19	0.78	4.10	0.00	0.00	0.00
30.60	3.19	0.78	4.10	0.00	0.00	0.00
30.65	3.19	0.78	4.10	0.00	0.00	0.00
30.70	3.19	0.78	4.10	0.00	0.00	0.00
30.75	3.19	0.78	4.09	0.00	0.00	0.00
30.80	3.19	0.78	4.09	0.00	0.00	0.00
30.85	3.19	0.78	4.09	0.00	0.00	0.00
30.90	3.19	0.78	4.09	0.00	0.00	0.00
30.95	3.19	0.78	4.09	0.00	0.00	0.00
31.00	3.19	0.78	4.08	0.00	0.00	0.00
31.05	3.19	0.78	4.08	0.00	0.00	0.00
31.10	3.19	0.78	4.08	0.00	0.00	0.00
31.15	3.19	0.78	4.08	0.00	0.00	0.00
31.20	3.19	0.78	4.07	0.00	0.00	0.00
31.25	3.19	0.78	4.07	0.00	0.00	0.00
31.30	3.19	0.78	4.07	0.00	0.00	0.00
31.35	3.19	0.78	4.07	0.00	0.00	0.00
31.40	3.19	0.78	4.07	0.00	0.00	0.00
31.45	3.19	0.78	4.06	0.00	0.00	0.00
31.50	3.19	0.78	4.06	0.00	0.00	0.00
31.55	3.19	0.79	4.06	0.00	0.00	0.00
31.60	3.19	0.79	4.06	0.00	0.00	0.00
31.65	3.19	0.79	4.06	0.00	0.00	0.00
31.70	3.19	0.79	4.05	0.00	0.00	0.00
31.75	3.19	0.79	4.05	0.00	0.00	0.00
31.80	3.19	0.79	4.05	0.00	0.00	0.00
31.85	3.19	0.79	4.05	0.00	0.00	0.00
31.90	3.19	0.79	4.05	0.00	0.00	0.00
31.95	3.19	0.79	4.04	0.00	0.00	0.00
32.00	3.19	0.79	4.04	0.00	0.00	0.00
32.05	3.19	0.79	4.04	0.00	0.00	0.00
32.10	3.19	0.79	4.04	0.00	0.00	0.00
32.15	3.19	0.79	4.04	0.00	0.00	0.00
32.20	3.19	0.79	4.04	0.00	0.00	0.00
32.25	3.19	0.79	4.03	0.00	0.00	0.00
32.30	3.19	0.79	4.03	0.00	0.00	0.00
32.35	3.19	0.79	4.03	0.00	0.00	0.00
32.40	3.19	0.79	4.03	0.00	0.00	0.00
32.45	3.19	0.79	4.03	0.00	0.00	0.00
32.50	3.19	0.79	4.02	0.00	0.00	0.00
32.55	3.19	0.79	4.02	0.00	0.00	0.00
32.60	3.19	0.79	4.02	0.00	0.00	0.00
32.65	3.19	0.79	4.02	0.00	0.00	0.00
32.70	3.19	0.79	4.02	0.00	0.00	0.00
32.75	3.19	0.79	4.02	0.00	0.00	0.00
32.80	3.19	0.79	4.01	0.00	0.00	0.00
32.85	3.19	0.79	4.01	0.00	0.00	0.00
32.90	3.19	0.80	4.01	0.00	0.00	0.00
32.95	3.19	0.80	4.01	0.00	0.00	0.00
33.00	3.19	0.80	4.01	0.00	0.00	0.00
33.05	3.19	0.80	4.00	0.00	0.00	0.00
33.10	3.19	0.80	4.00	0.00	0.00	0.00
33.15	3.19	0.80	4.00	0.00	0.00	0.00
33.20	3.19	0.80	4.00	0.00	0.00	0.00
33.25	3.19	0.80	4.00	0.00	0.00	0.00
33.30	3.19	0.80	4.00	0.00	0.00	0.00
33.35	3.19	0.80	3.99	0.00	0.00	0.00

33.40	3.19	0.80	3.99	0.00	0.00	0.00
33.45	3.19	0.80	3.99	0.00	0.00	0.00
33.50	3.19	0.80	3.99	0.00	0.00	0.00
33.55	3.19	0.80	3.99	0.00	0.00	0.00
33.60	3.19	0.80	3.99	0.00	0.00	0.00
33.65	3.19	0.80	3.99	0.00	0.00	0.00
33.70	3.19	0.80	3.98	0.00	0.00	0.00
33.75	3.19	0.80	3.98	0.00	0.00	0.00
33.80	3.19	0.80	3.98	0.00	0.00	0.00
33.85	3.19	0.80	3.98	0.00	0.00	0.00
33.90	3.19	0.80	3.98	0.00	0.00	0.00
33.95	3.21	0.80	4.00	0.00	0.00	0.00
34.00	3.21	0.80	4.00	0.00	0.00	0.00
34.05	3.21	0.80	4.00	0.00	0.00	0.00
34.10	3.21	0.80	3.99	0.00	0.00	0.00
34.15	3.20	0.80	3.99	0.00	0.00	0.00
34.20	3.20	0.80	3.99	0.00	0.00	0.00
34.25	3.20	0.80	3.99	0.00	0.00	0.00
34.30	3.20	0.80	3.98	0.00	0.00	0.00
34.35	3.20	0.80	3.98	0.00	0.00	0.00
34.40	3.20	0.80	3.98	0.00	0.00	0.00
34.45	3.20	0.81	3.98	0.00	0.00	0.00
34.50	3.20	0.81	3.97	0.00	0.00	0.00
34.55	3.20	0.81	3.97	0.00	0.00	0.00
34.60	3.20	0.81	3.97	0.00	0.00	0.00
34.65	3.20	0.81	3.97	0.00	0.00	0.00
34.70	3.20	0.81	3.96	0.00	0.00	0.00
34.75	3.20	0.81	3.96	0.00	0.00	0.00
34.80	3.19	0.81	3.96	0.00	0.00	0.00
34.85	3.19	0.81	3.96	0.00	0.00	0.00
34.90	3.19	0.81	3.95	0.00	0.00	0.00
34.95	3.19	0.81	3.95	0.00	0.00	0.00
35.00	3.19	0.81	3.95	0.00	0.00	0.00
35.05	3.19	0.81	3.95	0.00	0.00	0.00
35.10	3.19	0.81	3.94	0.00	0.00	0.00
35.15	3.19	0.81	3.94	0.00	0.00	0.00
35.20	3.19	0.81	3.94	0.00	0.00	0.00
35.25	3.19	0.81	3.94	0.00	0.00	0.00
35.30	3.19	0.81	3.94	0.00	0.00	0.00
35.35	3.19	0.81	3.93	0.00	0.00	0.00
35.40	3.19	0.81	3.93	0.00	0.00	0.00
35.45	3.18	0.81	3.93	0.00	0.00	0.00
35.50	3.18	0.81	3.93	0.00	0.00	0.00
35.55	3.18	0.81	3.92	0.00	0.00	0.00
35.60	3.18	0.81	3.92	0.00	0.00	0.00
35.65	3.18	0.81	3.92	0.00	0.00	0.00
35.70	3.18	0.81	3.92	0.00	0.00	0.00
35.75	3.18	0.81	3.92	0.00	0.00	0.00
35.80	3.18	0.81	3.91	0.00	0.00	0.00
35.85	3.18	0.81	3.91	0.00	0.00	0.00
35.90	3.18	0.81	3.91	0.00	0.00	0.00
35.95	3.18	0.81	3.91	0.00	0.00	0.00
36.00	3.18	0.81	3.90	0.00	0.00	0.00
36.05	3.18	0.81	3.90	0.00	0.00	0.00
36.10	3.17	0.81	3.90	0.00	0.00	0.00
36.15	3.17	0.81	3.90	0.00	0.00	0.00
36.20	3.17	0.81	3.90	0.00	0.00	0.00
36.25	3.17	0.81	3.89	0.00	0.00	0.00
36.30	3.17	0.81	3.89	0.00	0.00	0.00
36.35	3.17	0.82	3.89	0.00	0.00	0.00
36.40	3.17	0.82	3.89	0.00	0.00	0.00
36.45	3.17	0.82	3.89	0.00	0.00	0.00
36.50	3.17	0.82	3.88	0.00	0.00	0.00
36.55	3.17	0.82	3.88	0.00	0.00	0.00
36.60	3.17	0.82	3.88	0.00	0.00	0.00
36.65	3.17	0.82	3.88	0.00	0.00	0.00
36.70	3.17	0.82	3.88	0.00	0.00	0.00

36.75	3.16	0.82	3.87	0.00	0.00	0.00
36.80	3.16	0.82	3.87	0.00	0.00	0.00
36.85	3.16	0.82	3.87	0.00	0.00	0.00
36.90	3.16	0.82	3.87	0.00	0.00	0.00
36.95	3.16	0.82	3.87	0.00	0.00	0.00
37.00	3.16	0.82	3.86	0.00	0.00	0.00
37.05	3.16	0.82	3.86	0.00	0.00	0.00
37.10	3.16	0.82	3.86	0.00	0.00	0.00
37.15	3.16	0.82	3.86	0.00	0.00	0.00
37.20	3.16	0.82	3.86	0.00	0.00	0.00
37.25	3.16	0.82	3.85	0.00	0.00	0.00
37.30	3.16	0.82	3.85	0.00	0.00	0.00
37.35	3.16	0.82	3.85	0.00	0.00	0.00
37.40	3.15	0.82	3.85	0.00	0.00	0.00
37.45	3.15	0.82	3.85	0.00	0.00	0.00
37.50	3.15	0.82	3.84	0.00	0.00	0.00
37.55	3.15	0.82	3.84	0.00	0.00	0.00
37.60	3.15	0.82	3.84	0.00	0.00	0.00
37.65	3.15	0.82	3.84	0.00	0.00	0.00
37.70	3.15	0.82	3.84	0.00	0.00	0.00
37.75	3.15	0.82	3.84	0.00	0.00	0.00
37.80	3.15	0.82	3.83	0.00	0.00	0.00
37.85	3.15	0.82	3.83	0.00	0.00	0.00
37.90	3.15	0.82	3.83	0.00	0.00	0.00
37.95	3.15	0.82	3.83	0.00	0.00	0.00
38.00	3.15	0.82	3.83	0.00	0.00	0.00
38.05	3.14	0.82	3.82	0.00	0.00	0.00
38.10	3.14	0.82	3.82	0.00	0.00	0.00
38.15	3.14	0.82	3.82	0.00	0.00	0.00
38.20	3.14	0.82	3.82	0.00	0.00	0.00
38.25	3.14	0.82	3.82	0.00	0.00	0.00
38.30	3.14	0.82	3.82	0.00	0.00	0.00
38.35	3.14	0.82	3.81	0.00	0.00	0.00
38.40	3.14	0.82	3.81	0.00	0.00	0.00
38.45	3.14	0.82	3.81	0.00	0.00	0.00
38.50	3.14	0.82	3.81	0.00	0.00	0.00
38.55	3.14	0.82	3.81	0.00	0.00	0.00
38.60	3.14	0.82	3.80	0.00	0.00	0.00
38.65	3.14	0.82	3.80	0.00	0.00	0.00
38.70	3.14	0.82	3.80	0.00	0.00	0.00
38.75	3.13	0.82	3.80	0.00	0.00	0.00
38.80	3.13	0.83	3.80	0.00	0.00	0.00
38.85	3.13	0.83	3.80	0.00	0.00	0.00
38.90	3.13	0.83	3.79	0.00	0.00	0.00
38.95	3.13	0.83	3.79	0.00	0.00	0.00
39.00	3.13	0.83	3.79	0.00	0.00	0.00
39.05	3.13	0.83	3.79	0.00	0.00	0.00
39.10	3.13	0.83	3.79	0.00	0.00	0.00
39.15	3.13	0.83	3.79	0.00	0.00	0.00
39.20	3.13	0.83	3.78	0.00	0.00	0.00
39.25	3.13	0.83	3.78	0.00	0.00	0.00
39.30	3.13	0.83	3.78	0.00	0.00	0.00
39.35	3.13	0.83	3.78	0.00	0.00	0.00
39.40	3.12	0.83	3.78	0.00	0.00	0.00
39.45	3.12	0.83	3.78	0.00	0.00	0.00
39.50	3.12	0.83	3.77	0.00	0.00	0.00
39.55	3.12	0.83	3.77	0.00	0.00	0.00
39.60	3.12	0.83	3.77	0.00	0.00	0.00
39.65	3.12	0.83	3.77	0.00	0.00	0.00
39.70	3.12	0.83	3.77	0.00	0.00	0.00
39.75	3.12	0.83	3.77	0.00	0.00	0.00
39.80	3.12	0.83	3.77	0.00	0.00	0.00
39.85	3.12	0.83	3.76	0.00	0.00	0.00
39.90	3.12	0.83	3.76	0.00	0.00	0.00
39.95	3.12	0.83	3.76	0.00	0.00	0.00
40.00	3.12	0.83	3.76	0.00	0.00	0.00
40.05	3.11	0.83	3.76	0.00	0.00	0.00

40.10	3.11	0.83	3.76	0.00	0.00	0.00
40.15	3.11	0.83	3.75	0.00	0.00	0.00
40.20	3.11	0.83	3.75	0.00	0.00	0.00
40.25	3.11	0.83	3.75	0.00	0.00	0.00
40.30	3.11	0.83	3.75	0.00	0.00	0.00
40.35	3.11	0.83	3.75	0.00	0.00	0.00
40.40	3.11	0.83	3.75	0.00	0.00	0.00
40.45	3.11	0.83	3.75	0.00	0.00	0.00
40.50	3.11	0.83	3.74	0.00	0.00	0.00
40.55	3.11	0.83	3.74	0.00	0.00	0.00
40.60	3.11	0.83	3.74	0.00	0.00	0.00
40.65	3.11	0.83	3.74	0.00	0.00	0.00
40.70	3.11	0.83	3.74	0.00	0.00	0.00
40.75	3.10	0.83	3.74	0.00	0.00	0.00
40.80	3.10	0.83	3.74	0.00	0.00	0.00
40.85	3.10	0.83	3.73	0.00	0.00	0.00
40.90	3.10	0.83	3.73	0.00	0.00	0.00
40.95	3.10	0.83	3.73	0.00	0.00	0.00
41.00	3.10	0.83	3.73	0.00	0.00	0.00
41.05	3.10	0.83	3.73	0.00	0.00	0.00
41.10	3.10	0.83	3.73	0.00	0.00	0.00
41.15	3.10	0.83	3.73	0.00	0.00	0.00
41.20	3.10	0.83	3.72	0.00	0.00	0.00
41.25	3.10	0.83	3.72	0.00	0.00	0.00
41.30	3.10	0.83	3.72	0.00	0.00	0.00
41.35	3.10	0.83	3.72	0.00	0.00	0.00
41.40	3.10	0.83	3.72	0.00	0.00	0.00
41.45	3.09	0.83	3.72	0.00	0.00	0.00
41.50	3.09	0.83	3.72	0.00	0.00	0.00
41.55	3.09	0.83	3.71	0.00	0.00	0.00
41.60	3.09	0.83	3.71	0.00	0.00	0.00
41.65	3.09	0.83	3.71	0.00	0.00	0.00
41.70	3.09	0.83	3.71	0.00	0.00	0.00
41.75	3.09	0.83	3.71	0.00	0.00	0.00
41.80	3.09	0.83	3.71	0.00	0.00	0.00
41.85	3.09	0.83	3.71	0.00	0.00	0.00
41.90	3.09	0.83	3.71	0.00	0.00	0.00
41.95	3.09	0.83	3.70	0.00	0.00	0.00
42.00	3.09	0.83	3.70	0.00	0.00	0.00
42.05	3.09	0.83	3.70	0.00	0.00	0.00
42.10	3.08	0.83	3.70	0.00	0.00	0.00
42.15	3.08	0.83	3.70	0.00	0.00	0.00
42.20	3.08	0.83	3.70	0.00	0.00	0.00
42.25	3.08	0.83	3.70	0.00	0.00	0.00
42.30	3.08	0.83	3.70	0.00	0.00	0.00
42.35	3.08	0.83	3.69	0.00	0.00	0.00
42.40	3.08	0.83	3.69	0.00	0.00	0.00
42.45	3.08	0.83	3.69	0.00	0.00	0.00
42.50	3.08	0.83	3.69	0.00	0.00	0.00
42.55	3.08	0.83	3.69	0.00	0.00	0.00
42.60	3.08	0.83	3.69	0.00	0.00	0.00
42.65	3.08	0.83	3.69	0.00	0.00	0.00
42.70	3.08	0.83	3.69	0.00	0.00	0.00
42.75	3.08	0.83	3.68	0.00	0.00	0.00
42.80	3.07	0.83	3.68	0.00	0.00	0.00
42.85	3.07	0.83	3.68	0.00	0.00	0.00
42.90	3.07	0.84	3.68	0.00	0.00	0.00
42.95	3.07	0.84	3.68	0.00	0.00	0.00
43.00	3.07	0.84	3.68	0.00	0.00	0.00
43.05	3.07	0.84	3.68	0.00	0.00	0.00
43.10	3.07	0.84	3.68	0.00	0.00	0.00
43.15	3.07	0.84	3.67	0.00	0.00	0.00
43.20	3.07	0.84	3.67	0.00	0.00	0.00
43.25	3.07	0.84	3.67	0.00	0.00	0.00
43.30	3.07	0.84	3.67	0.00	0.00	0.00
43.35	3.07	0.84	3.67	0.00	0.00	0.00
43.40	3.07	0.84	3.67	0.00	0.00	0.00

43.45	3.07	0.84	3.67	0.00	0.00	0.00
43.50	3.06	0.84	3.67	0.00	0.00	0.00
43.55	3.06	0.84	3.67	0.00	0.00	0.00
43.60	3.06	0.84	3.66	0.00	0.00	0.00
43.65	3.06	0.84	3.66	0.00	0.00	0.00
43.70	3.06	0.84	3.66	0.00	0.00	0.00
43.75	3.06	0.84	3.66	0.00	0.00	0.00
43.80	3.06	0.84	3.66	0.00	0.00	0.00
43.85	3.06	0.84	3.66	0.00	0.00	0.00
43.90	3.06	0.84	3.66	0.00	0.00	0.00
43.95	3.06	0.84	3.66	0.00	0.00	0.00
44.00	3.06	0.84	3.66	0.00	0.00	0.00
44.05	3.06	0.84	3.65	0.00	0.00	0.00
44.10	3.06	0.84	3.65	0.00	0.00	0.00
44.15	3.06	0.84	3.65	0.00	0.00	0.00
44.20	3.06	0.84	3.65	0.00	0.00	0.00
44.25	3.05	0.84	3.65	0.00	0.00	0.00
44.30	3.05	0.84	3.65	0.00	0.00	0.00
44.35	3.05	0.84	3.65	0.00	0.00	0.00
44.40	3.05	0.84	3.65	0.00	0.00	0.00
44.45	3.05	0.84	3.65	0.00	0.00	0.00
44.50	3.05	0.84	3.65	0.00	0.00	0.00
44.55	3.05	0.84	3.64	0.00	0.00	0.00
44.60	3.05	0.84	3.64	0.00	0.00	0.00
44.65	3.05	0.84	3.64	0.00	0.00	0.00
44.70	3.05	0.84	3.64	0.00	0.00	0.00
44.75	3.05	0.84	3.64	0.00	0.00	0.00
44.80	3.05	0.84	3.64	0.00	0.00	0.00
44.85	3.05	0.84	3.64	0.00	0.00	0.00
44.90	3.05	0.84	3.64	0.00	0.00	0.00
44.95	3.04	0.84	3.64	0.00	0.00	0.00
45.00	3.04	0.84	3.64	0.00	0.00	0.00
45.05	3.04	0.84	3.63	0.00	0.00	0.00
45.10	3.04	0.84	3.63	0.00	0.00	0.00
45.15	3.04	0.84	3.63	0.00	0.00	0.00
45.20	3.04	0.84	3.63	0.00	0.00	0.00
45.25	3.04	0.84	3.63	0.00	0.00	0.00
45.30	3.04	0.84	3.63	0.00	0.00	0.00
45.35	3.04	0.84	3.63	0.00	0.00	0.00
45.40	3.04	0.84	3.63	0.00	0.00	0.00
45.45	3.04	0.84	3.63	0.00	0.00	0.00
45.50	3.04	0.84	3.63	0.00	0.00	0.00
45.55	3.04	0.84	3.63	0.00	0.00	0.00
45.60	3.04	0.84	3.63	0.00	0.00	0.00
45.65	3.04	0.84	3.63	0.00	0.00	0.00
45.70	3.04	0.84	3.63	0.00	0.00	0.00
45.75	3.04	0.84	3.63	0.00	0.00	0.00
45.80	3.04	0.84	3.63	0.00	0.00	0.00
45.85	3.04	0.84	3.63	0.00	0.00	0.00
45.90	3.04	0.84	3.63	0.00	0.00	0.00
45.95	3.04	0.84	3.63	0.00	0.00	0.00
46.00	3.04	0.84	3.63	0.00	0.00	0.00
46.05	3.04	0.84	3.63	0.00	0.00	0.00
46.10	3.04	0.84	3.63	0.00	0.00	0.00
46.15	3.04	0.84	3.63	0.00	0.00	0.00
46.20	3.04	0.84	3.63	0.00	0.00	0.00
46.25	3.04	0.84	3.62	0.00	0.00	0.00
46.30	3.04	0.84	3.62	0.00	0.00	0.00
46.35	3.04	0.84	3.62	0.00	0.00	0.00
46.40	3.04	0.84	3.62	0.00	0.00	0.00
46.45	3.04	0.84	3.62	0.00	0.00	0.00
46.50	3.04	0.84	3.62	0.00	0.00	0.00
46.55	3.04	0.84	3.62	0.00	0.00	0.00
46.60	3.04	0.84	3.62	0.00	0.00	0.00
46.65	3.03	0.84	3.62	0.00	0.00	0.00
46.70	3.03	0.84	3.62	0.00	0.00	0.00
46.75	3.03	0.84	3.62	0.00	0.00	0.00

46.80	3.03	0.84	3.62	0.00	0.00	0.00
46.85	3.03	0.84	3.62	0.00	0.00	0.00
46.90	3.03	0.84	3.62	0.00	0.00	0.00
46.95	3.03	0.84	3.62	0.00	0.00	0.00
47.00	3.03	0.84	3.62	0.00	0.00	0.00
47.05	3.03	0.84	3.62	0.00	0.00	0.00
47.10	3.03	0.84	3.62	0.00	0.00	0.00
47.15	3.03	0.84	3.62	0.00	0.00	0.00
47.20	3.03	0.84	3.62	0.00	0.00	0.00
47.25	3.03	0.84	3.62	0.00	0.00	0.00
47.30	3.03	0.84	3.62	0.00	0.00	0.00
47.35	3.03	0.84	3.62	0.00	0.00	0.00
47.40	3.03	0.84	3.62	0.00	0.00	0.00
47.45	3.03	0.84	3.62	0.00	0.00	0.00
47.50	3.03	0.84	3.62	0.00	0.00	0.00
47.55	3.03	0.84	3.62	0.00	0.00	0.00
47.60	3.03	0.84	3.62	0.00	0.00	0.00
47.65	3.03	0.84	3.62	0.00	0.00	0.00
47.70	3.03	0.84	3.62	0.00	0.00	0.00
47.75	3.03	0.84	3.62	0.00	0.00	0.00
47.80	3.03	0.84	3.62	0.00	0.00	0.00
47.85	3.03	0.84	3.62	0.00	0.00	0.00
47.90	3.03	0.84	3.62	0.00	0.00	0.00
47.95	3.03	0.84	3.62	0.00	0.00	0.00
48.00	3.03	0.84	3.62	0.00	0.00	0.00
48.05	3.03	0.84	3.62	0.00	0.00	0.00
48.10	3.03	0.84	3.61	0.00	0.00	0.00
48.15	3.03	0.84	3.61	0.00	0.00	0.00
48.20	3.03	0.84	3.61	0.00	0.00	0.00
48.25	3.03	0.84	3.61	0.00	0.00	0.00
48.30	3.03	0.84	3.61	0.00	0.00	0.00
48.35	3.03	0.84	3.61	0.00	0.00	0.00
48.40	3.03	0.84	3.61	0.00	0.00	0.00
48.45	3.03	0.84	3.61	0.00	0.00	0.00
48.50	3.03	0.84	3.61	0.00	0.00	0.00
48.55	3.03	0.84	3.61	0.00	0.00	0.00
48.60	3.02	0.84	3.61	0.00	0.00	0.00
48.65	3.02	0.84	3.61	0.00	0.00	0.00
48.70	3.02	0.84	3.61	0.00	0.00	0.00
48.75	3.02	0.84	3.61	0.00	0.00	0.00
48.80	3.02	0.84	3.61	0.00	0.00	0.00
48.85	3.02	0.84	3.61	0.00	0.00	0.00
48.90	3.02	0.84	3.61	0.00	0.00	0.00
48.95	3.02	0.84	3.61	0.00	0.00	0.00
49.00	3.02	0.84	3.61	0.00	0.00	0.00
49.05	3.02	0.84	3.61	0.00	0.00	0.00
49.10	3.02	0.84	3.61	0.00	0.00	0.00
49.15	3.02	0.84	3.61	0.00	0.00	0.00
49.20	3.02	0.84	3.61	0.00	0.00	0.00
49.25	3.02	0.84	3.61	0.00	0.00	0.00
49.30	3.02	0.84	3.61	0.00	0.00	0.00
49.35	3.02	0.84	3.61	0.00	0.00	0.00
49.40	3.02	0.84	3.61	0.00	0.00	0.00
49.45	3.02	0.84	3.61	0.00	0.00	0.00
49.50	3.02	0.84	3.61	0.00	0.00	0.00
49.55	3.02	0.84	3.61	0.00	0.00	0.00
49.60	3.02	0.84	3.61	0.00	0.00	0.00
49.65	3.02	0.84	3.61	0.00	0.00	0.00
49.70	3.02	0.84	3.61	0.00	0.00	0.00
49.75	3.02	0.84	3.61	0.00	0.00	0.00
49.80	3.02	0.84	3.61	0.00	0.00	0.00
49.85	3.02	0.84	3.61	0.00	0.00	0.00
49.90	3.02	0.84	3.61	0.00	0.00	0.00
49.95	3.02	0.84	3.61	0.00	0.00	0.00
50.00	3.02	0.84	3.61	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone

(F.S. is limited to 5, CRR is limited to 2,   CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

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1 atm (atmosphere) = 1 tsf (ton/ft2)

CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

Appendix D

Earthwork Specifications

APPENDIX D: EARTHWORK SPECIFICATIONS

D1.1 Scope of Work

The work includes all labor, supplies and construction equipment required to construct the building pad in a good, workmanlike manner, as shown on the drawings and herein specified. The major items of work covered in this section include the following:

- Site Inspection
- Authority of Geotechnical Engineer
- Site Clearing
- Excavations
- Preparation of Fill Areas
- Placement and Compaction of Fill
- Observation and Testing

D1.2 Site Inspection

- The Contractor shall carefully examine the site and make all inspections necessary, in order to determine the full extent of the work required to make the completed work conform to the drawings and specifications. The Contractor shall satisfy himself as to the nature and location of the work, ground surface and the characteristics of equipment and facilities needed prior to and during prosecution of the work. The Contractor shall satisfy himself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered. Any inaccuracies or discrepancies between the actual field conditions and the drawings, or between the drawings and specifications must be brought to the Owner's attention in order to clarify the exact nature of the work to be performed.

- This Geotechnical Study Report by Converse Consultants may be used as a reference to the surface and subsurface conditions on this project. The information presented in this report is intended for use in design and is subject to confirmation of the conditions encountered during construction. The exploration logs and related information depict subsurface conditions only at the particular time and location designated on the boring logs. Subsurface conditions at other locations may differ from conditions encountered at the exploration locations. In addition, the passage of time may result in a change in subsurface conditions at the exploration locations. Any review of this information shall not relieve the Contractor from performing such independent investigation and evaluation to satisfy himself as to the nature of the surface and subsurface conditions to be encountered and the procedures to be used in performing his work.

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D1.3 Authority of the Geotechnical Engineer

- The Geotechnical Engineer will observe the placement of compacted fill and will take sufficient tests to evaluate the uniformity and degree of compaction of filled ground.

  As the Owner's representative, the Geotechnical Engineer will (a) have the authority to cause the removal and replacement of loose, soft, disturbed and other unsatisfactory soils and uncontrolled fill; (b) have the authority to approve the preparation of native ground to receive fill material; and (c) have the authority to approve or reject soils proposed for use in building areas.

- The Civil Engineer and/or Owner will decide all questions regarding (a) the interpretation of the drawings and specifications, (b) the acceptable fulfillment of the contract on the part of the Contractor and (c) the matters of compensation.

D1.4 Site Clearing

- Clearing and grubbing shall consist of the removal from building areas to be graded of all existing structures, pavement, utilities, and vegetation.

- Organic and inorganic materials resulting from the clearing and grubbing operations shall be hauled away from the areas to be graded.

D1.5 Excavations

- Based on observations made during our field explorations, the surficial soils can be excavated with conventional earthwork equipment.

D1.6 Preparation of Fill Areas

- All organic material, organic soils, incompetent alluvium, undocumented fill soils and debris should be removed from the proposed building areas.

- In order to provide a relative uniform bearing material below shallow foundations, over-excavation and re-compaction of below the foundations and slab-on-grade are recommended. We recommend existing fills or a minimum 2 feet of onsite soils below the bottom of foundations and slabs should be removed, moisture-conditioned if necessary, and replaced as compacted fill. At least the eight (8) inches of soil at bottom of over-excavation, cut and transition areas should be scarified and compacted. All undocumented fill should be removed and replaced with compacted fill. The excavation to remove unsuitable soils should be extended to five (5) feet beyond the building limits and appendages where space is available. All loose, soft or disturbed earth materials should be removed from the bottom of excavations before placing structural fill. The actual depth of

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removal should be determined based on observations made during grading. After the required removals have been made, the exposed native earth materials shall be excavated to provide a zone of structural fill for the support of footings, slabs-on-grade, and exterior flatwork. The fill thickness under structures should not vary.

- The subgrade in all areas to receive fill shall be scarified to a minimum depth of eight (8) inches, the soil moisture adjusted within three (3) percent of the optimum moisture for granular soils and at above approximately three (3) percent of the optimum moisture for fine-grained soils, then compacted to at least 90 percent of the laboratory maximum dry density as determined by ASTM Standard D1557 test method. Scarification may be terminated on moderately hard to hard, cemented earth materials with the approval of the Geotechnical Engineer.

- Compacted fill may be placed on native soils that have been properly scarified and recompacted as discussed above.

- All areas to receive compacted fill will be observed and approved by the Geotechnical Engineer before the placement of fill.

D1.7 Placement and Compaction of Fill

- Compacted fill placed for the support of footings, slabs-on-grade, exterior concrete flatwork, and driveways will be considered structural fill. Structural fill may consist of approved on-site soils or imported fill that meets the criteria indicated below.

- Fill consisting of selected on-site earth materials or imported soils approved by the Geotechnical Engineer shall be placed in layers on approved earth materials. Soils used as compacted structural fill shall have the following characteristics:

    - All fill soil particles shall not exceed three (3) inches in nominal size, and shall be free of organic matter and miscellaneous inorganic debris and inert rubble.

    - Imported fill materials shall have an Expansion Index (EI) less than 20. All imported fill should be compacted to at least 90 percent of the laboratory maximum dry density (ASTM Standard D1557) at about three (3) percent above optimum moisture for fine grained soils, and within three (3) percent of optimum for granular soils.

- Fill soils shall be evenly spread in maximum 8-inch loose lifts, watered or dried as necessary, mixed and compacted to at least the density specified below. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer.

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- All fill placed at the site shall be compacted to at least 90 percent of the laboratory maximum dry density as determined by ASTM Standard D1557 test method. The on-site soils shall be moisture conditioned within three (3) percent of the optimum moisture for granular soils and at above approximately three (3) percent of the optimum moisture for fine-grained soils. At least the upper 12 inches of subgrade soils underneath the concrete apron, pavement and parking areas should be compacted to a minimum of 95 percent relative compaction.

- Fill exceeding five (5) feet in height shall not be placed on native slopes that are steeper than 5:1 horizontal to vertical (H:V). Where native slopes are steeper than 5:1 H:V, and the height of the fill is greater than five (5) feet, the fill shall be benched into competent materials. The height and width of the benches shall be at least two (2) feet.

- Representative samples of materials being used, as compacted fill will be analyzed in the laboratory by the Geotechnical Engineer to obtain information on their physical properties. Maximum laboratory density of each soil type used in the compacted fill will be determined by the ASTM Standard D1557 compaction method.

- Fill materials shall not be placed, spread or compacted during unfavorable weather conditions. When site grading is interrupted by heavy rain, filling operations shall not resume until the Geotechnical Engineer approves the moisture and density conditions of the previously placed fill.

- It shall be the Grading Contractor's obligation to take all measures deemed necessary during grading to provide erosion control devices in order to protect slope areas and adjacent properties from storm damage and flood hazard originating on this project. It shall be the contractor's responsibility to maintain slopes in their as-graded form until all slopes are in satisfactory compliance with job specifications, all berms have been properly constructed, and all associated drainage devices meet the requirements of the Civil Engineer.

D1.8 Trench Backfill

The following specifications are recommended to provide a basis for quality control during the placement of trench backfill.

- Trench excavations to receive backfill shall be free of trash, debris or other unsatisfactory materials at the time of backfill placement.

- Trench backfill shall be compacted to a minimum relative compaction of 90 percent as per ASTM Standard D1557 test method.

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- Rocks larger than one (1) inch should not be placed within 12 inches of the top of the pipeline or within the upper 12 inches of pavement or structure subgrade. No more than 30 percent of the backfill volume shall be larger than 3/4-inch in largest dimension diameter, and rocks shall be well mixed with finer soil.

- The pipe design engineer should select bedding material for the pipe. Bedding materials generally should have a Sand Equivalent (SE) greater than or equal to 30, as determined by the ASTM Standard D2419 test method.

- Trench backfill shall be compacted by mechanical methods, such as sheepsfoot, vibrating or pneumatic rollers, or mechanical tampers, to achieve the density specified herein. The backfill materials shall be brought to within three (3) percent of optimum moisture content for granular soils and fine-grained soils, then placed in horizontal layers. The thickness of uncompacted layers should not exceed eight (8) inches. Each layer shall be evenly spread, moistened or dried as necessary, and then tamped or rolled until the specified density has been achieved.

- The contractor shall select the equipment and processes to be used to achieve the specified density without damage to adjacent ground and completed work.

- The field density of the compacted soil shall be measured by the ASTM Standard D1556 or ASTM Standard D2922 test methods or equivalent.

- Observation and field tests should be performed by Converse during construction to confirm that the required degree of compaction has been obtained. Where compaction is less than that specified, additional compactive effort shall be made with adjustment of the moisture content as necessary, until the specified compaction is obtained.

- It should be the responsibility of the Contractor to maintain safe conditions during cut and/or fill operations.

- Trench backfill shall not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by the project's geotechnical consultant indicate that the moisture content and density of the fill are as previously specified.

D1.9 Observation and Testing

- During the progress of grading, the Geotechnical Engineer will provide observation of the fill placement operations.

- Field density tests will be made during grading to provide an opinion on the degree of compaction being obtained by the contractor. Where compaction of

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less than specified herein is indicated, additional compactive effort with adjustment of the moisture content shall be made as necessary, until the required degree of compaction is obtained.

A sufficient number of field density tests will be performed to provide an opinion to the degree of compaction achieved. In general, density tests will be performed on each one-foot lift of fill, but not less than one for each 500 cubic yards of fill placed.

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Appendix E

Guide Specifications for Installation and Acceptance of Tie-Back Anchors

APPENDIX E: GUIDE SPECIFICATIONS FOR INSTALLATION AND ACCEPTANCE OF TIE-BACK ANCHORS

E1.1 Installation

- Tie-back installation shall be performed during continuous observation by Geotechnical Consultant to confirm that the recommended earth materials are penetrated, that the dimensions of the installed anchors are at least as large as that indicated on the shoring plan, and that anchor installation has been performed as specified. The Contractor shall provide access and necessary facilities, including lighting, at their expense, to accommodate observations.

- All anchors shall be installed at the specified locations, to the required depth, and at the specified angle of inclination. A tolerance of 3° will be permitted on the required angle of inclination.

- After drilling, all holes shall be cleaned of loose soils. Concrete shall be placed by pumping from the tip of the anchor to the active wedge. Concrete placement shall begin within four hours after completion of drilling. The portion of the anchor within the active wedge shall be backfilled with sand-cement slurry after the anchor has been tested as specified below. However, if excessive caving occurs, the active wedge portion of the excavation can be filled with slurry as the casing is pulled. A zone of soft soil shall (in this case) be placed between the anchor and slurry (before testing).

- If a hollow-stem auger or casing is used due to caving, concrete shall be placed by pumping as the auger or casing is withdrawn while always maintaining a head of concrete inside the casing or auger.

- Concrete placement shall be continuous without interruption, and at such a rate that fresh concrete will not be deposited on concrete hardened sufficiently to form seams and planes of weakness.

- Any anchor deemed by the Owner or Geotechnical Consultant to be defective shall be replaced with substitute anchor(s) as directed by the Owner or Shoring Designer. The cost of installation of such substitute anchors shall be borne by the Contractor. Costs associated with analysis and design of substitute anchor(s) shall also be borne by the Contractor.

E1.2 Acceptance Criteria

- Actual capacities of anchors shall be determined by testing designated Test Anchors and all Production Anchors. Testing of anchors will enable evaluation of the applicability of design values for the chosen method of tieback construction.

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- All anchors shall be check-tested to at least 150% of the designed working load in accordance with the following procedures:

    - Test load anchors to 150% of the design-working load, incrementally noting loads, tendon extensions and soldier pile deflections. Hold load for 15 minutes. After pulling slack, the anchor movement shall not exceed 0.10 inch during the 15-minute load period. If the deflection is acceptable, reduce load to 100% of the design load and lock off.

    - Where an anchor shows excessive movement for additional 15-minute intervals, the load should be reduced until the rate of movement is 0.10 inch per 15 minutes or less. The load at which acceptable movement is attained should be divided by 1.5 to establish the working load of the anchor and additional measures taken to carry the required load.

- Geotechnical Consultant shall designate at least 5% of all proposed anchors as 200% Test Anchors. Additional anchor steel reinforcement will likely be required for the 200 percent load test anchors, and should be appropriately considered prior to anchor installation. Half of the 200% Test Anchors shall be tested for 30 minutes. The remaining Test Anchors shall be tested for a 24-hour period. Test anchors shall be tested in the following manner:

    - For the 30-minute test anchors, incrementally load the anchors to 200% of the design-working load noting loads, tendon/bar extensions and soldier pile deflections. Hold load for 30 minutes. Anchor movement shall not exceed 0.3 inch during the 30-minute load period. If the deflection is acceptable, reduce load to design load and lock off; otherwise, reduce the test load by 50% and repeat this step.

    - For 24-hour test anchors, incrementally load to 200% and hold for 24 hours; check load after 24 hours. If a pre-stress loss of 8% or less is recorded, restore load to 100% of working load and lock off. If loss of pre-stress exceeds 8%, restore load to 150% of working load and hold for an additional 24 hours. Check load after second 24-hour hold and, if loss of pre-stress is less than 8%; restore to 100% and lock off as before.

    - Where an anchor shows a continuous loss of pre-stress during a subsequent 24-hour period, the test load shall continue to be reduced by 50% until loss of pre-stress is negligible. Then the test load shall be divided by 1.5 to establish the working load of that anchor and additional measures taken to carry the required shoring load.

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- Any anchor pulled more than 12 inches shall not be used.

- Immediately after testing, the active wedge portion of tieback excavations should be filled with slurry.

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Appendix F

Percolation Testing

APPENDIX F: PERCOLATION TESTING

Percolation testing was performed utilizing exploratory boring BH-5 on June 26, 2017. The boring was pre-soaked prior to performing a falling-head percolation test to determine infiltration rates of the fill and native soils encountered between depths of 0 to 10 feet below the ground surface at the Boring BH-5 location in accordance with LA County Low Impact Development, Best Management Practices Guidelines. The test boring was prepared by placing a perforated 2-inch diameter PVC pipe surrounded by pea gravel after drilling and sampling. Water was filled to the ground surface to pre-soak prior to testing.

The boring was cased using a two-inch diameter perforated casing. Water was added to the bore hole until the water level was as near the ground surface as could be achieved, and allowed to pre-soak for at least 2 hours. After pre-soak, water was added to the bore hole until the water level was as near the ground surface as could be achieved. The water level was measured to the nearest 1/10-foot and recorded every 10 minutes for 30 minutes. There were three (3) sets of measurements taken and each set consisted of at least three (3) measurements (10 minute intervals). The results of the percolation tests are tabulated below.

Table No. F-1, Percolation Test Results

Boring No.	Depth of Boring* (feet)	Predominant Soil Types (USCS)	Average Percolation Rate (inches/hour)	Lowest Percolation Rate (inches/hour)
BH-5	10	Silty Sand (SM)	18.8	7.4

*Approximate

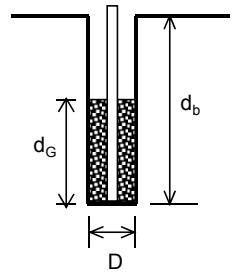
The site soils tested within the upper 10 feet are primarily silty sand with low to moderate infiltration rates. In accordance with County of Los Angeles requirements, the minimum percolation rate for design of infiltration system for storm water management is 0.50 inch per hour. These percolation rates for the onsite soils meet the minimum rate and are considered suitable for percolation drainage systems. The project Civil Engineer should review the raw data of percolation test presented herein to determine specific soil layers and percolation rates for design of the proposed infiltration system. Such systems should be constructed a minimum distance of 10 feet laterally from any existing or future planned building or subsurface structure as not to disturb or undermine foundations. The percolation rates were determined in general accordance with Los Angeles County guidelines. The detailed percolation test results are shown on the following data sheet.

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Percolation Testing

Job Name: San Gabriel valley water company
Job No.: 17-31-303-01
Location: Hacienda Heights
Test Date: June 26, 2017

Test Boring No **BH-5**
Depth of Boring (d_b): 10.0 feet
Diameter of Boring (D): 0.67 feet
Test Performer: Ram



Time of Testing			Water Level Measurement		Water Level Calculations				Percolation Rate Calculations		
Initial Time	Final Time	Time Interval	Initial depth to water	Final depth to water	Initial Height of water column	Final Height of water column	Drop in Height	Average height of water column	Pre-adjusted Percolation Rate	Reduction Factor	Adjusted Percolation Rate
T_i	T_f	ΔT	d_1	d_2	d_i	d_f	$\Delta d = d_i - d_f$	L_{ave}	$k_i = \Delta d / \Delta T$	R_f	$k = k_i / R_f$
		(hr)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(inch/hr)		(inch/hr)
Presoak	6/26/2017										
Percolation Test											
9:45:00 AM	9:55:00 AM	0.17	0.00	5.50	10.00	4.50	5.50	7.25	396.00	22.6	17.49
9:55:00 AM	10:05:00 AM	0.17	5.50	6.80	4.50	3.20	1.30	3.85	93.60	12.5	7.49
10:05:00 AM	10:15:00 AM	0.17	6.80	9.10	3.20	0.90	2.30	2.05	165.60	7.1	23.26
10:20:00 AM	10:30:00 AM	0.17	0.00	4.50	10.00	5.50	4.50	7.75	324.00	24.1	13.42
10:30:00 AM	10:40:00 AM	0.17	4.50	7.80	5.50	2.20	3.30	3.85	237.60	12.5	19.02
10:40:00 AM	10:50:00 AM	0.17	7.80	10.00	2.20	0.00	2.20	1.10	158.40	4.3	36.98
11:00:00 AM	11:10:00 AM	0.17	0.00	3.60	10.00	6.40	3.60	8.20	259.20	25.5	10.17
11:10:00 AM	11:20:00 AM	0.17	3.60	6.90	6.40	3.10	3.30	4.75	237.60	15.2	15.65
11:20:00 AM	11:30:00 AM	0.17	6.90	9.30	3.10	0.70	2.40	1.90	172.80	6.7	25.90

Note: Reduction Factor, $R_f = (2*d_i - \Delta d)/D + 1$

Lowest Perlcolaton Rate = 7.49 inch/hr
Average Percolation Rate = 18.82 inch/hr

Reference: Los Angeles County (2014). Adminstrative Manual - Guidelines for Design, Investigation, and Reporting Low Impact Development Storm Water Infiltration , 12/31/14.

APPENDIX 5

NOISE IMPACT ANALYSIS

SAN GABRIEL VALLEY WATER COMPANY
PLANT B14 PROJECT

HACIENDA HEIGHTS, CALIFORNIA

Prepared by:

Giroux & Associates
1800 E Garry St., #205
Santa Ana, CA 92705

Prepared for:

Tom Dodson & Associates
Attn: Kaitlyn Dodson
2150 N. Arrowhead Avenue
San Bernardino, California 92405

Date:

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Project No.: P18-034 N

NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally considered to be unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

Loud or soft, noisy or quiet, high-and-low pitch are all qualitative terms used to describe sound. These terms are relative descriptions. The science of acoustics attempts to quantify the human perception of sound into a quantitative and measurable basis. Amplitude is the measure of the pressure exerted by sound waves. Amplitude may be so small as to be inaudible by humans, or so great as to be painful. Frequency refers to pitch or tone. The unit of measure is in cycles per second called "hertz". Very low frequency bass tones and ultra-high frequency treble are difficult for humans to detect. Many noise generators in the ambient world are multi-spectral.

The decibel (dB) scale is used to quantify sound pressure levels. Although decibels are most commonly associated with sound, "dB" is a generic descriptor that is equal to ten times the logarithmic ratio of any physical parameter versus some reference quantity. For sound, the reference level is the faintest sound detectable by a young person with good auditory acuity.

Since the human ear is not equally sensitive to all sound frequencies within the entire auditory spectrum, human response is factored into sound descriptions by weighting sounds within the range of maximum human sensitivity more heavily in a process called "A-weighting," written as dB(A). Any further reference in this discussion to decibels written as "dB" should be understood to be A-weighted.

Time variations in noise exposure are typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. Lmax and Lmin are the highest and lowest values measured by a sound level meter during the monitoring interval.

Since the sensitivity to noise increases during the evening and at night, and because excessive noise interferes with the ability to sleep, 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiettime noise events. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 p.m. – 10:00 p.m.) noise levels and a 10 dB addition to nocturnal (10:00 p.m. – 7:00 a.m.) noise levels. The Day/Night Average Sound Level, Ldn, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period. An Ldn or CNEL standard is required by state law.[1]

[1] State of California, General Plan Guidelines, 2017, Governor's Office of Planning and Research.

PLANNING STANDARDS

The State of California[2] has established guidelines for acceptable community noise levels that are based upon the CNEL rating scale to ensure that noise exposure is considered in any development, as shown in Table 1. CNEL-based standards apply to noise sources whose noise generation is preempted from local control (such as from on-road vehicles, trains, airplanes, etc.) and are used to make land use decisions as to the suitability of a given site for its intended use. These CNEL-based standards are articulated in Chapter 11 of the County of Los Angeles General Plan, the Noise Element. Local jurisdictions generally regulate the level of non-transportation noise that one use may impose upon another through a Noise Ordinance.

The standard included in the Noise Element of the County's General Plan for residential uses show that levels up to 65 dB CNEL are considered "normally acceptable", but levels approaching 70 dB CNEL are considered "conditionally acceptable" and require a noise analysis.

Los Angeles County is pre-empted from regulating on-road traffic noise. However, when traffic noise exceeds the planning standard for an affected land use, CNEL-based standards are the accepted significance threshold for any CEQA environmental analysis.

NOISE ORDINANCE STANDARDS

For stationary noise sources located proximate to residential uses, Los Angeles County has adopted a detailed Noise Control Ordinance, which is codified in Chapter 12.08, Noise Control, of Title 12, Environmental Protection, of the Los Angeles County Code. Noise from one land use crossing the property line of an adjacent property is regulated by Section 12.08.390 of the Los Angeles County Code. These standards are expressed in terms of a mean (50th percentile) noise level, which is the noise level allowed for up to 30 minutes in any hour. Some short-term noise levels may exceed the 50th percentile standard, up to a maximum of 20 dB above the allowable mean.

The Los Angeles County Noise Control Ordinance allowable exterior noise levels for various land uses are shown in Table 2. A mean noise level of 50 dB L_{50} (50th percentile, or "L_{50}") by day and 45 dB L_{50} for residential areas at night is the standard applicable at the proposed project site. However, when these noise levels are already exceeded by ambient noise levels, then the ambient level becomes the standard.

[2] Ibid.

Table 1
California Land Use Compatibility Guidelines for Exterior Community Noise

Land Use	Community Noise Exposure CNEL, dB			
	Normally Acceptable	**Conditionally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Single Family, Duplex, Mobile Homes	50-60	55-70	70-75	Above 75
Multi-Family Homes	50-65	60-70	70-75	Above 75
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-70	60-70	70-80	Above 80
Transient Lodging: Motels, Hotels	50-65	60-70	70-80	Above 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-70	60-70	70-80	Above 80
Auditoriums, Concert Halls, Amphitheaters	-	50-70	-	Above 65
Sports Arena, Outdoor Spectator Sports	-	50-75	-	Above 70
Playgrounds, Neighborhood Parks	50-70	-	67-75	Above 75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-75	-	70-80	Above 80
Office Buildings, Business and Professional Commercial	50-70	67-77	Above 75	-
Industrial, Manufacturing, Utilities, Agriculture	50-75	70-80	Above 75	-

Source: State of California, General Plan Guidelines, 2017, Governor's Office of Planning and Research.

Notes:

Normally Acceptable: Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

Table 2
Los Angeles County Noise Control Ordinance Standards

Noise Zone	Land Use (Receptor Property)	Time Intervals	Exterior Noise Level (dB)				
			1 (L_{50}) 30 Min/Hr	2 (L_{25}) 15 Min/Hr	3 ($L_{8.3}$) 35 Min/Hr	4 ($L_{1.7}$) 70 Min/Hr	5 (L_0) at no time
I	Noise-Sensitive Area	Anytime	45	50	55	60	65
II	Residential Properties	10:00 p.m. to 7:00 a.m. (nighttime)	45	50	55	60	65
		7:00 a.m. to 10:00 p.m. (daytime)	50	55	60	65	70
III	Commercial Properties	10:00 p.m. to 7:00 a.m. (nighttime)	55	60	65	70	75
		7:00 a.m. to 10:00 p.m. (daytime)	60	65	70	75	80
IV	Industrial Properties	Anytime	70	75	80	85	90

Source: Los Angeles County Noise Control Ordinance, Exterior Noise Standards, Chapter 12.08.390.

Notes:

1. **Los Angeles County Noise Standard No. 1, L_{50}**: Noise levels which may not be exceeded for a cumulative period of more than 30 minutes in any hour. If the ambient L_{50} exceeds the levels listed above, then the ambient L_{50} becomes the exterior noise level for Standard No. 1.

2. **Los Angeles County Noise Standard No. 2, L_{25}:** Noise levels which may not be exceeded for a cumulative period of more than 15 minutes in any hour. If the ambient L_{25} exceeds the levels listed above, then the ambient L_{25} becomes the exterior noise level for Standard No. 2.

3. **Los Angeles County Noise Standard No. 3, $L_{8.3}$:** Noise levels which may not be exceeded for a cumulative period of more than 5 minutes in any hour. If the ambient $L_{8.3}$ exceeds the levels listed above, then the ambient $L_{8.3}$ becomes the exterior noise level for Standard No. 3.

4. **Los Angeles County Noise Standard No. 4, $L_{1.7}$:** Noise levels which may not be exceeded for a cumulative period of more than 1 minute in any hour. If the ambient $L_{1.7}$ exceeds the levels listed above, then the ambient $L_{1.7}$ becomes the exterior noise level for Standard No. 4.

5. **Los Angeles County Noise Standard No. 5, L_0:** Noise levels which may not be exceeded for any period of time. If the ambient L_0 exceeds the levels listed above, then the ambient L_0 becomes the exterior noise level for Standard No. 5.

GROUNDBORNE VIBRATION

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is described as the velocity and the rate of change of the speed is described as the acceleration. Each of these descriptors can be used to correlate vibration to building damage, and acceptable equipment vibration levels.

During construction, the operation of construction equipment can cause groundborne vibration. This type of vibration is best measured in terms of velocity or acceleration. The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to describe vibration amplitudes. The units for PPV velocity is normally inches per second (in/sec). PPV is defined as the maximum instantaneous peak of the vibration signal and is considered appropriate for evaluating potential building damage.

PROJECT NOISE IMPACTS

THRESHOLDS OF SIGNIFICANCE

According to the current CEQA Appendix G guidelines, noise impacts are considered potentially significant if they cause:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. (Noise levels generated by project activities exceeding the County of Los Angeles Noise Control Ordinance standards would be considered significant.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The noise impact assessment primarily evaluates short-term (temporary) impacts associated with project construction. The potential for impacts is assessed by considering several factors, including the proximity of construction-related noise sources to sensitive receptors and typical noise levels associated with construction equipment, and whether proposed activities would occur outside the construction time limits specified in the Los Angeles County Code. There will be little operational noise associated with this project. A pump station already exists to accommodate the existing, larger, reservoir.

CONSTRUCTION NOISE SIGNIFICANCE

The Los Angeles County Noise Ordinance restricts and regulates hours of construction operation and levels of construction noise. In Exterior Noise Standards, Chapter 28.08, Part 4, Specific Noise Restrictions, Section 12.08.440, construction noise is restricted from 7:00 p.m. to 7:00 a.m. weekdays and at any time on Sundays or holidays when it creates a noise disturbance across a residential or commercial property line.

As stated in Section 12.08.440 B, for noise restrictions at affected residential structures, the contractor is to conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed those listed as shown below. The ordinance is somewhat ambiguous in its definition of "maximum." In practice, the ordinance is interpreted to refer to the maximum one-hour average Leq as the appropriate construction activity noise performance standard.

Construction noise is additionally addressed in Chapter 12 of the County Code. The Code prohibits disturbing noise near residential occupancies between 8 p.m. and 6:30 a.m. on any day

and all day on Sunday (Section 12.12.030). It does not contain any numerical performance standards during allowed construction times. Because of the ordinance ambiguity in two minimally separated sections of the County Code, an intermediate definition of "maximum" as the loudest single hour is typically employed. For this study the more restrictive 7 a.m. to 7 p.m. noise standard is applied.

County Standards:

Noise Restrictions at Affected Structures. The contractor shall conduct construction activities in in the following schedule:

1. At Residential Structures.

a. Mobile Equipment. Maximum noise levels from non-scheduled, intermittent, and short-term operation (less than 10 days) of mobile equipment:

	Single-family Residential (dBA)	**Multi-family Residential (dBA)**	**Semi-residential/ Commercial (dBA)**
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75	80	85
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays.	60	65	70

b. Stationary Equipment Maximum noise level for repetitively scheduled and relatively long-term operation (period of 10 days or more) of stationary equipment:

	Single-family Residential (dBA)	**Multi-family Residential (dBA)**	**Semi-residential/ Commercial (dBA)**
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	60	65	70
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays.	50	55	60

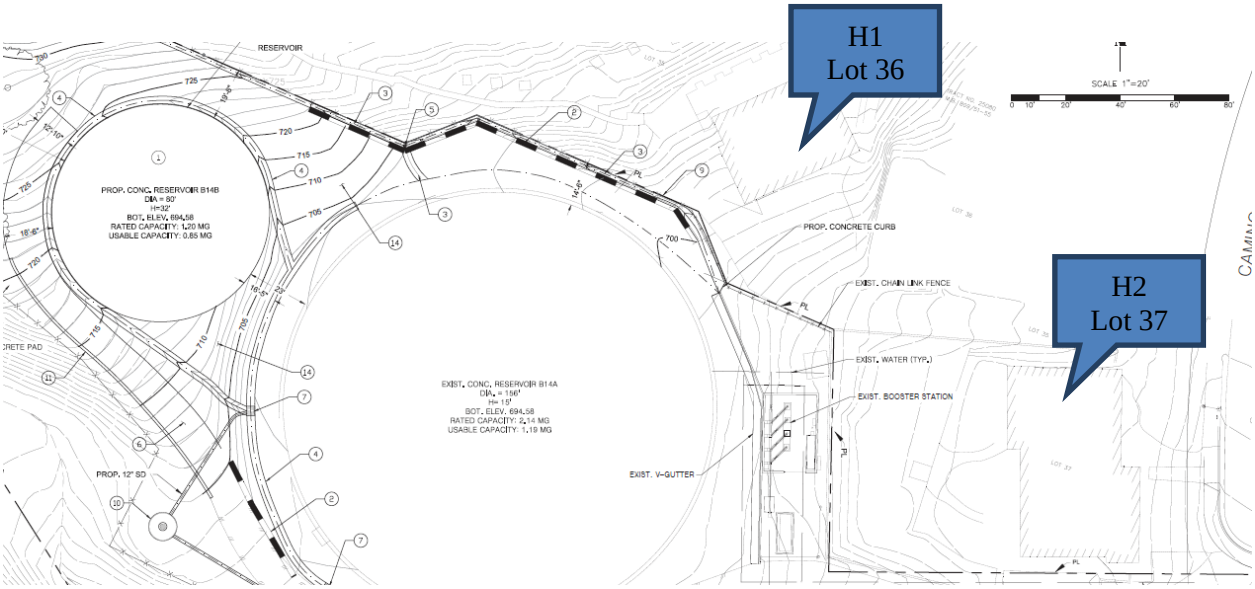
County Code: Chapter 12.08.440

SENSITIVE RECEPTORS

There are two homes that would be most impacted by the project as shown in Figure 1. H1 is approximately 175-feet from the closest perimeter of the new reservoir and H2 is about 275-feet from the closest perimeter. The existing reservoir blocks direct line-of-sight between the construction activity and H2 and would provide a degree some sound attenuation. Although the existing reservoir would block some of the new construction from H1, most activity would have a direct-line-of-sight so that no benefit was analyzed.

Pipelines are planned to connect the project to connect the proposed reservoir with the existing system. Noise levels associated with pipeline installation are limited to the time it takes to install pipeline adjacent to any residence which would be brief and would affect a given sensitive receptor for only a short period of time.

Figure 1
Most Impacted Residences Adjacent to Construction



CONSTRUCTION NOISE IMPACTS

OFF-ROAD EQUIPMENT

Development of the proposed project would result in short-term noise increases due to the operation of heavy equipment. Construction noise levels would fluctuate. To estimate probable noise impacts, typical equipment and construction techniques are assumed.

In 2006, the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model that includes a national database of construction equipment reference noise

emissions levels. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power during a construction phase. The usage factor is a key input variable that is used to calculate the average Leq noise levels.

Table 3 identifies highest (L_{max}) noise levels associated with each type of equipment identified for use, then adjusts this noise level for the extent of equipment usage (usage factor), which is represented as L_{eq}. The table is organized by construction activity and equipment associated with each activity.

Table 3
Construction Noise Impact

Phase Name	Equipment	Usage Factor[1]	Hours of Operation[2]	Reference Noise Level @ 50 feet (dB)	Cumulative Noise Level @ 50 feet (dB))
Grading & Retaining Wall	Loader/Backhoe	40%	3.2	84	80
	Dozer	40%	3.2	85	81
	Grader	40%	3.2	85	81
	Excavator	40%	3.2	81	78
Reservoir Construction	Forklift	20%	1.6	75	68
	Air Compressor	40%	3.2	78	74
	Pump	28%	2.2	81	75
	Loader/Backhoe	37%	3.0	78	74
	Crane/Stress Tower	16%	1.3	81	73
Drainage and Piping	Compactor	50%	4.0	77	74
	Loader/Backhoe	37%	3.0	78	74
	Forklift	20%	1.6	75	68
	Trencher	50%	4.0	85	82
	Roller	38%	3.0	80	76

Source: FHWA's Roadway Construction Noise Model, 2006

1. Represents the actual hours of peak construction equipment activity out of a typical 8 hour day
2. Estimates the fraction of time each piece of equipment is operating at full power during a construction operation

Quantitatively, the primary noise prediction equation is expressed as follows for the hourly average noise level (Leq) at distance D between the source and receiver (dBA):

$$Leq = Lmax @ 50' - 20 \log (D/50') + 10\log (U.F\%/100) - I.L.(bar)$$

Where:

Lmax @ 50' is the published reference noise level at 50 feet
U.F.% is the usage factor for full power operation per hour
I.L.(bar) is the insertion loss for intervening barriers

Table 3 describes the noise level at a 50-foot reference distance. However, noise levels would vary at each receptor depending on proximity to construction activities. The noise level during the construction period at both evaluated receptor location was calculated by making a distance adjustment to the construction source sound level. Table 4 indicates the resulting noise level at receptor locations.

On-site construction equipment, under direct line-of-sight conditions, could create a peak exterior noise level at the closest residence H1 as high as 71 dB. At H2 the maximal noise levels are calculated to be as high as 67 dB. Noise impacts would be significant if they caused a violation of any adopted standards. For mobile equipment, the allowable noise level is 75 dB for activities occurring during the daytime. No construction would occur within the nocturnal time period, and therefore construction noise would be less-than-significant.

Table 4
Construction Noise Levels at Individual Receptors

Phase Name	Equipment	Noise H1 (dB)	Noise H2 (dB)
Grading & Retaining Wall	Loader/Backhoe	69	65
	Dozer	70	66
	Grader	70	66
	Excavator	67	63
Construction	Forklift	57	53
	Air Compressor	63	59
	Pump	64	60
	Loader/Backhoe	63	59
	Crane/ Tower	62	58
Drainage and Piping	Compactor	63	59
	Loader/Backhoe	63	59
	Forklift	57	53
	Trencher	71	67
	Roller	65	61

CONSTRUCTION ACTIVITY VIBRATION

Ground-borne vibration occurs when heavy equipment travels over unpaved surfaces or when it is engaged in soil movement. The effects of ground-borne vibration include discernable movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Vibration related problems generally occur due to resonances in the structural components of a building because structures amplify groundborne vibration. Within the "soft" sedimentary surfaces of much of Southern California, ground vibration is quickly damped out. Groundborne vibration is almost never annoying to people who are outdoors (FTA 2006).

Groundborne vibrations from construction activities rarely reach levels that can damage structures. Because vibration is typically not an issue, very few jurisdictions have adopted vibration significance thresholds. Vibration thresholds have been adopted for major public works construction projects, but these relate mostly to structural protection (cracking foundations or stucco) rather than to human annoyance.

The vibration descriptor commonly used to determine structural damage is the peak particle velocity (ppv) which is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in in/sec. The range of such vibration is as follows in Table 5:

Table 5
Human Response To Transient Vibration

Average Human Response	ppv (in/sec)
Severe	2.00
Strongly perceptible	0.90
Distinctly perceptible	0.24
Barely perceptible	0.03

Source: Caltrans Transportation and Construction Vibration Guidance Manual, 2013.

Over the years, numerous vibration criteria and standards have been suggested by researchers, organizations, and governmental agencies. There are no Caltrans or Federal Highway Administration standards for vibration.

The American Association of State Highway and Transportation Officials (AASHTO) Standard R 8-96 (AASHTO, 2004) describes three general categories of damage to buildings from vibration: 1) Threshold cracking; 2) Architectural or Minor Damage; and 3) Major Damage. Both Threshold and Minor damage include cracks in room interior surfaces that do not affect the strength or structural integrity of the structure. The term "threshold cracking" is defined as the highest vibration amplitude at which no cosmetic, minor, or major damage occurs. This may include "threshold cracks" as hairline cracks in room walls that occur at the lowest vibration amplitudes. Based on the AASHTO guidelines, a threshold damage criterion of 0.5 in/sec PPV is appropriate to evaluate vibration impacts by transient and irregular sources. This threshold is applied in this analysis for transient vibration.

The closest residence would be located at least 175 feet from the proposed reservoir. Maximum vibration levels at that could be generated by construction equipment operating at the project boundary are presented in Table 6.

Table 6
Estimated Vibration Levels During Project Construction

Equipment	PPV at 25 ft (in/sec)	PPV at 50 ft (in/sec)	PPV at 175 ft (H1) (in/sec)	PPV at 275 ft (H2) (in/sec)
Large Bulldozer	0.089	0.031	0.005	0.002
Loaded trucks	0.076	0.027	0.004	0.002
Jackhammer	0.035	0.012	0.002	0.001
Small Bulldozer	0.003	0.001	<0.001	<0.001

Source: FHWA Transit Noise and Vibration Impact Assessment

The calculation to determine PPV at a given distance is:

PPVdistance = PPVref*(25/D)^1.5

Where:

PPVdistance = the peak particle velocity in inches/second of the equipment adjusted for distance,

PPVref = the reference vibration level in inches/second at 25 feet, and

D = the distance from the equipment to the receiver.

As indicated in Table 6, based on the Federal Transit Administration (FTA) data, vibration velocities from typical heavy construction equipment operation that would be used during project construction would range from less than 0.001 to 0.005 (in/sec) peak particle velocity (PPV) at each receptor. Therefore, vibration levels associated with operation of construction equipment is not expected to exceed the 0.5 in/sec PPV threshold for cosmetic damage from transient vibration and will likely be below the threshold of perception. There is no significant impact and no need for mitigation.

SITE OPERATIONAL NOISE

Operation of the new reservoir would not result in significant noise impacts and the structure would be in ground. The loudest project activity is generally associated with operation of electric water pumps within solidly enclosed pump stations. However, the pump station already exists for the existing reservoir and therefore will not represent a new noise source.

SUMMARY

Short-term construction noise impacts are mitigated by required compliance with the County of Los Angeles Noise Control Ordinance. The allowed hours of construction are from 7 a.m. to 7 p.m. Monday through Friday. Construction noise is unlikely to exceed 75 dB at the nearest noise-sensitive land use. Though optional, the following measures are recommended to further reduce construction noise at the nearest noise-sensitive land use.

When project construction activities occur within 500 feet of an occupied residential structure, the contractor shall:

- Shut off construction equipment that is not in use.
- Use construction equipment that is equipped with properly operating and maintained mufflers.
- Use electrical power to run air compressors and similar power tools.

Vibration levels resulting from project construction equipment would not exceed structural damage levels at the closest noise-sensitive land use and would be less than the barely perceptible threshold.

There is no anticipated operational noise associated with use of the new reservoir.