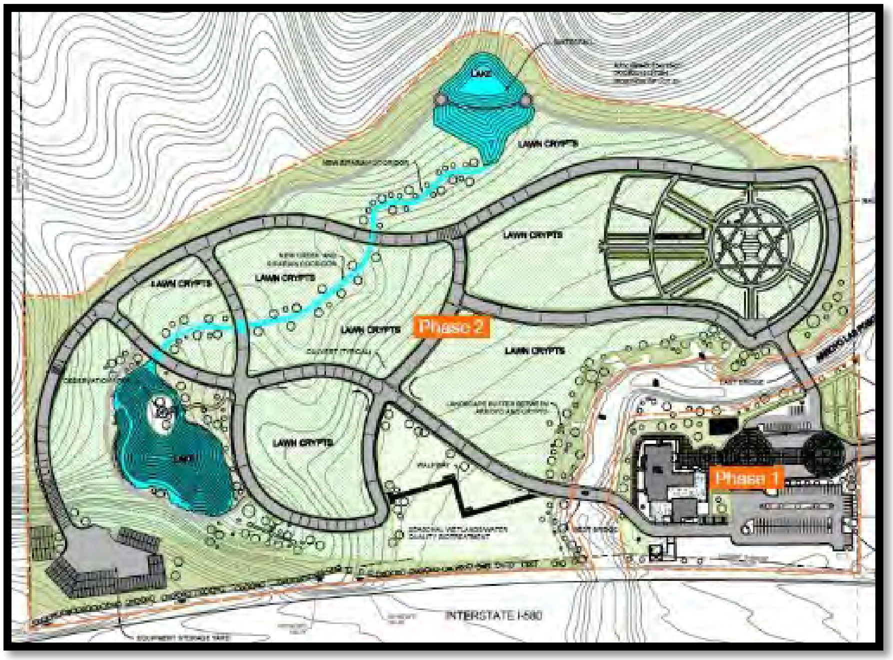
MONTE VISTA MEMORIAL GARDENS

Draft Environmental Impact Report: Appendices

SCH No. 2020069045

January 2022



Prepared for:

Alameda County Community Development Agency
224 Winton Ave Room 111
Hayward, CA 94544

Prepared by:

RCHGROUP

MONTE VISTA MEMORIAL GARDENS

Draft Environmental Impact Report: Appendices

SCH No. 2020069045

January 2022

Prepared for:

Alameda County Community Development Agency
224 Winton Ave Room 111
Hayward, CA 94544

Submitted by:

RCH Group, Inc.
PO Box 516
Rancho Murieta, CA 95683
(916) 782-4427

RCHGROUP
planning & environmental consulting

In Association with:

GECO
Grassetti Environmental Consulting

APPENDIX A

NOTICE OF PREPARATION (NOP)

ALAMEDA COUNTY COMMUNITY DEVELOPMENT AGENCY

PLANNING DEPARTMENT

Chris Bazar
Agency Director

Albert Lopez
Planning Director

224 West Winton Ave
Room 111

Hayward, California
94544-1215

phone
510.670.5400
fax
510.785-8793

www.acgov.org/cda

June 29, 2020

FROM: Albert Lopez, Planning Director

TO: Interested Parties, Responsible Agencies and Community Members

SUBJECT: Notice of Preparation (Notice) of an Environmental Impact Report and Notice of Virtual Scoping Meeting for **Monte Vista Memorial Gardens** Project Conditional Use Permit (PLN 2017-00194)

SUMMARY:

The County of Alameda (County) is issuing this notice to advise other agencies and the public that the County will be preparing an Environmental Impact Report (EIR) for the Monte Vista Memorial Gardens Project (Project) within the East County area of unincorporated Alameda County. The EIR will be prepared in compliance with the California Environmental Quality Act (CEQA) and all relevant state and Federal laws. The County will serve as the CEQA lead agency for preparation of the EIR.

The County is issuing this Notice to alert interested parties and solicit agency and public input regarding the scope and content of the environmental analysis. It is also intended to advise the public that outreach activities conducted by the County and its representatives will be considered in the preparation of the EIR.

DATES: Due Date for Comments and Public Scoping Meeting Date/Details

Written comments on the scope of the Monte Vista Memorial Gardens Project EIR, including the project objectives, impacts to be evaluated, methodologies to be used in the evaluations, and the alternatives to be considered, should be provided to the County by **July 29, 2020.** Due to the COVID-19 pandemic, a scoping meeting Zoom Webinar will be held on July 20 at 2 PM. The Webinar information is below:

Please click or enter the link below to join the webinar:

https://us02web.zoom.us/j/89263251844

Or by Phone (669) 900-9128 or (253) 215-8782 Webinar ID: 892 6325 1844

Details of the webinar will also be posted on the County’s website:

www.acgov.org/cda/planning/landuseprojects/currentprojects.htm

The project objectives, description of the proposed project and alternatives currently under consideration will be presented in the scoping meeting video presentation and slides.

ADDRESSES:

Written comments on the project scope should be sent to:

Albert Lopez, Planning Director
ATTN: Monte Vista Memorial Gardens Project EIR
Alameda County Community Development Agency
224 W. Winton Avenue, Suite 110
Hayward, CA 94544

Or, via email with the subject line "Monte Vista Memorial Gardens Project EIR" to:
albert.lopez@acgov.org

FOR FURTHER INFORMATION CONTACT: Albert Lopez, Planning Department, Alameda County Community Development Agency, 224 W. Winton Avenue, Suite 110, Hayward, CA 94544, or at 510-670-5426

SUPPLEMENTAL INFORMATION:

Scoping

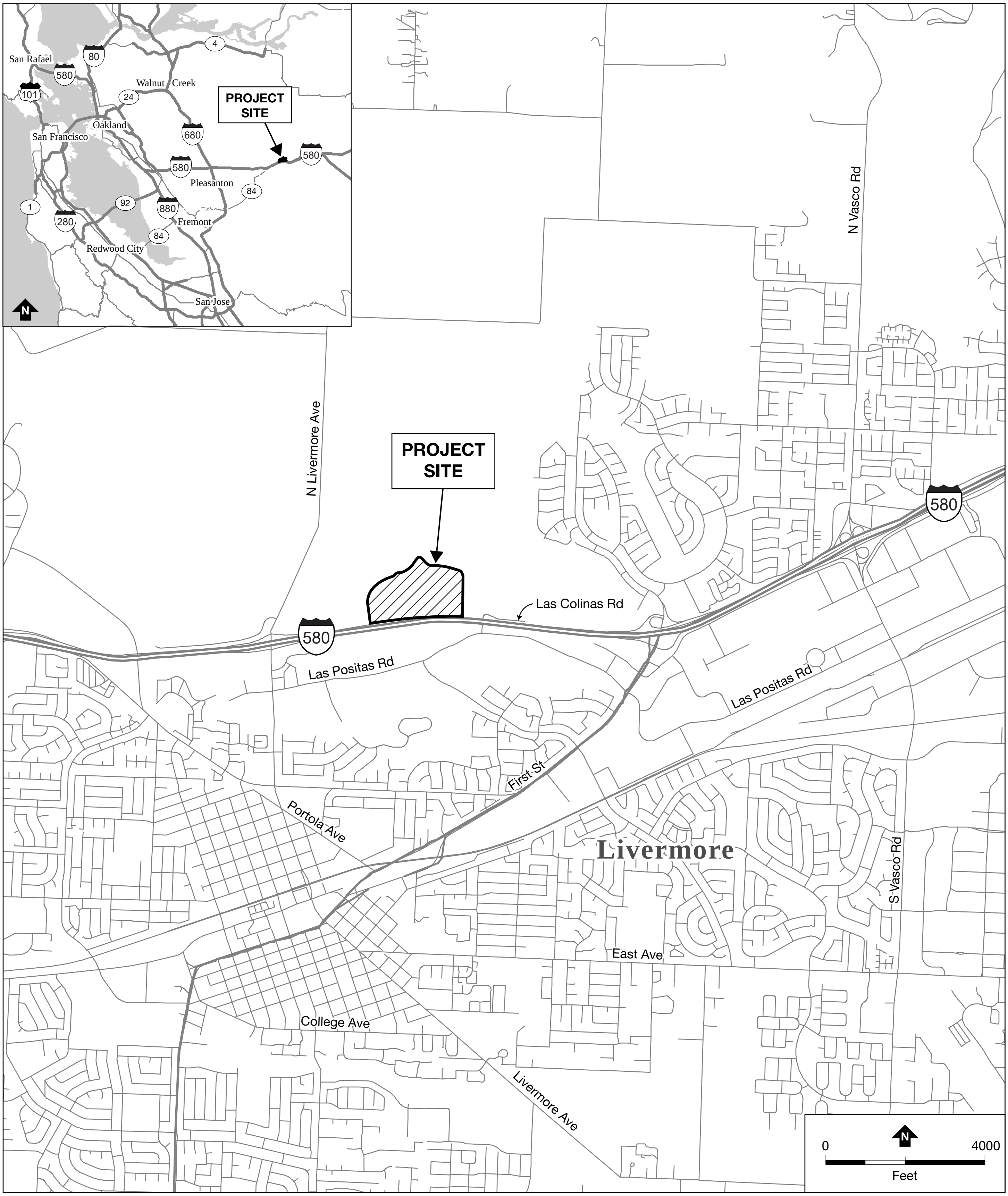
The County invites all interested individuals, organizations, public agencies, and Native American Tribes to comment on the scope of the EIR, including the project objectives, the alternatives to be studies, the impacts to be evaluated and the evaluation methods to be used. Comments should focus on alternatives that may have fewer environmental impacts while achieving similar objectives and the identification of any significant social, economic, or environmental issues related to alternatives.

The Proposed Project

The Project would be developed at 3656 Las Colinas Road, Livermore, CA in unincorporated Alameda County. Development of the Project would occur on approximately 47 acres in the southern portion of the ±104-acre parcel (Assessor's Parcel Number 099-0015-016-03) just north of the City of Livermore between the North Livermore Avenue and North First Street exits. (See **Figure 1**)

The Project site topography consists of a relatively flat lowland valley area to the southeast and gently sloping hills and valleys to the north and west. The valleys in the western portion of the Project site drain toward Arroyo Las Positas, which flows in a southwesterly direction.

The property bordering the Project site to the east of Arroyo Las Positas supports an existing residence and several roadways, while the area west of Arroyo Las Positas is undeveloped and is currently used for grazing and farming. The Project site is accessed on the southeastern corner of the property from Las Colinas Road that connects with Las Positas Road (south of I-580). North of I-580, legally recorded easements provide access to the Project site via County roads.



Source: RCH Group

Figure 1
Regional Location

RCHGROUP
planning & environmental consulting

Project Overview

The Project would include a funeral home with crematorium, burial lots, an entry plaza, internal roadways, parking, landscaping, new wetlands, lakes, and other associated infrastructure and improvements. **Table 1** shows the major Project facilities and the corresponding coverage areas.

Table 1: Project Facilities

Project Facilities	Coverage Area (acres)
Buildings	1.0
Road (decomposed granite)	5.1
Parking Lot (decomposed granite)	1.7
Landscaping	9.0
Entry Plaza (permeable pavers)	0.9
Burial Lots	24.0
New Wetlands	2.9
Lakes	2.5
Total Coverage Area	47.1

The Project would provide cemetery and mortuary products and services to a wide range of multi-cultural members of the Tri-Valley. These include online memorial service broadcasts, intimate areas for private discussions amongst family members, selection of music, private salons, a children’s playroom, ADA accessibility, a chapel for religious services, professional services of director and staff, caskets, vaults and urns, remembrance products, digital photographs and slideshows, deceased body transportation and storage, obituary services, cremation services, public viewings, private family visitations, catering, graveside services, markers and memorials, and various other services that would be provided to all clients.

Site Access

Access to the project is hampered by the lack of direct access to the site from an improved County or City right-of-way. An easement over County property (currently configured as an unnamed road) connecting the Project site to Las Colinas road as shown in **Figure 2** will serve as the only access to the site. This County owned property lies between two private properties in County jurisdiction (**See Figure 3**) which are subject to an active Clean-Up and Abatement Order No. R2-2017-1021 issued by the San Francisco Bay Regional Water Quality Control Board. A representative of the applicant has been named in said Order as a “discharger” due to unauthorized fill placed into jurisdictional waters on these sites (wetlands).

Due to adjacencies of the privately owned properties and access to the site over County owned property, resolution of the Order will be analyzed as one of the EIR alternatives, and resolution of the Order will be required prior to project approval and issuance of any grading, building, or other construction-related permits. Discussions with the Water Board in late April 2020 indicate there is an on-going state of violation. The applicant has acknowledged that their representative was a discharger and had done so to facilitate access to the site. **Figure 3** shows the ownership of the access road and surrounding properties and **Figure 4** shows the location of the Abatement Order wetlands.

Access to the site is adjacent to and may utilize a portion of identified wetlands in order to accommodate a new roadway serving the site. Mitigation of such an impact has been proposed and should be further evaluated as part of this EIR. In particular, approximately six acres of manmade wetlands are being proposed to serve this purpose, as well as to provide additional habitat for sensitive species. The viability of these newly constructed wetlands as suitable mitigation needs to be explored in the EIR with input from a variety of responsible agencies.

Any improvement to the roadway access will be the responsibility of the applicant, and additional impact to sensitive areas (habitat and/or wetland area) may require additional self-sustaining mitigation areas on the cemetery site itself. Input from the City of Livermore will be required for access roadway alignment given the cemetery access begins in the City's jurisdiction, goes through the County for a small segment, and will likely terminate in the City. The applicant will have to work with the City of Livermore, the County, and adjacent property owners to solve the access issues while addressing the on-going state of violation.

Funeral Home and Pavilion Building

The two-story Funeral Home building (Building A) would house the morgue, crematorium, sales offices, staff offices, chapel, garage, a receiving area, preparation room, family preparation room, reception area, guest lounge, and associated storage and sanitary facilities. The exterior of the building would look like a Tuscan Winery with courtyards and gardens. The interior of the building would consist of a chapel accommodating approximately 120-140 guests with high ceiling, clerestory windows, pulpit, and body or remains display area. A viewing room is also planned for those individuals who request witnessed cremation. Conceptual building elevations of the Funeral Home building are shown in **Figures 5** and **6**.

The single-story Pavilion building (Building B) would house the pavilion with table seating for approximately 120-130 guests, kitchens, and associated storage and sanitary facilities. **Table 2** shows building characteristics.

Table 2: Building Characteristics

Building	Building Footprint (square feet)	Total Building Area (square feet)	Building Height (feet)
Building A – Main Funeral Home (Two-Story Building)	12,115	16,181	40
Building B – Pavilion (Single-Story Building)	3,442	3,442	40
Total	**15,557**	**19,623**	N/A

The Funeral Home building would have the capacity for two cremation retorts, an embalming room and refrigeration unit capable of holding 100 bodies. In addition to the main body preparation room, there would be a separate family preparation room, for those cultures that must ritualistically cleanse and dress the body. The Funeral Home building would have adequate office space for funeral directors, cemetery managers, administration, and sales. It would house the limousines and hearses and would include storage space for inventory.

Funeral Home operations would use approximately 300 gallons per day of potable water from a municipal supply. An on-site septic system would dispose of blackwater. Stormwater runoff from impervious areas such as rooftops and surrounding parking areas would be treated in a bioretention area near the Arroyo prior to discharge, in conformance with local standards.

Cemetery Grounds

The approximately 47-acre cemetery grounds, of which approximately 24 acres would consist of various memorial monuments and burial gardens accessed by a crushed/decomposed granite access road on the eastern side of Arroyo Las Positas that would connect areas of the cemetery grounds.

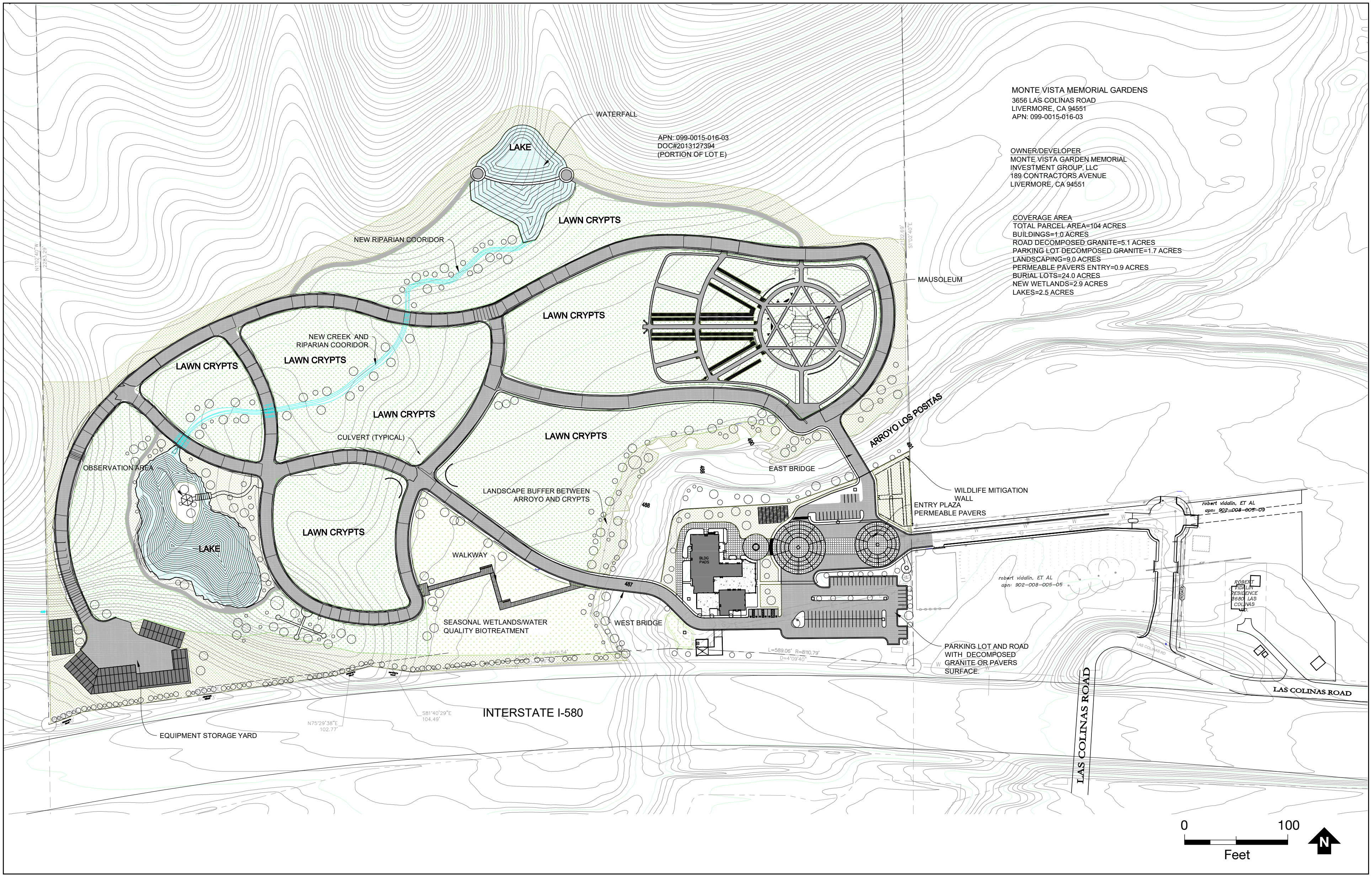
The main cemetery with lakes, a flowing waterway and monuments to the west of Arroyo Las Positas, would be accessed from the Funeral Home via two 24-foot-wide clear-span bridges designed for both pedestrian and vehicle use. These bridges would provide freeboard of at least one foot above the 500-year flood plain.

Two proposed “lakes” or ponds connected by a perennial linear waterway (i.e., creek) would be the primary landscape feature of the cemetery. A proposed depressional wetland feature is also planned on the south side of the cemetery grounds near the southern property boundary on the north side of I-580. There is some indication the applicant is relying on the newly constructed wetlands to be used for mitigation required by the abatement order (see discussion about Abatement and Clean-Up Order above). The viability of the constructed wetlands to be considered suitable wetland mitigation needs to be explored in the EIR. The burial area itself would have an extensive sub-drainage system draining to the lower lake feature to maximize onsite water re-use.

Key Environmental Issues

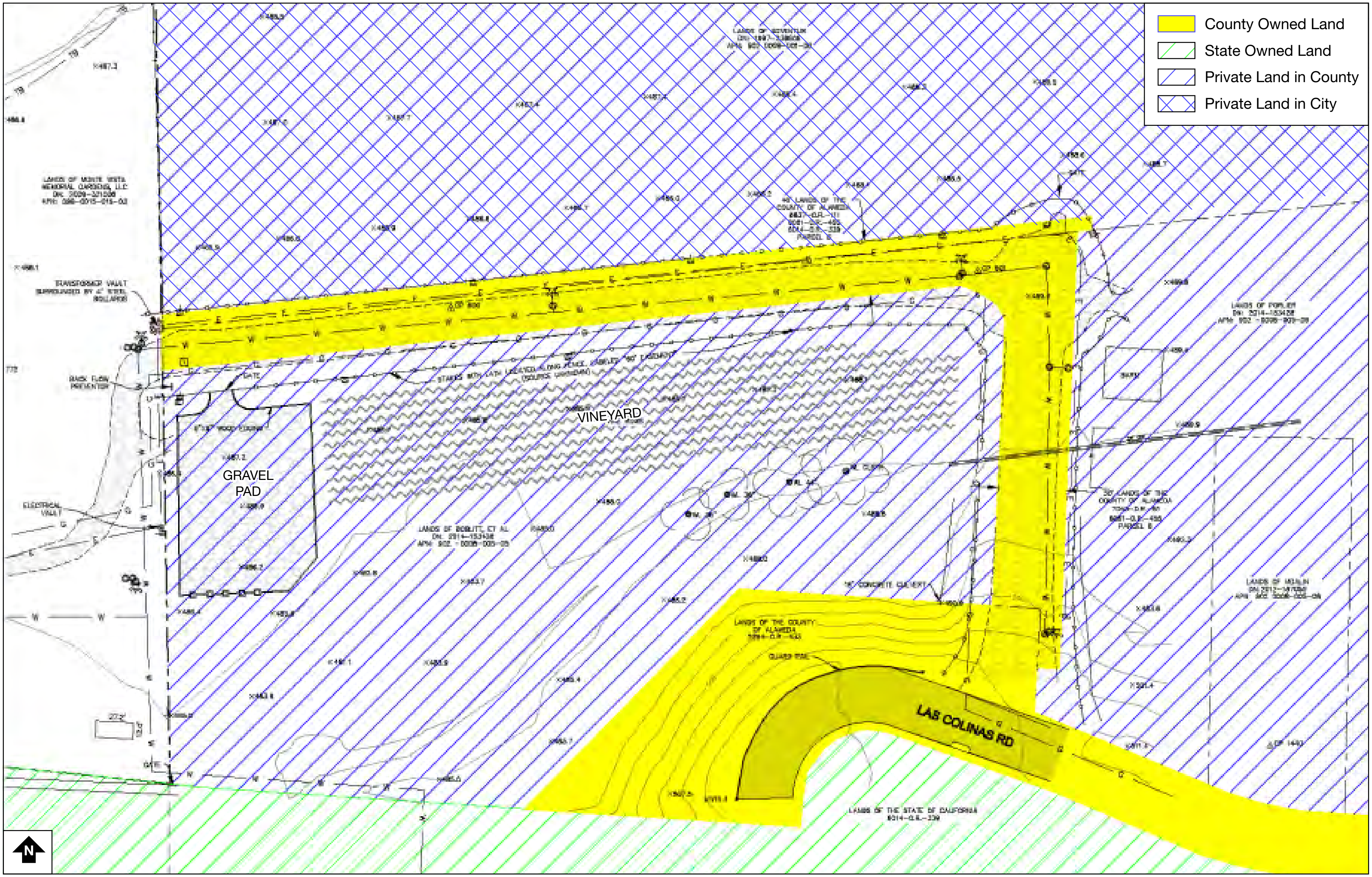
Key issues that will be evaluated in the EIR include:

- Biological Resources/Wetlands
- Hydrology/Water Quality
- Air Quality and Greenhouse Gasses
- Cultural Resources
- Land Use and Planning
- Traffic and Roadway Safety
- Public Services and Utilities
- Cumulative Impacts



Source: ENGO, 2020

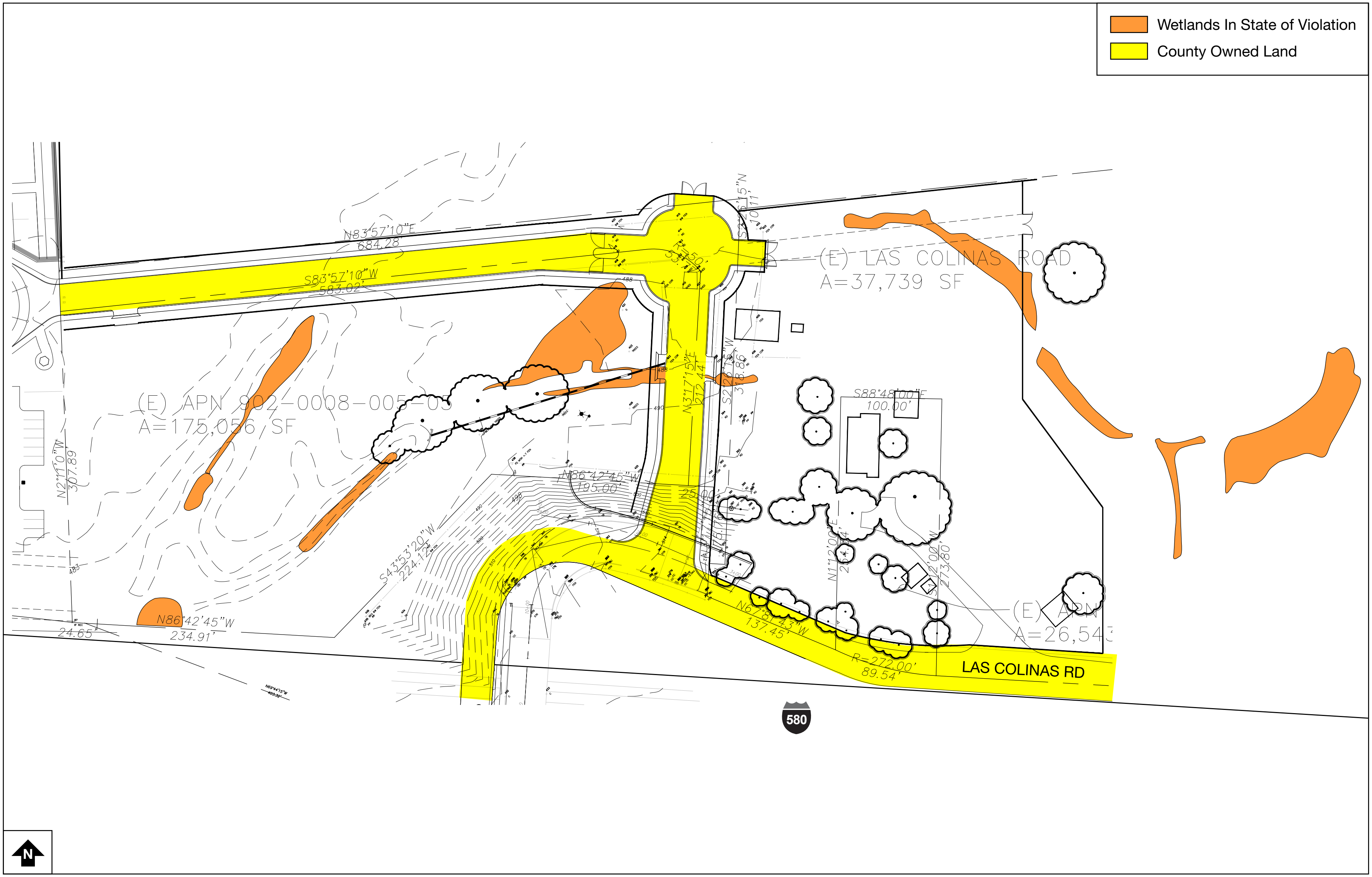
Figure 2
Site Plan



Source: Hogan and RCH Group, 2020

Figure 3
Ownership Map

RCHGROUP
planning & environmental consulting



Source: ACS Consulting Engineers, 2020

Figure 4
Wetlands Areas in State of Violation

RCHGROUP
planning & environmental consulting

SOUTH ELEVATION

Exterior Materials

Roof:	High Barrel Concrete Tile by Eagle Roofing Santa Barbara & Santa Cruz (50/50 Blend)
Fascia:	Copper Gutter o/ 6x8 Rafter Tails
Barge:	6x8 Rake Board
Walls:	Smooth Trowel Finish Stucco Mineret Bluffstone Veneer by Eldorado Stone
Windows:	Insulated Metal Frame w/ Dual Pane Glass
Doors:	Insulated Metal Frame w/ Dual Pane Glass Insulated Metal
Garage Door:	Insulated Metal Roll-up
Accents:	Stone Wall Cap & Frieze Block Metal Expansion Joints W/ 1" Reveal @ Stucco Copper Leaders & Downspouts Fabricated Metal Trellis & Arbors Stucco Finished Pilaster @ Garden Walls Composite Timber & Wood Gates

EAST ELEVATION

Figure 5
South and East

CONCEPTUAL ELEVATIONS

0 4 8 16
SCALE: 1/8" = 1'-0"
May 5, 2018

Owner / Applicant
Monte Vista Memorial Investment Group, LLC
189 Contractors Street
Livermore, CA 94551

Michael Kliment
1-408-499-2197

A.P.N. 099-0015-016-03
Monte Vista Memorial Gardens
3656 Las Colinas Road
Livermore, CA 94551

edward c. novak
ARCHITECT LEED AP
153 GILLETTE PLACE #108 LIVERMORE, CA 94550
phone: 714 323-8396 email: ed@ecnarchitecture.com

A1

NORTH ELEVATION

Exterior Materials

Roof:	High Barrel Concrete Tile by Eagle Roofing
	Santa Barbara & Santa Cruz (50/50 Blend)
Fascia:	Copper Gutter o/ 6x8 Rafter Tails
Barge:	6x8 Rake Board
Walls:	Smooth Trowel Finish Stucco
	Mineret Bluffstone Veneer by Eldorado Stone
Windows:	Insulated Metal Frame w/ Dual Pane Glass
Doors:	Insulated Metal Frame w/ Dual Pane Glass
	Insulated Metal
Garage Door:	Insulated Metal Roll-up
Accents:	Stone Wall Cap & Frieze Block
	Metal Expansion Joints W/ 1" Reveal @ Stucco
	Copper Leaders & Downspouts
	Fabricated Metal Trellis & Arbors
	Stucco Finished Pilaster @ Garden Walls
	Composite Timber & Wood Gates

WEST ELEVATION

Figure 6
North and West
CONCEPTUAL ELEVATIONS

0 4 8 16
SCALE: 1/8" = 1'-0"
May 5, 2018

MonteVista
Memorial Gardens

Owner / Applicant
Monte Vista Memorial Investment Group, LLC
189 Contractors Street
Livermore, CA 94551

Michael Kliment
1-408-499-2197

A.P.N. 099-0015-016-03
Monte Vista Memorial Gardens
3656 Las Colinas Road
Livermore, CA 94551

edward c. novak
ARCHITECT LEED AP
153 GILLETTE PLACE #108 LIVERMORE, CA 94550
phone: 714 323-8396 email: ed@ecnarchitecture.com

A2

Alternatives

The EIR will consider the proposed project and a reasonable range of alternatives including possible alternatives such as a Reduced Project Alternative, an Alternative to address potential inconsistencies with local plans, and the required No Project Alternative. The County welcomes comments from the public on alternatives that should be considered. An alternative focusing on the access issues, coupled with mitigation required to address Abatement Order will form the basis of one of the alternatives.

The EIR Process and the Role of Participating Agencies and the Public

The County encourages broad participation in the EIR process during scoping and review of the resulting environmental documents. Comments and suggestions are invited from all interested agencies and the and the public at large so that the full range of issues related to the proposed project and all reasonable feasible alternatives are addressed, and that all potentially significant issues are identified. In particular, the County is interested in learning whether there are areas of environmental concern whether there might be a potential for significant impacts. For all potentially significant impacts, the EIR will identify mitigation measures, where feasible, to reduce the impacts to a level below significance.

Public agencies with jurisdiction are requested to advise the County of their applicable permit and environmental review requirements, and the scope and content of the environmental information that is germane to the agency's statutory responsibilities in connection to the proposed project. Public agencies are requested to advise the County if they anticipate taking a major action in connection with the proposed project and if they wish to cooperate in the preparation of the EIR.

A public scoping meeting (Zoom Webinar) has been scheduled as an important component of the scoping process, in compliance with state law. Details of the scoping meeting are provided on Page 1 of this Notice.

Due to time limits mandated by state law, public agencies are requested to send their responses to this Notice to the County at the address provided above at the earliest possible date, but no later than July 29, 2020. Members of the general public should also provide scoping comments by that date.

APPENDIX B

COMMENTS ON NOP

This page intentionally left blank

STATE OF CALIFORNIA------- CALIFORNIA STATE TRANSPORTATION AGENCY Gavin Newsom, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF TRANSIT AND COMMUNITY PLANNING
P.O. BOX 23660, MS-10D
OAKLAND, CA 94623-0660
PHONE (510) 286-5528
TTY 711
www.dot.ca.gov

Making Conservation
a California Way of Life.

7/29/2020
Governor's Office of Planning & Research

Jul 29 2020

STATE CLEARINGHOUSE

July 29, 2020

SCH #2020069045
GTS # 04-ALA-2020-00548
GTS ID: 19842
ALA/580/PM 11.45

Albert Lopez, Planning Director
Alameda County Community Development
Agency
224 W. Winton Avenue, Suite 110
Hayward, CA 94544

Monte Vista Memorial Gardens PLN2017-194 – Notice of Preparation (NOP)

Dear Albert Lopez:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the Monte Vista Memorial Gardens Project. We are committed to ensuring that impacts to the State's multimodal transportation system and to our natural environment are identified and mitigated to support a safe, sustainable, integrated and efficient transportation system. The following comments are based on our review of the July 2020 NOP.

Project Understanding

The proposed project would develop a cemetery and include a funeral home with crematorium, burial lots, an entry plaza, internal roadways, parking, landscaping, new wetlands, lakes, and other associated infrastructure and improvements. The Project would be developed at 3656 Las Colinas Road, Livermore, CA in unincorporated Alameda County. Development of the Project would occur on approximately 47 acres in the southern portion of the ±104-acre parcel (Assessor's Parcel Number 099-0015-016-03) just north of the City of Livermore between the Interstate (I)-580 North Livermore Avenue and North First Street exits.

Hydraulics

Please clearly describe the impact of the proposed development drainage system to the existing facility to determine whether there are impacts to the existing Caltrans storm drain facility. Please provide a Hydrology study that includes a drainage plan. This study should include existing and proposed drainage patterns and any impacts on the existing drainage draining to State's drainage system. Provide calculation for post-construction 25-year peak flows do not exceed the 25-year pre-construction flows.

Transportation Impact Fees
Please identify project-generated travel demand and estimate the costs of transit and active transportation improvements potentially necessitated by the proposed project; viable funding sources such as development and/or transportation impact fees should also be identified. We encourage a sufficient allocation of fair share contributions toward multi-modal and regional transit improvements to fully mitigate cumulative impacts to regional transportation. We also strongly support measures to increase sustainable mode shares, thereby reducing VMT.

Lead Agency
As the Lead Agency, Alameda County is responsible for all project mitigation, including any needed improvements to the State Transportation Network (STN). The project’s fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures.

Encroachment Permit
Please be advised that any permanent work or temporary traffic control that encroaches onto the ROW requires a Caltrans-issued encroachment permit. If any Caltrans facilities are impacted by the project, those facilities must meet American Disabilities Act (ADA) Standards after project completion. As part of the encroachment permit submittal process, you may be asked by the Office of Encroachment Permits to submit a completed encroachment permit application, six (6) sets of plans clearly delineating the State ROW, six (6) copies of signed, dated and stamped (include stamp expiration date) traffic control plans, this comment letter, your response to the comment letter, and where applicable, the following items: new or amended Maintenance Agreement (MA), approved Design Standard Decision Document (DSDD), approved encroachment exception request, and/or airspace lease agreement.

To download the permit application and to obtain more information on all required documentation, visit https://dot.ca.gov/programs/traffic-operations/ep/applications.

Thank you again for including Caltrans in the environmental review process. Should you have any questions regarding this letter, please contact Laurel Sears at laurel.sears@dot.ca.gov. Additionally, for future notifications and requests for review of new projects, please contact LDIGR-D4@dot.ca.gov.

Sincerely,

Mark Leong

Mark Leong
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Bay Delta Region
2825 Cordelia Road, Suite 100
Fairfield, CA 94534
(707) 428-2002
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

Governor's Office of Planning & Research

Jul 21 2020

STATE CLEARINGHOUSE

July 21, 2020

Mr. Albert Lopez, Planning Director
ATTN: Monte Vista Memorial Gardens Project EIR
Alameda County Community Development Agency
224 W. Winton Avenue, Suite 110
Hayward, CA 94544
Albert.lopez@acgov.org

Subject: Monte Vista Memorial Gardens PLN2017-194, Notice of Preparation of an Environmental Impact Report, SCH No. 2020069045, Alameda County

Dear Mr. Lopez:

The California Department of Fish and Wildlife (CDFW) has reviewed Alameda County's (County) Notice of Preparation (NOP) for an Environmental Impact Report (EIR) for Monte Vista Memorial Gardens Project Conditional Use Permit (PLN 2017-00194) (Project). The Project is an application for a Conditional Use Permit (CUP) to allow construction of a funeral home with crematorium, burial lots, an entry plaza, internal roadways, parking, landscaping, new wetlands, lakes, and other associated infrastructure and improvements. The purpose of the EIR will be to evaluate the specific environmental effects of the Project as proposed by Monte Vista Memorial Investment Group, LLC (MVMIG).

CDFW is therefore submitting comments on the NOP to inform the County, as the Lead Agency, of our concerns regarding potentially significant impacts to sensitive resources associated with the proposed Project. CDFW is providing these comments and recommendations regarding those activities involved in the Project that are within CDFW's area of expertise and relevant to its statutory responsibilities (Fish and Game Code, § 1802), and/or which are required to be approved by CDFW (California Environmental Quality Act (CEQA) Guidelines, §§ 15086, 15096 and 15204).

CDFW ROLE

CDFW is a Trustee Agency with responsibility under CEQA (Pub. Resources Code, § 21000 et seq.) pursuant to CEQA Guidelines section 15386 for commenting on projects that could impact fish, plant, and wildlife resources. CDFW is also considered a Responsible Agency if a project would require discretionary approval, such as permits issued under the California Endangered Species Act (CESA), the Lake and Streambed Alteration (LSA) Program, or other provisions of the Fish and Game Code that afford protection to the state's fish and wildlife trust resources.

REGULATORY REQUIREMENTS

California Endangered Species Act

Please be advised that a CESA Permit must be obtained if the Project has the potential to result in "take" of plants or animals listed under CESA, either during construction or over the life of the Project. Issuance of a CESA Permit is subject to CEQA documentation; the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit.

CEQA requires a Mandatory Finding of Significance if a project is likely to substantially restrict the range or reduce the population of a threatened or endangered species. (Pub. Resources Code, §§ 21001, subd. (c), 21083; CEQA Guidelines, §§ 15380, 15064, and 15065). Impacts must be avoided or mitigated to less-than-significant levels unless the CEQA Lead Agency makes and supports Findings of Overriding Consideration (FOC). The CEQA Lead Agency's FOC does not eliminate the Project proponent's obligation to comply with Fish and Game Code section 2080.

Lake and Streambed Alteration

CDFW requires an LSA Notification, pursuant to Fish and Game Code section 1600 et. seq., for Project activities affecting lakes or streams and associated riparian habitat. Notification is required for any activity that may substantially divert or obstruct the natural flow; change or use material from the bed, channel, or bank including associated riparian or wetland resources; or deposit or dispose of material where it may pass into a river, lake or stream. Work within ephemeral streams, washes, watercourses with a subsurface flow, and floodplains are subject to notification requirements. CDFW will consider the CEQA document for the Project and may issue an LSA Agreement. CDFW may not execute the final LSA Agreement (or Incidental Take Permit) until it has complied with CEQA as a Responsible Agency.

PROJECT DESCRIPTION SUMMARY

Proponent: Monte Vista Memorial Investment Group, LLC.

Description and Location: The Project is located at 3656 Las Colinas Road, Livermore, CA in unincorporated Alameda County. Development of the Project would occur on approximately 47 acres in the southern portion of the ±104-acre parcel (Assessor's Parcel Number 099-0015-016-03) just north of the City of Livermore between the North Livermore Avenue and North First Street exits. The Project site topography consists of a relatively flat lowland valley area to the southeast and gently sloping hills and valleys to the north and west. The valleys in the western portion of the Project site drain toward Arroyo Las Positas, which flows in a southwesterly direction.

The property bordering the Project site to the east of Arroyo Las Positas supports an existing residence and several roadways, while the area west of Arroyo Las Positas is undeveloped and is currently used for grazing and farming. The Project site is accessed on the southeastern corner of the property from Las Colinas Road that connects with Las Positas Road [south of Interstate 580 (I-580)]. North of I-580, legally recorded easements provide access to the Project site via County roads.

The proposed Project includes a funeral home with crematorium, 24 acres of burial lots, an entry plaza, 6.8 acres of internal roadways and parking, 9 acres of landscaping, 2.9 acres of new wetlands, 2.5 acres of lakes, two bridges, and other associated infrastructure and improvements.

The NOP describes access to the Project is hampered by the lack of direct access to the site from an improved County or City right-of-way. An easement over County property (currently configured as an unnamed road) connecting the Project site to Las Colinas Road will serve as the only access to the site. This County-owned property lies between two private properties in County jurisdiction which are subject to an active Clean-Up and Abatement Order No. R2-2017-1021 issued by the San Francisco Bay Regional Water Quality Control Board (Water Board). A representative of the Proponent has been named in said Order as a “discharger” due to unauthorized fill placed into jurisdictional waters on these sites (wetlands). Due to adjacencies of the privately owned properties and access to the site over County-owned property, resolution of the Order will be analyzed as one of the EIR alternatives, and resolution of the Order will be required prior to Project approval and issuance of any grading, building, or other construction-related permits. Discussions with the Water Board in late April 2020 indicate there is an on-going state of violation. The MVMIG has acknowledged that their representative was a discharger and had done so to facilitate access to the site.

The Property and the adjacent private has had several violations caused by the MVMIG’s representative over the past eight years including a Notice of Violation (NOV) regarding the unlawful fill of wetlands and habitat for special-status species, issued by CDFW, dated September 29, 2015. CDFW recommends all violations be resolved and cleared prior to Project approval.

COMMENTS AND RECOMMENDATIONS

CDFW offers the below comments and recommendations to assist the County in adequately identifying and/or mitigating the Project’s significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources.

General Avian and Bat Impacts

The EIR should evaluate the cumulative effects of loss of habitat as an indirect cause of avian mortality for grassland birds. Breeding Bird Surveys (BBS) conducted by the U.S. Geological Survey Biological Resources Division and volunteers throughout the country show that grassland birds, as a group, have declined more than other groups, such as forest and wetland birds (Brennan and Kuvlesky 2005; NRCS 1999). The BBS shows that in California, grassland birds such as western meadowlark (*Sturnella neglecta*), State Species of Special Concern northern harrier (*Circus cyaneus*), horned lark (*Eremophila alpestris praticola*) , and State Species of Special Concern western burrowing owl (*Athene cunicularia*), have shown population declines since 1966 (Sauer et al. 2017). CDFW recommends at a minimum an equal amount of land with primary purpose of habitat conservation should be enhanced and conserved elsewhere to offset the loss of habitat for grassland birds.

East Alameda County Conservation Strategy

The Project site is located within the Conservation Zone 4 of the Eastern Alameda County Conservation Strategy (EACCS). The EACCS provides a baseline inventory of biological resources and conservation priorities to be utilized by local agencies and resource agencies during project-level planning and environmental permitting. It was designed to convey project-level permitting and environmental compliance of the federal and state endangered species acts, CEQA, the National Environmental Policy Act, and other applicable laws for all projects within the study area with impacts on biological resources. The EACCS was a joint effort including, but not limited to, the cities of Pleasanton, Dublin, and Livermore; Zone 7, Alameda County, East Bay Regional Park District, U.S. Fish and Wildlife Service (USFWS) and CDFW. The EACCS is intended support and streamline the permitting process. EACCS does not create new regulations or change the process by which a project applicant obtains permits for authorization to impact biological resources, but it has, in fact, been accepted as a guidance document by several agencies including USFWS and CDFW.

Several of the species potentially impacted by this Project are included as focal species in the EACCS, such as the federally threatened and State Species of Special Concern California red-legged frog (*Rana draytonii*), the federally and State threatened California tiger salamander (*Ambystoma californiense*), State Species of Special Concern western pond turtle (*emys mamorata*), the federally endangered and State threatened San Joaquin kit fox (*Vulpes macrotis mutica*), western burrowing owl, and the State Species of Special concern American badger (*Taxidea taxus*). The EACCS mitigation guidance sections (Chapter 3), for grassland, California tiger salamander, western burrowing owl, California red-legged frog, San Joaquin kit fox, and American badger all include mitigation in the form of habitat conservation for the loss of species habitat when it cannot be avoided. To be consistent with the EACCS and to offset permanent habitat loss or conversion, the EIR should include permanent habitat conservation as an enforceable mitigation measure.

California Red-legged Frog

Based on our records, California red-legged frogs have been documented on the adjacent property to the west, less than 300 feet from the Project site and have been present on adjacent properties. The USFWS Recovery Plan for California Red-Legged Frog (USFWS 2002) beginning on p. 12 describes a variety of habitats used by the California red-legged frog such as upland areas used as important dispersal, estivation and summer habitat for this species. During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats. They have been observed to make long-distance movements (up to 1.7 miles) that are straight-line, point to point migrations rather than using corridors for moving in between habitats. California red-legged frog are also known to use small mammal burrows and moist leaf litter as refuge (USFWS 2002). Because the actual movement patterns of California red-legged frog are generally not known and there are known occurrences of California red-legged frog on adjacent lands, the entire Project site should be considered suitable habitat for the species. Given their wide variety of habitat usage during different times of the year, it is highly unlikely all California red-legged frogs would be located during pre-constructions surveys. The EIR should therefore assume presence and, in addition to including avoidance and minimization measures, should include compensatory mitigation for loss of suitable California red-legged frog habitat in accordance with the EACCS for California Red-legged frog section 3.5.3.5.

California Tiger Salamander

The Project site is located within dispersal distance of known and/or potential California tiger salamander breeding ponds. Based on our records, California tiger salamanders have been found on the adjacent properties to the west and north. California tiger salamander are known to be able to travel 1.3 miles from upland habitat to breeding ponds. Given the historical and extant California tiger salamander detections within 1.3 miles of the Project site, and without evidence such as protocol-level presence/negative finding surveys, the EIR should assume presence.

California tiger salamanders spend much of their lives in underground retreats, often in burrowing mammal (ground squirrel, pocket gopher, and other burrowing mammal) burrows (USFWS 2004). Therefore, widespread burrowing mammal control as may be required in grassy areas such as golf courses, cemeteries, and parks may pose threats to the salamander.

Due to the potential presence of this listed species and the potential for Project-related take, including but not limited to, installation of exclusion fencing, grading, trenching, use of water trucks, and proposed construction of the lakes and wetlands, CDFW advises that the Project proponent obtain a CESA Permit (pursuant to Fish and Game Code Section 2080 et seq.) in advance of Project implementation. Issuance of a CESA Permit is subject to CEQA documentation; therefore, the CEQA document should specify impacts, mitigation measures, and fully describe a mitigation, monitoring and reporting program. If the proposed Project will impact any CESA-listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit. More information on the CESA permitting process can be found on the CDFW website at https://www.wildlife.ca.gov/Conservation/CESA.

Western Burrowing Owl

The EIR should evaluate the potential for burrowing owls to be present within and adjacent to the Project area by documenting the extent of fossorial mammals that may provide burrows used by owls during the nesting and/or wintering seasons. Based on our records, burrowing owls have been documented on adjacent properties. Burrowing owls may also use unnatural features such as debris piles, culverts and pipes for nesting, roosting or cover. If suitable burrowing owl habitat is present, CDFW recommends that surveys be conducted following the methodology described in Appendix D: Breeding and Non-breeding Season Surveys of the CDFW Staff Report on Burrowing Owl Mitigation (Staff Report), which is available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843.

Burrowing owl surveys should be conducted by a qualified CDFW-approved biologist. In accordance with the Staff Report, a minimum of four survey visits should be conducted within 500 feet of the Project area during the owl breeding season which is typically between February 1 and August 31. A minimum of three survey visits, at least three weeks apart, should be conducted during the peak nesting period, which is between April 15 and July 15, with at least one visit after June 15. Pre-construction surveys should be conducted no-less-than 14 days prior to the start of construction activities with a final survey conducted within 24 hours prior to ground disturbance.

Please be advised that CDFW does not consider exclusion of burrowing owls or “passive relocation” as a “take” avoidance, minimization or mitigation method, and considers exclusion as a significant impact. The long-term demographic consequences of exclusion techniques have not been thoroughly evaluated, and the survival rate of evicted or excluded owls is unknown. All possible avoidance and minimization measures should be considered before temporary or permanent exclusion and closure of burrows is implemented in order to avoid “take”.

The EIR should also include measures to avoid or minimize loss of burrowing owl foraging habitat, and mitigation for loss of breeding and foraging habitat that cannot be fully avoided. As described above, widespread burrowing mammal control as may be required in grassy areas such as cemeteries, may also pose threats to the burrowing owl. The ESCCS Mitigation Guidance (p.3-66) for burrowing owl recommends mitigating the loss of habitat by protecting habitat in accordance with the mitigation guidelines outlined in Table 3-10 (BUOW-3) through acquiring parcels, through fee title purchase or conservation easement, where known nesting sites occur or where nesting sites have occurred in the previous three nesting seasons (BUOW-1 and BUOW-2).

Pollinators

Urbanization continues to alter the landscape and changing habitats provide challenges for pollinators. It is more difficult for them to thrive in areas where fewer nest sites and host plants are available. Man-made structures and traffic make foraging riskier and more difficult. The CEQA document should include measures to increase use by pollinators such as preserving riparian areas, protecting native plant remnants and the planting of native species essential to the survival of bees and decrease use of herbicides and pesticides. The Project should be designed to optimize a balance between urban ornamental landscaping, drought resistant plants, and native plants. Bioswales can be planted with deep-rooted native flowers and grasses that capture and filter storm water, build topsoil, and provide abundant and healthy food for bees and other insects that provide critical services to our food and agricultural systems.

On June 12, 2019, CDFW the California Fish and Game Commission accepted a petition to list the western bumble bee (*Bombus occidentalis occidentalis*) as endangered under CESA, determining the listing “may be warranted” and advancing the species to the candidacy stage of the CESA listing process. The Project's potential to substantially reduce and adversely modify habitat for the western bumble bee, reduce and potentially seriously impair the viability of populations of the western bumble bee, and reduce the number and range of the species while taking into account the likelihood that special-status species on adjacent and nearby natural lands rely upon the habitat that occurs on the proposed Project site.

Due to suitable habitat within the Project site, within one year prior to vegetation removal and/or grading, a qualified entomologist familiar with the species behavior and life history should conduct surveys to determine the presence/absence of the western bumble bee. Surveys should be conducted during flying season when the species is most likely to be detected above ground, between February 1 to November 30 (Thorp et al. 1983). Survey results including negative findings should be submitted to CDFW prior to initiation of Project activities. If “take” or adverse impacts to western bumble bee cannot be avoided either during Project activities or over the life of the Project, MVMIG must consult CDFW to determine if a CESA Incidental Take Permit is required (pursuant to Fish and Game Code, § 2080 et seq.).

Stream Impacts

Riparian and stream areas provide habitat for a wide variety of wildlife species and should be protected. Trees and shrubs provide nesting and roosting sites for birds in addition to foraging areas for species of mammals, reptiles, birds, and amphibians. CDFW recommends a minimum 100-foot buffer, measured outward from the top of each streambank or from the outer edge of riparian habitat if it extends beyond the streambank, be established to protect streams and riparian vegetation, and to provide a travel corridor for wildlife. No roads, buildings, yards, turf, or paved paths should be permitted within the buffer, except the bridge crossing which are subject to Fish and Game Code section 1600, as described above. Pedestrian trails should be located along the outside edge of the riparian vegetation. Vegetation planting and landscaping should be native plants appropriate for the area. Common causes of bank failure include over-watering lawns, removal of vegetation, and on-site or upstream alteration of the creek channel so CDFW recommends no permanent irrigating of landscape be permitted in the riparian area and on the banks.

Construction of Lakes and Wetlands

The Project proposes to install artificial lakes and new wetlands. Artificial water bodies such as lakes, reservoirs, ornamental ponds, and bioretention basins can create an attractive nuisance for both California tiger salamanders and California red-legged frogs. California tiger salamanders and California red-legged frogs have been documented to breed or, attempt to breed, in these aquatic features. This can result in amphibians becoming trapped or cause desiccation of eggs, larvae or adults. Conversely, the aquatic features could become suitable breeding habitat in an environment where the upland area no longer supports enough suitable habitat to maintain a viable population. Since California tiger salamanders rely on burrows constructed by fossorial mammals, as described above, the Project site will no longer provide suitable habitat. In addition, ornamental ponds, reservoirs and other perennial aquatic habitat can attract invasive non-native species such as American bullfrogs (*Lithobates catesbeianus*) and human introduced species such as red-eared sliders (*Trachemys scripta elegans*), goldfish (Carassius auratus) and pond koi.

The Project proposes to create new wetlands, as mitigation for the wetlands that were previously filled and were the subject of the Notices of Violation. CDFW does not recommend creating mitigation wetlands adjacent to upland areas that no longer support suitable habitat for the amphibians and reptiles that it is intended to benefit. CDFW recommends the lakes and wetlands be removed from the proposed Project.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs., tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

CDFW appreciates the opportunity to comment on the NOP to assist the County in identifying and mitigating Project impacts on biological resources.

Questions regarding this letter or further coordination should be directed to Ms. Marcia Grefsrud, Environmental Scientist, at (707) 644-2812 or Marcia.Grefsrud@wildlife.ca.gov; or Ms. Brenda Blinn, Senior Environmental Scientist (Supervisory), at (707) 944-5541 or Brenda.Blinn@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Gregg Erickson
BE74D4C93C604EA...

Gregg Erickson
Regional Manager
Bay Delta Region

cc: State Clearinghouse, SCH No. 2018092012

Ryan Olah, Ryan_Olah@fws.gov
U.S. Fish and Wildlife Service

Brian Wines, Brian.Wines@waterboards.ca.gov
San Francisco Bay Regional Water Quality Control Board

Frances Malamud-Roam, frances.p.malamud-roam@usace.army.mil
San Francisco District, U.S. Army Corps of Engineers

REFERENCES

Brennan, Leonard A. and Kuvlesky, William P. Jr. 2005. North American Grassland Birds: An Unfolding Conservation Crisis? The Journal of Wildlife Management, Vol. 69, No. 1, pp. 1-13

NRCS. U.S. Department of Agriculture. Natural Resources Conservation Service. October 1999. Grassland Birds. Fish and Wildlife Habitat Management Leaflet Number 8.

Sauer, J. R., D. K. Niven, J. E. Hines, D. J. Ziolkowski, Jr, K. L. Pardieck, J. E. Fallon, and W. A. Link. 2017. The North American Breeding Bird Survey, Results and Analysis 1966 - 2015. Version 2.07.2017 USGS Patuxent Wildlife Research Center, Laurel, MD

U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

U. S. Fish and Wildlife Service. 2004. Determination of threatened status for the California tiger salamander; and special rule exemption for existing routine ranching activities; Final Rule. Federal Register, Vol. 69:47212-47248.

STATE OF CALIFORNIA Gavin Newsom, *Governor*

NATIVE AMERICAN HERITAGE COMMISSION

7/29/2020

Governor's Office of Planning & Research

Jul 03 2020

STATE CLEARINGHOUSE

June 30, 2020

Albert Lopez
Alameda County Community Development Agency
224 W. Winton Avenue, Suite 110
Hayward, CA 94544

Re: 2020069045, Monte Vista Memorial Gardens PLN2017-194 Project, Alameda County

Dear Mr. Lopez:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states 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. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015. If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). Both SB 18 and AB 52 have tribal consultation requirements. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of <u>portions</u> of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

- **a.** The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
- **b.** A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

- **a.** Avoidance and preservation of the resources in place, including, but not limited to:
  - **i.** Planning and construction to avoid the resources and protect the cultural and natural context.
  - **ii.** Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
- **b.** Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
  - **i.** Protecting the cultural character and integrity of the resource.
  - **ii.** Protecting the traditional use of the resource.
  - **iii.** Protecting the confidentiality of the resource.
- **c.** Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
- **d.** Protecting the resource. (Pub. Resource Code §21084.3 (b)).
- **e.** Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
- **f.** Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

- **a.** The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
- **b.** The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
- **c.** The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe. (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    - **a.** The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    - **b.** Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    - **a.** If part or all of the APE has been previously surveyed for cultural resources.
    - **b.** If any known cultural resources have already been recorded on or adjacent to the APE.
    - **c.** If the probability is low, moderate, or high that cultural resources are located in the APE.
    - **d.** If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    - **a.** The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    - **b.** The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

  a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

  b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

  a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.

  b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.

  c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,

Nancy Gonzalez

Nancy Gonzalez-Lopez
Cultural Resources Analyst

cc: State Clearinghouse

CALIFORNIA
Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

7/29/2020

July 27, 2020

Governor's Office of Planning & Research

Jul 27 2020

STATE CLEARINGHOUSE

Sent via electronic mail: No hardcopy to follow

Alameda County Community Development Agency
ATTN: Albert Lopez, Planning Director (albert.lopez@acgov.org)
224 West Winton Avenue, Suite 110
Hayward, CA 94544

Subject: San Francisco Bay Regional Water Quality Control Board Comments on the Notice of Preparation for an Environmental Impact Report for the Monte Vista Memorial Gardens in Alameda County, California (PLN 2017-00194)
SCH No. 2020069045

Dear Mr. Lopez:

San Francisco Bay Regional Water Quality Control Board (Water Board) staff appreciates the opportunity to review the *Notice of Preparation for an Environmental Impact Report for the Monte Vista Memorial Gardens* (NOP). The NOP describes the proposed Monte Vista Memorial Gardens Project (Project) and the potential environmental impacts associated with implementing the Project that are to be assessed in the Environmental Impact Report (EIR) for the Project.

Project Summary. The proposed Project is located at 3656 Las Colinas Road, Livermore, CA in unincorporated Alameda County. Development of the Project would occur on 47 acres in the southern portion of Assessor's Parcel Number 099-0015-016-03, just north of the City of Livermore, between the North Livermore Avenue and North First Street exits from I-580. The property bordering the Project site to the east of Arroyo Las Positas supports an existing residence and several roadways, while the area west of Arroyo Las Positas is undeveloped and is currently used for grazing and farming. The Project site is accessed on the southeastern corner of the property from Las Colinas Road.

The Project includes a funeral home with crematorium, burial lots, an entry plaza, internal roadways, parking, landscaping, new wetlands, lakes, and other associated infrastructure and improvements.

Access to the project is hampered by the lack of direct access to the site from an improved County or City right-of-way. An easement over County property (currently configured as an unnamed road) connecting the Project site to Las Colinas road will serve as the only access to the site. This County owned property lies between two private properties in County jurisdiction which are subject to an active Cleanup and Abatement Order No. R2-2017-1021 issued by the San Francisco Bay Regional Water Quality Control Board. A representative of the applicant has been named in said Order as a “Discharger” due to unauthorized fill placed into jurisdictional waters on these sites. Due to adjacencies of the privately owned properties and access to the site over County owned property, resolution of the Order will be analyzed as one of the EIR alternatives, and resolution of the Order will be required prior to project approval and issuance of any grading, building, or other construction-related permits. The applicant has acknowledged that their representative was a Discharger and had done so to facilitate access to the site.

Access to the site is adjacent to, and may utilize a portion of, identified wetlands in order to accommodate a new roadway serving the site. Mitigation of such an impact has been proposed and should be further evaluated as part of the EIR. In particular, approximately six acres of manmade wetlands are being proposed by the Project to serve this purpose, as well as to provide additional habitat for sensitive species.

Comment 1. Cleanup and Abatement Order No. R2-2017-1021 remains unresolved three years after being issued.
Cleanup and Abatement Order No. R2-2017-1021 (CAO) was issued in 2017. The CAO required removal of unpermitted fill, restoration of waters of the State that were filled without permits, and the creation of compensatory mitigation for illegally filled wetlands. In the three years since issuance of the CAO, the violations have not been resolved. The Water Board is preparing a Notice of Violation (NOV) for failure to respond to the CAO in a timely manner. To account for the temporal loss of wetlands associated with the three-year delay in restoring wetlands and providing mitigation wetlands, the NOV will increase the required amount of mitigation wetlands to be created at the Project site from 0.75 acres to 1.35 acres. If the Dischargers continue to defer compliance with the CAO, the required amount of mitigation may increase further.

Comment 2. The EIR should assess the feasibility of creating self-sustaining mitigation wetlands at the Project site.
Figure 2 in the NOP indicates that mitigation wetlands are proposed to be created in an area of the Project site west of Arroyo Las Positas and immediately north of I-580. The EIR should assess the feasibility of creating self-sustaining wetlands in this area of the Project site. Mitigation wetlands must have a sufficiently large watershed to support the required acreage of mitigation wetlands, without anthropogenic management to provide the hydrology necessary to sustain the wetlands.

The EIR should also discuss the establishment of buffers around the mitigation wetlands to minimize impacts to the wetlands associated with the operation of the cemetery (e.g., pesticide or herbicide drift from managed areas of the cemetery, seed spread from landscaping at the cemetery, leach fields for septic systems). Figure 2 indicates that a walkway may transit the area with the mitigation wetlands. The walkway should be designed to avoid the mitigation wetlands.

A restrictive covenant (e.g., conservation easement or deed restriction) must be placed over the mitigation wetlands in perpetuity. The EIR should describe the restrictive covenant to be used at the Project site and the third party that will be responsible for holding the covenant.

The Project summary provided with the NOP states that the created wetlands would provide habitat for special status species. Special status species that may currently use the Project site include the California red-legged frog (CRLF) and the California tiger salamander (CTS). The Project proposes to create two artificial lakes and a water channel between the lakes as part of the Project's landscaping. Permanent water bodies provide habitat for bullfrogs and crayfish; these species prey on CRLF and CTS. The EIR should assess the compatibility of the proposed landscaping for the Project with the ability to sustain special status species in the created wetlands.

Comment 3. The EIR should include a wetland delineation for the entire Project site, including portions of Arroyo Las Positas that will be impacted by the new access bridges and any new stormwater outfalls to Arroyo Las Positas.
Based on the NOP, there does not appear to be a wetland delineation available for the Project site. To support the discussion of impacts to biological resources, a wetland delineation should be prepared for the entire project site, including any areas of Arroyo Las Positas that may be impacted by the new access bridges or new stormwater outfalls. Once the delineation is completed, the EIR should include an evaluation of alternatives that would avoid impacts to waters of the State and provide mitigation for all unavoidable impacts to waters of the State. The NOP proposes two new bridges over Arroyo Las Positas to provide access to the cemetery. Bridges impact waters of the State via fill associated with abutments and piers, including any rock riprap armoring to protect abutments and piers from scour, and by shading waters of the State. The EIR should evaluate design options that use a single bridge over Arroyo Las Positas. To minimize impacts to waters of the State, bridges should be clear span structures with abutments set back from the top of bank.

The required amount of mitigation for any unavoidable impacts to waters of the State will depend on the similarity of the impacted waters to the waters in the mitigation proposal, the uncertainty associated with successful implementation of the mitigation project, and the distance between the site of the impact and the site of the mitigation water. In-kind mitigation for the fill of waters consists of the creation of new waters. If the mitigation consists of restoration or enhancement of waters, the amount of mitigation will be greater than if the mitigation consists of creation.

In a CEQA document, a project's potential impacts and proposed mitigation measures should be presented in sufficient detail for readers of the CEQA document to evaluate the likelihood that the proposed remedy will actually reduce impacts to a less than significant level. CEQA requires that mitigation measures for each significant environmental effect be adequate, timely, and resolved by the lead agency. In an adequate CEQA document, mitigation measures must be feasible and fully enforceable through permit conditions, agreements, or other legally binding instruments (CEQA

Guidelines Section 15126.4). Mitigation measures to be identified at some future time are not acceptable. It has been determined by court ruling that such mitigation measures would be improperly exempted from the process of public and governmental scrutiny which is required under the California Environmental Quality Act.

Comment 4. The EIR should describe how the Project will comply with the stormwater management requirements of the Municipal Regional Permit (MRP) for the management of stormwater runoff.
Projects requiring permits from the Water Board are required to provide documentation that they will provide stormwater runoff treatment and hydromodification mitigation that is consistent with the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Regional Permit (MRP) for the management of stormwater runoff (Order R2-2015-0049; NPDES Permit No. CAS612008). The EIR should describe how the Project will provide the required water quality treatment and the required mitigation for hydromodification impacts associated with the Project's new and recreated impervious surfaces.

The EIR should identify the locations of stormwater management features and demonstrate that sufficient surface area has been set aside for the construction of the required stormwater treatment and hydromodification mitigation infrastructure. Figure 2 in the NOP identifies an area west of Arroyo Las Positas and north of I-580 as "seasonal wetlands/water quality treatment". Water quality treatment areas must be maintained separately from mitigation wetlands. To facilitate their maintenance, stormwater treatment features installed for conformance with the MRP are not regulated as waters of the State. Since they are not waters of the State, they cannot provide mitigation for impacts to waters of the State. The EIR should indicate the locations on the Project site of the proposed water quality treatment measures and the locations on the Project site at which mitigation wetlands will be established.

If you have any questions, please contact me at (510) 622-5680, or via e-mail at brian.wines@waterboards.ca.gov.

Sincerely,

Brian Wines

Brian Wines
Water Resources Control Engineer
South and East Bay Watershed Section

cc: State Clearinghouse (state.clearinghouse@opr.ca.gov)
CDFW, Marcia Grefsrud (marcia.grefsrud@wildlife.ca.gov)
USACE, Katerina Galacatos (Katerina.galacatos@usace.army.mil)
USACE, Frances Malamud-Roam (Frances.P.Malamud-Roam@usace.army.mil)
Joan Boblitt (joanboblitt@yahoo.com)

July 4, 2020

Albert Lopez, Planning Director
ATTN: Monte Vista Memorial Gardens Project EIR
Alameda County Community Development Agency
224 W. Winton Avenue, Suite 110
Hayward, California 94544

RE: Response to Notice of Monte Vista Memorial Gardens EIR Report
for Conditional Use Permit (PUN 2017-00194)

Dear Mr. Lopez:

We own two small parcels of land in Livermore, 902-8-5-9 and 902-8-5-5, the latter of which abuts the Monte Vista Memorial Gardens parcel 099-0015-016-3. From the beginning, Dr. Starkweather, Chairman of the Board of MVMG/MVMIG (MonteVista Memorial Investment Group) hoped to gain ownership of our two parcels so that the approach (our land) to the cemetery he was planning would be in keeping with the theme and appearance of his project. When we did not accept his offer, he had his attorneys draw up a 297-year lease, which, if signed, we would have lost our land through Adverse Possession. Naturally, our attorneys advised against signing the lease. However, the MVMG/MVMIG board was so convinced by Dr. Starkweather that our land was theirs to do with as they pleased, that work took place on our land often <u>without our permission,</u> always <u>without permits,</u> and in most cases <u>without our knowledge.</u> What follows are some highlights of what has transpired between MVMG/MVMIG and the owners of the above-mentioned parcels.

At first, there was a neighborly relationship with Dr. Starkweather and MVMG/MVMIG who worked diligently on an aggressive clean-up effort for our mutual benefit. Two of the owners went on a walking tour to see what Dr. Starkweather had envisioned. He spoke of cleaning up junk which had been dumped along the roadside. He talked about removing the sagging outbuildings and deteriorating old fences as well as clearing out weeds. When asked why he was willing to work so hard to clean up our property, Dr. Starkweather replied to the two of us, "I want to use your land as collateral to get a bank loan for the cemetery project." Yes, we heard the word "collateral," but since we had no intention of selling our parcels or signing a lease, we were not worried. At first.

After the initial clean-up, which involved weeding and light disking, along with removing dead trees and debris from a couple of old outbuildings which had slowly collapsed over the years, and the removal of old barbed-wire fences, the appearance of our property was nothing short of amazing. Dr. Starkweather carefully and respectfully bundled old wood from demolished buildings he said he would use to repair the barn. He spoke about plans for restoring the barn and putting a new roof on the 100-year-old home. One of the owners worked side by side with Dr. Starkweather. There appeared to be a true friendship and mutual trust developing.

Dr. Starkweather even spoke of starting a 501c3, a nonprofit, with the establishment of a museum in the barn he was planning to restore honoring the Robert Livermore family and history. Our family has many photos, books, artifacts, etc., highlighting the rich history of our great great great grandfather, Robert Livermore, on whose land these parcels exist of the original Rancho Las Positas. Two of the owners spent hours researching, gathering materials, planning, and writing the application for a 501c3 only to learn at a subsequent meeting that Dr. Starkweather had already submitted the application for a 501c3. It did not reflect the appropriate name we agreed upon and it did not reflect the agreed-upon goals and intention of the nonprofit. In fact, the whole point of the nonprofit dramatically changed so that it would become a showcase for Mrs. Starkweather's artwork, and it would become an upscale destination for future donors to the cemetery project who would be able to sip wine and eat finger sandwiches while listening to presentations for donations. The museum was never spoken of again and the owners had no interest in donating our barn for the cemetery business.

Dr. Starkweather then spoke of getting free soil from a nearby orchard to bring to the property so the lower spots could be filled in. One of the owners asked, "Won't you need a permit for that?" His reply was, "No. The dirt's clean. It's been certified. I have friends from the County who know me and will work with me. Don't worry. I know what I'm doing. I've been doing this for 30 years." Over and over, Dr. Starkweather assured us that he wouldn't do anything that we, the family, didn't want him to do. We would have a say in everything. Considering what had happened to the nonprofit plans, we questioned the bringing in of dirt. We were assured that the dirt was from an orchard in Fremont and that it had been certified twice as clean. We were led to believe the amount of dirt was small.

During the delivery of the dirt, there was apparently an anonymous tip called into the County that the dirt was not from a Fremont orchard but from a mechanic's yard. Agencies visited our property and noticed several violations: disking had taken place too close to the wetlands, an "illegal dwelling" (camper) had been moved so that it was visible to passersby, truckloads of uncertified dirt had been dumped and graded to level out the property, a horse shed was erected to provide shelter for two horses belonging to a board member's wife who paid no horse rental fees to the owners and was making plans for an elaborate horse stable and horse therapy school the owners knew nothing about, and a triple-wide trailer was placed inches from the MVMG/MVMIG property line to be used as an office building for MVMG/MVMIG business. Since no permits had been obtained, violations were issued, but not in Dr. Starkweather's/MVMG/MVMIG's name. At that point, our property had several violations against it. Our family had NEVER had one violation or issue with the City, County, State, or Federal Government. We had always followed the rules. When a garage was added to the home property, all necessary permits and inspections were obtained.

Two of the four owners lived in another city and one of the owners lived in another state at the time. When two of us visited our property to look at new fencing, we were shocked to see how much dirt had been brought in, what it covered, and the grading that had taken place. In fact, we arrived while dumping and grading was taking place and took photos. It was no longer the same place that our grandfather farmed. All the once-fertile land was covered with new soil. That new soil had been graded so that all the land was now level. No more ancient little creek full of cattails. No more "vegetable patch." No more character. The writer of this letter wept. Memories and "sacred" places on the properties were wiped away with someone else's dirt and huge graders. No permission had been given for any of this. No certification of the soil or permits were obtained. Dr. Starkweather had gone too far. All the assurances he gave us about not doing anything the family didn't want him to do were for naught. He even had his crew dump truckloads of dirt on an adjacent parcel owned by the Calvin Andersen family. Dr. Starkweather had also hoped to own this land. It just so happened that Calvin's son, Eric, drove by on I-580 and saw what was taking place. He called his real estate agent who came to the property and ordered the dumping of dirt halted. Even though the property was/is up for sale, the Andersen family will not sell to Dr. Starkweather due to unethical practices.

At first, Dr. Starkweather and MVMG/MVMIG took no responsibility for these violations issued against us. Agencies stated no further work was allowed on our property, but work by them continued. We had to call and email many times for work to stop. Agencies ordered the camper, horse shed, horses, and triple-wide off the properties and gave firm time limits for each violation to be cleared. These orders and timelines were ignored by Dr. Starkweather, Mike Kliment, and MVMG/MVMIG despite our insistence to comply with the orders.

Dr. Starkweather, possessing a degree in Urban Planning, knew what was allowed and what was not allowed. He knew when permits were needed and which permits were required. Yet, he failed to obtain the appropriate permits, and he failed to obtain permission from all four owners, and he failed to comply with agency orders and timelines. Since he expressed ownership interest in our property, Dr. Starkweather and members of his board have viewed our property as their property. They looked into 19 various County permits concerning our property without our knowledge. A few of these are as follows: Boarding Stables/Riding Academy, Boarding Stables Manure Management Plan, Certified Massage Practitioners, Rezoning, Boundary Line Adjustment or Lot Merger, Subdivision, etc. None of the 19 permit inquiries was ever fully completed and paid for. We owners knew nothing about their interest in any of the above as they failed to include us in any of their true planning. Interestingly, it appears that County Portal records showing these 19 permit inquiries have been "wiped" clean. It does show, however, that Robert and William Vidalin, two of the owners, took out a permit for a triple-wide office building to be placed temporarily on our parcel abuting MVMG/MVMIG property. Neither of them took out such a permit!!!!!

When we owners explained to the owner of the two horses that the horses needed to be removed and the reason, the response was, "T.W. said I could have my horses here, that I could do anything I wanted." It was at this point that Dr. (T.W.) Starkweather turned us over to Mike Kliment. From that point on he was to work with us to clear up the violations against our property. It took weeks for this writer to respectfully "evict" the board member's wife's horses. Mike Kliment was no help in the removal of the horses. Then there was the removal of the camper (illegal dwelling), the home of an elderly gentleman. He had been feeding and watering the horses and called his spot on the property "home." The County said the camper could stay but a pad had to be placed and improvements made for it to be legal. Upgrades would cost us $140,000! We had no resources to finance the necessary upgrades. Mike Kliment brokered the solution. He said T.W. had set aside a beautiful shady spot on his ranch in San Ramon next to a little stream. It would be ideal for Preston and his horse to live out their years. In fact, a pad was already being poured for Preston's camper. Of course, T.W. knew nothing of these plans for Preston to live on his ranch. This would not be the last of Mike Kliment's deceptions. Weeks passed before a place was readied for Preston and his horse and the move could take place. With two violations cleared, next was the triple-wide trailer.

We did receive an email from the County Fraud Department inviting us to contact them. To date we have not responded to that invitation.

All of this information is to provide some history of what has led us to this point and to help establish a pattern of behavior illustrating Dr. Starkweather's, Mike Kliment's, and MVMG/MVMIG's disdain for agencies' rules and procedures along with their contempt toward us, their neighbors. I can provide further information, evidence, documentation, as well as business plans written by two of the owners with the encouragement of Dr. Starkweather who tried to make us believe we could work together to realize our dreams of honoring our ancestry with the establishment of a Robert Livermore Museum and Historic Rancho along with an education center.

We four owners go on record that we are not opposed to MVMG/MVMIG's plans for a cemetery. However, we are absolutely and vigorously opposed to their proceeding with their plans unless and until they address and fulfill their promises to the agencies and to us to remediate the wetlands and mitigate 0.6 acres, thereby cleaning up the long-standing abatement order on our land, parcels 902-8-5-9 and 902-8-5-5.

We have the following comments, questions, and concerns:

1. The agencies found Dr. Starkweather/MVMG/MVMIG in the wrong and found them responsible for damage to the wetlands on our two parcels. Remediation and mitigation have yet to take place. They are now allowed to proceed with an EIR for their project toward obtaining a CUP. Yet, we are not allowed to do anything with our land until the abatement order is cleared. We cannot sell, get a loan, make some necessary improvements, get a permit, earn an income, or even to successfully grow vegetables for home use in once highly

fertile soil. When will the agencies require Dr. StarkweatherMVMG/MVMIG to fulfill their obligations?

2. If Dr. Starkweather, Mike Kliment, and the board of MVMG/MVMIG decide to walk away from their cemetery project or, God forbid, go bankrupt, what then happens? Will they still be held accountable to remediate the wetlands on our property and to mitigate the 0.6 acres? We have been asking this from the beginning and thus far have received no response from any agency.

3. When will we, the owners, begin to hear from the agencies with regard to our unanswered questions and repeated requests for information and involvement?

4. Do we have to file a formal complaint that we have been forgotten, ignored, not informed, not included, and not protected. We have been kept in the dark.

5. Why have Dr. Starkweather, Mike Kliment, MVMG/MVMIG been allowed all this time to evade their responsibility and legal obligation to clear up the abatement order?

6. Mr. Lopez, in your letter of June 29, 2020, Page 2, last paragraph, you state, "North of I-580, legally recorded easements provide access to the Project site via County roads." We are unaware of any "legally recorded easements." Can you provide documentation of these legally recorded easements?

7. Finally, regarding the road that was created by Dr. Starkweather, without a permit, which comes off the Las Colinas overpass onto the county road that serves our mutual properties: when it rains, water washes down this portion of roadway deviating the stream onto our property flooding the barn and land surrounding the barn. This needs to be addressed and remediated.

Until Dr. Starkweather involved himself by taking advantage of us and trying to take over our land, our family held the distinction of being in continuous business since 1834. Now, because of his refusal, and that of the board members of MVMG/MVMIG and Mike Kliment, to honor his/their legal obligation to clear the abatement order against our property and have it signed off, we can no longer have our property earn enough to pay for taxes and expenses. Until such time when the abatement order is lifted from our property, we strongly oppose any progress made by MVMG/MVMIG toward fulfilling their project requirements.

We thank you very much for allowing us to comment in this process.

Joan Boblitt
1616 Landes Court
Modesto, CA 95350
(209) 985-0701

Jean Porlier
1616 Landes Court
Modesto, CA 95350

Robert Vidalin
3680 Las Colinas Road
Livermore, CA 94551

William Vidalin
3680 Las Colinas Road
Livermore, CA 94551

Cc: rodrigo.orduna@acgov.
brian.wines@waterboards.ca.gov
bruce.wolfe@waterboards.gov
yan.nusinovich@waterboards.ca.gov
brian.thompson@waterboards.ca.gov
tasha.sturgis@waterboards.ca.gov
nicole.kozicki@waterboards.ca.gov
marcia.grefsrud@wildlife.ca.gov
ryan_olah@fws.gov
damien.curry@acgov.org
dilan.roe@acgov.org
monica.jackson@acgov.org
johnr@acpwa.org
mkaten@zone7water.com
stevestewart@ci.livermore.ca.us

APPENDIX C

AIR QUALITY SUPPORTING INFORMATION

Supporting Air Quality Assumptions and Calculations

Air Emission Calculation Methodology

Project construction and operation were analyzed. Construction emissions were estimated for off-road equipment, on-road trucks for material delivery and equipment hauling, and worker commute trips. Operational emissions were estimated for area sources, energy sources, stationary sources, onroad vehicles, offroad equipment, solid waste disposal, and water/wastewater conveyance.

Regulatory models used to estimate air quality impacts included:

> California Emissions Estimator Model[1] (CalEEMod) Version 2020.4.0 is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and greenhouse gas (GHG) emissions associated with both construction and operations from a variety of land use projects. The model quantifies direct emissions from construction and operation activities (including vehicle use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use.

The CalEEMod emissions inventory includes an estimation of criteria pollutant emissions such as carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC) as reactive organic gases (ROG), particulate matter less than 10 micrometers (coarse or PM10), and particulate matter less than 2.5 micrometers (fine or PM2.5), as well as GHG emissions.

Construction Emissions Assumptions

Phase I

Phase I development would occur over 6.8 acres of the Project site. Phase I would include construction of the funeral home and entry plaza, the single-story "Pavilion" building, the access road, the parking lot, and landscaping east of Arroyo Las Positas. Phase I grading of the Project site would be balanced and would not require soil import or export. Construction would require approximately 30 working days of site preparation, 90 working days of grading, 30 working days of utilities/trenching, 270 working days of building construction, 30 working days of paving, and 30 working days of architectural coating). While Phase I construction is expected to occur over five years, this air quality analysis assumes construction would commence in

---

[1] California Air Pollution Control Officers Association (CAPCOA). 2021. *California Emissions Estimator Model User's Guide Version 2020.4.0*. May 2021. http://www.caleemod.com/

January 2023 and be complete by September 2024 (approximately 21 months). **Table 1** provides the estimated construction schedule for Phase I:

TABLE 1 -- ESTIMATED PHASE I CONSTRUCTION SCHEDULE

Phase	Description	Start	End	Working Days
1	Site Preparation	01/02/2023	02/10/2023	30
2	Grading	02/11/2023	06/16/2023	90
3	Trenching/Utilities	05/07/2023	06/16/2023	30
4	Building Construction	06/17/2023	06/28/2024	270
5	Paving	06/29/2024	08/09/2024	30
6	Architectural Coating	08/10/2024	09/20/2024	30

SOURCE: CalEEMod Version 2020.4.0

Phase II

Phase II development would occur over 40.3 acres of the Project site. Phase II construction would include construction of the burial lots, new wetland features, lakes and landscaping west of Arroyo Las Positas. Phase II grading of the Project site would be balanced and would not require soil import or export. Construction would require approximately 60 working days of site preparation, 180 working days of grading, 60 working days of utilities/trenching, 270 working days of building construction, 60 working days of paving, and 60 working days of architectural coating). While Phase II construction is expected to occur over approximately 100 years, this air quality analysis assumes construction would commence in January 2027 and be complete by June 2029 (approximately 29 months). **Table 2** provides the estimated construction schedule for Phase II:

TABLE 2 -- ESTIMATED PHASE II CONSTRUCTION SCHEDULE

Phase	Description	Start	End	Working Days
1	Site Preparation	01/04/2027	03/26/2027	60
2	Grading	03/27/2027	12/03/2027	180
3	Trenching/Utilities	09/11/2027	12/03/2027	60
4	Building Construction	12/04/2027	12/15/2028	270
5	Paving	12/16/2027	03/09/2029	60
6	Architectural Coating	03/10/2029	06/01/2029	60

SOURCE: CalEEMod Version 2020.4.0

Project construction would not require on-road haul trucks for soil import/export since the Project site would be balanced. Phase I construction was estimated to consume a total of approximately 43,000 gallons of diesel fuel and 9,400 gallons of gasoline. Phase II construction was estimated to consume a total of approximately 151,000 gallons of diesel and approximately 50,000 gallons of gasoline. Construction equipment assumed by phase is provided in **Table 3** for Phase I construction and in **Table 4** for Phase II construction.

TABLE 3 -- ESTIMATED PHASE I CONSTRUCTION EQUIPMENT USAGE

Phase	Equipment	Amount	Daily Hours	HP	Load Factor
Site Preparation	Graders	1	8	187	0.41
Site Preparation	Scrapers	1	8	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7	97	0.37
Grading	Graders	1	8	187	0.41
Grading	Rubber Tired Dozers	1	8	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7	97	0.37
Utilities	Trenchers	1	8	78	0.50
Utilities	Tractors/Loaders/Backhoes	1	7	97	0.37
Utilities	Excavators	1	8	158	0.38
Building Construction	Cranes	1	8	231	0.29
Building Construction	Forklifts	2	7	89	0.20
Building Construction	Generator Sets	1	8	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6	97	0.37
Building Construction	Welders	3	8	46	0.45
Paving	Cement and Mortar Mixers	1	8	9	0.56
Paving	Pavers	1	8	130	0.42
Paving	Paving Equipment	1	8	132	0.36
Paving	Rollers	2	8	80	0.38
Paving	Tractors/Loaders/Backhoes	1	6	97	0.37
Architectural Coating	Air Compressors	1	6	78	0.48

SOURCE: CalEEMod Version 2020.4.0

TABLE 4 -- ESTIMATED PHASE II CONSTRUCTION EQUIPMENT USAGE

Phase	Equipment	Amount	Daily Hours	HP	Load Factor
Site Preparation	Rubber Tired Dozers	3	8	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37
Grading	Excavators	2	8	158	0.38
Grading	Graders	1	8	187	0.41
Grading	Rubber Tired Dozers	1	8	247	0.40
Grading	Scrapers	2	8	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8	97	0.37
Utilities	Trenchers	1	8	78	0.50
Utilities	Tractors/Loaders/Backhoes	1	7	97	0.37
Utilities	Excavators	1	8	158	0.38
Building Construction	Cranes	1	7	231	0.29
Building Construction	Forklifts	3	8	89	0.20
Building Construction	Generator Sets	1	8	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7	97	0.37
Building Construction	Welders	1	8	46	0.45
Paving	Pavers	2	8	130	0.42

Paving	Paving Equipment	2	8	132	0.36
Paving	Rollers	2	8	80	0.38
Architectural Coating	Air Compressors	1	6	78	0.48

SOURCE: CalEEMod Version 2020.4.0

Operational Emissions Assumptions

Project operational emissions were conservatively analyzed for full buildout of the Project for operational year 2025. Project operations would generate emissions of criteria pollutants and/or GHG emissions from motor vehicles, onsite equipment (biodiesel fueled tractors), landscaping equipment, area sources (e.g., solvents and cleaners), energy use, solid waste disposal, and water/wastewater conveyance. Operational emissions would also be generated through use of the natural gas fired incinerator for the crematorium and the natural gas fired emergency generator (201 horsepower). It was assumed that 1,000 bodies per year would be incinerated through the crematorium operations and that the emergency generator would be limited to 50 hours per year for testing per BAAQMD Rules and Regulations. PM2.5 emissions from the crematorium were estimated using San Diego Air Pollution Control District emission factors for cremation.[2] The Project would generate approximately 100 one-way daily trips.[3]

The Project would require two biodiesel tractors for burials, which were estimated to be used approximately two hours on a given day. Landscaping equipment for the Project would be all electric. The Project would also include 30 electric vehicle (EV) charging stalls and a 3 megawatt (MW) photovoltaic (PV) solar system. Without accounting for electricity savings from solar, the Project is estimated to consume approximately 162,000 kWh of electricity and 523,600,000 British thermal unit (BTU) of natural gas per year. The Project is also estimated to consume approximately 6,300 gallons of gasoline per year from motor vehicles.

---

[2] Environmental Permitting Specialists. 2021. *Health Risk Assessment, Monte Vista Memorial Gardens, Livermore, CA.* July 29, 2021.

[3] PHA Transportation Consultants. 2021. *Focused Traffic Study*. May 20, 2021.

Attachments

CalEEMod Emissions Outputs

- Phase I Annual (36 pages)
- Phase I Summer Daily (29 pages)
- Phase I Winter Daily (29 pages)
- Phase II Annual (38 pages)
- Phase II Summer Daily (31 pages)
- Phase II Winter Daily (31 pages)

Health Risk Assessment (49 pages)

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

MVMG Phase 1

Alameda County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Place of Worship	19.62	1000sqft	0.36	19,623.00	0
Other Non-Asphalt Surfaces	0.90	Acre	0.90	39,204.00	0
Parking Lot	91.00	Space	1.70	36,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2025
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 16,181 SF funeral home, 3,442 SF pavillion, 91 space parking lot and 0.9 acre entry plaza

Construction Phase - Per Applicant's construction schedule

Off-road Equipment -

Off-road Equipment - Assumed additional equipment for utility trenching

Grading - Phase 1 6.8 acres

Vehicle Trips - PHA Transportation Consultants, 2021. 100 trips per day.

Construction Off-road Equipment Mitigation - BAAQMD standard dust measures

Area Mitigation -

Energy Mitigation - 3 MW system - based on 2,146 MWh per year per MW

Operational Off-Road Equipment - 2 bio-diesel tractors for burials

Stationary Sources - Emergency Generators and Fire Pumps - 150KW (201 HP) emergency generator (natural gas) - assumed one hour per day for testing/ limited to 50 hours per year per BAAQMD.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	220.00	270.00
tblConstructionPhase	NumDays	6.00	90.00
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	3.00	30.00
tblGrading	AcresOfGrading	90.00	6.80
tblGrading	AcresOfGrading	45.00	6.80
tblLandUse	LandUseSquareFeet	19,620.00	19,623.00
tblLandUse	LotAcreage	0.45	0.36
tblLandUse	LotAcreage	0.82	1.70
tblOperationalOffRoadEquipment	OperFuelType	Diesel	Bio-diesel
tblOperationalOffRoadEquipment	OperHorsePower	97.00	212.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.00
tblOperationalOffRoadEquipment	OperLoadFactor	0.37	0.43
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblStationaryGeneratorsPumpsUse	HorsePowerValue	0.00	201.00
tblStationaryGeneratorsPumpsUse	HoursPerDay	0.00	1.00
tblStationaryGeneratorsPumpsUse	HoursPerYear	0.00	50.00
tblStationaryGeneratorsPumpsUse	NumberOfEquipment	0.00	1.00
tblVehicleTrips	ST_TR	5.99	5.10
tblVehicleTrips	SU_TR	27.63	5.10
tblVehicleTrips	WD_TR	6.95	5.10

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					
2023	0.2198	1.9660	1.7431	3.6700e-003	0.3132	0.0842	0.3974	0.1592	0.0791	0.2383	0.0000	317.4450	317.4450	0.0700	3.8500e-003	320.3425
2024	0.2477	1.0237	1.1941	2.3400e-003	0.0301	0.0422	0.0723	8.1700e-003	0.0403	0.0484	0.0000	199.8288	199.8288	0.0335	3.4400e-003	201.6923
Maximum	**0.2477**	**1.9660**	**1.7431**	**3.6700e-003**	**0.3132**	**0.0842**	**0.3974**	**0.1592**	**0.0791**	**0.2383**	**0.0000**	**317.4450**	**317.4450**	**0.0700**	**3.8500e-003**	**320.3425**

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					
2023	0.2198	1.9660	1.7431	3.6700e-003	0.1601	0.0842	0.2444	0.0769	0.0791	0.1560	0.0000	317.4447	317.4447	0.0700	3.8500e-003	320.3422
2024	0.2477	1.0237	1.1941	2.3400e-003	0.0301	0.0422	0.0723	8.1700e-003	0.0403	0.0484	0.0000	199.8287	199.8287	0.0335	3.4400e-003	201.6921
Maximum	**0.2477**	**1.9660**	**1.7431**	**3.6700e-003**	**0.1601**	**0.0842**	**0.2444**	**0.0769**	**0.0791**	**0.1560**	**0.0000**	**317.4447**	**317.4447**	**0.0700**	**3.8500e-003**	**320.3422**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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**	**44.58**	**0.00**	**32.58**	**49.21**	**0.00**	**28.72**	**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	**1-2-2023**	**4-1-2023**	0.5062	0.5062
2	**4-2-2023**	**7-1-2023**	0.6168	0.6168
3	**7-2-2023**	**10-1-2023**	0.5324	0.5324
4	**10-2-2023**	**1-1-2024**	0.5339	0.5339
5	**1-2-2024**	**4-1-2024**	0.4982	0.4982
6	**4-2-2024**	**7-1-2024**	0.4899	0.4899
7	**7-2-2024**	**9-30-2024**	0.2671	0.2671
		Highest	0.6168	0.6168

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	0.0934	1.0000e-005	1.0200e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.9900e-003	1.9900e-003	1.0000e-005	0.0000	2.1200e-003
Energy	2.7700e-003	0.0252	0.0212	1.5000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	43.2997	43.2997	3.1000e-003	8.1000e-004	43.6197
Mobile	0.0357	0.0420	0.3126	6.4000e-004	0.0691	4.9000e-004	0.0696	0.0185	4.6000e-004	0.0189	0.0000	60.6799	60.6799	4.1000e-003	3.2600e-003	61.7549
Offroad	0.0127	0.1316	0.1066	5.1000e-004		4.4400e-003	4.4400e-003		4.0900e-003	4.0900e-003	8.9231	35.6925	44.6156	0.0144	0.0000	44.9764
Stationary	0.0442	4.2600e-003	0.1151	2.0000e-005		2.4000e-004	2.4000e-004		2.4000e-004	2.4000e-004	0.0000	2.5624	2.5624	5.3600e-003	0.0000	2.6964
Waste						0.0000	0.0000		0.0000	0.0000	22.7005	0.0000	22.7005	1.3416	0.0000	56.2395
Water						0.0000	0.0000		0.0000	0.0000	0.1948	0.6183	0.8130	0.0201	4.8000e-004	1.4600
Total	**0.1889**	**0.2030**	**0.5564**	**1.3200e-003**	**0.0691**	**7.0800e-003**	**0.0762**	**0.0185**	**6.7000e-003**	**0.0252**	**31.8184**	**142.8548**	**174.6731**	**1.3887**	**4.5500e-003**	**210.7489**

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	0.0934	1.0000e-005	5.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0700e-003	1.0700e-003	0.0000	0.0000	1.1300e-003
Energy	2.7700e-003	0.0252	0.0212	1.5000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	-552.3684	-552.3684	-0.0933	-0.0109	-557.9385
Mobile	0.0357	0.0420	0.3126	6.4000e-004	0.0691	4.9000e-004	0.0696	0.0185	4.6000e-004	0.0189	0.0000	60.6799	60.6799	4.1000e-003	3.2600e-003	61.7549
Offroad	0.0127	0.1316	0.1066	5.1000e-004		4.4400e-003	4.4400e-003		4.0900e-003	4.0900e-003	8.9231	35.6925	44.6156	0.0144	0.0000	44.9764
Stationary	0.0442	4.2600e-003	0.1151	2.0000e-005		2.4000e-004	2.4000e-004		2.4000e-004	2.4000e-004	0.0000	2.5624	2.5624	5.3600e-003	0.0000	2.6964
Waste						0.0000	0.0000		0.0000	0.0000	22.7005	0.0000	22.7005	1.3416	0.0000	56.2395
Water						0.0000	0.0000		0.0000	0.0000	0.1948	0.6183	0.8130	0.0201	4.8000e-004	1.4600
Total	**0.1888**	**0.2030**	**0.5560**	**1.3200e-003**	**0.0691**	**7.0800e-003**	**0.0762**	**0.0185**	**6.7000e-003**	**0.0252**	**31.8184**	**-452.8142**	**-420.9958**	**1.2923**	**-0.0071**	**-390.8102**

	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	**0.03**	**0.00**	**0.08**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**416.98**	**341.02**	**6.94**	**256.70**	**285.44**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/2/2023	2/10/2023	5	30	
2	Grading	Grading	2/11/2023	6/16/2023	5	90	
3	Utilities	Trenching	5/7/2023	6/16/2023	5	30	
4	Building Construction	Building Construction	6/17/2023	6/28/2024	5	270	
5	Paving	Paving	6/29/2024	8/9/2024	5	30	
6	Architectural Coating	Architectural Coating	8/10/2024	9/20/2024	5	30	

Acres of Grading (Site Preparation Phase): 6.8

Acres of Grading (Grading Phase): 6.8

Acres of Paving: 2.6

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 29,435; Non-Residential Outdoor: 9,812; Striped Parking Area: 4,536 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56

Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48
Utilities	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Utilities	Trenchers	1	8.00	78	0.50

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
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	40.00	16.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2023

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					3.6100e-003	0.0000	3.6100e-003	3.9000e-004	0.0000	3.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0195	0.2142	0.1467	3.7000e-004		8.1300e-003	8.1300e-003		7.4800e-003	7.4800e-003	0.0000	32.3166	32.3166	0.0105	0.0000	32.5779
Total	**0.0195**	**0.2142**	**0.1467**	**3.7000e-004**	**3.6100e-003**	**8.1300e-003**	**0.0117**	**3.9000e-004**	**7.4800e-003**	**7.8700e-003**	**0.0000**	**32.3166**	**32.3166**	**0.0105**	**0.0000**	**32.5779**

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	3.1000e-004	2.2000e-004	2.6800e-003	1.0000e-005	9.5000e-004	0.0000	9.5000e-004	2.5000e-004	0.0000	2.6000e-004	0.0000	0.7480	0.7480	2.0000e-005	2.0000e-005	0.7548
Total	**3.1000e-004**	**2.2000e-004**	**2.6800e-003**	**1.0000e-005**	**9.5000e-004**	**0.0000**	**9.5000e-004**	**2.5000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7480**	**0.7480**	**2.0000e-005**	**2.0000e-005**	**0.7548**

3.2 Site Preparation - 2023

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					1.6200e-003	0.0000	1.6200e-003	1.8000e-004	0.0000	1.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0195	0.2142	0.1467	3.7000e-004		8.1300e-003	8.1300e-003		7.4800e-003	7.4800e-003	0.0000	32.3166	32.3166	0.0105	0.0000	32.5779
Total	**0.0195**	**0.2142**	**0.1467**	**3.7000e-004**	**1.6200e-003**	**8.1300e-003**	**9.7500e-003**	**1.8000e-004**	**7.4800e-003**	**7.6600e-003**	**0.0000**	**32.3166**	**32.3166**	**0.0105**	**0.0000**	**32.5779**

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	3.1000e-004	2.2000e-004	2.6800e-003	1.0000e-005	9.5000e-004	0.0000	9.5000e-004	2.5000e-004	0.0000	2.6000e-004	0.0000	0.7480	0.7480	2.0000e-005	2.0000e-005	0.7548
Total	**3.1000e-004**	**2.2000e-004**	**2.6800e-003**	**1.0000e-005**	**9.5000e-004**	**0.0000**	**9.5000e-004**	**2.5000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7480**	**0.7480**	**2.0000e-005**	**2.0000e-005**	**0.7548**

3.3 Grading - 2023

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					0.2746	0.0000	0.2746	0.1494	0.0000	0.1494	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0600	0.6510	0.3917	9.3000e-004		0.0272	0.0272		0.0250	0.0250	0.0000	81.4676	81.4676	0.0264	0.0000	82.1263
Total	**0.0600**	**0.6510**	**0.3917**	**9.3000e-004**	**0.2746**	**0.0272**	**0.3018**	**0.1494**	**0.0250**	**0.1744**	**0.0000**	**81.4676**	**81.4676**	**0.0264**	**0.0000**	**82.1263**

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	1.1800e-003	8.1000e-004	0.0100	3.0000e-005	3.5600e-003	2.0000e-005	3.5800e-003	9.5000e-004	2.0000e-005	9.6000e-004	0.0000	2.8051	2.8051	8.0000e-005	8.0000e-005	2.8304
Total	**1.1800e-003**	**8.1000e-004**	**0.0100**	**3.0000e-005**	**3.5600e-003**	**2.0000e-005**	**3.5800e-003**	**9.5000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**2.8051**	**2.8051**	**8.0000e-005**	**8.0000e-005**	**2.8304**

3.3 Grading - 2023

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					0.1236	0.0000	0.1236	0.0672	0.0000	0.0672	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0600	0.6510	0.3917	9.3000e-004		0.0272	0.0272		0.0250	0.0250	0.0000	81.4675	81.4675	0.0264	0.0000	82.1262
Total	**0.0600**	**0.6510**	**0.3917**	**9.3000e-004**	**0.1236**	**0.0272**	**0.1508**	**0.0672**	**0.0250**	**0.0922**	**0.0000**	**81.4675**	**81.4675**	**0.0264**	**0.0000**	**82.1262**

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	1.1800e-003	8.1000e-004	0.0100	3.0000e-005	3.5600e-003	2.0000e-005	3.5800e-003	9.5000e-004	2.0000e-005	9.6000e-004	0.0000	2.8051	2.8051	8.0000e-005	8.0000e-005	2.8304
Total	**1.1800e-003**	**8.1000e-004**	**0.0100**	**3.0000e-005**	**3.5600e-003**	**2.0000e-005**	**3.5800e-003**	**9.5000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**2.8051**	**2.8051**	**8.0000e-005**	**8.0000e-005**	**2.8304**

3.4 Utilities - 2023

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	0.0100	0.0919	0.1170	1.7000e-004		5.5000e-003	5.5000e-003		5.0600e-003	5.0600e-003	0.0000	14.8486	14.8486	4.8000e-003	0.0000	14.9687
Total	**0.0100**	**0.0919**	**0.1170**	**1.7000e-004**		**5.5000e-003**	**5.5000e-003**		**5.0600e-003**	**5.0600e-003**	**0.0000**	**14.8486**	**14.8486**	**4.8000e-003**	**0.0000**	**14.9687**

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	3.1000e-004	2.2000e-004	2.6800e-003	1.0000e-005	9.5000e-004	0.0000	9.5000e-004	2.5000e-004	0.0000	2.6000e-004	0.0000	0.7480	0.7480	2.0000e-005	2.0000e-005	0.7548
Total	**3.1000e-004**	**2.2000e-004**	**2.6800e-003**	**1.0000e-005**	**9.5000e-004**	**0.0000**	**9.5000e-004**	**2.5000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7480**	**0.7480**	**2.0000e-005**	**2.0000e-005**	**0.7548**

3.4 Utilities - 2023

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	0.0100	0.0919	0.1170	1.7000e-004		5.5000e-003	5.5000e-003		5.0600e-003	5.0600e-003	0.0000	14.8486	14.8486	4.8000e-003	0.0000	14.9686
Total	**0.0100**	**0.0919**	**0.1170**	**1.7000e-004**		**5.5000e-003**	**5.5000e-003**		**5.0600e-003**	**5.0600e-003**	**0.0000**	**14.8486**	**14.8486**	**4.8000e-003**	**0.0000**	**14.9686**

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	3.1000e-004	2.2000e-004	2.6800e-003	1.0000e-005	9.5000e-004	0.0000	9.5000e-004	2.5000e-004	0.0000	2.6000e-004	0.0000	0.7480	0.7480	2.0000e-005	2.0000e-005	0.7548
Total	**3.1000e-004**	**2.2000e-004**	**2.6800e-003**	**1.0000e-005**	**9.5000e-004**	**0.0000**	**9.5000e-004**	**2.5000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7480**	**0.7480**	**2.0000e-005**	**2.0000e-005**	**0.7548**

3.5 Building Construction - 2023

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	0.1200	0.9537	0.9950	1.7500e-003		0.0430	0.0430		0.0412	0.0412	0.0000	145.3914	145.3914	0.0275	0.0000	146.0788
Total	**0.1200**	**0.9537**	**0.9950**	**1.7500e-003**		**0.0430**	**0.0430**		**0.0412**	**0.0412**	**0.0000**	**145.3914**	**145.3914**	**0.0275**	**0.0000**	**146.0788**

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	1.1300e-003	0.0490	0.0148	2.2000e-004	7.3600e-003	3.0000e-004	7.6500e-003	2.1300e-003	2.8000e-004	2.4100e-003	0.0000	21.6656	21.6656	3.0000e-004	3.2400e-003	22.6397
Worker	7.3300e-003	5.0200e-003	0.0624	1.9000e-004	0.0221	1.2000e-004	0.0223	5.8900e-003	1.1000e-004	6.0000e-003	0.0000	17.4540	17.4540	5.1000e-004	4.8000e-004	17.6112
Total	**8.4600e-003**	**0.0540**	**0.0772**	**4.1000e-004**	**0.0295**	**4.2000e-004**	**0.0299**	**8.0200e-003**	**3.9000e-004**	**8.4100e-003**	**0.0000**	**39.1196**	**39.1196**	**8.1000e-004**	**3.7200e-003**	**40.2509**

3.5 Building Construction - 2023

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	0.1200	0.9537	0.9950	1.7500e-003		0.0430	0.0430		0.0412	0.0412	0.0000	145.3913	145.3913	0.0275	0.0000	146.0787
Total	**0.1200**	**0.9537**	**0.9950**	**1.7500e-003**		**0.0430**	**0.0430**		**0.0412**	**0.0412**	**0.0000**	**145.3913**	**145.3913**	**0.0275**	**0.0000**	**146.0787**

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	1.1300e-003	0.0490	0.0148	2.2000e-004	7.3600e-003	3.0000e-004	7.6500e-003	2.1300e-003	2.8000e-004	2.4100e-003	0.0000	21.6656	21.6656	3.0000e-004	3.2400e-003	22.6397
Worker	7.3300e-003	5.0200e-003	0.0624	1.9000e-004	0.0221	1.2000e-004	0.0223	5.8900e-003	1.1000e-004	6.0000e-003	0.0000	17.4540	17.4540	5.1000e-004	4.8000e-004	17.6112
Total	**8.4600e-003**	**0.0540**	**0.0772**	**4.1000e-004**	**0.0295**	**4.2000e-004**	**0.0299**	**8.0200e-003**	**3.9000e-004**	**8.4100e-003**	**0.0000**	**39.1196**	**39.1196**	**8.1000e-004**	**3.7200e-003**	**40.2509**

3.5 Building Construction - 2024

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	0.1038	0.8335	0.9165	1.6300e-003		0.0350	0.0350		0.0335	0.0335	0.0000	135.0141	135.0141	0.0252	0.0000	135.6427
Total	**0.1038**	**0.8335**	**0.9165**	**1.6300e-003**		**0.0350**	**0.0350**		**0.0335**	**0.0335**	**0.0000**	**135.0141**	**135.0141**	**0.0252**	**0.0000**	**135.6427**

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	1.0300e-003	0.0457	0.0135	2.0000e-004	6.8300e-003	2.8000e-004	7.1100e-003	1.9800e-003	2.6000e-004	2.2400e-003	0.0000	19.8077	19.8077	2.7000e-004	2.9700e-003	20.6989
Worker	6.3600e-003	4.1700e-003	0.0542	1.7000e-004	0.0206	1.0000e-004	0.0207	5.4700e-003	9.0000e-005	5.5600e-003	0.0000	15.8077	15.8077	4.3000e-004	4.2000e-004	15.9434
Total	**7.3900e-003**	**0.0498**	**0.0676**	**3.7000e-004**	**0.0274**	**3.8000e-004**	**0.0278**	**7.4500e-003**	**3.5000e-004**	**7.8000e-003**	**0.0000**	**35.6153**	**35.6153**	**7.0000e-004**	**3.3900e-003**	**36.6423**

3.5 Building Construction - 2024

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	0.1038	0.8335	0.9165	1.6300e-003		0.0350	0.0350		0.0335	0.0335	0.0000	135.0139	135.0139	0.0252	0.0000	135.6426
Total	**0.1038**	**0.8335**	**0.9165**	**1.6300e-003**		**0.0350**	**0.0350**		**0.0335**	**0.0335**	**0.0000**	**135.0139**	**135.0139**	**0.0252**	**0.0000**	**135.6426**

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	1.0300e-003	0.0457	0.0135	2.0000e-004	6.8300e-003	2.8000e-004	7.1100e-003	1.9800e-003	2.6000e-004	2.2400e-003	0.0000	19.8077	19.8077	2.7000e-004	2.9700e-003	20.6989
Worker	6.3600e-003	4.1700e-003	0.0542	1.7000e-004	0.0206	1.0000e-004	0.0207	5.4700e-003	9.0000e-005	5.5600e-003	0.0000	15.8077	15.8077	4.3000e-004	4.2000e-004	15.9434
Total	**7.3900e-003**	**0.0498**	**0.0676**	**3.7000e-004**	**0.0274**	**3.8000e-004**	**0.0278**	**7.4500e-003**	**3.5000e-004**	**7.8000e-003**	**0.0000**	**35.6153**	**35.6153**	**7.0000e-004**	**3.3900e-003**	**36.6423**

3.6 Paving - 2024

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	0.0126	0.1216	0.1756	2.7000e-004		5.9400e-003	5.9400e-003		5.4800e-003	5.4800e-003	0.0000	23.2720	23.2720	7.3800e-003	0.0000	23.4564
Paving	2.2300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0149**	**0.1216**	**0.1756**	**2.7000e-004**		**5.9400e-003**	**5.9400e-003**		**5.4800e-003**	**5.4800e-003**	**0.0000**	**23.2720**	**23.2720**	**7.3800e-003**	**0.0000**	**23.4564**

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	5.5000e-004	3.6000e-004	4.6900e-003	1.0000e-005	1.7800e-003	1.0000e-005	1.7900e-003	4.7000e-004	1.0000e-005	4.8000e-004	0.0000	1.3680	1.3680	4.0000e-005	4.0000e-005	1.3797
Total	**5.5000e-004**	**3.6000e-004**	**4.6900e-003**	**1.0000e-005**	**1.7800e-003**	**1.0000e-005**	**1.7900e-003**	**4.7000e-004**	**1.0000e-005**	**4.8000e-004**	**0.0000**	**1.3680**	**1.3680**	**4.0000e-005**	**4.0000e-005**	**1.3797**

3.6 Paving - 2024

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	0.0126	0.1216	0.1756	2.7000e-004		5.9400e-003	5.9400e-003		5.4800e-003	5.4800e-003	0.0000	23.2720	23.2720	7.3800e-003	0.0000	23.4564
Paving	2.2300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0149**	**0.1216**	**0.1756**	**2.7000e-004**		**5.9400e-003**	**5.9400e-003**		**5.4800e-003**	**5.4800e-003**	**0.0000**	**23.2720**	**23.2720**	**7.3800e-003**	**0.0000**	**23.4564**

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	5.5000e-004	3.6000e-004	4.6900e-003	1.0000e-005	1.7800e-003	1.0000e-005	1.7900e-003	4.7000e-004	1.0000e-005	4.8000e-004	0.0000	1.3680	1.3680	4.0000e-005	4.0000e-005	1.3797
Total	**5.5000e-004**	**3.6000e-004**	**4.6900e-003**	**1.0000e-005**	**1.7800e-003**	**1.0000e-005**	**1.7900e-003**	**4.7000e-004**	**1.0000e-005**	**4.8000e-004**	**0.0000**	**1.3680**	**1.3680**	**4.0000e-005**	**4.0000e-005**	**1.3797**

3.7 Architectural Coating - 2024

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	0.1181					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.7100e-003	0.0183	0.0272	4.0000e-005		9.1000e-004	9.1000e-004		9.1000e-004	9.1000e-004	0.0000	3.8299	3.8299	2.2000e-004	0.0000	3.8353
Total	**0.1208**	**0.0183**	**0.0272**	**4.0000e-005**		**9.1000e-004**	**9.1000e-004**		**9.1000e-004**	**9.1000e-004**	**0.0000**	**3.8299**	**3.8299**	**2.2000e-004**	**0.0000**	**3.8353**

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	2.9000e-004	1.9000e-004	2.5000e-003	1.0000e-005	9.5000e-004	0.0000	9.5000e-004	2.5000e-004	0.0000	2.6000e-004	0.0000	0.7296	0.7296	2.0000e-005	2.0000e-005	0.7359
Total	**2.9000e-004**	**1.9000e-004**	**2.5000e-003**	**1.0000e-005**	**9.5000e-004**	**0.0000**	**9.5000e-004**	**2.5000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7296**	**0.7296**	**2.0000e-005**	**2.0000e-005**	**0.7359**

3.7 Architectural Coating - 2024

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	0.1181					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.7100e-003	0.0183	0.0272	4.0000e-005		9.1000e-004	9.1000e-004		9.1000e-004	9.1000e-004	0.0000	3.8299	3.8299	2.2000e-004	0.0000	3.8353
Total	**0.1208**	**0.0183**	**0.0272**	**4.0000e-005**		**9.1000e-004**	**9.1000e-004**		**9.1000e-004**	**9.1000e-004**	**0.0000**	**3.8299**	**3.8299**	**2.2000e-004**	**0.0000**	**3.8353**

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	2.9000e-004	1.9000e-004	2.5000e-003	1.0000e-005	9.5000e-004	0.0000	9.5000e-004	2.5000e-004	0.0000	2.6000e-004	0.0000	0.7296	0.7296	2.0000e-005	2.0000e-005	0.7359
Total	**2.9000e-004**	**1.9000e-004**	**2.5000e-003**	**1.0000e-005**	**9.5000e-004**	**0.0000**	**9.5000e-004**	**2.5000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**0.7296**	**0.7296**	**2.0000e-005**	**2.0000e-005**	**0.7359**

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	0.0357	0.0420	0.3126	6.4000e-004	0.0691	4.9000e-004	0.0696	0.0185	4.6000e-004	0.0189	0.0000	60.6799	60.6799	4.1000e-003	3.2600e-003	61.7549
Unmitigated	0.0357	0.0420	0.3126	6.4000e-004	0.0691	4.9000e-004	0.0696	0.0185	4.6000e-004	0.0189	0.0000	60.6799	60.6799	4.1000e-003	3.2600e-003	61.7549

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Place of Worship	100.06	100.06	100.06	187,185	187,185
Total	100.06	100.06	100.06	187,185	187,185

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Place of Worship	9.50	7.30	7.30	0.00	95.00	5.00	64	25	11

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423
Parking Lot	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423
Place of Worship	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	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	-579.7830	-579.7830	-0.0938	-0.0114	-585.5160
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	15.8851	15.8851	2.5700e-003	3.1000e-004	16.0421
NaturalGas Mitigated	2.7700e-003	0.0252	0.0212	1.5000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	27.4146	27.4146	5.3000e-004	5.0000e-004	27.5775
NaturalGas Unmitigated	2.7700e-003	0.0252	0.0212	1.5000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	27.4146	27.4146	5.3000e-004	5.0000e-004	27.5775

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					
Other Non-Asphalt Surfaces	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
Parking Lot	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
Place of Worship	513730	2.7700e-003	0.0252	0.0212	1.5000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	27.4146	27.4146	5.3000e-004	5.0000e-004	27.5775
Total		**2.7700e-003**	**0.0252**	**0.0212**	**1.5000e-004**		**1.9100e-003**	**1.9100e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**27.4146**	**27.4146**	**5.3000e-004**	**5.0000e-004**	**27.5775**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Parking Lot	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
Place of Worship	513730	2.7700e-003	0.0252	0.0212	1.5000e-004		1.9100e-003	1.9100e-003		1.9100e-003	1.9100e-003	0.0000	27.4146	27.4146	5.3000e-004	5.0000e-004	27.5775
Total		**2.7700e-003**	**0.0252**	**0.0212**	**1.5000e-004**		**1.9100e-003**	**1.9100e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**27.4146**	**27.4146**	**5.3000e-004**	**5.0000e-004**	**27.5775**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	12740	1.1788	1.9000e-004	2.0000e-005	1.1904
Place of Worship	158946	14.7063	2.3800e-003	2.9000e-004	14.8517
Total		**15.8851**	**2.5700e-003**	**3.1000e-004**	**16.0421**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	-2.146e +006	-198.5560	-0.0321	-0.0039	-200.5194
Parking Lot	-2.13326e +006	-197.3773	-0.0319	-0.0039	-199.3290
Place of Worship	-1.98705e +006	-183.8497	-0.0297	-0.0036	-185.6677
Total		**-579.7830**	**-0.0938**	**-0.0114**	**-585.5160**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use Electric Chainsaw

	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	0.0934	1.0000e-005	5.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0700e-003	1.0700e-003	0.0000	0.0000	1.1300e-003
Unmitigated	0.0934	1.0000e-005	1.0200e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.9900e-003	1.9900e-003	1.0000e-005	0.0000	2.1200e-003

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	0.0118					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0815					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	9.0000e-005	1.0000e-005	1.0200e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.9900e-003	1.9900e-003	1.0000e-005	0.0000	2.1200e-003
Total	**0.0934**	**1.0000e-005**	**1.0200e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.9900e-003**	**1.9900e-003**	**1.0000e-005**	**0.0000**	**2.1200e-003**

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	0.0118					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0815					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	4.0000e-005	1.0000e-005	5.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0700e-003	1.0700e-003	0.0000	0.0000	1.1300e-003
Total	**0.0934**	**1.0000e-005**	**5.9000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.0700e-003**	**1.0700e-003**	**0.0000**	**0.0000**	**1.1300e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.8130	0.0201	4.8000e-004	1.4600
Unmitigated	0.8130	0.0201	4.8000e-004	1.4600

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Place of Worship	0.613888 / 0.960184	0.8130	0.0201	4.8000e-004	1.4600
Total		**0.8130**	**0.0201**	**4.8000e-004**	**1.4600**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Place of Worship	).613888 / 0.960184	0.8130	0.0201	4.8000e-004	1.4600
Total		**0.8130**	**0.0201**	**4.8000e-004**	**1.4600**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	22.7005	1.3416	0.0000	56.2395
Unmitigated	22.7005	1.3416	0.0000	56.2395

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Place of Worship	111.83	22.7005	1.3416	0.0000	56.2395
Total		**22.7005**	**1.3416**	**0.0000**	**56.2395**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Place of Worship	111.83	22.7005	1.3416	0.0000	56.2395
Total		**22.7005**	**1.3416**	**0.0000**	**56.2395**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Tractors/Loaders/Backhoes	2	2.00	260	212	0.43	Bio-diesel

UnMitigated/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
Equipment Type	tons/yr										MT/yr					
Tractors/Loaders/ Backhoes	0.0127	0.1316	0.1066	5.1000e-004		4.4400e-003	4.4400e-003		4.0900e-003	4.0900e-003	8.9231	35.6925	44.6156	0.0144	0.0000	44.9764
Total	**0.0127**	**0.1316**	**0.1066**	**5.1000e-004**		**4.4400e-003**	**4.4400e-003**		**4.0900e-003**	**4.0900e-003**	**8.9231**	**35.6925**	**44.6156**	**0.0144**	**0.0000**	**44.9764**

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type
Emergency Generator	1	1	50	201	0.73	CNG

Boilers

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

User Defined Equipment

Equipment Type	Number

10.1 Stationary Sources

Unmitigated/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
Equipment Type	tons/yr										MT/yr					
Emergency Generator - CNG (0 - 500 HP)	0.0442	4.2600e-003	0.1151	2.0000e-005		2.4000e-004	2.4000e-004		2.4000e-004	2.4000e-004	0.0000	2.5624	2.5624	5.3600e-003	0.0000	2.6964
Total	**0.0442**	**4.2600e-003**	**0.1151**	**2.0000e-005**		**2.4000e-004**	**2.4000e-004**		**2.4000e-004**	**2.4000e-004**	**0.0000**	**2.5624**	**2.5624**	**5.3600e-003**	**0.0000**	**2.6964**

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

MVMG Phase 1

Alameda County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Place of Worship	19.62	1000sqft	0.36	19,623.00	0
Other Non-Asphalt Surfaces	0.90	Acre	0.90	39,204.00	0
Parking Lot	91.00	Space	1.70	36,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2025
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 16,181 SF funeral home, 3,442 SF pavillion, 91 space parking lot and 0.9 acre entry plaza

Construction Phase - Per Applicant's construction schedule

Off-road Equipment -

Off-road Equipment - Assumed additional equipment for utility trenching

Grading - Phase 1 6.8 acres

Vehicle Trips - PHA Transportation Consultants, 2021. 100 trips per day.

Construction Off-road Equipment Mitigation - BAAQMD standard dust measures

Area Mitigation -

Energy Mitigation - 3 MW system - based on 2,146 MWh per year per MW

Operational Off-Road Equipment - 2 bio-diesel tractors for burials

Stationary Sources - Emergency Generators and Fire Pumps - 150KW (201 HP) emergency generator (natural gas) - assumed one hour per day for testing/ limited to 50 hours per year per BAAQMD.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	220.00	270.00
tblConstructionPhase	NumDays	6.00	90.00
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	3.00	30.00
tblGrading	AcresOfGrading	90.00	6.80
tblGrading	AcresOfGrading	45.00	6.80
tblLandUse	LandUseSquareFeet	19,620.00	19,623.00
tblLandUse	LotAcreage	0.45	0.36
tblLandUse	LotAcreage	0.82	1.70
tblOperationalOffRoadEquipment	OperFuelType	Diesel	Bio-diesel
tblOperationalOffRoadEquipment	OperHorsePower	97.00	212.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.00
tblOperationalOffRoadEquipment	OperLoadFactor	0.37	0.43
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblStationaryGeneratorsPumpsUse	HorsePowerValue	0.00	201.00
tblStationaryGeneratorsPumpsUse	HoursPerDay	0.00	1.00
tblStationaryGeneratorsPumpsUse	HoursPerYear	0.00	50.00
tblStationaryGeneratorsPumpsUse	NumberOfEquipment	0.00	1.00
tblVehicleTrips	ST_TR	5.99	5.10
tblVehicleTrips	SU_TR	27.63	5.10
tblVehicleTrips	WD_TR	6.95	5.10

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					
2023	2.0509	20.6216	16.9384	0.0332	6.2501	0.9715	7.2216	3.3581	0.8938	4.2519	0.0000	3,219.1396	3,219.1396	1.0017	0.0580	3,245.1232
2024	8.0744	13.5573	15.1999	0.0310	0.4370	0.5439	0.9809	0.1184	0.5208	0.6392	0.0000	2,912.1181	2,912.1181	0.5446	0.0568	2,939.9957
Maximum	**8.0744**	**20.6216**	**16.9384**	**0.0332**	**6.2501**	**0.9715**	**7.2216**	**3.3581**	**0.8938**	**4.2519**	**0.0000**	**3,219.1396**	**3,219.1396**	**1.0017**	**0.0580**	**3,245.1232**

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					
2023	2.0509	20.6216	16.9384	0.0332	2.8939	0.9715	3.8654	1.5327	0.8938	2.4265	0.0000	3,219.1396	3,219.1396	1.0017	0.0580	3,245.1232
2024	8.0744	13.5573	15.1999	0.0310	0.4370	0.5439	0.9809	0.1184	0.5208	0.6392	0.0000	2,912.1181	2,912.1181	0.5446	0.0568	2,939.9957
Maximum	**8.0744**	**20.6216**	**16.9384**	**0.0332**	**2.8939**	**0.9715**	**3.8654**	**1.5327**	**0.8938**	**2.4265**	**0.0000**	**3,219.1396**	**3,219.1396**	**1.0017**	**0.0580**	**3,245.1232**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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**	**50.19**	**0.00**	**40.92**	**52.51**	**0.00**	**37.32**	**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	0.5125	1.0000e-004	0.0114	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0244	0.0244	6.0000e-005		0.0260
Energy	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Mobile	0.2227	0.2126	1.6808	3.7100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5200e-003	0.1075		387.3440	387.3440	0.0229	0.0188	393.5117
Offroad	0.0977	1.0123	0.8196	3.9100e-003		0.0342	0.0342		0.0315	0.0315	75.6621	302.6483	378.3104	0.1224		381.3693
Stationary	1.7684	0.1703	4.6058	6.2000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003		112.9840	112.9840	0.2362		118.8900
Total	**2.6165**	**1.5333**	**7.2335**	**9.0700e-003**	**0.3942**	**0.0572**	**0.4514**	**0.1050**	**0.0543**	**0.1592**	**75.6621**	**968.5866**	**1,044.2486**	**0.3847**	**0.0218**	**1,060.3668**

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	lb/day										lb/day					
Area	0.5119	6.0000e-005	6.5900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0132	0.0132	3.0000e-005		0.0138
Energy	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Mobile	0.2227	0.2126	1.6808	3.7100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5200e-003	0.1075		387.3440	387.3440	0.0229	0.0188	393.5117
Offroad	0.0977	1.0123	0.8196	3.9100e-003		0.0342	0.0342		0.0315	0.0315	75.6621	302.6483	378.3104	0.1224		381.3693
Stationary	1.7684	0.1703	4.6058	6.2000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003		112.9840	112.9840	0.2362		118.8900
Total	**2.6159**	**1.5333**	**7.2287**	**9.0700e-003**	**0.3942**	**0.0572**	**0.4513**	**0.1050**	**0.0542**	**0.1592**	**75.6621**	**968.5753**	**1,044.2374**	**0.3847**	**0.0218**	**1,060.3547**

	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	**0.02**	**0.00**	**0.07**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.04**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**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	Site Preparation	Site Preparation	1/2/2023	2/10/2023	5	30	
2	Grading	Grading	2/11/2023	6/16/2023	5	90	
3	Utilities	Trenching	5/7/2023	6/16/2023	5	30	

4	Building Construction	Building Construction	6/17/2023	6/28/2024	5	270	
5	Paving	Paving	6/29/2024	8/9/2024	5	30	
6	Architectural Coating	Architectural Coating	8/10/2024	9/20/2024	5	30	

Acres of Grading (Site Preparation Phase): 6.8

Acres of Grading (Grading Phase): 6.8

Acres of Paving: 2.6

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 29,435; Non-Residential Outdoor: 9,812; Striped Parking Area: 4,536 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Utilities	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Utilities	Trenchers	1	8.00	78	0.50

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
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	40.00	16.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2023

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					0.2404	0.0000	0.2404	0.0260	0.0000	0.0260			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985		2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.2404**	**0.5419**	**0.7823**	**0.0260**	**0.4985**	**0.5245**		**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

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	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
Worker	0.0223	0.0127	0.1922	5.7000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		58.8177	58.8177	1.5100e-003	1.4000e-003	59.2734
Total	**0.0223**	**0.0127**	**0.1922**	**5.7000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**58.8177**	**58.8177**	**1.5100e-003**	**1.4000e-003**	**59.2734**

3.2 Site Preparation - 2023

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					0.1082	0.0000	0.1082	0.0117	0.0000	0.0117			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985	0.0000	2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.1082**	**0.5419**	**0.6501**	**0.0117**	**0.4985**	**0.5102**	**0.0000**	**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

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	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
Worker	0.0223	0.0127	0.1922	5.7000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		58.8177	58.8177	1.5100e-003	1.4000e-003	59.2734
Total	**0.0223**	**0.0127**	**0.1922**	**5.7000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**58.8177**	**58.8177**	**1.5100e-003**	**1.4000e-003**	**59.2734**

3.3 Grading - 2023

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					6.1022	0.0000	6.1022	3.3189	0.0000	3.3189			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560		1,995.6147	1,995.6147	0.6454		2,011.7503
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**6.1022**	**0.6044**	**6.7066**	**3.3189**	**0.5560**	**3.8749**		**1,995.6147**	**1,995.6147**	**0.6454**		**2,011.7503**

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	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
Worker	0.0278	0.0158	0.2402	7.2000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		73.5222	73.5222	1.8900e-003	1.7500e-003	74.0918
Total	**0.0278**	**0.0158**	**0.2402**	**7.2000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**73.5222**	**73.5222**	**1.8900e-003**	**1.7500e-003**	**74.0918**

3.3 Grading - 2023

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					2.7460	0.0000	2.7460	1.4935	0.0000	1.4935			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560	0.0000	1,995.6147	1,995.6147	0.6454		2,011.7503
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**2.7460**	**0.6044**	**3.3504**	**1.4935**	**0.5560**	**2.0495**	**0.0000**	**1,995.6147**	**1,995.6147**	**0.6454**		**2,011.7503**

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	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
Worker	0.0278	0.0158	0.2402	7.2000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		73.5222	73.5222	1.8900e-003	1.7500e-003	74.0918
Total	**0.0278**	**0.0158**	**0.2402**	**7.2000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**73.5222**	**73.5222**	**1.8900e-003**	**1.7500e-003**	**74.0918**

3.4 Utilities - 2023

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	0.6678	6.1255	7.8023	0.0113		0.3664	0.3664		0.3371	0.3371		1,091.1849	1,091.1849	0.3529		1,100.0077
Total	**0.6678**	**6.1255**	**7.8023**	**0.0113**		**0.3664**	**0.3664**		**0.3371**	**0.3371**		**1,091.1849**	**1,091.1849**	**0.3529**		**1,100.0077**

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	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
Worker	0.0223	0.0127	0.1922	5.7000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		58.8177	58.8177	1.5100e-003	1.4000e-003	59.2734
Total	**0.0223**	**0.0127**	**0.1922**	**5.7000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**58.8177**	**58.8177**	**1.5100e-003**	**1.4000e-003**	**59.2734**

3.4 Utilities - 2023

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	0.6678	6.1255	7.8023	0.0113		0.3664	0.3664		0.3371	0.3371	0.0000	1,091.1849	1,091.1849	0.3529		1,100.0077
Total	**0.6678**	**6.1255**	**7.8023**	**0.0113**		**0.3664**	**0.3664**		**0.3371**	**0.3371**	**0.0000**	**1,091.1849**	**1,091.1849**	**0.3529**		**1,100.0077**

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	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
Worker	0.0223	0.0127	0.1922	5.7000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		58.8177	58.8177	1.5100e-003	1.4000e-003	59.2734
Total	**0.0223**	**0.0127**	**0.1922**	**5.7000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**58.8177**	**58.8177**	**1.5100e-003**	**1.4000e-003**	**59.2734**

3.5 Building Construction - 2023

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	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880		2,289.5233	2,289.5233	0.4330		2,300.3479
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**		**2,289.5233**	**2,289.5233**	**0.4330**		**2,300.3479**

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	0.0000
Vendor	0.0166	0.6747	0.2084	3.2000e-003	0.1084	4.2100e-003	0.1127	0.0312	4.0300e-003	0.0353		340.9339	340.9339	4.6700e-003	0.0510	356.2554
Worker	0.1112	0.0633	0.9609	2.8700e-003	0.3286	1.6500e-003	0.3302	0.0872	1.5200e-003	0.0887		294.0887	294.0887	7.5400e-003	7.0100e-003	296.3671
Total	**0.1278**	**0.7380**	**1.1693**	**6.0700e-003**	**0.4370**	**5.8600e-003**	**0.4429**	**0.1184**	**5.5500e-003**	**0.1239**		**635.0226**	**635.0226**	**0.0122**	**0.0580**	**652.6225**

3.5 Building Construction - 2023

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	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880	0.0000	2,289.5233	2,289.5233	0.4330		2,300.3479
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**	**0.0000**	**2,289.5233**	**2,289.5233**	**0.4330**		**2,300.3479**

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	0.0000
Vendor	0.0166	0.6747	0.2084	3.2000e-003	0.1084	4.2100e-003	0.1127	0.0312	4.0300e-003	0.0353		340.9339	340.9339	4.6700e-003	0.0510	356.2554
Worker	0.1112	0.0633	0.9609	2.8700e-003	0.3286	1.6500e-003	0.3302	0.0872	1.5200e-003	0.0887		294.0887	294.0887	7.5400e-003	7.0100e-003	296.3671
Total	**0.1278**	**0.7380**	**1.1693**	**6.0700e-003**	**0.4370**	**5.8600e-003**	**0.4429**	**0.1184**	**5.5500e-003**	**0.1239**		**635.0226**	**635.0226**	**0.0122**	**0.0580**	**652.6225**

3.5 Building Construction - 2024

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	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153		2,289.6541	2,289.6541	0.4265		2,300.3154
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**		**2,289.6541**	**2,289.6541**	**0.4265**		**2,300.3154**

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	0.0000
Vendor	0.0162	0.6773	0.2044	3.1500e-003	0.1084	4.2600e-003	0.1127	0.0312	4.0700e-003	0.0353		335.6717	335.6717	4.6600e-003	0.0503	350.7682
Worker	0.1038	0.0565	0.8953	2.7800e-003	0.3286	1.5700e-003	0.3302	0.0872	1.4400e-003	0.0886		286.7924	286.7924	6.8300e-003	6.5400e-003	288.9121
Total	**0.1200**	**0.7339**	**1.0997**	**5.9300e-003**	**0.4370**	**5.8300e-003**	**0.4429**	**0.1184**	**5.5100e-003**	**0.1239**		**622.4640**	**622.4640**	**0.0115**	**0.0568**	**639.6803**

3.5 Building Construction - 2024

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	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153	0.0000	2,289.6541	2,289.6541	0.4265		2,300.3154
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**	**0.0000**	**2,289.6541**	**2,289.6541**	**0.4265**		**2,300.3154**

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	0.0000
Vendor	0.0162	0.6773	0.2044	3.1500e-003	0.1084	4.2600e-003	0.1127	0.0312	4.0700e-003	0.0353		335.6717	335.6717	4.6600e-003	0.0503	350.7682
Worker	0.1038	0.0565	0.8953	2.7800e-003	0.3286	1.5700e-003	0.3302	0.0872	1.4400e-003	0.0886		286.7924	286.7924	6.8300e-003	6.5400e-003	288.9121
Total	**0.1200**	**0.7339**	**1.0997**	**5.9300e-003**	**0.4370**	**5.8300e-003**	**0.4429**	**0.1184**	**5.5100e-003**	**0.1239**		**622.4640**	**622.4640**	**0.0115**	**0.0568**	**639.6803**

3.6 Paving - 2024

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	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652		1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9909**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**		**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

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	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
Worker	0.0389	0.0212	0.3357	1.0400e-003	0.1232	5.9000e-004	0.1238	0.0327	5.4000e-004	0.0332		107.5471	107.5471	2.5600e-003	2.4500e-003	108.3420
Total	**0.0389**	**0.0212**	**0.3357**	**1.0400e-003**	**0.1232**	**5.9000e-004**	**0.1238**	**0.0327**	**5.4000e-004**	**0.0332**		**107.5471**	**107.5471**	**2.5600e-003**	**2.4500e-003**	**108.3420**

3.6 Paving - 2024

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	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652	0.0000	1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9909**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**	**0.0000**	**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

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	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
Worker	0.0389	0.0212	0.3357	1.0400e-003	0.1232	5.9000e-004	0.1238	0.0327	5.4000e-004	0.0332		107.5471	107.5471	2.5600e-003	2.4500e-003	108.3420
Total	**0.0389**	**0.0212**	**0.3357**	**1.0400e-003**	**0.1232**	**5.9000e-004**	**0.1238**	**0.0327**	**5.4000e-004**	**0.0332**		**107.5471**	**107.5471**	**2.5600e-003**	**2.4500e-003**	**108.3420**

3.7 Architectural Coating - 2024

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	7.8729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**8.0536**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

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	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
Worker	0.0208	0.0113	0.1791	5.6000e-004	0.0657	3.1000e-004	0.0660	0.0174	2.9000e-004	0.0177		57.3585	57.3585	1.3700e-003	1.3100e-003	57.7824
Total	**0.0208**	**0.0113**	**0.1791**	**5.6000e-004**	**0.0657**	**3.1000e-004**	**0.0660**	**0.0174**	**2.9000e-004**	**0.0177**		**57.3585**	**57.3585**	**1.3700e-003**	**1.3100e-003**	**57.7824**

3.7 Architectural Coating - 2024

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	7.8729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**8.0536**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

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	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
Worker	0.0208	0.0113	0.1791	5.6000e-004	0.0657	3.1000e-004	0.0660	0.0174	2.9000e-004	0.0177		57.3585	57.3585	1.3700e-003	1.3100e-003	57.7824
Total	**0.0208**	**0.0113**	**0.1791**	**5.6000e-004**	**0.0657**	**3.1000e-004**	**0.0660**	**0.0174**	**2.9000e-004**	**0.0177**		**57.3585**	**57.3585**	**1.3700e-003**	**1.3100e-003**	**57.7824**

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	0.2227	0.2126	1.6808	3.7100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5200e-003	0.1075		387.3440	387.3440	0.0229	0.0188	393.5117
Unmitigated	0.2227	0.2126	1.6808	3.7100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5200e-003	0.1075		387.3440	387.3440	0.0229	0.0188	393.5117

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Place of Worship	100.06	100.06	100.06	187,185	187,185
Total	100.06	100.06	100.06	187,185	187,185

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Place of Worship	9.50	7.30	7.30	0.00	95.00	5.00	64	25	11

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423
Parking Lot	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423
Place of Worship	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	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	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
NaturalGas Unmitigated	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699

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					
Other Non-Asphalt Surfaces	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
Parking Lot	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
Place of Worship	1407.48	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Total		**0.0152**	**0.1380**	**0.1159**	**8.3000e-004**		**0.0105**	**0.0105**		**0.0105**	**0.0105**		**165.5859**	**165.5859**	**3.1700e-003**	**3.0400e-003**	**166.5699**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Parking Lot	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
Place of Worship	1.40748	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Total		**0.0152**	**0.1380**	**0.1159**	**8.3000e-004**		**0.0105**	**0.0105**		**0.0105**	**0.0105**		**165.5859**	**165.5859**	**3.1700e-003**	**3.0400e-003**	**166.5699**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use Electric Chainsaw

	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	0.5119	6.0000e-005	6.5900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0132	0.0132	3.0000e-005		0.0138
Unmitigated	0.5125	1.0000e-004	0.0114	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0244	0.0244	6.0000e-005		0.0260

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	0.0647					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4467					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0500e-003	1.0000e-004	0.0114	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0244	0.0244	6.0000e-005		0.0260
Total	**0.5125**	**1.0000e-004**	**0.0114**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**		**0.0244**	**0.0244**	**6.0000e-005**		**0.0260**

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	0.0647					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4467					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	4.4000e-004	6.0000e-005	6.5900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0132	0.0132	3.0000e-005		0.0138
Total	**0.5119**	**6.0000e-005**	**6.5900e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**0.0132**	**0.0132**	**3.0000e-005**		**0.0138**

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
Tractors/Loaders/Backhoes	2	2.00	260	212	0.43	Bio-diesel

UnMitigated/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
Equipment Type	lb/day										lb/day					
Tractors/Loaders/ Backhoes	0.0977	1.0123	0.8196	3.9100e-003		0.0342	0.0342		0.0315	0.0315	75.6621	302.6483	378.3104	0.1224		381.3693
Total	**0.0977**	**1.0123**	**0.8196**	**3.9100e-003**		**0.0342**	**0.0342**		**0.0315**	**0.0315**	**75.6621**	**302.6483**	**378.3104**	**0.1224**		**381.3693**

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type
Emergency Generator	1	1	50	201	0.73	CNG

Boilers

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

User Defined Equipment

Equipment Type	Number

10.1 Stationary Sources

Unmitigated/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
Equipment Type	lb/day										lb/day					
Emergency Generator - CNG (0 - 500 HP)	1.7684	0.1703	4.6058	6.2000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003		112.9840	112.9840	0.2362		118.8900
Total	**1.7684**	**0.1703**	**4.6058**	**6.2000e-004**		**9.7600e-003**	**9.7600e-003**		**9.7600e-003**	**9.7600e-003**		**112.9840**	**112.9840**	**0.2362**		**118.8900**

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

MVMG Phase 1

Alameda County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Place of Worship	19.62	1000sqft	0.36	19,623.00	0
Other Non-Asphalt Surfaces	0.90	Acre	0.90	39,204.00	0
Parking Lot	91.00	Space	1.70	36,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2025
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 16,181 SF funeral home, 3,442 SF pavillion, 91 space parking lot and 0.9 acre entry plaza

Construction Phase - Per Applicant's construction schedule

Off-road Equipment -

Off-road Equipment - Assumed additional equipment for utility trenching

Grading - Phase 1 6.8 acres

Vehicle Trips - PHA Transportation Consultants, 2021. 100 trips per day.

Construction Off-road Equipment Mitigation - BAAQMD standard dust measures

Area Mitigation -

Energy Mitigation - 3 MW system - based on 2,146 MWh per year per MW

Operational Off-Road Equipment - 2 bio-diesel tractors for burials

Stationary Sources - Emergency Generators and Fire Pumps - 150KW (201 HP) emergency generator (natural gas) - assumed one hour per day for testing/ limited to 50 hours per year per BAAQMD.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	220.00	270.00
tblConstructionPhase	NumDays	6.00	90.00
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	3.00	30.00
tblGrading	AcresOfGrading	90.00	6.80
tblGrading	AcresOfGrading	45.00	6.80
tblLandUse	LandUseSquareFeet	19,620.00	19,623.00
tblLandUse	LotAcreage	0.45	0.36
tblLandUse	LotAcreage	0.82	1.70
tblOperationalOffRoadEquipment	OperFuelType	Diesel	Bio-diesel
tblOperationalOffRoadEquipment	OperHorsePower	97.00	212.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.00
tblOperationalOffRoadEquipment	OperLoadFactor	0.37	0.43
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblStationaryGeneratorsPumpsUse	HorsePowerValue	0.00	201.00
tblStationaryGeneratorsPumpsUse	HoursPerDay	0.00	1.00
tblStationaryGeneratorsPumpsUse	HoursPerYear	0.00	50.00
tblStationaryGeneratorsPumpsUse	NumberOfEquipment	0.00	1.00
tblVehicleTrips	ST_TR	5.99	5.10
tblVehicleTrips	SU_TR	27.63	5.10
tblVehicleTrips	WD_TR	6.95	5.10

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					
2023	2.0517	20.6285	16.9215	0.0331	6.2501	0.9715	7.2216	3.3581	0.8938	4.2519	0.0000	3,209.6498	3,209.6498	1.0022	0.0593	3,235.7925
2024	8.0748	13.6113	15.1748	0.0308	0.4370	0.5439	0.9809	0.1184	0.5208	0.6392	0.0000	2,892.1678	2,892.1678	0.5450	0.0580	2,920.4108
Maximum	**8.0748**	**20.6285**	**16.9215**	**0.0331**	**6.2501**	**0.9715**	**7.2216**	**3.3581**	**0.8938**	**4.2519**	**0.0000**	**3,209.6498**	**3,209.6498**	**1.0022**	**0.0593**	**3,235.7925**

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					
2023	2.0517	20.6285	16.9215	0.0331	2.8939	0.9715	3.8654	1.5327	0.8938	2.4265	0.0000	3,209.6498	3,209.6498	1.0022	0.0593	3,235.7925
2024	8.0748	13.6113	15.1748	0.0308	0.4370	0.5439	0.9809	0.1184	0.5208	0.6392	0.0000	2,892.1678	2,892.1678	0.5450	0.0580	2,920.4108
Maximum	**8.0748**	**20.6285**	**16.9215**	**0.0331**	**2.8939**	**0.9715**	**3.8654**	**1.5327**	**0.8938**	**2.4265**	**0.0000**	**3,209.6498**	**3,209.6498**	**1.0022**	**0.0593**	**3,235.7925**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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**	**50.19**	**0.00**	**40.92**	**52.51**	**0.00**	**37.32**	**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	0.5125	1.0000e-004	0.0114	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0244	0.0244	6.0000e-005		0.0260
Energy	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Mobile	0.1954	0.2434	1.8463	3.5100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5300e-003	0.1075		366.2933	366.2933	0.0264	0.0205	373.0665
Offroad	0.0977	1.0123	0.8196	3.9100e-003		0.0342	0.0342		0.0315	0.0315	75.6621	302.6483	378.3104	0.1224		381.3693
Stationary	1.7684	0.1703	4.6058	6.2000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003		112.9840	112.9840	0.2362		118.8900
Total	**2.5892**	**1.5640**	**7.3990**	**8.8700e-003**	**0.3942**	**0.0572**	**0.4514**	**0.1050**	**0.0543**	**0.1592**	**75.6621**	**947.5359**	**1,023.1980**	**0.3883**	**0.0236**	**1,039.9216**

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	lb/day										lb/day					
Area	0.5119	6.0000e-005	6.5900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0132	0.0132	3.0000e-005		0.0138
Energy	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Mobile	0.1954	0.2434	1.8463	3.5100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5300e-003	0.1075		366.2933	366.2933	0.0264	0.0205	373.0665
Offroad	0.0977	1.0123	0.8196	3.9100e-003		0.0342	0.0342		0.0315	0.0315	75.6621	302.6483	378.3104	0.1224		381.3693
Stationary	1.7684	0.1703	4.6058	6.2000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003		112.9840	112.9840	0.2362		118.8900
Total	**2.5886**	**1.5640**	**7.3942**	**8.8700e-003**	**0.3942**	**0.0572**	**0.4513**	**0.1050**	**0.0543**	**0.1592**	**75.6621**	**947.5247**	**1,023.1867**	**0.3882**	**0.0236**	**1,039.9094**

	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	**0.02**	**0.00**	**0.06**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.04**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**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	Site Preparation	Site Preparation	1/2/2023	2/10/2023	5	30	
2	Grading	Grading	2/11/2023	6/16/2023	5	90	
3	Utilities	Trenching	5/7/2023	6/16/2023	5	30	

4	Building Construction	Building Construction	6/17/2023	6/28/2024	5	270	
5	Paving	Paving	6/29/2024	8/9/2024	5	30	
6	Architectural Coating	Architectural Coating	8/10/2024	9/20/2024	5	30	

Acres of Grading (Site Preparation Phase): 6.8

Acres of Grading (Grading Phase): 6.8

Acres of Paving: 2.6

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 29,435; Non-Residential Outdoor: 9,812; Striped Parking Area: 4,536 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Utilities	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Utilities	Trenchers	1	8.00	78	0.50

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
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	40.00	16.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2023

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					0.2404	0.0000	0.2404	0.0260	0.0000	0.0260			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985		2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.2404**	**0.5419**	**0.7823**	**0.0260**	**0.4985**	**0.5245**		**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

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	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
Worker	0.0226	0.0157	0.1847	5.3000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		54.6001	54.6001	1.7200e-003	1.6200e-003	55.1265
Total	**0.0226**	**0.0157**	**0.1847**	**5.3000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**54.6001**	**54.6001**	**1.7200e-003**	**1.6200e-003**	**55.1265**

3.2 Site Preparation - 2023

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					0.1082	0.0000	0.1082	0.0117	0.0000	0.0117			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985	0.0000	2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.1082**	**0.5419**	**0.6501**	**0.0117**	**0.4985**	**0.5102**	**0.0000**	**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

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	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
Worker	0.0226	0.0157	0.1847	5.3000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		54.6001	54.6001	1.7200e-003	1.6200e-003	55.1265
Total	**0.0226**	**0.0157**	**0.1847**	**5.3000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**54.6001**	**54.6001**	**1.7200e-003**	**1.6200e-003**	**55.1265**

3.3 Grading - 2023

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					6.1022	0.0000	6.1022	3.3189	0.0000	3.3189			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560		1,995.6147	1,995.6147	0.6454		2,011.7503
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**6.1022**	**0.6044**	**6.7066**	**3.3189**	**0.5560**	**3.8749**		**1,995.6147**	**1,995.6147**	**0.6454**		**2,011.7503**

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	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
Worker	0.0283	0.0197	0.2308	6.7000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		68.2501	68.2501	2.1500e-003	2.0300e-003	68.9081
Total	**0.0283**	**0.0197**	**0.2308**	**6.7000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**68.2501**	**68.2501**	**2.1500e-003**	**2.0300e-003**	**68.9081**

3.3 Grading - 2023

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					2.7460	0.0000	2.7460	1.4935	0.0000	1.4935			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560	0.0000	1,995.6147	1,995.6147	0.6454		2,011.7503
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**2.7460**	**0.6044**	**3.3504**	**1.4935**	**0.5560**	**2.0495**	**0.0000**	**1,995.6147**	**1,995.6147**	**0.6454**		**2,011.7503**

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	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
Worker	0.0283	0.0197	0.2308	6.7000e-004	0.0822	4.1000e-004	0.0826	0.0218	3.8000e-004	0.0222		68.2501	68.2501	2.1500e-003	2.0300e-003	68.9081
Total	**0.0283**	**0.0197**	**0.2308**	**6.7000e-004**	**0.0822**	**4.1000e-004**	**0.0826**	**0.0218**	**3.8000e-004**	**0.0222**		**68.2501**	**68.2501**	**2.1500e-003**	**2.0300e-003**	**68.9081**

3.4 Utilities - 2023

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	0.6678	6.1255	7.8023	0.0113		0.3664	0.3664		0.3371	0.3371		1,091.1849	1,091.1849	0.3529		1,100.0077
Total	**0.6678**	**6.1255**	**7.8023**	**0.0113**		**0.3664**	**0.3664**		**0.3371**	**0.3371**		**1,091.1849**	**1,091.1849**	**0.3529**		**1,100.0077**

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	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
Worker	0.0226	0.0157	0.1847	5.3000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		54.6001	54.6001	1.7200e-003	1.6200e-003	55.1265
Total	**0.0226**	**0.0157**	**0.1847**	**5.3000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**54.6001**	**54.6001**	**1.7200e-003**	**1.6200e-003**	**55.1265**

3.4 Utilities - 2023

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	0.6678	6.1255	7.8023	0.0113		0.3664	0.3664		0.3371	0.3371	0.0000	1,091.1849	1,091.1849	0.3529		1,100.0077
Total	**0.6678**	**6.1255**	**7.8023**	**0.0113**		**0.3664**	**0.3664**		**0.3371**	**0.3371**	**0.0000**	**1,091.1849**	**1,091.1849**	**0.3529**		**1,100.0077**

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	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
Worker	0.0226	0.0157	0.1847	5.3000e-004	0.0657	3.3000e-004	0.0661	0.0174	3.0000e-004	0.0177		54.6001	54.6001	1.7200e-003	1.6200e-003	55.1265
Total	**0.0226**	**0.0157**	**0.1847**	**5.3000e-004**	**0.0657**	**3.3000e-004**	**0.0661**	**0.0174**	**3.0000e-004**	**0.0177**		**54.6001**	**54.6001**	**1.7200e-003**	**1.6200e-003**	**55.1265**

3.5 Building Construction - 2023

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	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880		2,289.5233	2,289.5233	0.4330		2,300.3479
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**		**2,289.5233**	**2,289.5233**	**0.4330**		**2,300.3479**

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	0.0000
Vendor	0.0158	0.7149	0.2153	3.2000e-003	0.1084	4.2300e-003	0.1127	0.0312	4.0500e-003	0.0353		341.5075	341.5075	4.6200e-003	0.0512	356.8671
Worker	0.1131	0.0786	0.9233	2.6700e-003	0.3286	1.6500e-003	0.3302	0.0872	1.5200e-003	0.0887		273.0002	273.0002	8.6100e-003	8.1100e-003	275.6323
Total	**0.1289**	**0.7935**	**1.1386**	**5.8700e-003**	**0.4370**	**5.8800e-003**	**0.4429**	**0.1184**	**5.5700e-003**	**0.1240**		**614.5077**	**614.5077**	**0.0132**	**0.0593**	**632.4994**

3.5 Building Construction - 2023

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	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880	0.0000	2,289.5233	2,289.5233	0.4330		2,300.3479
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**	**0.0000**	**2,289.5233**	**2,289.5233**	**0.4330**		**2,300.3479**

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	0.0000
Vendor	0.0158	0.7149	0.2153	3.2000e-003	0.1084	4.2300e-003	0.1127	0.0312	4.0500e-003	0.0353		341.5075	341.5075	4.6200e-003	0.0512	356.8671
Worker	0.1131	0.0786	0.9233	2.6700e-003	0.3286	1.6500e-003	0.3302	0.0872	1.5200e-003	0.0887		273.0002	273.0002	8.6100e-003	8.1100e-003	275.6323
Total	**0.1289**	**0.7935**	**1.1386**	**5.8700e-003**	**0.4370**	**5.8800e-003**	**0.4429**	**0.1184**	**5.5700e-003**	**0.1240**		**614.5077**	**614.5077**	**0.0132**	**0.0593**	**632.4994**

3.5 Building Construction - 2024

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	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153		2,289.6541	2,289.6541	0.4265		2,300.3154
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**		**2,289.6541**	**2,289.6541**	**0.4265**		**2,300.3154**

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	0.0000
Vendor	0.0154	0.7176	0.2113	3.1500e-003	0.1084	4.2700e-003	0.1127	0.0312	4.0800e-003	0.0353		336.2425	336.2425	4.6100e-003	0.0504	351.3756
Worker	0.1058	0.0702	0.8634	2.5800e-003	0.3286	1.5700e-003	0.3302	0.0872	1.4400e-003	0.0886		266.2713	266.2713	7.8200e-003	7.5600e-003	268.7197
Total	**0.1212**	**0.7878**	**1.0747**	**5.7300e-003**	**0.4370**	**5.8400e-003**	**0.4429**	**0.1184**	**5.5200e-003**	**0.1239**		**602.5137**	**602.5137**	**0.0124**	**0.0580**	**620.0954**

3.5 Building Construction - 2024

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	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153	0.0000	2,289.6541	2,289.6541	0.4265		2,300.3154
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**	**0.0000**	**2,289.6541**	**2,289.6541**	**0.4265**		**2,300.3154**

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	0.0000
Vendor	0.0154	0.7176	0.2113	3.1500e-003	0.1084	4.2700e-003	0.1127	0.0312	4.0800e-003	0.0353		336.2425	336.2425	4.6100e-003	0.0504	351.3756
Worker	0.1058	0.0702	0.8634	2.5800e-003	0.3286	1.5700e-003	0.3302	0.0872	1.4400e-003	0.0886		266.2713	266.2713	7.8200e-003	7.5600e-003	268.7197
Total	**0.1212**	**0.7878**	**1.0747**	**5.7300e-003**	**0.4370**	**5.8400e-003**	**0.4429**	**0.1184**	**5.5200e-003**	**0.1239**		**602.5137**	**602.5137**	**0.0124**	**0.0580**	**620.0954**

3.6 Paving - 2024

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	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652		1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9909**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**		**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

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	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
Worker	0.0397	0.0263	0.3238	9.7000e-004	0.1232	5.9000e-004	0.1238	0.0327	5.4000e-004	0.0332		99.8517	99.8517	2.9300e-003	2.8400e-003	100.7699
Total	**0.0397**	**0.0263**	**0.3238**	**9.7000e-004**	**0.1232**	**5.9000e-004**	**0.1238**	**0.0327**	**5.4000e-004**	**0.0332**		**99.8517**	**99.8517**	**2.9300e-003**	**2.8400e-003**	**100.7699**

3.6 Paving - 2024

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	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652	0.0000	1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9909**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**	**0.0000**	**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

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	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
Worker	0.0397	0.0263	0.3238	9.7000e-004	0.1232	5.9000e-004	0.1238	0.0327	5.4000e-004	0.0332		99.8517	99.8517	2.9300e-003	2.8400e-003	100.7699
Total	**0.0397**	**0.0263**	**0.3238**	**9.7000e-004**	**0.1232**	**5.9000e-004**	**0.1238**	**0.0327**	**5.4000e-004**	**0.0332**		**99.8517**	**99.8517**	**2.9300e-003**	**2.8400e-003**	**100.7699**

3.7 Architectural Coating - 2024

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	7.8729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**8.0536**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

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	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
Worker	0.0212	0.0140	0.1727	5.2000e-004	0.0657	3.1000e-004	0.0660	0.0174	2.9000e-004	0.0177		53.2543	53.2543	1.5600e-003	1.5100e-003	53.7440
Total	**0.0212**	**0.0140**	**0.1727**	**5.2000e-004**	**0.0657**	**3.1000e-004**	**0.0660**	**0.0174**	**2.9000e-004**	**0.0177**		**53.2543**	**53.2543**	**1.5600e-003**	**1.5100e-003**	**53.7440**

3.7 Architectural Coating - 2024

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	7.8729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**8.0536**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

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	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
Worker	0.0212	0.0140	0.1727	5.2000e-004	0.0657	3.1000e-004	0.0660	0.0174	2.9000e-004	0.0177		53.2543	53.2543	1.5600e-003	1.5100e-003	53.7440
Total	**0.0212**	**0.0140**	**0.1727**	**5.2000e-004**	**0.0657**	**3.1000e-004**	**0.0660**	**0.0174**	**2.9000e-004**	**0.0177**		**53.2543**	**53.2543**	**1.5600e-003**	**1.5100e-003**	**53.7440**

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	0.1954	0.2434	1.8463	3.5100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5300e-003	0.1075		366.2933	366.2933	0.0264	0.0205	373.0665
Unmitigated	0.1954	0.2434	1.8463	3.5100e-003	0.3942	2.7100e-003	0.3969	0.1050	2.5300e-003	0.1075		366.2933	366.2933	0.0264	0.0205	373.0665

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Place of Worship	100.06	100.06	100.06	187,185	187,185
Total	100.06	100.06	100.06	187,185	187,185

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Place of Worship	9.50	7.30	7.30	0.00	95.00	5.00	64	25	11

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423
Parking Lot	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423
Place of Worship	0.570753	0.056481	0.179220	0.111941	0.020784	0.005211	0.013984	0.013033	0.000790	0.000560	0.024477	0.000343	0.002423

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	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	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
NaturalGas Unmitigated	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699

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					
Other Non-Asphalt Surfaces	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
Parking Lot	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
Place of Worship	1407.48	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Total		**0.0152**	**0.1380**	**0.1159**	**8.3000e-004**		**0.0105**	**0.0105**		**0.0105**	**0.0105**		**165.5859**	**165.5859**	**3.1700e-003**	**3.0400e-003**	**166.5699**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Parking Lot	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
Place of Worship	1.40748	0.0152	0.1380	0.1159	8.3000e-004		0.0105	0.0105		0.0105	0.0105		165.5859	165.5859	3.1700e-003	3.0400e-003	166.5699
Total		**0.0152**	**0.1380**	**0.1159**	**8.3000e-004**		**0.0105**	**0.0105**		**0.0105**	**0.0105**		**165.5859**	**165.5859**	**3.1700e-003**	**3.0400e-003**	**166.5699**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use Electric Chainsaw

	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	0.5119	6.0000e-005	6.5900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0132	0.0132	3.0000e-005		0.0138
Unmitigated	0.5125	1.0000e-004	0.0114	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0244	0.0244	6.0000e-005		0.0260

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	0.0647					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4467					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0500e-003	1.0000e-004	0.0114	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0244	0.0244	6.0000e-005		0.0260
Total	**0.5125**	**1.0000e-004**	**0.0114**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**		**0.0244**	**0.0244**	**6.0000e-005**		**0.0260**

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	0.0647					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4467					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	4.4000e-004	6.0000e-005	6.5900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0132	0.0132	3.0000e-005		0.0138
Total	**0.5119**	**6.0000e-005**	**6.5900e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**0.0132**	**0.0132**	**3.0000e-005**		**0.0138**

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
Tractors/Loaders/Backhoes	2	2.00	260	212	0.43	Bio-diesel

UnMitigated/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
Equipment Type	lb/day										lb/day					
Tractors/Loaders/ Backhoes	0.0977	1.0123	0.8196	3.9100e-003		0.0342	0.0342		0.0315	0.0315	75.6621	302.6483	378.3104	0.1224		381.3693
Total	**0.0977**	**1.0123**	**0.8196**	**3.9100e-003**		**0.0342**	**0.0342**		**0.0315**	**0.0315**	**75.6621**	**302.6483**	**378.3104**	**0.1224**		**381.3693**

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type
Emergency Generator	1	1	50	201	0.73	CNG

Boilers

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

User Defined Equipment

Equipment Type	Number

10.1 Stationary Sources

Unmitigated/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
Equipment Type	lb/day										lb/day					
Emergency Generator - CNG (0 - 500 HP)	1.7684	0.1703	4.6058	6.2000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003		112.9840	112.9840	0.2362		118.8900
Total	**1.7684**	**0.1703**	**4.6058**	**6.2000e-004**		**9.7600e-003**	**9.7600e-003**		**9.7600e-003**	**9.7600e-003**		**112.9840**	**112.9840**	**0.2362**		**118.8900**

11.0 Vegetation

MVMG Phase 2 (Construction Only)

Alameda County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Place of Worship	20.00	1000sqft	0.46	20,000.00	0
User Defined Educational	24.00	User Defined Unit	24.00	1,045,440.00	0
Other Non-Asphalt Surfaces	5.10	Acre	5.10	222,156.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2030
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 20,000 SF Columbarium and Mausoleum, 24 acres of burial lots, 5.1 acres of roads (decomposed granite)

Construction Phase - Per Applicant's construction schedule

Off-road Equipment -

Off-road Equipment - Assumed additional equipment for utility trenching

Grading - Phase 2 40.3 acres

Vehicle Trips - Transportation emissions in Phase I emissions estimates.

Energy Use - Construction Only - Energy Use in Phase I emissions

Water And Wastewater - Construction Only - Water Emissions estimated in Phase I emissions

Solid Waste - Construction Only - Waste emissions are in Phase I emissions.

Construction Off-road Equipment Mitigation - BAAQMD standard dust measures

Area Mitigation -

Energy Mitigation - Solar estimated in Phase I emissions

Operational Off-Road Equipment - burial tractors in Phase I emissions

Stationary Sources - Emergency Generators and Fire Pumps - Emergency generator in Phase I emissions

Consumer Products - Construction Only

Area Coating - Construction Only

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	532720	0
tblAreaCoating	Area_Nonresidential_Interior	1598160	0
tblAreaCoating	Area_Parking	13329	0
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	35.00	60.00
tblConstructionPhase	NumDays	440.00	270.00
tblConstructionPhase	NumDays	45.00	180.00
tblConstructionPhase	NumDays	35.00	60.00
tblConstructionPhase	NumDays	20.00	60.00
tblConsumerProducts	ROG_EF	2.14E-05	0
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblConsumerProducts	ROG_EF_PesticidesFertilizers	5.152E-08	0
tblEnergyUse	LightingElect	3.08	0.00
tblEnergyUse	NT24E	3.70	0.00
tblEnergyUse	NT24NG	6.67	0.00
tblEnergyUse	T24E	1.32	0.00
tblEnergyUse	T24NG	19.51	0.00
tblGrading	AcresOfGrading	540.00	40.30
tblGrading	AcresOfGrading	90.00	40.30

tblLandUse	LandUseSquareFeet	0.00	1,045,440.00
tblLandUse	LotAcreage	0.00	24.00
tblSolidWaste	SolidWasteGenerationRate	114.00	0.00
tblVehicleTrips	ST_TR	5.99	0.00
tblVehicleTrips	SU_TR	27.63	0.00
tblVehicleTrips	WD_TR	6.95	0.00
tblWater	IndoorWaterUseRate	625,778.17	0.00
tblWater	OutdoorWaterUseRate	978,781.24	0.00

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					
2027	0.3852	3.6580	3.4681	8.2000e-003	1.2038	0.1496	1.3533	0.6213	0.1378	0.7590	0.0000	727.1747	727.1747	0.2078	6.7800e-003	734.3891
2028	0.3308	2.8209	3.5470	0.0122	0.7086	0.0771	0.7857	0.1925	0.0725	0.2651	0.0000	1,141.7302	1,141.7302	0.0862	0.0786	1,167.2972
2029	5.6366	0.2527	0.4771	8.6000e-004	0.0286	0.0121	0.0407	7.6000e-003	0.0113	0.0189	0.0000	77.4656	77.4656	0.0170	4.5000e-004	78.0254
Maximum	**5.6366**	**3.6580**	**3.5470**	**0.0122**	**1.2038**	**0.1496**	**1.3533**	**0.6213**	**0.1378**	**0.7590**	**0.0000**	**1,141.7302**	**1,141.7302**	**0.2078**	**0.0786**	**1,167.2972**

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					
2027	0.3852	3.6580	3.4681	8.2000e-003	0.5841	0.1496	0.7336	0.2910	0.1378	0.4288	0.0000	727.1739	727.1739	0.2078	6.7800e-003	734.3884
2028	0.3308	2.8209	3.5470	0.0122	0.7086	0.0771	0.7857	0.1925	0.0725	0.2651	0.0000	1,141.7298	1,141.7298	0.0862	0.0786	1,167.2968
2029	5.6366	0.2527	0.4771	8.6000e-004	0.0286	0.0121	0.0407	7.6000e-003	0.0113	0.0189	0.0000	77.4655	77.4655	0.0170	4.5000e-004	78.0254
Maximum	**5.6366**	**3.6580**	**3.5470**	**0.0122**	**0.7086**	**0.1496**	**0.7857**	**0.2910**	**0.1378**	**0.4288**	**0.0000**	**1,141.7298**	**1,141.7298**	**0.2078**	**0.0786**	**1,167.2968**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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**	**31.93**	**0.00**	**28.43**	**40.21**	**0.00**	**31.67**	**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	**1-4-2027**	**4-3-2027**	0.9016	0.9016
2	**4-4-2027**	**7-3-2027**	1.0045	1.0045
3	**7-4-2027**	**10-3-2027**	1.0645	1.0645
4	**10-4-2027**	**1-3-2028**	1.0836	1.0836
5	**1-4-2028**	**4-3-2028**	0.8175	0.8175
6	**4-4-2028**	**7-3-2028**	0.7963	0.7963
7	**7-4-2028**	**10-3-2028**	0.8058	0.8058
8	**10-4-2028**	**1-3-2029**	0.7211	0.7211
9	**1-4-2029**	**4-3-2029**	1.9035	1.9035
10	**4-4-2029**	**7-3-2029**	3.9689	3.9689
		Highest	3.9689	3.9689

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	4.0000e-005	0.0000	4.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.8000e-004	8.8000e-004	0.0000	0.0000	9.3000e-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	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	**4.0000e-005**	**0.0000**	**4.5000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**8.8000e-004**	**8.8000e-004**	**0.0000**	**0.0000**	**9.3000e-004**

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	4.0000e-005	0.0000	4.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.8000e-004	8.8000e-004	0.0000	0.0000	9.3000e-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	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	**4.0000e-005**	**0.0000**	**4.5000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**8.8000e-004**	**8.8000e-004**	**0.0000**	**0.0000**	**9.3000e-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	Site Preparation	Site Preparation	1/4/2027	3/26/2027	5	60	
2	Grading	Grading	3/27/2027	12/3/2027	5	180	
3	Utilities	Trenching	9/11/2027	12/3/2027	5	60	

4	Building Construction	Building Construction	12/4/2027	12/15/2028	5	270	
5	Paving	Paving	12/16/2028	3/9/2029	5	60	
6	Architectural Coating	Architectural Coating	3/10/2029	6/1/2029	5	60	

Acres of Grading (Site Preparation Phase): 40.3

Acres of Grading (Grading Phase): 40.3

Acres of Paving: 5.1

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 1,598,160; Non-Residential Outdoor: 532,720; Striped Parking Area: 13,329 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Utilities	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Utilities	Trenchers	1	8.00	78	0.50
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36

Paving	Rollers		2	8.00	80	0.38
Architectural Coating	Air Compressors		1	6.00	78	0.48

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
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	541.00	211.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	108.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2027

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					0.5634	0.0000	0.5634	0.3002	0.0000	0.3002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0742	0.7570	0.5374	1.1400e-003		0.0326	0.0326		0.0300	0.0300	0.0000	100.4010	100.4010	0.0325	0.0000	101.2128
Total	**0.0742**	**0.7570**	**0.5374**	**1.1400e-003**	**0.5634**	**0.0326**	**0.5960**	**0.3002**	**0.0300**	**0.3302**	**0.0000**	**100.4010**	**100.4010**	**0.0325**	**0.0000**	**101.2128**

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	1.1100e-003	6.5000e-004	9.4900e-003	3.0000e-005	4.2700e-003	2.0000e-005	4.2900e-003	1.1400e-003	2.0000e-005	1.1500e-003	0.0000	3.0643	3.0643	7.0000e-005	7.0000e-005	3.0879
Total	**1.1100e-003**	**6.5000e-004**	**9.4900e-003**	**3.0000e-005**	**4.2700e-003**	**2.0000e-005**	**4.2900e-003**	**1.1400e-003**	**2.0000e-005**	**1.1500e-003**	**0.0000**	**3.0643**	**3.0643**	**7.0000e-005**	**7.0000e-005**	**3.0879**

3.2 Site Preparation - 2027

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					0.2535	0.0000	0.2535	0.1351	0.0000	0.1351	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0742	0.7570	0.5374	1.1400e-003		0.0326	0.0326		0.0300	0.0300	0.0000	100.4008	100.4008	0.0325	0.0000	101.2126
Total	**0.0742**	**0.7570**	**0.5374**	**1.1400e-003**	**0.2535**	**0.0326**	**0.2861**	**0.1351**	**0.0300**	**0.1651**	**0.0000**	**100.4008**	**100.4008**	**0.0325**	**0.0000**	**101.2126**

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	1.1100e-003	6.5000e-004	9.4900e-003	3.0000e-005	4.2700e-003	2.0000e-005	4.2900e-003	1.1400e-003	2.0000e-005	1.1500e-003	0.0000	3.0643	3.0643	7.0000e-005	7.0000e-005	3.0879
Total	**1.1100e-003**	**6.5000e-004**	**9.4900e-003**	**3.0000e-005**	**4.2700e-003**	**2.0000e-005**	**4.2900e-003**	**1.1400e-003**	**2.0000e-005**	**1.1500e-003**	**0.0000**	**3.0643**	**3.0643**	**7.0000e-005**	**7.0000e-005**	**3.0879**

3.3 Grading - 2027

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					0.5634	0.0000	0.5634	0.3002	0.0000	0.3002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2611	2.5149	2.3698	5.5900e-003		0.1018	0.1018		0.0936	0.0936	0.0000	490.5559	490.5559	0.1587	0.0000	494.5223
Total	**0.2611**	**2.5149**	**2.3698**	**5.5900e-003**	**0.5634**	**0.1018**	**0.6651**	**0.3002**	**0.0936**	**0.3939**	**0.0000**	**490.5559**	**490.5559**	**0.1587**	**0.0000**	**494.5223**

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	3.6800e-003	2.1700e-003	0.0316	1.1000e-004	0.0142	6.0000e-005	0.0143	3.7900e-003	6.0000e-005	3.8400e-003	0.0000	10.2142	10.2142	2.3000e-004	2.4000e-004	10.2928
Total	**3.6800e-003**	**2.1700e-003**	**0.0316**	**1.1000e-004**	**0.0142**	**6.0000e-005**	**0.0143**	**3.7900e-003**	**6.0000e-005**	**3.8400e-003**	**0.0000**	**10.2142**	**10.2142**	**2.3000e-004**	**2.4000e-004**	**10.2928**

3.3 Grading - 2027

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					0.2535	0.0000	0.2535	0.1351	0.0000	0.1351	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2611	2.5149	2.3698	5.5900e-003		0.1018	0.1018		0.0936	0.0936	0.0000	490.5553	490.5553	0.1587	0.0000	494.5217
Total	**0.2611**	**2.5149**	**2.3698**	**5.5900e-003**	**0.2535**	**0.1018**	**0.3553**	**0.1351**	**0.0936**	**0.2287**	**0.0000**	**490.5553**	**490.5553**	**0.1587**	**0.0000**	**494.5217**

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	3.6800e-003	2.1700e-003	0.0316	1.1000e-004	0.0142	6.0000e-005	0.0143	3.7900e-003	6.0000e-005	3.8400e-003	0.0000	10.2142	10.2142	2.3000e-004	2.4000e-004	10.2928
Total	**3.6800e-003**	**2.1700e-003**	**0.0316**	**1.1000e-004**	**0.0142**	**6.0000e-005**	**0.0143**	**3.7900e-003**	**6.0000e-005**	**3.8400e-003**	**0.0000**	**10.2142**	**10.2142**	**2.3000e-004**	**2.4000e-004**	**10.2928**

3.4 Utilities - 2027

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	0.0179	0.1600	0.2334	3.4000e-004		9.1000e-003	9.1000e-003		8.3700e-003	8.3700e-003	0.0000	29.7189	29.7189	9.6100e-003	0.0000	29.9592
Total	**0.0179**	**0.1600**	**0.2334**	**3.4000e-004**		**9.1000e-003**	**9.1000e-003**		**8.3700e-003**	**8.3700e-003**	**0.0000**	**29.7189**	**29.7189**	**9.6100e-003**	**0.0000**	**29.9592**

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	4.9000e-004	2.9000e-004	4.2200e-003	1.0000e-005	1.9000e-003	1.0000e-005	1.9100e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.3619	1.3619	3.0000e-005	3.0000e-005	1.3724
Total	**4.9000e-004**	**2.9000e-004**	**4.2200e-003**	**1.0000e-005**	**1.9000e-003**	**1.0000e-005**	**1.9100e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.3619**	**1.3619**	**3.0000e-005**	**3.0000e-005**	**1.3724**

3.4 Utilities - 2027

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	0.0179	0.1600	0.2334	3.4000e-004		9.1000e-003	9.1000e-003		8.3700e-003	8.3700e-003	0.0000	29.7188	29.7188	9.6100e-003	0.0000	29.9591
Total	**0.0179**	**0.1600**	**0.2334**	**3.4000e-004**		**9.1000e-003**	**9.1000e-003**		**8.3700e-003**	**8.3700e-003**	**0.0000**	**29.7188**	**29.7188**	**9.6100e-003**	**0.0000**	**29.9591**

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	4.9000e-004	2.9000e-004	4.2200e-003	1.0000e-005	1.9000e-003	1.0000e-005	1.9100e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.3619	1.3619	3.0000e-005	3.0000e-005	1.3724
Total	**4.9000e-004**	**2.9000e-004**	**4.2200e-003**	**1.0000e-005**	**1.9000e-003**	**1.0000e-005**	**1.9100e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.3619**	**1.3619**	**3.0000e-005**	**3.0000e-005**	**1.3724**

3.5 Building Construction - 2027

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	0.0137	0.1247	0.1609	2.7000e-004		5.2800e-003	5.2800e-003		4.9600e-003	4.9600e-003	0.0000	23.1920	23.1920	5.4500e-003	0.0000	23.3282
Total	**0.0137**	**0.1247**	**0.1609**	**2.7000e-004**		**5.2800e-003**	**5.2800e-003**		**4.9600e-003**	**4.9600e-003**	**0.0000**	**23.1920**	**23.1920**	**5.4500e-003**	**0.0000**	**23.3282**

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	1.9700e-003	0.0918	0.0263	3.9000e-004	0.0139	5.6000e-004	0.0144	4.0100e-003	5.3000e-004	4.5400e-003	0.0000	37.9675	37.9675	5.5000e-004	5.6900e-003	39.6780
Worker	0.0111	6.5200e-003	0.0951	3.2000e-004	0.0428	1.8000e-004	0.0430	0.0114	1.7000e-004	0.0116	0.0000	30.6992	30.6992	6.9000e-004	7.4000e-004	30.9356
Total	**0.0130**	**0.0984**	**0.1214**	**7.1000e-004**	**0.0566**	**7.4000e-004**	**0.0574**	**0.0154**	**7.0000e-004**	**0.0161**	**0.0000**	**68.6667**	**68.6667**	**1.2400e-003**	**6.4300e-003**	**70.6136**

3.5 Building Construction - 2027

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	0.0137	0.1247	0.1609	2.7000e-004		5.2800e-003	5.2800e-003		4.9600e-003	4.9600e-003	0.0000	23.1919	23.1919	5.4500e-003	0.0000	23.3282
Total	**0.0137**	**0.1247**	**0.1609**	**2.7000e-004**		**5.2800e-003**	**5.2800e-003**		**4.9600e-003**	**4.9600e-003**	**0.0000**	**23.1919**	**23.1919**	**5.4500e-003**	**0.0000**	**23.3282**

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	1.9700e-003	0.0918	0.0263	3.9000e-004	0.0139	5.6000e-004	0.0144	4.0100e-003	5.3000e-004	4.5400e-003	0.0000	37.9675	37.9675	5.5000e-004	5.6900e-003	39.6780
Worker	0.0111	6.5200e-003	0.0951	3.2000e-004	0.0428	1.8000e-004	0.0430	0.0114	1.7000e-004	0.0116	0.0000	30.6992	30.6992	6.9000e-004	7.4000e-004	30.9356
Total	**0.0130**	**0.0984**	**0.1214**	**7.1000e-004**	**0.0566**	**7.4000e-004**	**0.0574**	**0.0154**	**7.0000e-004**	**0.0161**	**0.0000**	**68.6667**	**68.6667**	**1.2400e-003**	**6.4300e-003**	**70.6136**

3.5 Building Construction - 2028

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	0.1709	1.5587	2.0106	3.3700e-003		0.0659	0.0659		0.0620	0.0620	0.0000	289.8993	289.8993	0.0682	0.0000	291.6030
Total	**0.1709**	**1.5587**	**2.0106**	**3.3700e-003**		**0.0659**	**0.0659**		**0.0620**	**0.0620**	**0.0000**	**289.8993**	**289.8993**	**0.0682**	**0.0000**	**291.6030**

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	0.0242	1.1438	0.3254	4.8000e-003	0.1733	6.9000e-003	0.1802	0.0501	6.6000e-003	0.0567	0.0000	465.1218	465.1218	6.9000e-003	0.0698	486.0796
Worker	0.1309	0.0754	1.1368	3.8900e-003	0.5347	2.1400e-003	0.5368	0.1422	1.9700e-003	0.1442	0.0000	376.2821	376.2821	7.9300e-003	8.8000e-003	379.1036
Total	**0.1551**	**1.2192**	**1.4623**	**8.6900e-003**	**0.7080**	**9.0400e-003**	**0.7170**	**0.1924**	**8.5700e-003**	**0.2009**	**0.0000**	**841.4039**	**841.4039**	**0.0148**	**0.0786**	**865.1832**

3.5 Building Construction - 2028

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	0.1709	1.5587	2.0106	3.3700e-003		0.0659	0.0659		0.0620	0.0620	0.0000	289.8990	289.8990	0.0682	0.0000	291.6026
Total	**0.1709**	**1.5587**	**2.0106**	**3.3700e-003**		**0.0659**	**0.0659**		**0.0620**	**0.0620**	**0.0000**	**289.8990**	**289.8990**	**0.0682**	**0.0000**	**291.6026**

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	0.0242	1.1438	0.3254	4.8000e-003	0.1733	6.9000e-003	0.1802	0.0501	6.6000e-003	0.0567	0.0000	465.1218	465.1218	6.9000e-003	0.0698	486.0796
Worker	0.1309	0.0754	1.1368	3.8900e-003	0.5347	2.1400e-003	0.5368	0.1422	1.9700e-003	0.1442	0.0000	376.2821	376.2821	7.9300e-003	8.8000e-003	379.1036
Total	**0.1551**	**1.2192**	**1.4623**	**8.6900e-003**	**0.7080**	**9.0400e-003**	**0.7170**	**0.1924**	**8.5700e-003**	**0.2009**	**0.0000**	**841.4039**	**841.4039**	**0.0148**	**0.0786**	**865.1832**

3.6 Paving - 2028

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	4.5800e-003	0.0429	0.0729	1.1000e-004		2.0900e-003	2.0900e-003		1.9300e-003	1.9300e-003	0.0000	10.0096	10.0096	3.2400e-003	0.0000	10.0906
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.5800e-003**	**0.0429**	**0.0729**	**1.1000e-004**		**2.0900e-003**	**2.0900e-003**		**1.9300e-003**	**1.9300e-003**	**0.0000**	**10.0096**	**10.0096**	**3.2400e-003**	**0.0000**	**10.0906**

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	1.5000e-004	8.0000e-005	1.2600e-003	0.0000	5.9000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4173	0.4173	1.0000e-005	1.0000e-005	0.4205
Total	**1.5000e-004**	**8.0000e-005**	**1.2600e-003**	**0.0000**	**5.9000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4173**	**0.4173**	**1.0000e-005**	**1.0000e-005**	**0.4205**

3.6 Paving - 2028

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	4.5800e-003	0.0429	0.0729	1.1000e-004		2.0900e-003	2.0900e-003		1.9300e-003	1.9300e-003	0.0000	10.0096	10.0096	3.2400e-003	0.0000	10.0906
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.5800e-003**	**0.0429**	**0.0729**	**1.1000e-004**		**2.0900e-003**	**2.0900e-003**		**1.9300e-003**	**1.9300e-003**	**0.0000**	**10.0096**	**10.0096**	**3.2400e-003**	**0.0000**	**10.0906**

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	1.5000e-004	8.0000e-005	1.2600e-003	0.0000	5.9000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4173	0.4173	1.0000e-005	1.0000e-005	0.4205
Total	**1.5000e-004**	**8.0000e-005**	**1.2600e-003**	**0.0000**	**5.9000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4173**	**0.4173**	**1.0000e-005**	**1.0000e-005**	**0.4205**

3.6 Paving - 2029

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	0.0229	0.2145	0.3645	5.7000e-004		0.0105	0.0105		9.6300e-003	9.6300e-003	0.0000	50.0481	50.0481	0.0162	0.0000	50.4528
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0229**	**0.2145**	**0.3645**	**5.7000e-004**		**0.0105**	**0.0105**		**9.6300e-003**	**9.6300e-003**	**0.0000**	**50.0481**	**50.0481**	**0.0162**	**0.0000**	**50.4528**

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	6.9000e-004	3.9000e-004	6.0500e-003	2.0000e-005	2.9700e-003	1.0000e-005	2.9800e-003	7.9000e-004	1.0000e-005	8.0000e-004	0.0000	2.0496	2.0496	4.0000e-005	5.0000e-005	2.0646
Total	**6.9000e-004**	**3.9000e-004**	**6.0500e-003**	**2.0000e-005**	**2.9700e-003**	**1.0000e-005**	**2.9800e-003**	**7.9000e-004**	**1.0000e-005**	**8.0000e-004**	**0.0000**	**2.0496**	**2.0496**	**4.0000e-005**	**5.0000e-005**	**2.0646**

3.6 Paving - 2029

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	0.0229	0.2145	0.3645	5.7000e-004		0.0105	0.0105		9.6300e-003	9.6300e-003	0.0000	50.0481	50.0481	0.0162	0.0000	50.4527
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0229**	**0.2145**	**0.3645**	**5.7000e-004**		**0.0105**	**0.0105**		**9.6300e-003**	**9.6300e-003**	**0.0000**	**50.0481**	**50.0481**	**0.0162**	**0.0000**	**50.4527**

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	6.9000e-004	3.9000e-004	6.0500e-003	2.0000e-005	2.9700e-003	1.0000e-005	2.9800e-003	7.9000e-004	1.0000e-005	8.0000e-004	0.0000	2.0496	2.0496	4.0000e-005	5.0000e-005	2.0646
Total	**6.9000e-004**	**3.9000e-004**	**6.0500e-003**	**2.0000e-005**	**2.9700e-003**	**1.0000e-005**	**2.9800e-003**	**7.9000e-004**	**1.0000e-005**	**8.0000e-004**	**0.0000**	**2.0496**	**2.0496**	**4.0000e-005**	**5.0000e-005**	**2.0646**

3.7 Architectural Coating - 2029

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	5.6019					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.1300e-003	0.0344	0.0543	9.0000e-005		1.5500e-003	1.5500e-003		1.5500e-003	1.5500e-003	0.0000	7.6598	7.6598	4.2000e-004	0.0000	7.6702
Total	**5.6071**	**0.0344**	**0.0543**	**9.0000e-005**		**1.5500e-003**	**1.5500e-003**		**1.5500e-003**	**1.5500e-003**	**0.0000**	**7.6598**	**7.6598**	**4.2000e-004**	**0.0000**	**7.6702**

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	5.9200e-003	3.3600e-003	0.0523	1.8000e-004	0.0256	1.0000e-004	0.0257	6.8100e-003	9.0000e-005	6.9000e-003	0.0000	17.7082	17.7082	3.5000e-004	4.1000e-004	17.8379
Total	**5.9200e-003**	**3.3600e-003**	**0.0523**	**1.8000e-004**	**0.0256**	**1.0000e-004**	**0.0257**	**6.8100e-003**	**9.0000e-005**	**6.9000e-003**	**0.0000**	**17.7082**	**17.7082**	**3.5000e-004**	**4.1000e-004**	**17.8379**

3.7 Architectural Coating - 2029

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	5.6019					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.1300e-003	0.0344	0.0543	9.0000e-005		1.5500e-003	1.5500e-003		1.5500e-003	1.5500e-003	0.0000	7.6598	7.6598	4.2000e-004	0.0000	7.6702
Total	**5.6071**	**0.0344**	**0.0543**	**9.0000e-005**		**1.5500e-003**	**1.5500e-003**		**1.5500e-003**	**1.5500e-003**	**0.0000**	**7.6598**	**7.6598**	**4.2000e-004**	**0.0000**	**7.6702**

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	5.9200e-003	3.3600e-003	0.0523	1.8000e-004	0.0256	1.0000e-004	0.0257	6.8100e-003	9.0000e-005	6.9000e-003	0.0000	17.7082	17.7082	3.5000e-004	4.1000e-004	17.8379
Total	**5.9200e-003**	**3.3600e-003**	**0.0523**	**1.8000e-004**	**0.0256**	**1.0000e-004**	**0.0257**	**6.8100e-003**	**9.0000e-005**	**6.9000e-003**	**0.0000**	**17.7082**	**17.7082**	**3.5000e-004**	**4.1000e-004**	**17.8379**

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
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Place of Worship	0.00	0.00	0.00		
User Defined Educational	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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Place of Worship	9.50	7.30	7.30	0.00	95.00	5.00	64	25	11
User Defined Educational	9.50	7.30	7.30	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
Other Non-Asphalt Surfaces	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332
Place of Worship	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332
User Defined Educational	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332

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					
Other Non-Asphalt Surfaces	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
Place of Worship	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
User Defined Educational	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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Place of Worship	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
User Defined Educational	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			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Place of Worship	0	0.0000	0.0000	0.0000	0.0000
User Defined Educational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Place of Worship	0	0.0000	0.0000	0.0000	0.0000
User Defined Educational	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	4.0000e-005	0.0000	4.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.8000e-004	8.8000e-004	0.0000	0.0000	9.3000e-004
Unmitigated	4.0000e-005	0.0000	4.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.8000e-004	8.8000e-004	0.0000	0.0000	9.3000e-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	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	4.0000e-005	0.0000	4.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.8000e-004	8.8000e-004	0.0000	0.0000	9.3000e-004
Total	**4.0000e-005**	**0.0000**	**4.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**8.8000e-004**	**8.8000e-004**	**0.0000**	**0.0000**	**9.3000e-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	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	4.0000e-005	0.0000	4.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.8000e-004	8.8000e-004	0.0000	0.0000	9.3000e-004
Total	**4.0000e-005**	**0.0000**	**4.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**8.8000e-004**	**8.8000e-004**	**0.0000**	**0.0000**	**9.3000e-004**

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			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Place of Worship	0 / 0	0.0000	0.0000	0.0000	0.0000
User Defined Educational	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			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Place of Worship	0 / 0	0.0000	0.0000	0.0000	0.0000
User Defined Educational	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			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Place of Worship	0	0.0000	0.0000	0.0000	0.0000
User Defined Educational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Place of Worship	0	0.0000	0.0000	0.0000	0.0000
User Defined Educational	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

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

MVMG Phase 2 (Construction Only)

Alameda County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Place of Worship	20.00	1000sqft	0.46	20,000.00	0
User Defined Educational	24.00	User Defined Unit	24.00	1,045,440.00	0
Other Non-Asphalt Surfaces	5.10	Acre	5.10	222,156.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2030
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 20,000 SF Columbarium and Mausoleum, 24 acres of burial lots, 5.1 acres of roads (decomposed granite)

Construction Phase - Per Applicant's construction schedule

Off-road Equipment -

Off-road Equipment - Assumed additional equipment for utility trenching

Grading - Phase 2 40.3 acres

Vehicle Trips - Transportation emissions in Phase I emissions estimates.

Energy Use - Construction Only - Energy Use in Phase I emissions

Water And Wastewater - Construction Only - Water Emissions estimated in Phase I emissions

Solid Waste - Construction Only - Waste emissions are in Phase I emissions.

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Construction Off-road Equipment Mitigation - BAAQMD standard dust measures

Area Mitigation -

Energy Mitigation - Solar estimated in Phase I emissions

Operational Off-Road Equipment - burial tractors in Phase I emissions

Stationary Sources - Emergency Generators and Fire Pumps - Emergency generator in Phase I emissions

Consumer Products - Construction Only

Area Coating - Construction Only

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	532720	0
tblAreaCoating	Area_Nonresidential_Interior	1598160	0
tblAreaCoating	Area_Parking	13329	0
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	35.00	60.00
tblConstructionPhase	NumDays	440.00	270.00
tblConstructionPhase	NumDays	45.00	180.00
tblConstructionPhase	NumDays	35.00	60.00
tblConstructionPhase	NumDays	20.00	60.00
tblConsumerProducts	ROG_EF	2.14E-05	0
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblConsumerProducts	ROG_EF_PesticidesFertilizers	5.152E-08	0
tblEnergyUse	LightingElect	3.08	0.00
tblEnergyUse	NT24E	3.70	0.00
tblEnergyUse	NT24NG	6.67	0.00
tblEnergyUse	T24E	1.32	0.00
tblEnergyUse	T24NG	19.51	0.00
tblGrading	AcresOfGrading	540.00	40.30
tblGrading	AcresOfGrading	90.00	40.30

tblLandUse	LandUseSquareFeet	0.00	1,045,440.00
tblLandUse	LotAcreage	0.00	24.00
tblSolidWaste	SolidWasteGenerationRate	114.00	0.00
tblVehicleTrips	ST_TR	5.99	0.00
tblVehicleTrips	SU_TR	27.63	0.00
tblVehicleTrips	WD_TR	6.95	0.00
tblWater	IndoorWaterUseRate	625,778.17	0.00
tblWater	OutdoorWaterUseRate	978,781.24	0.00

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					
2027	3.5586	33.3058	34.6365	0.1003	18.9264	1.4351	20.0138	10.0468	1.3203	11.0472	0.0000	10,357.8273	10,357.8273	2.3000	0.7015	10,585.1861
2028	2.6738	21.8271	28.3680	0.0986	5.8744	0.5998	6.4742	1.5906	0.5648	2.1554	0.0000	10,203.8792	10,203.8792	0.7266	0.6858	10,426.4238
2029	187.1108	8.5954	14.8366	0.0237	0.8872	0.4190	0.9419	0.2353	0.3855	0.4181	0.0000	2,303.3920	2,303.3920	0.7154	0.0137	2,321.8441
Maximum	**187.1108**	**33.3058**	**34.6365**	**0.1003**	**18.9264**	**1.4351**	**20.0138**	**10.0468**	**1.3203**	**11.0472**	**0.0000**	**10,357.8273**	**10,357.8273**	**2.3000**	**0.7015**	**10,585.1861**

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					
2027	3.5586	33.3058	34.6365	0.1003	8.5982	1.4351	9.6856	4.5426	1.3203	5.5431	0.0000	10,357.8273	10,357.8273	2.3000	0.7015	10,585.1861
2028	2.6738	21.8271	28.3680	0.0986	5.8744	0.5998	6.4742	1.5906	0.5648	2.1554	0.0000	10,203.8792	10,203.8792	0.7266	0.6858	10,426.4238
2029	187.1108	8.5954	14.8366	0.0237	0.8872	0.4190	0.9419	0.2353	0.3855	0.4181	0.0000	2,303.3920	2,303.3920	0.7154	0.0137	2,321.8441
Maximum	**187.1108**	**33.3058**	**34.6365**	**0.1003**	**8.5982**	**1.4351**	**9.6856**	**4.5426**	**1.3203**	**5.5431**	**0.0000**	**10,357.8273**	**10,357.8273**	**2.3000**	**0.7015**	**10,585.1861**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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	40.21	0.00	37.65	46.36	0.00	40.41	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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
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	0.0000
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**	**0.0000**	**0.0114**

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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
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	0.0000
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**	**0.0000**	**0.0114**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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	Site Preparation	Site Preparation	1/4/2027	3/26/2027	5	60	
2	Grading	Grading	3/27/2027	12/3/2027	5	180	
3	Utilities	Trenching	9/11/2027	12/3/2027	5	60	
4	Building Construction	Building Construction	12/4/2027	12/15/2028	5	270	
5	Paving	Paving	12/16/2028	3/9/2029	5	60	
6	Architectural Coating	Architectural Coating	3/10/2029	6/1/2029	5	60	

Acres of Grading (Site Preparation Phase): 40.3

Acres of Grading (Grading Phase): 40.3

Acres of Paving: 5.1

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 1,598,160; Non-Residential Outdoor: 532,720; Striped Parking Area: 13,329 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40

Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Utilities	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Utilities	Trenchers	1	8.00	78	0.50
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

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
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	541.00	211.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	108.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2027

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					18.7786	0.0000	18.7786	10.0076	0.0000	10.0076			0.0000			0.0000
Off-Road	2.4727	25.2339	17.9118	0.0381		1.0868	1.0868		0.9999	0.9999		3,689.1037	3,689.1037	1.1931		3,718.9320
Total	**2.4727**	**25.2339**	**17.9118**	**0.0381**	**18.7786**	**1.0868**	**19.8654**	**10.0076**	**0.9999**	**11.0074**		**3,689.1037**	**3,689.1037**	**1.1931**		**3,718.9320**

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	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
Worker	0.0390	0.0192	0.3384	1.1400e-003	0.1479	6.1000e-004	0.1485	0.0392	5.6000e-004	0.0398		120.4173	120.4173	2.3300e-003	2.4800e-003	121.2156
Total	**0.0390**	**0.0192**	**0.3384**	**1.1400e-003**	**0.1479**	**6.1000e-004**	**0.1485**	**0.0392**	**5.6000e-004**	**0.0398**		**120.4173**	**120.4173**	**2.3300e-003**	**2.4800e-003**	**121.2156**

3.2 Site Preparation - 2027

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					8.4504	0.0000	8.4504	4.5034	0.0000	4.5034			0.0000			0.0000
Off-Road	2.4727	25.2339	17.9118	0.0381		1.0868	1.0868		0.9999	0.9999	0.0000	3,689.1037	3,689.1037	1.1931		3,718.9320
Total	**2.4727**	**25.2339**	**17.9118**	**0.0381**	**8.4504**	**1.0868**	**9.5371**	**4.5034**	**0.9999**	**5.5033**	**0.0000**	**3,689.1037**	**3,689.1037**	**1.1931**		**3,718.9320**

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	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
Worker	0.0390	0.0192	0.3384	1.1400e-003	0.1479	6.1000e-004	0.1485	0.0392	5.6000e-004	0.0398		120.4173	120.4173	2.3300e-003	2.4800e-003	121.2156
Total	**0.0390**	**0.0192**	**0.3384**	**1.1400e-003**	**0.1479**	**6.1000e-004**	**0.1485**	**0.0392**	**5.6000e-004**	**0.0398**		**120.4173**	**120.4173**	**2.3300e-003**	**2.4800e-003**	**121.2156**

3.3 Grading - 2027

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					6.2595	0.0000	6.2595	3.3359	0.0000	3.3359			0.0000			0.0000
Off-Road	2.9012	27.9429	26.3311	0.0621		1.1309	1.1309		1.0404	1.0404		6,008.2814	6,008.2814	1.9432		6,056.8614
Total	**2.9012**	**27.9429**	**26.3311**	**0.0621**	**6.2595**	**1.1309**	**7.3904**	**3.3359**	**1.0404**	**4.3763**		**6,008.2814**	**6,008.2814**	**1.9432**		**6,056.8614**

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	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
Worker	0.0433	0.0213	0.3760	1.2600e-003	0.1643	6.8000e-004	0.1650	0.0436	6.2000e-004	0.0442		133.7971	133.7971	2.5900e-003	2.7600e-003	134.6840
Total	**0.0433**	**0.0213**	**0.3760**	**1.2600e-003**	**0.1643**	**6.8000e-004**	**0.1650**	**0.0436**	**6.2000e-004**	**0.0442**		**133.7971**	**133.7971**	**2.5900e-003**	**2.7600e-003**	**134.6840**

3.3 Grading - 2027

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					2.8168	0.0000	2.8168	1.5011	0.0000	1.5011			0.0000			0.0000
Off-Road	2.9012	27.9429	26.3311	0.0621		1.1309	1.1309		1.0404	1.0404	0.0000	6,008.2814	6,008.2814	1.9432		6,056.8614
Total	**2.9012**	**27.9429**	**26.3311**	**0.0621**	**2.8168**	**1.1309**	**3.9477**	**1.5011**	**1.0404**	**2.5416**	**0.0000**	**6,008.2814**	**6,008.2814**	**1.9432**		**6,056.8614**

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	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
Worker	0.0433	0.0213	0.3760	1.2600e-003	0.1643	6.8000e-004	0.1650	0.0436	6.2000e-004	0.0442		133.7971	133.7971	2.5900e-003	2.7600e-003	134.6840
Total	**0.0433**	**0.0213**	**0.3760**	**1.2600e-003**	**0.1643**	**6.8000e-004**	**0.1650**	**0.0436**	**6.2000e-004**	**0.0442**		**133.7971**	**133.7971**	**2.5900e-003**	**2.7600e-003**	**134.6840**

3.4 Utilities - 2027

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	0.5967	5.3331	7.7790	0.0113		0.3033	0.3033		0.2790	0.2790		1,091.9819	1,091.9819	0.3532		1,100.8111
Total	**0.5967**	**5.3331**	**7.7790**	**0.0113**		**0.3033**	**0.3033**		**0.2790**	**0.2790**		**1,091.9819**	**1,091.9819**	**0.3532**		**1,100.8111**

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	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
Worker	0.0173	8.5100e-003	0.1504	5.1000e-004	0.0657	2.7000e-004	0.0660	0.0174	2.5000e-004	0.0177		53.5188	53.5188	1.0400e-003	1.1000e-003	53.8736
Total	**0.0173**	**8.5100e-003**	**0.1504**	**5.1000e-004**	**0.0657**	**2.7000e-004**	**0.0660**	**0.0174**	**2.5000e-004**	**0.0177**		**53.5188**	**53.5188**	**1.0400e-003**	**1.1000e-003**	**53.8736**

3.4 Utilities - 2027

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	0.5967	5.3331	7.7790	0.0113		0.3033	0.3033		0.2790	0.2790	0.0000	1,091.9819	1,091.9819	0.3532		1,100.8111
Total	**0.5967**	**5.3331**	**7.7790**	**0.0113**		**0.3033**	**0.3033**		**0.2790**	**0.2790**	**0.0000**	**1,091.9819**	**1,091.9819**	**0.3532**		**1,100.8111**

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	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
Worker	0.0173	8.5100e-003	0.1504	5.1000e-004	0.0657	2.7000e-004	0.0660	0.0174	2.5000e-004	0.0177		53.5188	53.5188	1.0400e-003	1.1000e-003	53.8736
Total	**0.0173**	**8.5100e-003**	**0.1504**	**5.1000e-004**	**0.0657**	**2.7000e-004**	**0.0660**	**0.0174**	**2.5000e-004**	**0.0177**		**53.5188**	**53.5188**	**1.0400e-003**	**1.1000e-003**	**53.8736**

3.5 Building Construction - 2027

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963		2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**		**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.2018	8.8566	2.5865	0.0392	1.4302	0.0555	1.4857	0.4118	0.0531	0.4649		4,182.1428	4,182.1428	0.0612	0.6269	4,370.4848
Worker	1.1718	0.5756	10.1715	0.0342	4.4442	0.0183	4.4625	1.1788	0.0168	1.1956		3,619.2102	3,619.2102	0.0700	0.0746	3,643.2032
Total	**1.3735**	**9.4322**	**12.7581**	**0.0734**	**5.8744**	**0.0738**	**5.9482**	**1.5906**	**0.0699**	**1.6606**		**7,801.3529**	**7,801.3529**	**0.1313**	**0.7015**	**8,013.6880**

3.5 Building Construction - 2027

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963	0.0000	2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**	**0.0000**	**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.2018	8.8566	2.5865	0.0392	1.4302	0.0555	1.4857	0.4118	0.0531	0.4649		4,182.1428	4,182.1428	0.0612	0.6269	4,370.4848
Worker	1.1718	0.5756	10.1715	0.0342	4.4442	0.0183	4.4625	1.1788	0.0168	1.1956		3,619.2102	3,619.2102	0.0700	0.0746	3,643.2032
Total	**1.3735**	**9.4322**	**12.7581**	**0.0734**	**5.8744**	**0.0738**	**5.9482**	**1.5906**	**0.0699**	**1.6606**		**7,801.3529**	**7,801.3529**	**0.1313**	**0.7015**	**8,013.6880**

3.5 Building Construction - 2028

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963		2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**		**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.1991	8.8252	2.5641	0.0384	1.4302	0.0551	1.4854	0.4118	0.0528	0.4646		4,098.6539	4,098.6539	0.0611	0.6144	4,283.2682
Worker	1.1073	0.5322	9.7192	0.0333	4.4442	0.0171	4.4613	1.1788	0.0157	1.1946		3,548.7510	3,548.7510	0.0645	0.0715	3,571.6575
Total	**1.3064**	**9.3574**	**12.2833**	**0.0717**	**5.8744**	**0.0723**	**5.9467**	**1.5906**	**0.0685**	**1.6591**		**7,647.4049**	**7,647.4049**	**0.1256**	**0.6858**	**7,854.9257**

3.5 Building Construction - 2028

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963	0.0000	2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**	**0.0000**	**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.1991	8.8252	2.5641	0.0384	1.4302	0.0551	1.4854	0.4118	0.0528	0.4646		4,098.6539	4,098.6539	0.0611	0.6144	4,283.2682
Worker	1.1073	0.5322	9.7192	0.0333	4.4442	0.0171	4.4613	1.1788	0.0157	1.1946		3,548.7510	3,548.7510	0.0645	0.0715	3,571.6575
Total	**1.3064**	**9.3574**	**12.2833**	**0.0717**	**5.8744**	**0.0723**	**5.9467**	**1.5906**	**0.0685**	**1.6591**		**7,647.4049**	**7,647.4049**	**0.1256**	**0.6858**	**7,854.9257**

3.6 Paving - 2028

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850		2,206.7452	2,206.7452	0.7137		2,224.5878
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**		**2,206.7452**	**2,206.7452**	**0.7137**		**2,224.5878**

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	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
Worker	0.0307	0.0148	0.2695	9.2000e-004	0.1232	4.7000e-004	0.1237	0.0327	4.4000e-004	0.0331		98.3942	98.3942	1.7900e-003	1.9800e-003	99.0293
Total	**0.0307**	**0.0148**	**0.2695**	**9.2000e-004**	**0.1232**	**4.7000e-004**	**0.1237**	**0.0327**	**4.4000e-004**	**0.0331**		**98.3942**	**98.3942**	**1.7900e-003**	**1.9800e-003**	**99.0293**

3.6 Paving - 2028

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850	0.0000	2,206.7452	2,206.7452	0.7137		2,224.5878
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**	**0.0000**	**2,206.7452**	**2,206.7452**	**0.7137**		**2,224.5878**

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	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
Worker	0.0307	0.0148	0.2695	9.2000e-004	0.1232	4.7000e-004	0.1237	0.0327	4.4000e-004	0.0331		98.3942	98.3942	1.7900e-003	1.9800e-003	99.0293
Total	**0.0307**	**0.0148**	**0.2695**	**9.2000e-004**	**0.1232**	**4.7000e-004**	**0.1237**	**0.0327**	**4.4000e-004**	**0.0331**		**98.3942**	**98.3942**	**1.7900e-003**	**1.9800e-003**	**99.0293**

3.6 Paving - 2029

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850		2,206.7452	2,206.7452	0.7137		2,224.5878
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**		**2,206.7452**	**2,206.7452**	**0.7137**		**2,224.5878**

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	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
Worker	0.0290	0.0137	0.2586	9.0000e-004	0.1232	4.4000e-004	0.1237	0.0327	4.1000e-004	0.0331		96.6469	96.6469	1.6500e-003	1.9100e-003	97.2563
Total	**0.0290**	**0.0137**	**0.2586**	**9.0000e-004**	**0.1232**	**4.4000e-004**	**0.1237**	**0.0327**	**4.1000e-004**	**0.0331**		**96.6469**	**96.6469**	**1.6500e-003**	**1.9100e-003**	**97.2563**

3.6 Paving - 2029

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850	0.0000	2,206.7452	2,206.7452	0.7137		2,224.5878
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**	**0.0000**	**2,206.7452**	**2,206.7452**	**0.7137**		**2,224.5878**

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	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
Worker	0.0290	0.0137	0.2586	9.0000e-004	0.1232	4.4000e-004	0.1237	0.0327	4.1000e-004	0.0331		96.6469	96.6469	1.6500e-003	1.9100e-003	97.2563
Total	**0.0290**	**0.0137**	**0.2586**	**9.0000e-004**	**0.1232**	**4.4000e-004**	**0.1237**	**0.0327**	**4.1000e-004**	**0.0331**		**96.6469**	**96.6469**	**1.6500e-003**	**1.9100e-003**	**97.2563**

3.7 Architectural Coating - 2029

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	186.7313					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**186.9022**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

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	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
Worker	0.2086	0.0989	1.8619	6.4800e-003	0.8872	3.2000e-003	0.8904	0.2353	2.9400e-003	0.2383		695.8573	695.8573	0.0119	0.0137	700.2456
Total	**0.2086**	**0.0989**	**1.8619**	**6.4800e-003**	**0.8872**	**3.2000e-003**	**0.8904**	**0.2353**	**2.9400e-003**	**0.2383**		**695.8573**	**695.8573**	**0.0119**	**0.0137**	**700.2456**

3.7 Architectural Coating - 2029

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	186.7313					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**186.9022**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

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	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
Worker	0.2086	0.0989	1.8619	6.4800e-003	0.8872	3.2000e-003	0.8904	0.2353	2.9400e-003	0.2383		695.8573	695.8573	0.0119	0.0137	700.2456
Total	**0.2086**	**0.0989**	**1.8619**	**6.4800e-003**	**0.8872**	**3.2000e-003**	**0.8904**	**0.2353**	**2.9400e-003**	**0.2383**		**695.8573**	**695.8573**	**0.0119**	**0.0137**	**700.2456**

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	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Place of Worship	0.00	0.00	0.00		
User Defined Educational	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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Place of Worship	9.50	7.30	7.30	0.00	95.00	5.00	64	25	11
User Defined Educational	9.50	7.30	7.30	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
Other Non-Asphalt Surfaces	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332
Place of Worship	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332
User Defined Educational	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332

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					
Other Non-Asphalt Surfaces	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
Place of Worship	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
User Defined Educational	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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Place of Worship	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
User Defined Educational	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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
Unmitigated	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114

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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**		**0.0114**

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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**		**0.0114**

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

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

MVMG Phase 2 (Construction Only)

Alameda County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Place of Worship	20.00	1000sqft	0.46	20,000.00	0
User Defined Educational	24.00	User Defined Unit	24.00	1,045,440.00	0
Other Non-Asphalt Surfaces	5.10	Acre	5.10	222,156.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2030
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 20,000 SF Columbarium and Mausoleum, 24 acres of burial lots, 5.1 acres of roads (decomposed granite)

Construction Phase - Per Applicant's construction schedule

Off-road Equipment -

Off-road Equipment - Assumed additional equipment for utility trenching

Grading - Phase 2 40.3 acres

Vehicle Trips - Transportation emissions in Phase I emissions estimates.

Energy Use - Construction Only - Energy Use in Phase I emissions

Water And Wastewater - Construction Only - Water Emissions estimated in Phase I emissions

Solid Waste - Construction Only - Waste emissions are in Phase I emissions.

Construction Off-road Equipment Mitigation - BAAQMD standard dust measures

Area Mitigation -

Energy Mitigation - Solar estimated in Phase I emissions

Operational Off-Road Equipment - burial tractors in Phase I emissions

Stationary Sources - Emergency Generators and Fire Pumps - Emergency generator in Phase I emissions

Consumer Products - Construction Only

Area Coating - Construction Only

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	532720	0
tblAreaCoating	Area_Nonresidential_Interior	1598160	0
tblAreaCoating	Area_Parking	13329	0
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	35.00	60.00
tblConstructionPhase	NumDays	440.00	270.00
tblConstructionPhase	NumDays	45.00	180.00
tblConstructionPhase	NumDays	35.00	60.00
tblConstructionPhase	NumDays	20.00	60.00
tblConsumerProducts	ROG_EF	2.14E-05	0
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblConsumerProducts	ROG_EF_PesticidesFertilizers	5.152E-08	0
tblEnergyUse	LightingElect	3.08	0.00
tblEnergyUse	NT24E	3.70	0.00
tblEnergyUse	NT24NG	6.67	0.00
tblEnergyUse	T24E	1.32	0.00
tblEnergyUse	T24NG	19.51	0.00
tblGrading	AcresOfGrading	540.00	40.30
tblGrading	AcresOfGrading	90.00	40.30

tblLandUse	LandUseSquareFeet	0.00	1,045,440.00
tblLandUse	LotAcreage	0.00	24.00
tblSolidWaste	SolidWasteGenerationRate	114.00	0.00
tblVehicleTrips	ST_TR	5.99	0.00
tblVehicleTrips	SU_TR	27.63	0.00
tblVehicleTrips	WD_TR	6.95	0.00
tblWater	IndoorWaterUseRate	625,778.17	0.00
tblWater	OutdoorWaterUseRate	978,781.24	0.00

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					
2027	3.5603	33.3130	34.6213	0.0979	18.9264	1.4351	20.0138	10.0468	1.3203	11.0472	0.0000	10,107.1944	10,107.1944	2.3006	0.7146	10,338.7068
2028	2.6964	22.4790	28.1870	0.0963	5.8744	0.6000	6.4744	1.5906	0.5649	2.1555	0.0000	9,958.2850	9,958.2850	0.7362	0.6984	10,184.8013
2029	187.1176	8.5987	14.8297	0.0236	0.8872	0.4190	0.9419	0.2353	0.3855	0.4181	0.0000	2,296.5080	2,296.5080	0.7156	0.0158	2,315.0543
Maximum	**187.1176**	**33.3130**	**34.6213**	**0.0979**	**18.9264**	**1.4351**	**20.0138**	**10.0468**	**1.3203**	**11.0472**	**0.0000**	**10,107.1944**	**10,107.1944**	**2.3006**	**0.7146**	**10,338.7068**

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					
2027	3.5603	33.3130	34.6213	0.0979	8.5982	1.4351	9.6856	4.5426	1.3203	5.5431	0.0000	10,107.1944	10,107.1944	2.3006	0.7146	10,338.7068
2028	2.6964	22.4790	28.1870	0.0963	5.8744	0.6000	6.4744	1.5906	0.5649	2.1555	0.0000	9,958.2850	9,958.2850	0.7362	0.6984	10,184.8013
2029	187.1176	8.5987	14.8297	0.0236	0.8872	0.4190	0.9419	0.2353	0.3855	0.4181	0.0000	2,296.5080	2,296.5080	0.7156	0.0158	2,315.0543
Maximum	**187.1176**	**33.3130**	**34.6213**	**0.0979**	**8.5982**	**1.4351**	**9.6856**	**4.5426**	**1.3203**	**5.5431**	**0.0000**	**10,107.1944**	**10,107.1944**	**2.3006**	**0.7146**	**10,338.7068**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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**	**40.21**	**0.00**	**37.65**	**46.36**	**0.00**	**40.41**	**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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
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	0.0000
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**	**0.0000**	**0.0114**

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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
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	0.0000
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**	**0.0000**	**0.0114**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	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	Site Preparation	Site Preparation	1/4/2027	3/26/2027	5	60	
2	Grading	Grading	3/27/2027	12/3/2027	5	180	
3	Utilities	Trenching	9/11/2027	12/3/2027	5	60	
4	Building Construction	Building Construction	12/4/2027	12/15/2028	5	270	
5	Paving	Paving	12/16/2028	3/9/2029	5	60	
6	Architectural Coating	Architectural Coating	3/10/2029	6/1/2029	5	60	

Acres of Grading (Site Preparation Phase): 40.3

Acres of Grading (Grading Phase): 40.3

Acres of Paving: 5.1

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 1,598,160; Non-Residential Outdoor: 532,720; Striped Parking Area: 13,329 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40

Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Utilities	Excavators	1	8.00	158	0.38
Utilities	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Utilities	Trenchers	1	8.00	78	0.50
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

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
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	541.00	211.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	108.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2027

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					18.7786	0.0000	18.7786	10.0076	0.0000	10.0076			0.0000			0.0000
Off-Road	2.4727	25.2339	17.9118	0.0381		1.0868	1.0868		0.9999	0.9999		3,689.1037	3,689.1037	1.1931		3,718.9320
Total	**2.4727**	**25.2339**	**17.9118**	**0.0381**	**18.7786**	**1.0868**	**19.8654**	**10.0076**	**0.9999**	**11.0074**		**3,689.1037**	**3,689.1037**	**1.1931**		**3,718.9320**

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	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
Worker	0.0401	0.0238	0.3287	1.0600e-003	0.1479	6.1000e-004	0.1485	0.0392	5.6000e-004	0.0398		111.8357	111.8357	2.6900e-003	2.8700e-003	112.7576
Total	**0.0401**	**0.0238**	**0.3287**	**1.0600e-003**	**0.1479**	**6.1000e-004**	**0.1485**	**0.0392**	**5.6000e-004**	**0.0398**		**111.8357**	**111.8357**	**2.6900e-003**	**2.8700e-003**	**112.7576**

3.2 Site Preparation - 2027

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					8.4504	0.0000	8.4504	4.5034	0.0000	4.5034			0.0000			0.0000
Off-Road	2.4727	25.2339	17.9118	0.0381		1.0868	1.0868		0.9999	0.9999	0.0000	3,689.1037	3,689.1037	1.1931		3,718.9320
Total	**2.4727**	**25.2339**	**17.9118**	**0.0381**	**8.4504**	**1.0868**	**9.5371**	**4.5034**	**0.9999**	**5.5033**	**0.0000**	**3,689.1037**	**3,689.1037**	**1.1931**		**3,718.9320**

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	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
Worker	0.0401	0.0238	0.3287	1.0600e-003	0.1479	6.1000e-004	0.1485	0.0392	5.6000e-004	0.0398		111.8357	111.8357	2.6900e-003	2.8700e-003	112.7576
Total	**0.0401**	**0.0238**	**0.3287**	**1.0600e-003**	**0.1479**	**6.1000e-004**	**0.1485**	**0.0392**	**5.6000e-004**	**0.0398**		**111.8357**	**111.8357**	**2.6900e-003**	**2.8700e-003**	**112.7576**

3.3 Grading - 2027

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					6.2595	0.0000	6.2595	3.3359	0.0000	3.3359			0.0000			0.0000
Off-Road	2.9012	27.9429	26.3311	0.0621		1.1309	1.1309		1.0404	1.0404		6,008.2814	6,008.2814	1.9432		6,056.8614
Total	**2.9012**	**27.9429**	**26.3311**	**0.0621**	**6.2595**	**1.1309**	**7.3904**	**3.3359**	**1.0404**	**4.3763**		**6,008.2814**	**6,008.2814**	**1.9432**		**6,056.8614**

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	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
Worker	0.0445	0.0264	0.3652	1.1700e-003	0.1643	6.8000e-004	0.1650	0.0436	6.2000e-004	0.0442		124.2619	124.2619	2.9900e-003	3.1900e-003	125.2862
Total	**0.0445**	**0.0264**	**0.3652**	**1.1700e-003**	**0.1643**	**6.8000e-004**	**0.1650**	**0.0436**	**6.2000e-004**	**0.0442**		**124.2619**	**124.2619**	**2.9900e-003**	**3.1900e-003**	**125.2862**

3.3 Grading - 2027

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					2.8168	0.0000	2.8168	1.5011	0.0000	1.5011			0.0000			0.0000
Off-Road	2.9012	27.9429	26.3311	0.0621		1.1309	1.1309		1.0404	1.0404	0.0000	6,008.2814	6,008.2814	1.9432		6,056.8614
Total	**2.9012**	**27.9429**	**26.3311**	**0.0621**	**2.8168**	**1.1309**	**3.9477**	**1.5011**	**1.0404**	**2.5416**	**0.0000**	**6,008.2814**	**6,008.2814**	**1.9432**		**6,056.8614**

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	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
Worker	0.0445	0.0264	0.3652	1.1700e-003	0.1643	6.8000e-004	0.1650	0.0436	6.2000e-004	0.0442		124.2619	124.2619	2.9900e-003	3.1900e-003	125.2862
Total	**0.0445**	**0.0264**	**0.3652**	**1.1700e-003**	**0.1643**	**6.8000e-004**	**0.1650**	**0.0436**	**6.2000e-004**	**0.0442**		**124.2619**	**124.2619**	**2.9900e-003**	**3.1900e-003**	**125.2862**

3.4 Utilities - 2027

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	0.5967	5.3331	7.7790	0.0113		0.3033	0.3033		0.2790	0.2790		1,091.9819	1,091.9819	0.3532		1,100.8111
Total	**0.5967**	**5.3331**	**7.7790**	**0.0113**		**0.3033**	**0.3033**		**0.2790**	**0.2790**		**1,091.9819**	**1,091.9819**	**0.3532**		**1,100.8111**

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	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
Worker	0.0178	0.0106	0.1461	4.7000e-004	0.0657	2.7000e-004	0.0660	0.0174	2.5000e-004	0.0177		49.7048	49.7048	1.2000e-003	1.2700e-003	50.1145
Total	**0.0178**	**0.0106**	**0.1461**	**4.7000e-004**	**0.0657**	**2.7000e-004**	**0.0660**	**0.0174**	**2.5000e-004**	**0.0177**		**49.7048**	**49.7048**	**1.2000e-003**	**1.2700e-003**	**50.1145**

3.4 Utilities - 2027

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	0.5967	5.3331	7.7790	0.0113		0.3033	0.3033		0.2790	0.2790	0.0000	1,091.981 9	1,091.981 9	0.3532		1,100.811 1
Total	**0.5967**	**5.3331**	**7.7790**	**0.0113**		**0.3033**	**0.3033**		**0.2790**	**0.2790**	**0.0000**	**1,091.981 9**	**1,091.981 9**	**0.3532**		**1,100.811 1**

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	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
Worker	0.0178	0.0106	0.1461	4.7000e-004	0.0657	2.7000e-004	0.0660	0.0174	2.5000e-004	0.0177		49.7048	49.7048	1.2000e-003	1.2700e-003	50.1145
Total	**0.0178**	**0.0106**	**0.1461**	**4.7000e-004**	**0.0657**	**2.7000e-004**	**0.0660**	**0.0174**	**2.5000e-004**	**0.0177**		**49.7048**	**49.7048**	**1.2000e-003**	**1.2700e-003**	**50.1145**

3.5 Building Construction - 2027

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963		2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**		**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.1910	9.3822	2.6732	0.0392	1.4302	0.0557	1.4859	0.4118	0.0533	0.4651		4,189.4349	4,189.4349	0.0606	0.6284	4,378.2171
Worker	1.2046	0.7143	9.8782	0.0318	4.4442	0.0183	4.4625	1.1788	0.0168	1.1956		3,361.2851	3,361.2851	0.0809	0.0862	3,388.9916
Total	**1.3956**	**10.0965**	**12.5515**	**0.0710**	**5.8744**	**0.0740**	**5.9483**	**1.5906**	**0.0701**	**1.6607**		**7,550.7200**	**7,550.7200**	**0.1415**	**0.7146**	**7,767.2087**

3.5 Building Construction - 2027

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963	0.0000	2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**	**0.0000**	**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.1910	9.3822	2.6732	0.0392	1.4302	0.0557	1.4859	0.4118	0.0533	0.4651		4,189.4349	4,189.4349	0.0606	0.6284	4,378.2171
Worker	1.2046	0.7143	9.8782	0.0318	4.4442	0.0183	4.4625	1.1788	0.0168	1.1956		3,361.2851	3,361.2851	0.0809	0.0862	3,388.9916
Total	**1.3956**	**10.0965**	**12.5515**	**0.0710**	**5.8744**	**0.0740**	**5.9483**	**1.5906**	**0.0701**	**1.6607**		**7,550.7200**	**7,550.7200**	**0.1415**	**0.7146**	**7,767.2087**

3.5 Building Construction - 2028

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963		2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**		**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.1882	9.3490	2.6499	0.0384	1.4302	0.0553	1.4855	0.4118	0.0529	0.4647		4,105.8513	4,105.8513	0.0605	0.6159	4,290.8948
Worker	1.1409	0.6603	9.4525	0.0309	4.4442	0.0171	4.4613	1.1788	0.0157	1.1946		3,295.9594	3,295.9594	0.0747	0.0825	3,322.4085
Total	**1.3290**	**10.0093**	**12.1024**	**0.0694**	**5.8744**	**0.0724**	**5.9468**	**1.5906**	**0.0686**	**1.6593**		**7,401.8106**	**7,401.8106**	**0.1352**	**0.6984**	**7,613.3032**

3.5 Building Construction - 2028

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	1.3674	12.4697	16.0847	0.0270		0.5276	0.5276		0.4963	0.4963	0.0000	2,556.4744	2,556.4744	0.6010		2,571.4981
Total	**1.3674**	**12.4697**	**16.0847**	**0.0270**		**0.5276**	**0.5276**		**0.4963**	**0.4963**	**0.0000**	**2,556.4744**	**2,556.4744**	**0.6010**		**2,571.4981**

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	0.0000
Vendor	0.1882	9.3490	2.6499	0.0384	1.4302	0.0553	1.4855	0.4118	0.0529	0.4647		4,105.8513	4,105.8513	0.0605	0.6159	4,290.8948
Worker	1.1409	0.6603	9.4525	0.0309	4.4442	0.0171	4.4613	1.1788	0.0157	1.1946		3,295.9594	3,295.9594	0.0747	0.0825	3,322.4085
Total	**1.3290**	**10.0093**	**12.1024**	**0.0694**	**5.8744**	**0.0724**	**5.9468**	**1.5906**	**0.0686**	**1.6593**		**7,401.8106**	**7,401.8106**	**0.1352**	**0.6984**	**7,613.3032**

3.6 Paving - 2028

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850		2,206.7452	2,206.7452	0.7137		2,224.5878
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**		**2,206.7452**	**2,206.7452**	**0.7137**		**2,224.5878**

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	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
Worker	0.0316	0.0183	0.2621	8.6000e-004	0.1232	4.7000e-004	0.1237	0.0327	4.4000e-004	0.0331		91.3852	91.3852	2.0700e-003	2.2900e-003	92.1185
Total	**0.0316**	**0.0183**	**0.2621**	**8.6000e-004**	**0.1232**	**4.7000e-004**	**0.1237**	**0.0327**	**4.4000e-004**	**0.0331**		**91.3852**	**91.3852**	**2.0700e-003**	**2.2900e-003**	**92.1185**

3.6 Paving - 2028

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850	0.0000	2,206.7452	2,206.7452	0.7137		2,224.5878
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**	**0.0000**	**2,206.7452**	**2,206.7452**	**0.7137**		**2,224.5878**

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	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
Worker	0.0316	0.0183	0.2621	8.6000e-004	0.1232	4.7000e-004	0.1237	0.0327	4.4000e-004	0.0331		91.3852	91.3852	2.0700e-003	2.2900e-003	92.1185
Total	**0.0316**	**0.0183**	**0.2621**	**8.6000e-004**	**0.1232**	**4.7000e-004**	**0.1237**	**0.0327**	**4.4000e-004**	**0.0331**		**91.3852**	**91.3852**	**2.0700e-003**	**2.2900e-003**	**92.1185**

3.6 Paving - 2029

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850		2,206.745 2	2,206.745 2	0.7137		2,224.587 8
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**		**2,206.745 2**	**2,206.745 2**	**0.7137**		**2,224.587 8**

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	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
Worker	0.0299	0.0170	0.2518	8.4000e-004	0.1232	4.4000e-004	0.1237	0.0327	4.1000e-004	0.0331		89.7628	89.7628	1.9200e-003	2.2000e-003	90.4665
Total	**0.0299**	**0.0170**	**0.2518**	**8.4000e-004**	**0.1232**	**4.4000e-004**	**0.1237**	**0.0327**	**4.1000e-004**	**0.0331**		**89.7628**	**89.7628**	**1.9200e-003**	**2.2000e-003**	**90.4665**

3.6 Paving - 2029

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	0.9152	8.5816	14.5780	0.0228		0.4185	0.4185		0.3850	0.3850	0.0000	2,206.7452	2,206.7452	0.7137		2,224.5878
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.9152**	**8.5816**	**14.5780**	**0.0228**		**0.4185**	**0.4185**		**0.3850**	**0.3850**	**0.0000**	**2,206.7452**	**2,206.7452**	**0.7137**		**2,224.5878**

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	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
Worker	0.0299	0.0170	0.2518	8.4000e-004	0.1232	4.4000e-004	0.1237	0.0327	4.1000e-004	0.0331		89.7628	89.7628	1.9200e-003	2.2000e-003	90.4665
Total	**0.0299**	**0.0170**	**0.2518**	**8.4000e-004**	**0.1232**	**4.4000e-004**	**0.1237**	**0.0327**	**4.1000e-004**	**0.0331**		**89.7628**	**89.7628**	**1.9200e-003**	**2.2000e-003**	**90.4665**

3.7 Architectural Coating - 2029

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	186.7313					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**186.9022**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

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	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
Worker	0.2154	0.1226	1.8126	6.0200e-003	0.8872	3.2000e-003	0.8904	0.2353	2.9400e-003	0.2383		646.2924	646.2924	0.0138	0.0158	651.3587
Total	**0.2154**	**0.1226**	**1.8126**	**6.0200e-003**	**0.8872**	**3.2000e-003**	**0.8904**	**0.2353**	**2.9400e-003**	**0.2383**		**646.2924**	**646.2924**	**0.0138**	**0.0158**	**651.3587**

3.7 Architectural Coating - 2029

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	186.7313					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**186.9022**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

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	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
Worker	0.2154	0.1226	1.8126	6.0200e-003	0.8872	3.2000e-003	0.8904	0.2353	2.9400e-003	0.2383		646.2924	646.2924	0.0138	0.0158	651.3587
Total	**0.2154**	**0.1226**	**1.8126**	**6.0200e-003**	**0.8872**	**3.2000e-003**	**0.8904**	**0.2353**	**2.9400e-003**	**0.2383**		**646.2924**	**646.2924**	**0.0138**	**0.0158**	**651.3587**

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	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Place of Worship	0.00	0.00	0.00		
User Defined Educational	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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Place of Worship	9.50	7.30	7.30	0.00	95.00	5.00	64	25	11
User Defined Educational	9.50	7.30	7.30	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
Other Non-Asphalt Surfaces	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332
Place of Worship	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332
User Defined Educational	0.573117	0.056467	0.176478	0.111811	0.020328	0.005383	0.015207	0.013118	0.000775	0.000513	0.024109	0.000363	0.002332

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					
Other Non-Asphalt Surfaces	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
Place of Worship	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
User Defined Educational	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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Place of Worship	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
User Defined Educational	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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
Unmitigated	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114

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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**		**0.0114**

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	4.6000e-004	4.0000e-005	4.9900e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005		0.0108	0.0108	3.0000e-005		0.0114
Total	**4.6000e-004**	**4.0000e-005**	**4.9900e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**		**0.0108**	**0.0108**	**3.0000e-005**		**0.0114**

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

Health Risk Assessment
Monte Vista Memorial Gardens

Livermore, California

July 29, 2021

Prepared For:
RCH Group
6521 Chesbro Circle
Rancho Murieta, CA 95683
Contact: Paul Miller

Prepared By:
Environmental Permitting Specialists
7068 Riverside Boulevard
Sacramento, CA 95831
https://www.epsconsulting.org/
Contact: Ray Kapahi, Principal
Tel: 916-687-8352
Ray.Kapahi@gmail.com

TABLE OF CONTENTS

SECTION 1: INTRODUCTION

1.1 Background and Project Location

Environmental Permitting Specialists (EPS) has been retained by RCH Group to evaluate public health risks associated with the proposed Monte Vista Memorial Gardens crematory (Project) to be located in Livermore (Alameda County County), California. Up to 1,000 cremations are planned annually using a natural gas fired incinerator equipped with an afterburner to control emissions. This risk analysis is in support of the Environmental Impact Report and the Conditional Use Permit being prepared by Alameda County Planning Department.

The proposed Project would be located at 3656 Las Colinas Road in Livermore. It would occupy approximately 47 acres of a 104 acre lot. Figures 1-1 and 1-2 illustrate the project location and site map respectively.

The objective of the risk assessment is to determine if the operation of the proposed project is likely to expose nearby residents or workers to significant health risks. The criteria used to determine if health risks are significant is discussed later in this Section.

Three (4) types of risks are evaluated. These risks are:

1. Individual Cancer Risk
2. Chronic Non-Cancer Risk
3. Acute Non-Cancer Risk
4. Exposure to fine particulate matter (PM-2.5) concentration

Individual cancer risk refers to the increased probability that an individual would contract cancer after long-term exposure, typically 25 to 70 years. For residences, a 30 year exposure is recommended by OEHHA. For workers, including schools, a 25 year exposure is recommended.

Chronic (non-cancer) risk is reported as a ratio of the average concentration of a specific TAC associated with the project divided by the recommended exposure level for that TAC. A hazard index below 1 indicates that chronic non-cancer health effects are not expected.

Acute (non-cancer) risk is reported as a ratio of 1-hour concentration of a specific TAC associated with the project divided by the recommended exposure level for that TAC. A hazard index below 1 indicates that acute non-cancer health effects are not expected.

Chronic (long-term) exposure assumes that TACs are emitted continuously and that the pollutant concentrations are annual averages. Acute exposure assumes a maximum hour concentration.

Non-cancer residential health risks associated with exposure to concentration of PM-2.5 assume an exposure duration of 1 year to concentrations of PM-2.5 released from the crematory.

1.2 Scope of the Health Risk Assessment

Preparation of risk assessments is a three-step process. The first step is to identify sources of toxic air contaminants (TACs) that may lead to public health risks. The second step is to assess the amounts of contaminants that may reach the public (exposure assessment). The last step is to calculate the magnitude of the health risk as a result of exposure to harmful contaminants (risk characterization).

The Office of Environmental Health Hazard Assessment (OEHHA), and the Bay Area Air Quality Management District (BAAQMD)[1] have provided guidance on the procedures that should be used, including, the types of risks to be evaluated for each TAC, toxicological data for individual contaminants and recommended exposure pathways. The current analysis relies on guidance from both of these agencies.

1.3 Significance Criteria

The following significance criteria are used in this report to assess the significance of public health risks. These criteria are based on the BAAQMD Guidelines for Assessing and Mitigating Air Quality Impacts and District Regulation 11-18. These Guidelines and Regulations are designed to inform the public and the Lead Agencies of the extent of airborne emissions from stationary sources and the potential public health impacts associated with exposure to such emissions.

Table 1-1
Significance Thresholds for Public Health Risks

Risk Metric	Project Level
Residential Lifetime Cancer Risk 30 years exposure	>10 cancers per million
Workplace Cancer Risk 25 years exposure	>10 cancers per million
Chronic Hazard Index 30 years exposure	>1
Acute Hazard Index 1-Hour exposure	>1
Annual PM-2.5 Concentration	0.3 ug/m3

1.4 Report Organization

This report is divided into seven Sections and two Appendices as follows:

---

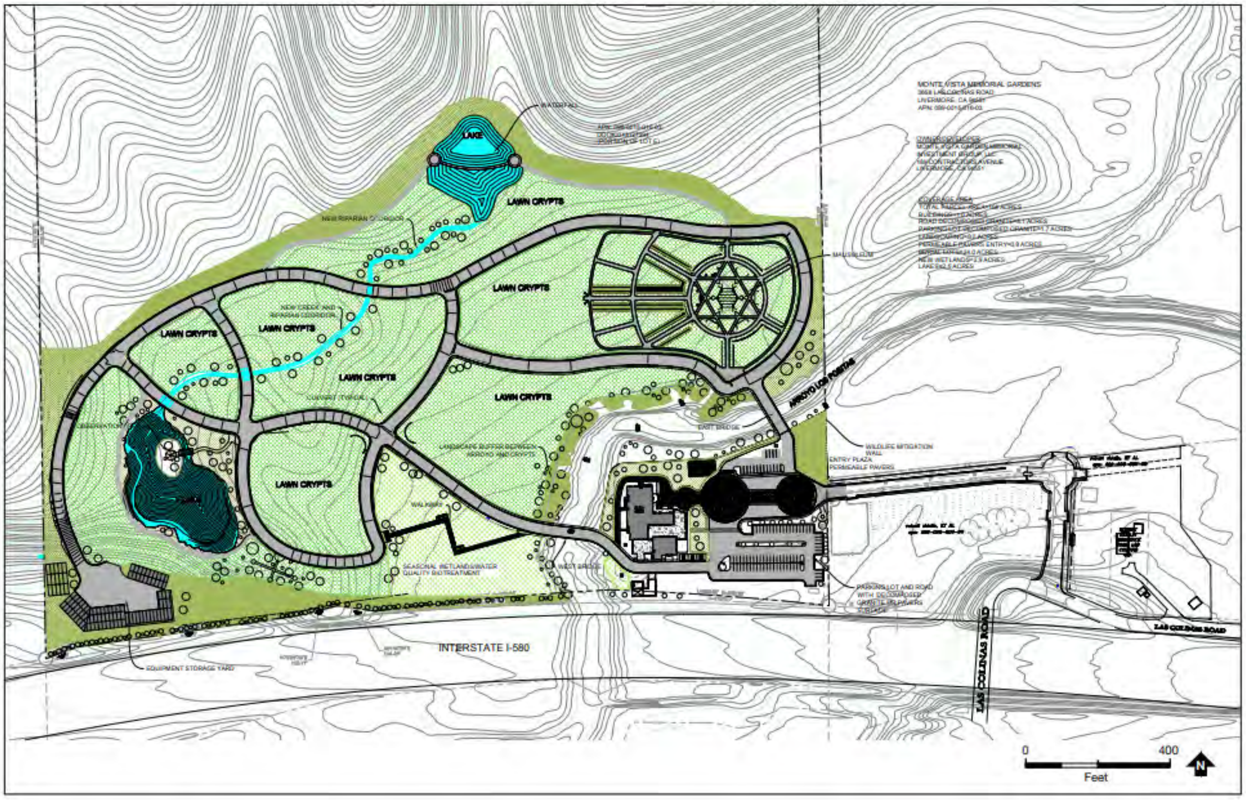
[1] BAAQMD Air Toxics NSR Program HRA Guidelines December 2016.

Technical data and calculations appear in Appendices A thru C.

Figure 1-1
Vicinity Map

Figure 1-2
Site Map

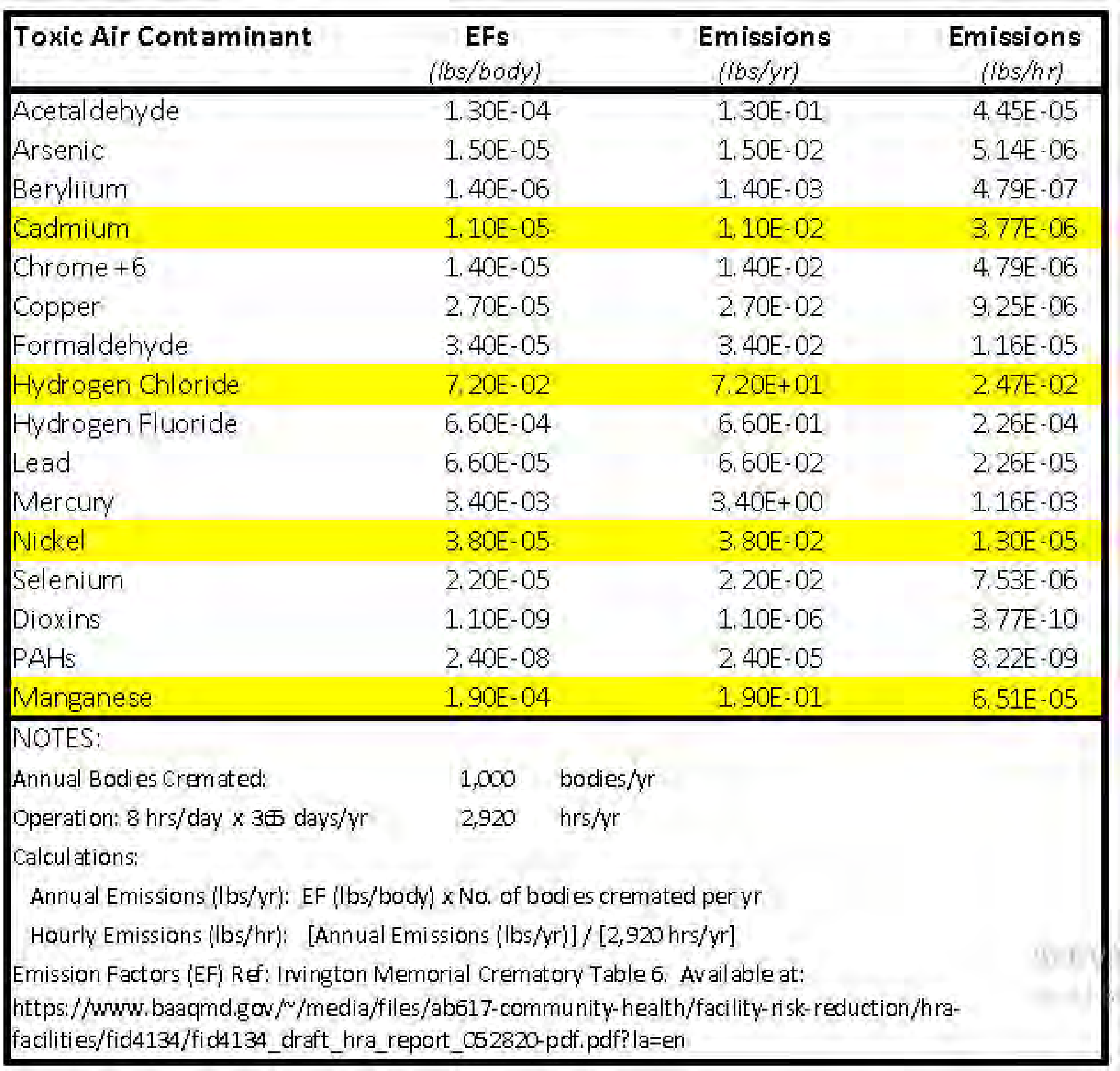
Source: RCH Group



SECTION 2: EMISSIONS SUMMARY

The Project consists on a natural gas fired crematory furnace equipped with an afterburner to control emissions. The crematory furnace would emit toxic air contaminants from the combustion of human remains, caskets and natural gas. EPS relied on BAAQMD approved emission factors for crematories such as the recently completed for Irvington Memorial Crematory in Fremont[2]. The annual and hourly toxic emissions based on 1,000 cremations per year are summarized in Table 2-1.

Table 2-1
Summary of Toxic Emissions Based on 1,000 Cremations per Year



Toxic Air Contaminant	EFs *(lbs/body)*	Emissions *(lbs/yr)*	Emissions *(lbs/hr)*
Acetaldehyde	1.30E-04	1.30E-01	4.45E-05
Arsenic	1.50E-05	1.50E-02	5.14E-06
Beryliium	1.40E-06	1.40E-03	4.79E-07
Cadmium	1.10E-05	1.10E-02	3.77E-06
Chrome +6	1.40E-05	1.40E-02	4.79E-06
Copper	2.70E-05	2.70E-02	9.25E-06
Formaldehyde	3.40E-05	3.40E-02	1.16E-05
Hydrogen Chloride	7.20E-02	7.20E+01	2.47E-02
Hydrogen Fluoride	6.60E-04	6.60E-01	2.26E-04
Lead	6.60E-05	6.60E-02	2.26E-05
Mercury	3.40E-03	3.40E+00	1.16E-03
Nickel	3.80E-05	3.80E-02	1.30E-05
Selenium	2.20E-05	2.20E-02	7.53E-06
Dioxins	1.10E-09	1.10E-06	3.77E-10
PAHs	2.40E-08	2.40E-05	8.22E-09
Manganese	1.90E-04	1.90E-01	6.51E-05

NOTES:

Annual Bodies Cremated:	1,000	bodies/yr
Operation: 8 hrs/day x 365 days/yr	2,920	hrs/yr

Calculations:

Annual Emissions (lbs/yr): EF (lbs/body) x No. of bodies cremated per yr

Hourly Emissions (lbs/hr): [Annual Emissions (lbs/yr)] / [2,920 hrs/yr]

Emission Factors (EF) Ref: Irvington Memorial Crematory Table 6. Available at:
https://www.baaqmd.gov/~/media/files/ab617-community-health/facility-risk-reduction/hra-facilities/fid4134/fid4134_draft_hra_report_052820-pdf.pdf?la=en

---

[2] BAAQMD (2020) Health Risk Assessment Facility # A4134 Irvington Memorial Cemetery, Fremont, CA.

For PM-2.5 emissions, the analysis relied on emission factors from San Diego County Air Pollution Control District. The recommended emission factor is 6.5 pounds of PM per ton of bodies charged. It is assumed that all PM is equivalent to PM-2.5. On this basis, it is estimated that annual PM-2.5 emissions would equal 487.5 pounds per year. Detailed calculations are provided in Table 2-2.

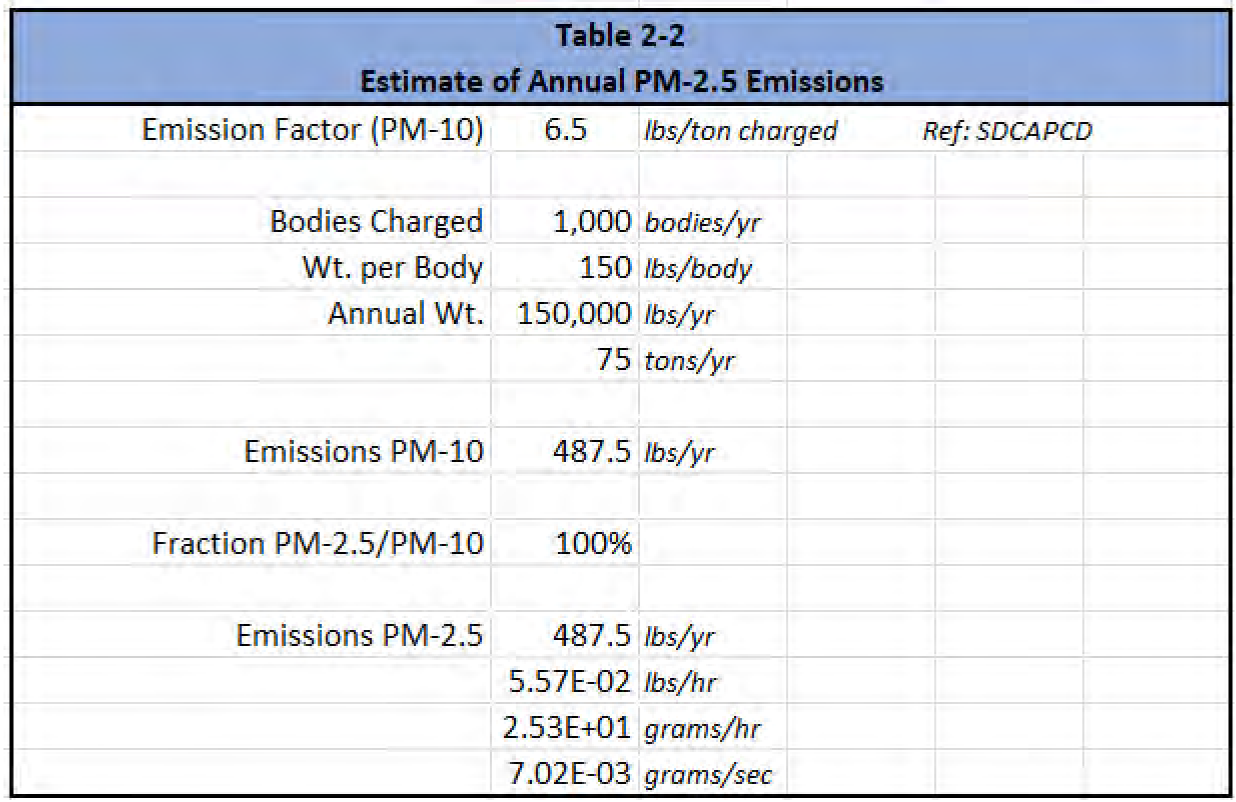


Table 2-2
Estimate of Annual PM-2.5 Emissions

Emission Factor (PM-10)	6.5	*lbs/ton charged*	*Ref: SDCAPCD*
Bodies Charged	1,000	*bodies/yr*	
Wt. per Body	150	*lbs/body*	
Annual Wt.	150,000	*lbs/yr*	
	75	*tons/yr*	
Emissions PM-10	487.5	*lbs/yr*	
Fraction PM-2.5/PM-10	100%		
Emissions PM-2.5	487.5	*lbs/yr*	
	5.57E-02	*lbs/hr*	
	2.53E+01	*grams/hr*	
	7.02E-03	*grams/sec*	

We note that more recent source test data[3] from Northern California crematories indicate that PM-10 emissions range from 2.67 to 0.7 pounds of PM per ton charged. As a result, the PM-10/PM-2.5 annual emissions calculated above are a conservative estimate of emissions.

---

[3] Blue Sky Environmental (May 17, 2021). Personal communication related to test results from 6 different crematory source tests.

SECTION 3: EXPOSURE ASSESSMENT

Exposure assessment involves translating the emission rate (e.g., lbs/hr) of individual toxic air contaminants (presented in Tables 2-1 and 2-2) into the concentration (e.g., grams/cubic meter or parts per million) of each toxic air contaminant. The key step in performing an exposure assessment is the application of an air dispersion model. The dispersion model incorporates the local meteorological data (wind speed, wind direction, local temperature, inversion heights, etc.), stack height, exhaust flow characteristics, into the concentration of individual air contaminant. EPA and the BAAQMD recommended AERMOD dispersion model (Version 19191) was employed in the current exposure assessment. The plot files created using Lakes Environmental (AERMODVIEW) Version 9.8.3 were exported into the HARP risk model.

This section discusses the model set-up, the extent of the modeling area, and the choice and duration of meteorological data used in the current analysis.

3.1 Model Set-Up

The following regulatory default options were used. They are based on the latest EPA and BAAQMD guidance on running AERMOD.

- Use of Calm Wind Processing
- Use of Missing Data Processing
- Use of Terrain Adjustment

The emissions were modeled as a single point source, 32 feet high. Exhaust flow rate and temperature were based on data from other, similar, crematories. Adjustment due to changes in elevation in the modeling area were included using the digital elevation model (DEM)[4] terrain data. Detailed model inputs are provided in Appendix A.

3.2 Modeling Grid and Coordinate System

A rectangular (x-y) Cartesian coordinate system was used. A region 1,875 x 1,875 meters (1.2 miles x 1.2 miles) was used. The modeling region divided into 75 meter cells for a total of 2,500 individual receptors in the vicinity of the project area. In addition to the modeling grid, discrete receptors were located at nearby homes and businesses. See Figure 3-1 for a layout of the modeling grid.

---

[4] Information available at: https://www.usgs.gov/faqs/what-are-digital-elevation-models-dems?qt-news_science_products=0#qt-news_science_products

.

3.3 Meteorological Data

Five years of hourly meteorological data from 2009 to 2014 (total 43,800 hours) was used in the exposure assessment. The surface data (wind speed, wind direction, temperature, etc.) were recorded at Livermore Municipal Airport located 3 miles to the West. These data were obtained from the California Air Resources Board[5] and are considered representative of the project site.

In addition to surface meteorological data, hourly inversion height data are also required. Five years of data from the nearest upper air station (Oakland, CA) were used to develop hourly inversion heights.

---

[5] CARB AERMOD Meteorological Files. Available at: https://ww2.arb.ca.gov/resources/documents/harp-aermod-meteorological-files

Figure 3-1
Lay-Out of Modeling Grid

SECTION 4: HEALTH RISK ANALYSIS

Health risks from exposure to various toxic air contaminants is discussed in this section. The emission rates of various TACs discussed in Section 2 are used as a basis to quantify various health risks. EPS used the HARP risk model developed by CARB and the Office of Environmental Health Hazard Assessment (OEHHA)[6] to calculate the actual health risks. The HARP (Hotspots Analysis and Reporting Program)[7] model options used are summarized in Table 4-1.

Table 4-1
HARP Risk Model Options

Parameter	Value
Exposure Durations	1-Hour 30 years (Residential) 25 years (Worker)
Intake Rate Percentile	OEHHA Derived
Deposition Velocity	0.02 meters/sec
Exposure Pathways	Minimum Mandatory Pathways Recommended for Chronic Risk Inhalation Only for Acute Risk
Age Sensitive Factors	Option Used for Residential Receptors
Fraction of Time at Home	73% for age 16 to 30 years 72% for age 2 to 16 years 85% of time for age 0 to 2 years

4.1 Residential Cancer Risk

The spatial distribution of residential cancer risk is shown in Figure 4-1. The results show that the cancer risk varies between 0.13 to less than 0.001 cancers per million depending on location. The maximum residential cancer risk occurs East of the project site. The cancer risk at this location is 0.13 cancers per million as shown in Figure 4-1. Risk at other residences is below 0.01 cancers per million. Excerpts of the HARP2 model are provided in Appendix B.

---

[6] OEHHA Hotspots Analysis and Reporting Program (HARP) available at: https://ww3.arb.ca.gov/toxics/harp/harp.htm

[7] HARP: The Hotspots Analysis and Reporting Program (HARP) is a software suite that addresses the programmatic requirements of the Air Toxics "Hot Spots" Program (Assembly Bill 2588). The current risk analysis, however, is not intended to satisfy requirements of AB-2588 reporting program.

4.2 Workplace Cancer Risk

The maximum worker risk varies between 0.00043 to less than 0.00001 cancer per million. The maximum worker risk is Southwest of the project site as shown in Figure 4-2.

4.3 Non-Cancer Health Risk

The maximum non-cancer risks at this location are calculated in terms of a hazard index (HI) as follows:

Maximum Chronic Hazard Index (HI):	0.0148
Maximum Acute Hazard Index (HI):	0.0060

Excerpts of the HARP model showing the calculated HIs are provided in Appendix B.

Figure 4-1
Spatial Variation of Residential Cancer Risk per Million

Figure 4-2
Spatial Variation of Worker Cancer Risk per Million

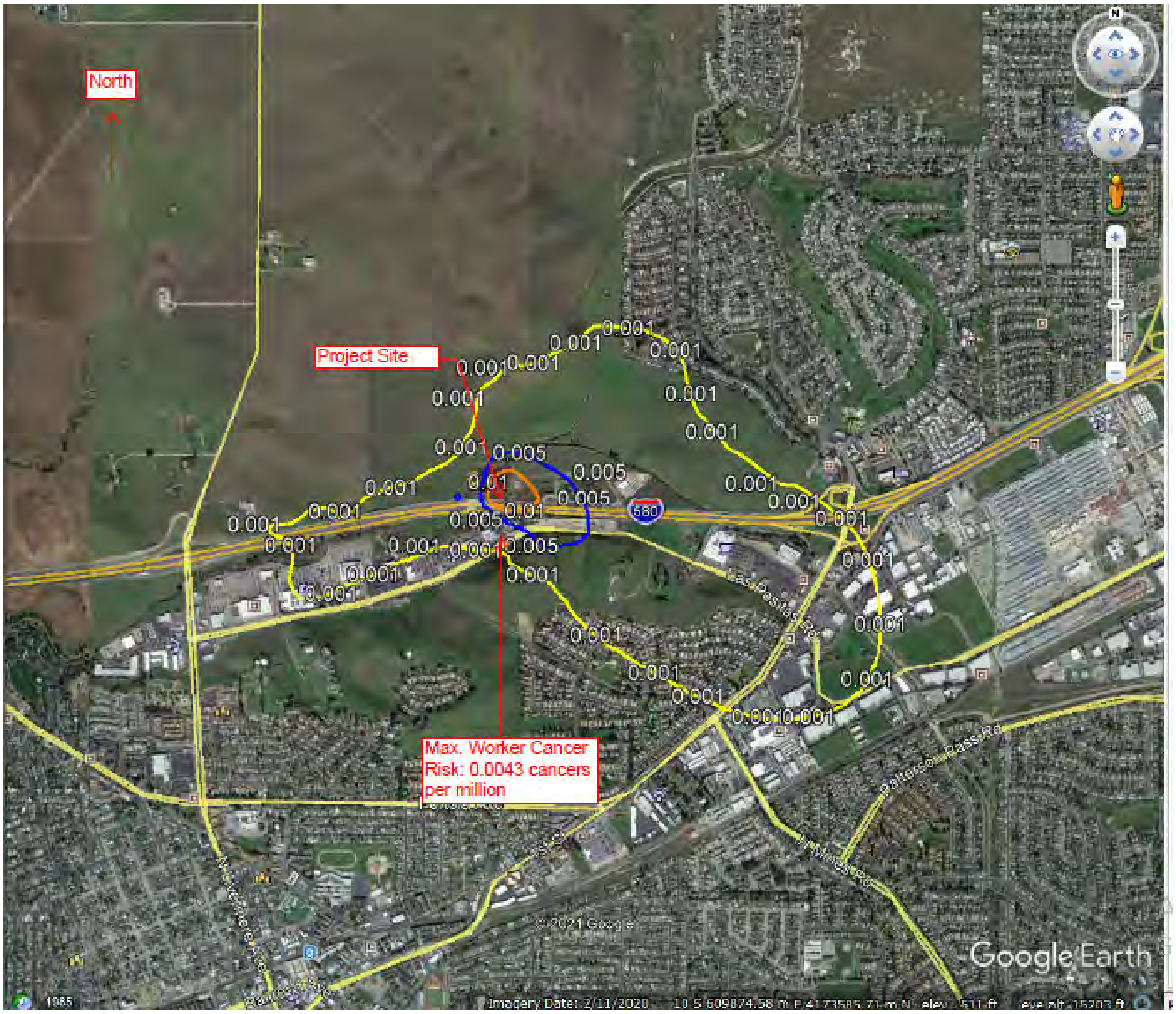


Figure 4-3
Spatial Variation of Chronic Hazard Index

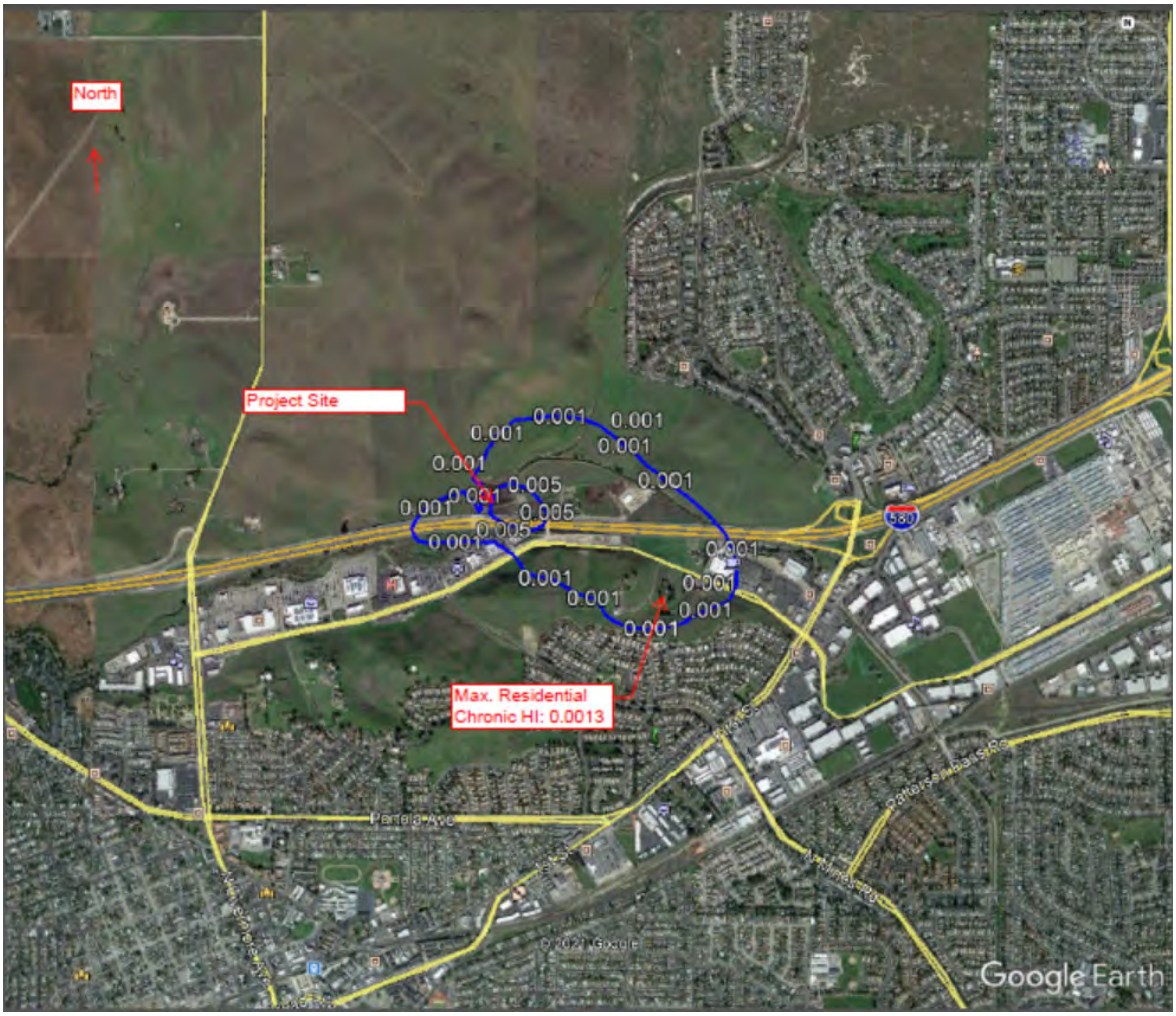
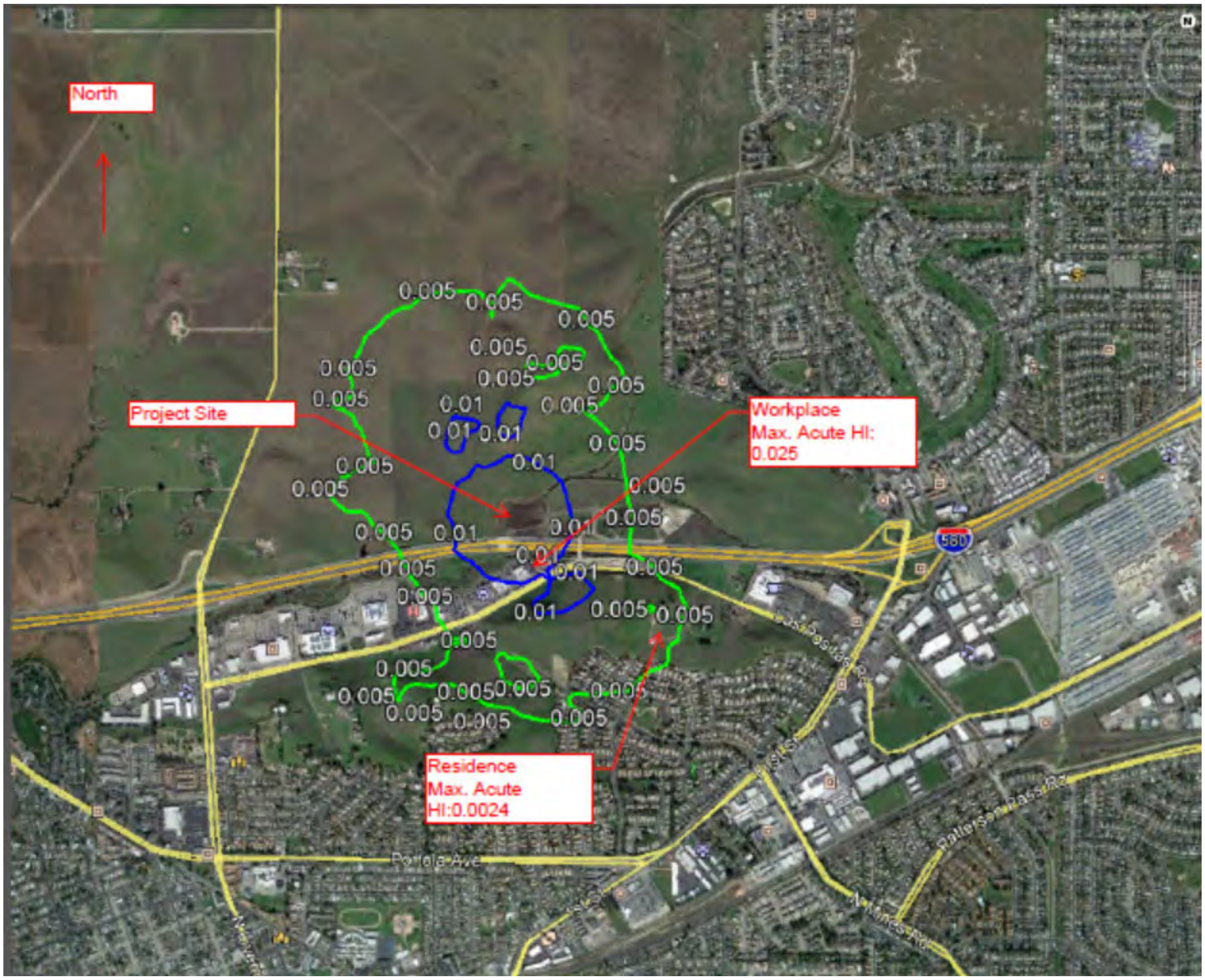


Figure 4-4
Spatial Variation of Acute Hazard Index



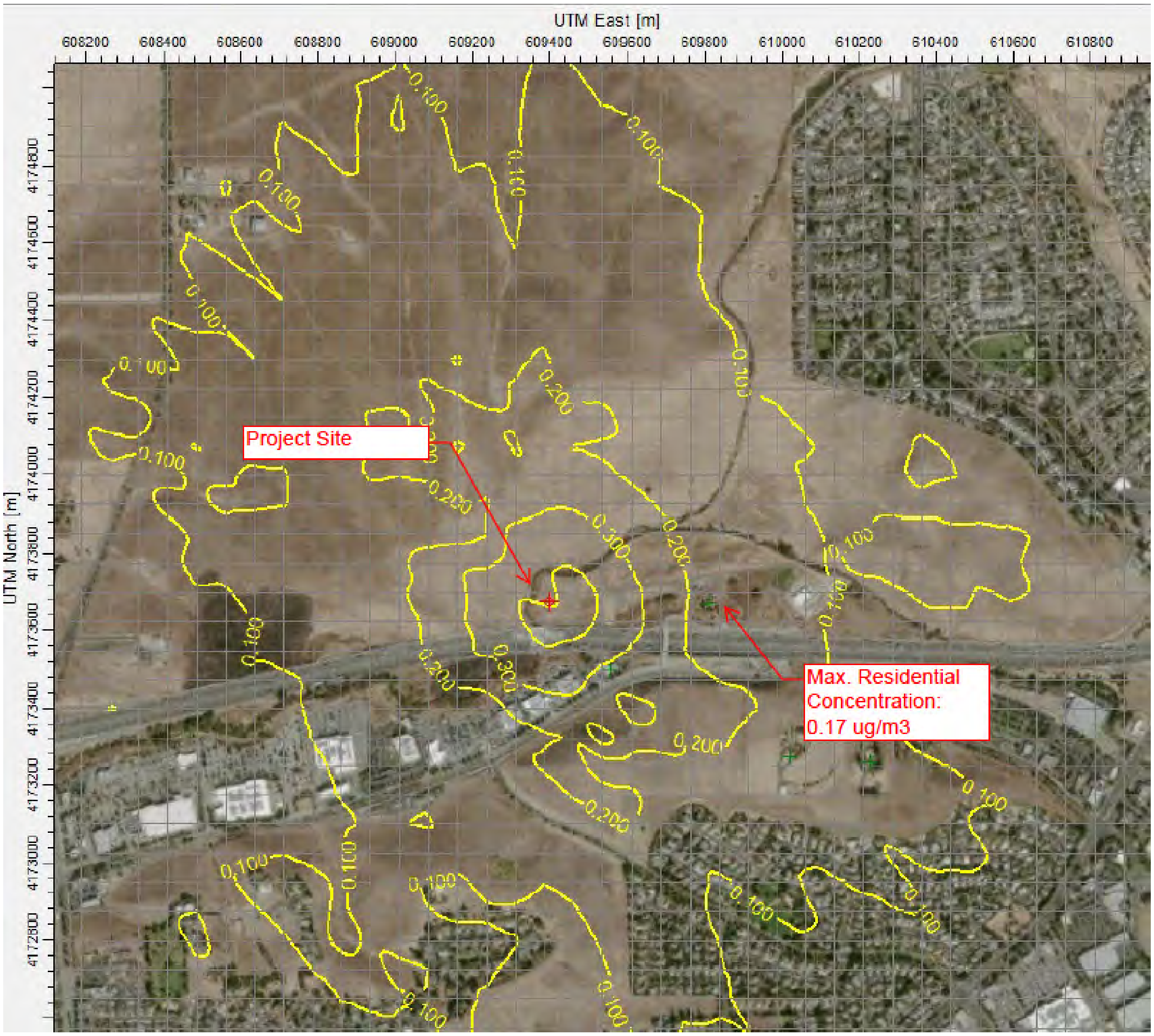
4.4 Non-Cancer Health Risks (PM-2.5)

The results of the annual PM-2.5 concentration modeling are presented in Figure 4-5. The maximum annual PM-2.5 concentration at the nearest home is 0.17 micrograms per cubic meter (ug/m3).

Figure 4-5

Spatial Variation of Annual PM-2.5 Concentration

(in micrograms per cubic meter)



SECTION 5: CUMULATIVE CANCER RISK

EPS evaluated cumulative cancer risk that included any sources of toxic emissions within 1,000 feet of the project site. The 1,000 foot requirement is stipulated in the BAAQMD CEQA Guidelines.

There are no other stationary sources of toxic air contaminants within 1,000 feet of the project site. However, portions of I-580 are within 1,000 feet of the project site. The main toxic air contaminant released from I-580 is diesel particulate matter from heavy duty diesel trucks. EPS reviewed the daily average traffic data from CalTrans[8] for 2018 and typical emissions from HD trucks (EMFAC 2017 for the Bay Area)[9]. HD trucks refers to trucks with 5 or more axels. Average daily truck traffic along I-580 near North Livermore Avenue is 11,991 trucks per day with a DPM emission rate of 0.059 grams per mile. The emission rate of PM-2.5 calculated using EMFAC 2017 is used as a surrogate for DPM. Detailed calculations are provided in Appendix C.

The results of the cumulative cancer risk analysis are presented in Figure 4-6. The cumulative cancer risk at the nearest residence East of the project site is estimate to equal 29.5 cancers per million.

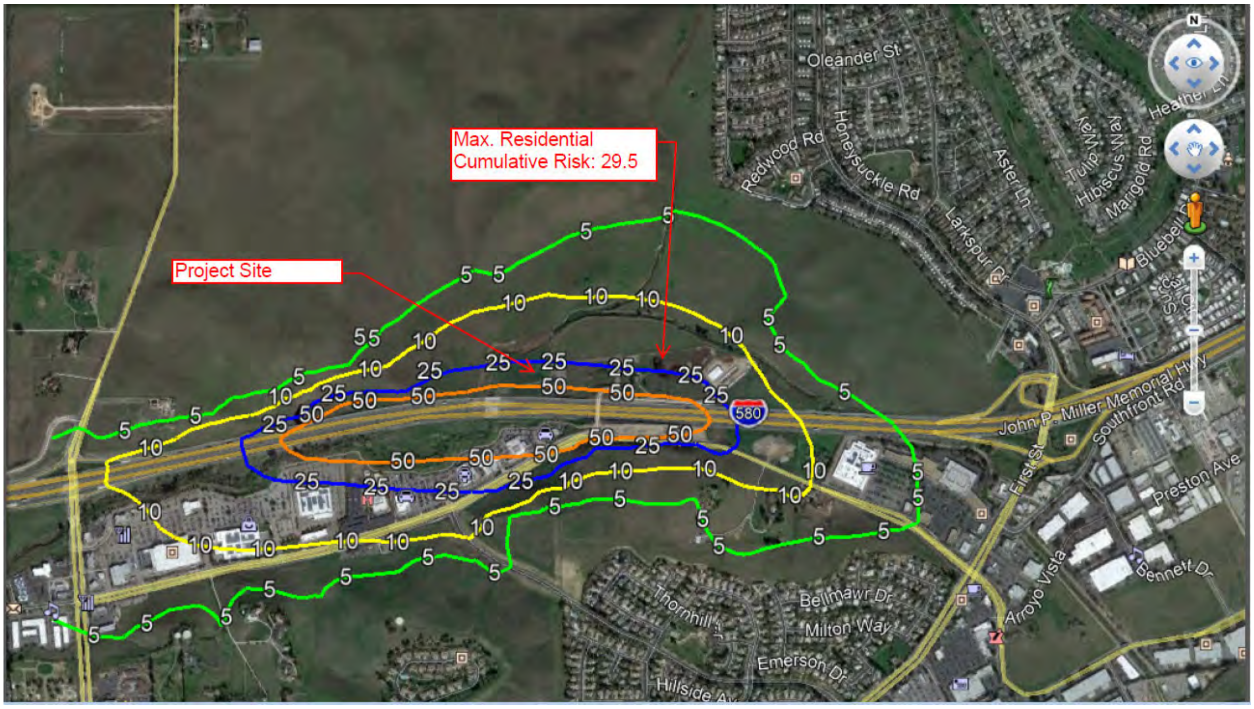
---

[8] CalTrans (2021) “Traffic Censes Program”. Available at: https://dot.ca.gov/programs/traffic-operations/census

[9] EMFAC 2017 “Mobile Source Emissions Inventory EMFAC 2017 Web Database. Available at: https://arb.ca.gov/emfac/2017/

Figure 4-6
Spatial Variation of Cumulative Cancer Risk

(per one million)



SECTION 6: RESULTS AND CONCLUSIONS

The results of the current analysis are summarized in Table 5-1. These results demonstrate that public health risks associated with the operation of the proposed crematory would not lead to significant public health risks.

Table 5-1
Summary of Project Risks

Risk Metric	Risk Value	Significance Threshold	Significant?
Maximum Residential Cancer Risk	0.13 (per million)	10 (per million)	No
Maximum Worker Cancer Risk	0.0043 (per million)	10 (per million)	No
Maximum Chronic Hazard Index	0.0148	1.0	No
Maximum Acute Hazard Index	0.006	1.0	No
Annual PM-2.5 Concentration	0.17	0.3	No
Cumulative Cancer Risk	29.5	100	No

The risk assessment process contains numerous, conservative assumption to ensure that public health risks are not underestimated. These assumptions are related to the exposure duration, toxicity data and use of Gaussian type statistical atmospheric dispersion models. For example, it is very unlikely any individual would remain at the same location for 30 years. As a result, this assumption substantially overstated the exposure and the health risks presented in this report. This is discussed in the next section.

SECTION 7: UNCERTAINTIES IN RISK EVALUATION

The HRA presented in this report contains numerous assumptions and uncertainties associated with estimates of emissions, dispersion modeling and risk characterization. The estimated risks in this HRA are based primarily on a series of conservative assumptions related to predicted environmental concentrations, exposure and chemical toxicity. As a result, the actual risks to nearby residents or workers would be 10 to 50 times lower than estimates presented in this report. These assumptions and uncertainties are discussed in this section.

Emissions Estimates

For long-term risk evaluation, EPS used emissions based on 1,000 cremations per year and that these emissions would remain unchanged over the next 30 years. In reality, emissions will decline in the future in response to future, more stringent, regulations.

Estimate of Exposure Concentration

The algorithms used in the AERMOD dispersion model tend to over-predict the actual concentration. According to the EPA[10], errors of +/- 10% to 40% are typical for the highest predicted concentrations due to limitations in the algorithms. As a result, the methodology used by EPS will overstate the actual concentration of DPM.

Exposure Assumptions

The 2015 OEHHA Guidelines assume that individuals spend 73% of the time at home. This is very conservative in that residents near the project site are likely to stay home every day for 30 years. This overestimate of exposure directly leads to an over estimate of cancer risk

---

[10] USEPA 2005: “Guidelines on Air Quality Models (Revised), 40 CFR 51, Appendix W. Available at: https://www.epa.gov/ttn/scram/guidance_permit.htm#appw

SECTION 8: REFERENCES

BAAQMD: Air Toxics NSR Program HRA Guidelines December 2016.

BAAQMD: CEQA Guidelines May 2017. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

CalEPA (2012) “Technical Support Document for Exposure Assessment and Stochastic Analysis. Office of Environmental Health Hazard Assessment. California Environmental Protection Agency, August 2012.

CARB (2003) HARP User’s Guide. Available at: http://www.arb.ca.gov/toxics/harp/harp.htm December 2003.

CARB (2004) Final Report to Research Division “Internal Combustion Engines (ICE) Air Toxics Emissions” Prepared by Zhu, Durbin, Norbeck and Cocker (July 2004).

EPA (2004) “User’s Guide for the AMS/EPA Regulatory Model – AERMOD”. EPA Document No. EPA=454/B-03-001 September 2004.

OEHHA (2014) Consolidated Table of Approved health Risk Values. Cal EPA, Office of Environmental Health Hazard Assessment. Available at: file:///C:/2014%20Feather%20River%20AQMD/Hollycross%20Cemetary/OEHHA%20contable.pdf. July 3, 2014.

SDCAPCD (2021) Crematory and Incinerator Emissions. Available at: https://www.sdapcd.org/content/dam/sdc/apcd/PDF/Misc/EFT/Crematory_and_Incinerator/APCD_Crematory_Natural_Gas_Fired_Human_Remains_Controlled_Air.pdf

APPENDIX A

Excerpts of AERMOD Model Report

```
**
****************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 9.9.0
** Lakes Environmental Software Inc.
** Date: 2/21/2021
** File: C:\Lakes\AERMOD View\Monte_Vista\Monte_Vista.ADI
**
****************************************
**
**
****************************************
** AERMOD Control Pathway
****************************************
**
**
CO STARTING
   TITLEONE C:\Lakes\AERMOD View\Monte_Vista\Monte_Vista.isc
   TITLETWO Monte Vista memorial - Plot File Creation 32 feet stack
   MODELOPT DFAULT CONC
   AVERTIME 1 PERIOD
   URBANOPT 500000
   POLLUTID GENERIC
   RUNORNOT RUN
   ERRORFIL Monte_Vista.err
CO FINISHED
**
****************************************
** AERMOD Source Pathway
****************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
   LOCATION STCK1        POINT      609400.000  4173673.530      147.000
** DESCRSRC Crematory Stack
** Source Parameters **
   SRCPARAM STCK1              1.0     9.754  1028.000   4.67721     0.700
   URBANSRC STCK1
   SRCGROUP STCK1    STCK1
   SRCGROUP ALL
SO FINISHED
**
****************************************
** AERMOD Receptor Pathway
****************************************
**
**
RE STARTING
   INCLUDED Monte_Vista.rou
RE FINISHED
**
****************************************
```

```
** AERMOD Meteorology Pathway
****************************************
**
**
ME STARTING
   SURFFILE "..\0 0 0 Met Data\Livermore\724927.SFC"
   PROFFILE "..\0 0 0 Met Data\Livermore\724927.PFL"
   SURFDATA 23285 2009
   UAIRDATA 23230 2009 OAKLAND/WSO_AP
   PROFBASE 100.58 METERS
ME FINISHED
**
****************************************
** AERMOD Output Pathway
****************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 1ST
** Auto-Generated Plotfiles
   PLOTFILE 1 ALL 1ST Monte_Vista.AD\01H1GALL.PLT 31
   PLOTFILE 1 STCK1 1ST Monte_Vista.AD\01H1G001.PLT 32
   PLOTFILE PERIOD ALL Monte_Vista.AD\PE00GALL.PLT 33
   PLOTFILE PERIOD STCK1 Monte_Vista.AD\PE00G000.PLT 34
   SUMMFILE Monte_Vista.sum
OU FINISHED

 ***********************************
 *** SETUP Finishes Successfully ***
 ***********************************
```

```
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Model Is Setup For Calculation of Average CONCentration Values.

  --  DEPOSITION LOGIC  --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
**Model Uses NO WET DEPLETION.  WETDPLT  =  F

**Model Uses URBAN Dispersion Algorithm for the SBL for     1 Source(s),
  for Total of    1 Urban Area(s):
  Urban Population =    500000.0 ;  Urban Roughness Length =  1.000 m

**Model Uses Regulatory DEFAULT Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Urban Roughness Length of 1.0 Meter Assumed.

**Other Options Specified:
        CCVR_Sub - Meteorological data includes CCVR substitutions
        TEMP_Sub - Meteorological data includes TEMP substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of:  GENERIC

**Model Calculates  1 Short Term Average(s) of:   1-HR
    and Calculates PERIOD Averages

**This Run Includes:      1 Source(s);       2 Source Group(s); and    2500 Receptor(s)

               with:      1 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:      0 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 RLINE/RLINEXT source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with      0 line(s)


**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date:  14134

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
```

```
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                               m for Missing Hours
                                                               b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   100.58 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      3.9 MB of RAM.

**Input Runstream File:          aermod.inp
**Output Print File:             aermod.out

**Detailed Error/Message File:   Monte_Vista.err
**File for Summary of Results:   Monte_Vista.sum
```

```
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN


                                                 *** POINT SOURCE DATA ***

              NUMBER EMISSION RATE                    BASE     STACK   STACK    STACK     STACK    BLDG   URBAN  CAP/  EMIS RATE
  SOURCE       PART.  (GRAMS/SEC)     X        Y      ELEV.    HEIGHT  TEMP.   EXIT VEL. DIAMETER  EXISTS SOURCE HOR   SCALAR
    ID         CATS.               (METERS) (METERS) (METERS) (METERS) (DEG.K)  (M/SEC)  (METERS)                      VARY BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

STCK1            0   0.10000E+01  609400.0 4173673.5   147.0     9.75  1028.00     4.68     0.70    NO      YES   NO
```

```
                                          *** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID                                             SOURCE IDs
-----------                                             ----------


 STCK1      STCK1       ,

 ALL        STCK1       ,
```

```
                                         *** SOURCE IDs DEFINED AS URBAN SOURCES ***

 URBAN ID   URBAN POP                                   SOURCE IDs
 --------   ---------                                   ----------


              500000.   STCK1       ,
```

```
                                       *** GRIDDED RECEPTOR NETWORK SUMMARY ***

                                 *** NETWORK ID: UCART1   ;  NETWORK TYPE: GRIDCART ***

                                         *** X-COORDINATES OF GRID ***
                                                   (METERS)

      608036.4,  608111.4,  608186.4,  608261.4,  608336.4,  608411.4,  608486.4,  608561.4,  608636.4,  608711.4,
      608786.4,  608861.4,  608936.4,  609011.4,  609086.4,  609161.4,  609236.4,  609311.4,  609386.4,  609461.4,
      609536.4,  609611.4,  609686.4,  609761.4,  609836.4,  609911.4,  609986.4,  610061.4,  610136.4,  610211.4,
      610286.4,  610361.4,  610436.4,  610511.4,  610586.4,  610661.4,  610736.4,  610811.4,  610886.4,  610961.4,
      611036.4,  611111.4,  611186.4,  611261.4,  611336.4,  611411.4,  611486.4,  611561.4,  611636.4,  611711.4,


                                         *** Y-COORDINATES OF GRID ***
                                                   (METERS)

     4171748.4, 4171823.4, 4171898.4, 4171973.4, 4172048.4, 4172123.4, 4172198.4, 4172273.4, 4172348.4, 4172423.4,
     4172498.4, 4172573.4, 4172648.4, 4172723.4, 4172798.4, 4172873.4, 4172948.4, 4173023.4, 4173098.4, 4173173.4,
     4173248.4, 4173323.4, 4173398.4, 4173473.4, 4173548.4, 4173623.4, 4173698.4, 4173773.4, 4173848.4, 4173923.4,
     4173998.4, 4174073.4, 4174148.4, 4174223.4, 4174298.4, 4174373.4, 4174448.4, 4174523.4, 4174598.4, 4174673.4,
     4174748.4, 4174823.4, 4174898.4, 4174973.4, 4175048.4, 4175123.4, 4175198.4, 4175273.4, 4175348.4, 4175423.4,
```

```
*** AERMOD - VERSION  19191 ***   *** C:\Lakes\AERMOD View\Monte_Vista\Monte_Vista.isc                   ***        02/21/21
*** AERMET - VERSION  14134 ***   *** Monte Vista memorial - Plot File Creation 32 feet stack            ***        20:22:43
                                                                                                                    PAGE   6
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                 *** NETWORK ID: UCART1   ;  NETWORK TYPE: GRIDCART ***

                                               * ELEVATION HEIGHTS IN METERS *

   Y-COORD  |                                                 X-COORD (METERS)
   (METERS) |     608036.41    608111.41    608186.41    608261.41    608336.41    608411.41    608486.41    608561.41    608636.41
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 4175423.39 |        158.00       158.00       158.00       158.00       159.00       160.60       162.10       163.60       164.80
 4175348.39 |        157.00       157.40       157.80       158.00       159.00       160.10       162.10       163.60       165.10
 4175273.39 |        156.90       157.00       157.20       157.70       159.00       160.00       162.00       163.60       165.40
 4175198.39 |        156.00       156.00       157.00       157.60       158.00       159.60       162.50       165.40       166.30
 4175123.39 |        155.30       156.00       157.00       157.00       158.10       160.60       164.10       165.60       167.80
 4175048.39 |        155.00       155.40       156.10       157.60       159.10       161.70       164.30       165.70       167.10
 4174973.39 |        154.10       155.00       156.10       157.60       159.80       162.60       165.00       165.60       165.30
 4174898.39 |        154.00       155.00       156.10       157.60       159.90       162.60       164.80       164.00       165.20
 4174823.39 |        154.00       155.00       156.10       157.60       160.10       163.60       165.70       165.70       168.40
 4174748.39 |        153.80       154.60       157.10       159.10       161.30       163.80       166.40       169.80       172.40
 4174673.39 |        152.30       154.60       157.10       159.30       162.20       165.60       167.90       171.60       174.90
 4174598.39 |        152.00       154.60       157.30       159.80       163.10       164.20       168.30       170.40       174.90
 4174523.39 |        153.70       155.50       158.80       161.90       163.80       166.60       170.70       170.90       173.20
 4174448.39 |        155.00       156.60       158.10       163.20       166.10       167.80       170.30       171.70       173.40
 4174373.39 |        154.20       157.30       158.30       164.20       167.10       169.40       171.10       172.50       171.00
 4174298.39 |        157.50       162.90       166.70       165.00       167.40       170.70       172.00       171.40       170.00
 4174223.39 |        158.60       166.20       171.10       170.00       168.10       170.10       171.00       171.90       169.60
 4174148.39 |        153.90       160.90       169.20       170.40       168.80       168.90       170.10       171.20       167.50
 4174073.39 |        152.20       158.50       169.20       171.00       166.20       168.30       168.30       168.40       166.10
 4173998.39 |        152.10       157.50       165.00       162.60       157.90       160.30       163.40       163.60       161.50
 4173923.39 |        152.10       155.70       157.20       155.20       154.30       166.40       162.60       157.00       158.60
 4173848.39 |        153.10       154.60       153.70       152.80       159.30       166.20       169.50       166.80       166.50
 4173773.39 |        153.00       153.60       152.00       151.30       153.30       157.80       166.40       169.20       167.50
 4173698.39 |        152.80       152.40       151.10       154.50       157.30       157.70       160.30       158.20       164.80
 4173623.39 |        152.70       151.60       150.20       154.80       159.00       158.90       157.90       154.70       157.20
 4173548.39 |        152.60       148.10       150.80       154.00       159.30       161.00       159.80       155.70       149.70
 4173473.39 |        150.00       147.50       157.70       158.50       155.70       153.20       147.60       145.20       145.70
 4173398.39 |        147.80       145.80       149.40       146.00       144.20       142.80       140.80       141.20       140.70
 4173323.39 |        144.40       141.80       140.50       140.00       140.00       140.00       140.00       140.00       140.00
 4173248.39 |        140.70       140.00       140.00       140.00       140.90       140.20       140.00       141.10       142.00
 4173173.39 |        139.10       140.60       141.10       141.70       142.00       141.90       141.80       142.70       143.70
 4173098.39 |        139.10       141.00       142.00       143.00       143.30       144.20       144.30       145.20       145.20
 4173023.39 |        139.00       140.60       142.80       144.40       145.10       145.90       148.20       152.20       161.20
 4172948.39 |        139.00       140.60       143.30       145.10       148.60       159.10       161.90       152.40       172.40
 4172873.39 |        139.00       140.60       144.80       147.50       159.80       170.10       170.20       153.30       160.10
 4172798.39 |        143.20       146.10       148.00       156.20       161.80       165.40       172.60       161.70       155.20
 4172723.39 |        146.30       146.80       150.60       152.80       156.30       162.60       167.90       169.50       159.00
 4172648.39 |        145.00       145.80       146.00       147.30       149.90       153.80       159.50       164.60       164.20
 4172573.39 |        144.00       144.70       145.00       146.00       146.70       150.00       153.60       156.30       157.60
 4172498.39 |        143.80       144.00       145.00       145.00       146.00       147.60       150.80       151.80       153.90
```

```
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                 *** NETWORK ID: UCART1   ;  NETWORK TYPE: GRIDCART ***

                                               * ELEVATION HEIGHTS IN METERS *

   Y-COORD  |                                                 X-COORD (METERS)
   (METERS) |     608036.41    608111.41    608186.41    608261.41    608336.41    608411.41    608486.41    608561.41    608636.41
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 4172423.39 |        143.00       144.00       145.00       145.00       146.00       146.60       148.30       150.10       152.10
 4172348.39 |        143.00       143.40       144.00       145.00       145.10       146.00       147.10       148.90       151.80
 4172273.39 |        142.30       143.60       144.00       144.70       145.00       145.70       146.10       148.10       150.30
 4172198.39 |        142.30       143.00       144.00       144.00       145.00       145.40       146.00       147.40       148.80
 4172123.39 |        143.00       143.00       144.00       144.00       145.00       145.00       146.00       146.60       148.00
 4172048.39 |        143.00       143.00       144.00       144.00       145.00       145.00       146.00       146.00       147.10
 4171973.39 |        143.00       143.60       144.00       144.00       145.00       145.00       146.00       146.00       147.00
 4171898.39 |        143.00       144.00       144.00       144.70       145.00       145.10       146.00       146.00       147.00
 4171823.39 |        143.00       144.00       144.10       145.00       145.10       146.00       146.00       146.90       147.10
 4171748.39 |        143.10       144.00       145.00       145.00       146.00       146.00       147.00       147.00       147.30
```

```
*** AERMOD - VERSION  19191 ***   *** C:\Lakes\AERMOD View\Monte_Vista\Monte_Vista.isc                     ***        02/21/21
*** AERMET - VERSION  14134 ***   *** Monte Vista memorial - Plot File Creation 32 feet stack              ***        20:22:43
                                                                                                                      PAGE  95
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                             *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                 INCLUDING SOURCE(S):     STCK1       ,

                                  *** NETWORK ID: UCART1   ;  NETWORK TYPE: GRIDCART ***

                                       ** CONC OF GENERIC  IN MICROGRAMS/M**3                              **

 Y-COORD  |                                                  X-COORD (METERS)
 (METERS) |       611411.41               611486.41               611561.41               611636.41               611711.41
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

4172423.4 |      9.16608 (12022704)      9.04924 (12123118)      8.70863 (11122504)      8.39229 (11122504)      8.14471 (10121819)
4172348.4 |      9.10582 (10020321)      8.89070 (10020321)      8.70496 (12123118)      8.56826 (12123118)      8.25685 (11122504)
4172273.4 |      8.97293 (10120324)      8.67665 (10020321)      8.68335 (10020321)      8.43991 (12022704)      8.32021 (12123118)
4172198.4 |      8.81017 (09122007)      8.67752 (10120324)      8.42847 (10120324)      8.38519 (10020321)      8.21179 (10020321)
4172123.4 |      8.39445 (10010822)      8.46582 (09122007)      8.37436 (09122007)      8.26738 (10120324)      7.99254 (10020321)
4172048.4 |      8.46815 (11122602)      8.15481 (10010822)      8.07826 (09122007)      8.13887 (09122007)      8.00617 (10120324)
4171973.4 |      8.43950 (13122908)      8.19127 (11122602)      7.90701 (11122602)      7.67047 (09122007)      7.85242 (09122007)
4171898.4 |      8.33607 (13012505)      8.15718 (13012505)      7.95604 (13122908)      7.73661 (11122602)      7.47759 (10010822)
4171823.4 |      7.73600 (09050924)      8.04143 (13012505)      7.94266 (13012505)      7.75235 (13122908)      7.54204 (11122602)
4171748.4 |      7.64898 (13022722)      7.50096 (09050924)      7.75674 (13012505)      7.72415 (13012505)      7.54944 (13122908)
```

```
                                             *** THE SUMMARY OF MAXIMUM PERIOD ( 43872 HRS) RESULTS ***


                                         ** CONC OF GENERIC  IN MICROGRAMS/M**3                          **

                                                                                                                     NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

STCK1     1ST HIGHEST VALUE IS      10.34218 AT (  609536.41,  4173623.39,   148.20,   197.00,    0.00)  GC  UCART1
          2ND HIGHEST VALUE IS       8.13844 AT (  609536.41,  4173698.39,   147.30,   197.00,    0.00)  GC  UCART1
          3RD HIGHEST VALUE IS       7.47978 AT (  609461.41,  4173623.39,   148.00,   197.00,    0.00)  GC  UCART1
          4TH HIGHEST VALUE IS       7.01351 AT (  609611.41,  4173623.39,   150.40,   197.00,    0.00)  GC  UCART1
          5TH HIGHEST VALUE IS       5.84930 AT (  609461.41,  4173698.39,   147.20,   197.00,    0.00)  GC  UCART1
          6TH HIGHEST VALUE IS       5.49486 AT (  609611.41,  4173698.39,   148.80,   197.00,    0.00)  GC  UCART1
          7TH HIGHEST VALUE IS       4.99472 AT (  609611.41,  4173548.39,   151.60,   197.00,    0.00)  GC  UCART1
          8TH HIGHEST VALUE IS       4.91521 AT (  609686.41,  4173623.39,   152.40,   197.00,    0.00)  GC  UCART1
          9TH HIGHEST VALUE IS       4.53592 AT (  609686.41,  4173548.39,   155.10,   197.00,    0.00)  GC  UCART1
         10TH HIGHEST VALUE IS       4.19418 AT (  609536.41,  4173548.39,   148.20,   197.00,    0.00)  GC  UCART1

ALL       1ST HIGHEST VALUE IS      10.34218 AT (  609536.41,  4173623.39,   148.20,   197.00,    0.00)  GC  UCART1
          2ND HIGHEST VALUE IS       8.13844 AT (  609536.41,  4173698.39,   147.30,   197.00,    0.00)  GC  UCART1
          3RD HIGHEST VALUE IS       7.47978 AT (  609461.41,  4173623.39,   148.00,   197.00,    0.00)  GC  UCART1
          4TH HIGHEST VALUE IS       7.01351 AT (  609611.41,  4173623.39,   150.40,   197.00,    0.00)  GC  UCART1
          5TH HIGHEST VALUE IS       5.84930 AT (  609461.41,  4173698.39,   147.20,   197.00,    0.00)  GC  UCART1
          6TH HIGHEST VALUE IS       5.49486 AT (  609611.41,  4173698.39,   148.80,   197.00,    0.00)  GC  UCART1
          7TH HIGHEST VALUE IS       4.99472 AT (  609611.41,  4173548.39,   151.60,   197.00,    0.00)  GC  UCART1
          8TH HIGHEST VALUE IS       4.91521 AT (  609686.41,  4173623.39,   152.40,   197.00,    0.00)  GC  UCART1
          9TH HIGHEST VALUE IS       4.53592 AT (  609686.41,  4173548.39,   155.10,   197.00,    0.00)  GC  UCART1
         10TH HIGHEST VALUE IS       4.19418 AT (  609536.41,  4173548.39,   148.20,   197.00,    0.00)  GC  UCART1


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

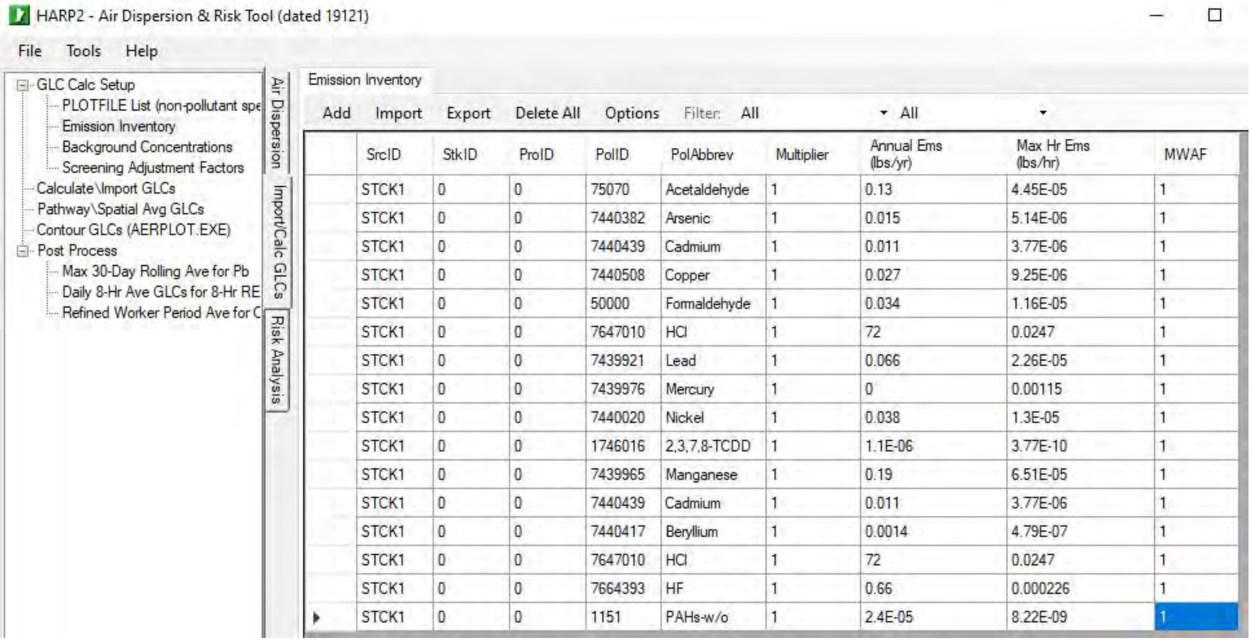
```
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

                                                *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                    ** CONC OF GENERIC  IN MICROGRAMS/M**3                          **

                                                      DATE                                                                  NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

STCK1    HIGH   1ST HIGH VALUE IS      98.94553  ON 13102723: AT (  609461.41,  4173698.39,   147.20,   197.00,    0.00)  GC  UCART1

ALL      HIGH   1ST HIGH VALUE IS      98.94553  ON 13102723: AT (  609461.41,  4173698.39,   147.20,   197.00,    0.00)  GC  UCART1


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            0 Warning Message(s)
A Total of        15235 Informational Message(s)

A Total of        43872 Hours Were Processed

A Total of        13448 Calm Hours Identified

A Total of         1787 Missing Hours Identified (  4.07 Percent)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
              ***  NONE  ***


   ************************************
   *** AERMOD Finishes Successfully ***
   ************************************
```

APPENDIX B

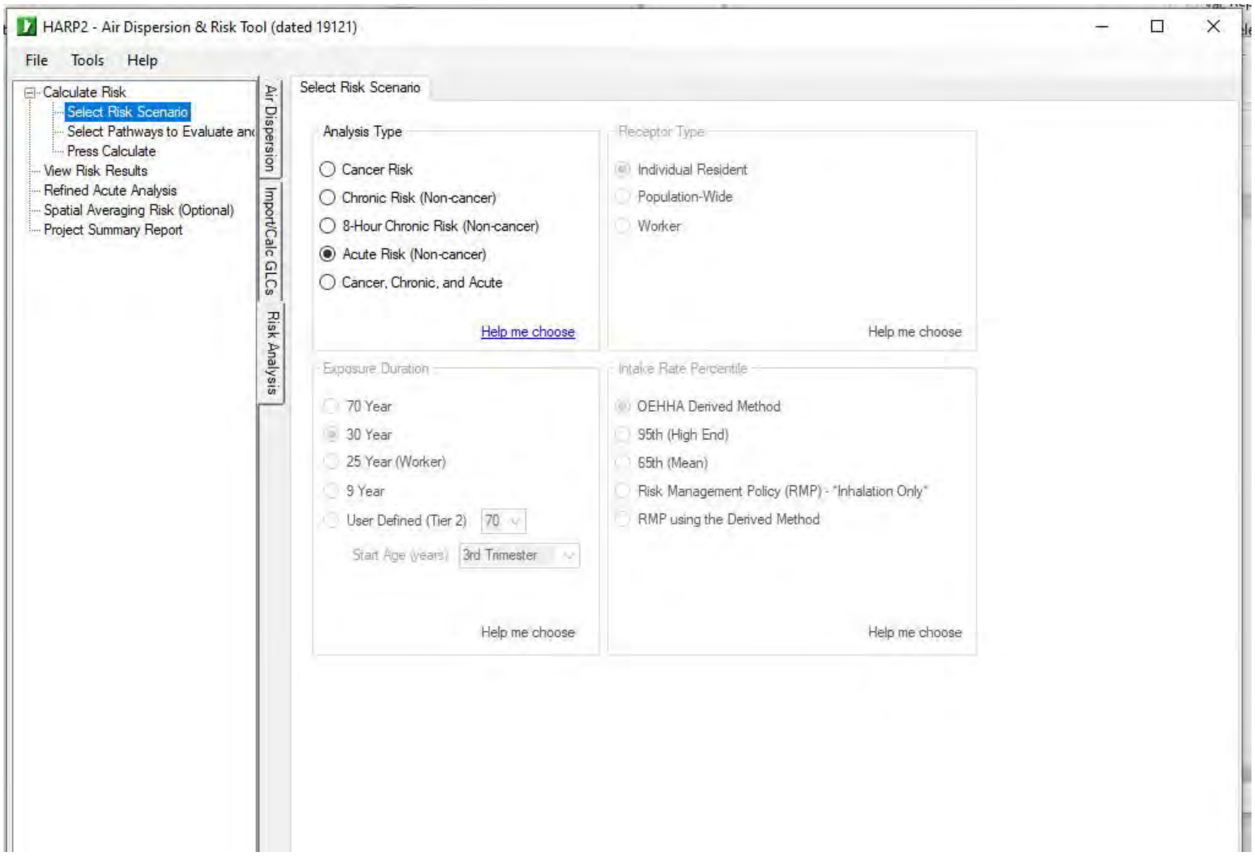
Excerpts of the HARP2 Risk Model

Emissions Inventory



	SrcID	StkID	ProID	PolID	PolAbbrev	Multiplier	Annual Ems (lbs/yr)	Max Hr Ems (lbs/hr)	MWAF
	STCK1	0	0	75070	Acetaldehyde	1	0.13	4.45E-05	1
	STCK1	0	0	7440382	Arsenic	1	0.015	5.14E-06	1
	STCK1	0	0	7440439	Cadmium	1	0.011	3.77E-06	1
	STCK1	0	0	7440508	Copper	1	0.027	9.25E-06	1
	STCK1	0	0	50000	Formaldehyde	1	0.034	1.16E-05	1
	STCK1	0	0	7647010	HCl	1	72	0.0247	1
	STCK1	0	0	7439921	Lead	1	0.066	2.26E-05	1
	STCK1	0	0	7439976	Mercury	1	0	0.00115	1
	STCK1	0	0	7440020	Nickel	1	0.038	1.3E-05	1
	STCK1	0	0	1746016	2,3,7,8-TCDD	1	1.1E-06	3.77E-10	1
	STCK1	0	0	7439965	Manganese	1	0.19	6.51E-05	1
	STCK1	0	0	7440439	Cadmium	1	0.011	3.77E-06	1
	STCK1	0	0	7440417	Beryllium	1	0.0014	4.79E-07	1
	STCK1	0	0	7647010	HCl	1	72	0.0247	1
	STCK1	0	0	7664393	HF	1	0.66	0.000226	1
▸	STCK1	0	0	1151	PAHs-w/o	1	2.4E-05	8.22E-09	1

Risk Selection



Analysis Type

- ○ Cancer Risk
- ○ Chronic Risk (Non-cancer)
- ○ 8-Hour Chronic Risk (Non-cancer)
- ● Acute Risk (Non-cancer)
- ○ Cancer, Chronic, and Acute

Receptor Type

- ● Individual Resident
- ○ Population-Wide
- ○ Worker

Exposure Duration

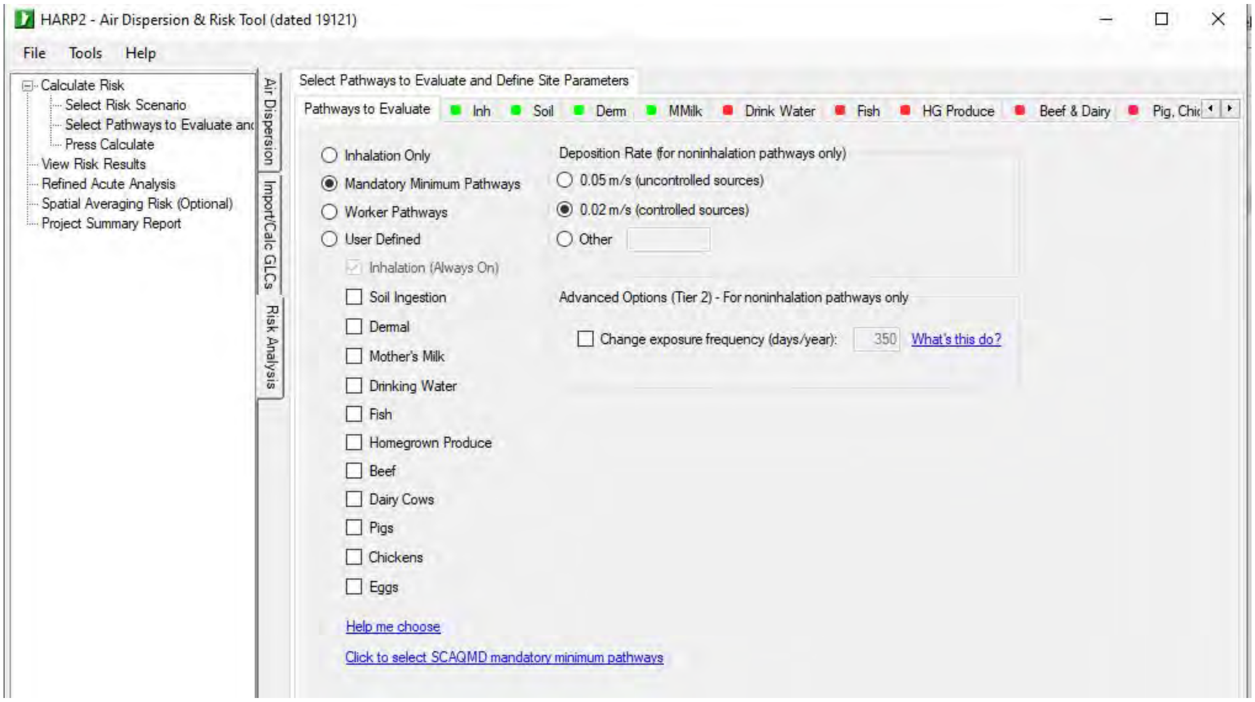
- ○ 70 Year
- ● 30 Year
- ○ 25 Year (Worker)
- ○ 9 Year
- ○ User Defined (Tier 2) 70

Start Age (years) 3rd Trimester

Intake Rate Percentile

- ● OEHHA Derived Method
- ○ 95th (High End)
- ○ 65th (Mean)
- ○ Risk Management Policy (RMP) - "Inhalation Only"
- ○ RMP using the Derived Method

Exposure Pathway Selection

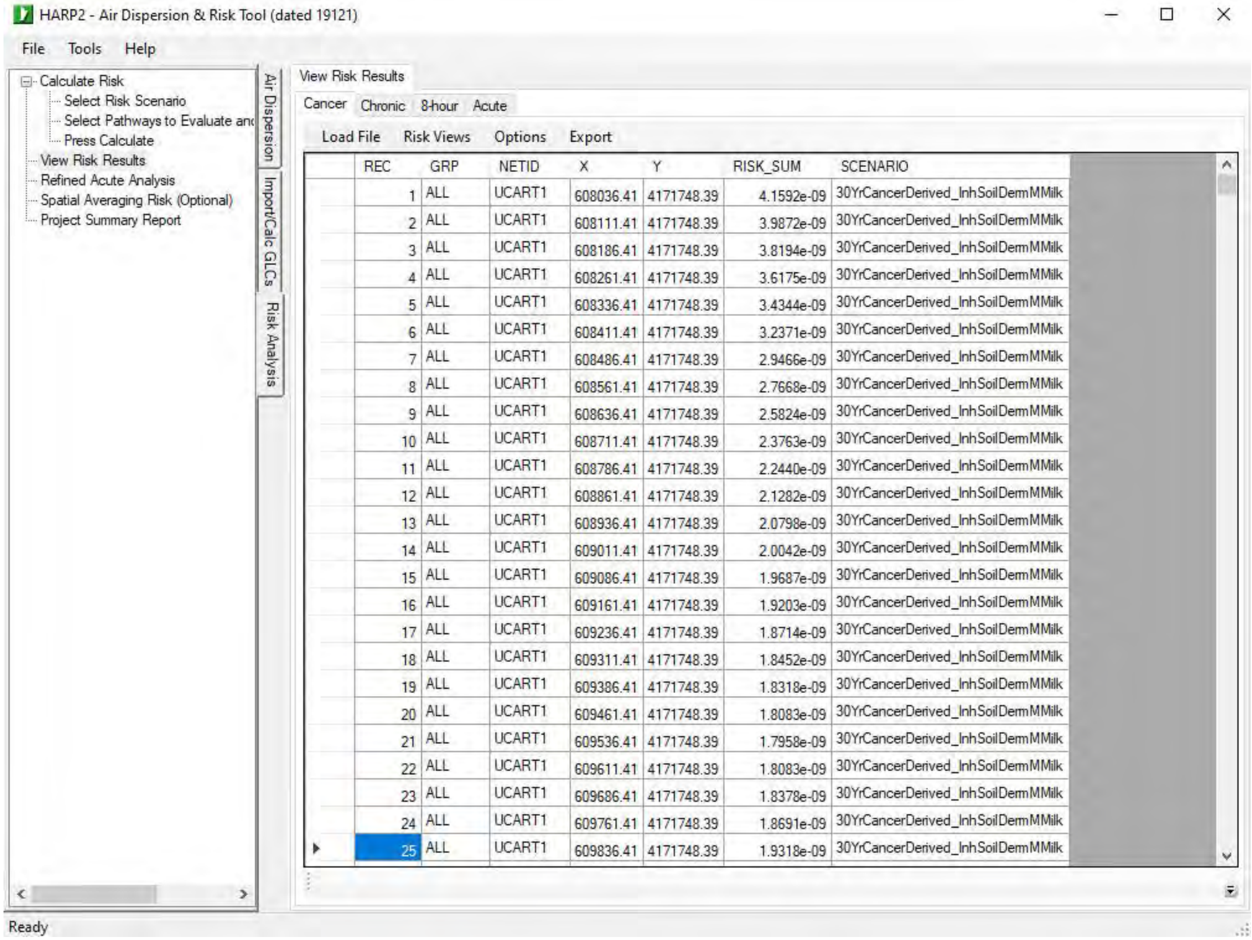


○ Inhalation Only
● Mandatory Minimum Pathways
○ Worker Pathways
○ User Defined
☑ Inhalation (Always On)
☐ Soil Ingestion
☐ Dermal
☐ Mother's Milk
☐ Drinking Water
☐ Fish
☐ Homegrown Produce
☐ Beef
☐ Dairy Cows
☐ Pigs
☐ Chickens
☐ Eggs

Deposition Rate (for noninhalation pathways only)
○ 0.05 m/s (uncontrolled sources)
● 0.02 m/s (controlled sources)
○ Other

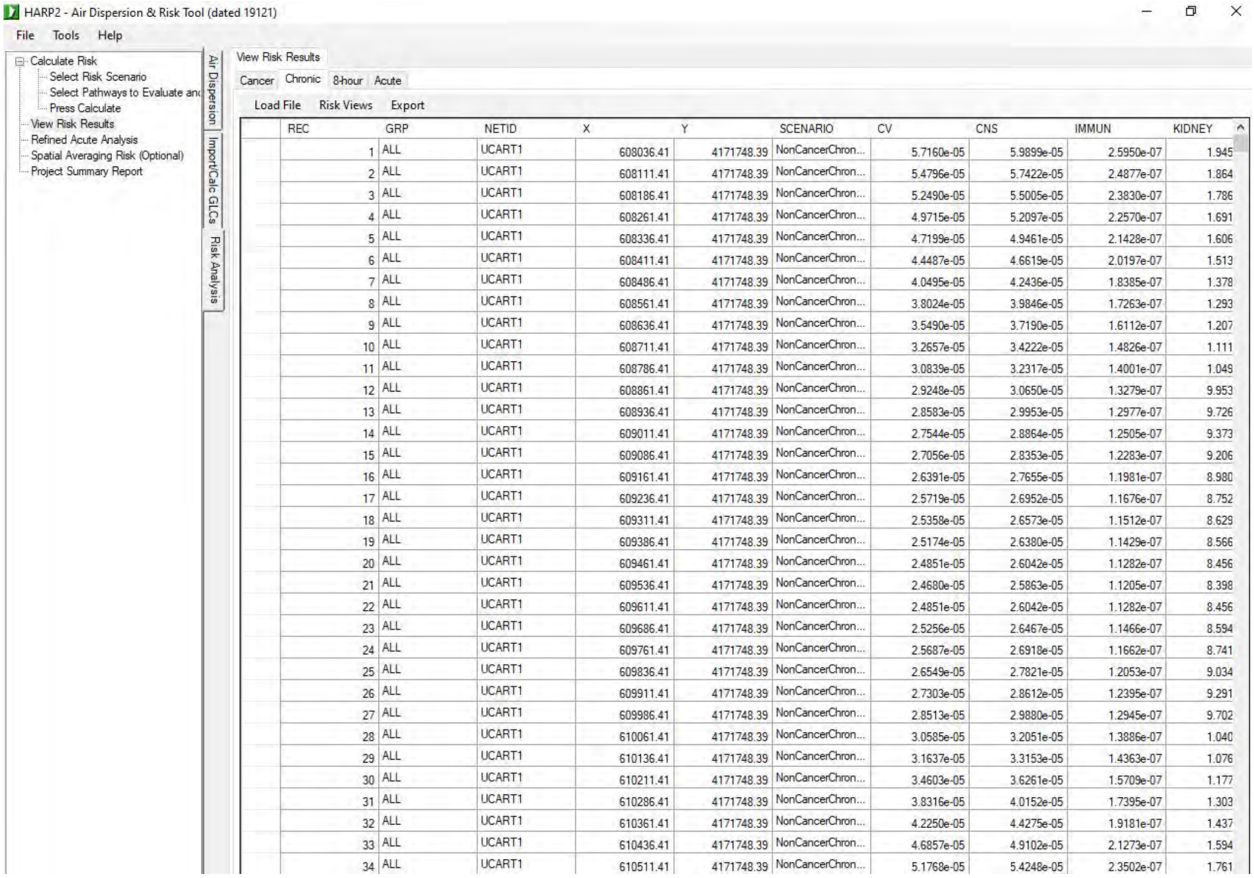
Advanced Options (Tier 2) - For noninhalation pathways only
☐ Change exposure frequency (days/year): 350

Residential Cancer Risk Results



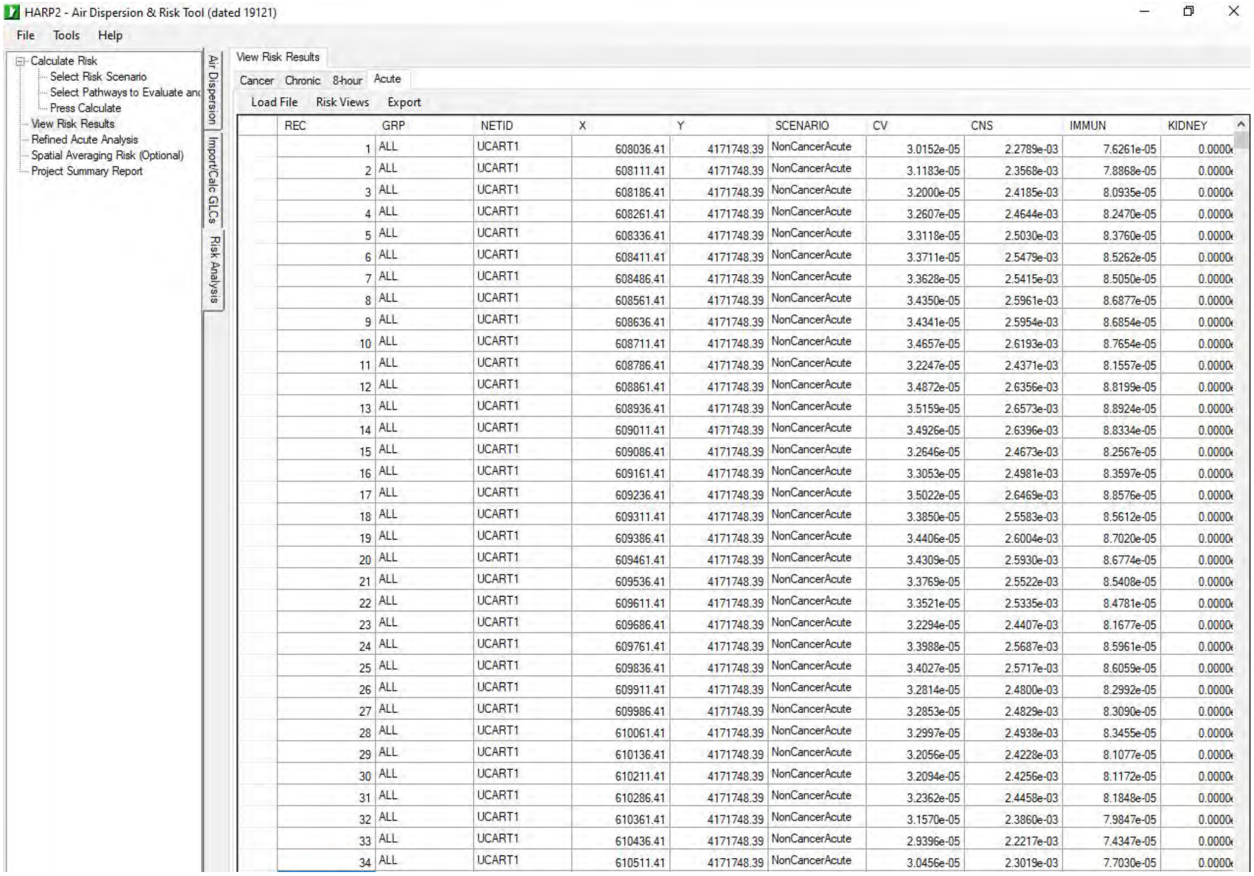
REC	GRP	NETID	X	Y	RISK_SUM	SCENARIO
1	ALL	UCART1	608036.41	4171748.39	4.1592e-09	30YrCancerDerived_InhSoilDermMMilk
2	ALL	UCART1	608111.41	4171748.39	3.9872e-09	30YrCancerDerived_InhSoilDermMMilk
3	ALL	UCART1	608186.41	4171748.39	3.8194e-09	30YrCancerDerived_InhSoilDermMMilk
4	ALL	UCART1	608261.41	4171748.39	3.6175e-09	30YrCancerDerived_InhSoilDermMMilk
5	ALL	UCART1	608336.41	4171748.39	3.4344e-09	30YrCancerDerived_InhSoilDermMMilk
6	ALL	UCART1	608411.41	4171748.39	3.2371e-09	30YrCancerDerived_InhSoilDermMMilk
7	ALL	UCART1	608486.41	4171748.39	2.9466e-09	30YrCancerDerived_InhSoilDermMMilk
8	ALL	UCART1	608561.41	4171748.39	2.7668e-09	30YrCancerDerived_InhSoilDermMMilk
9	ALL	UCART1	608636.41	4171748.39	2.5824e-09	30YrCancerDerived_InhSoilDermMMilk
10	ALL	UCART1	608711.41	4171748.39	2.3763e-09	30YrCancerDerived_InhSoilDermMMilk
11	ALL	UCART1	608786.41	4171748.39	2.2440e-09	30YrCancerDerived_InhSoilDermMMilk
12	ALL	UCART1	608861.41	4171748.39	2.1282e-09	30YrCancerDerived_InhSoilDermMMilk
13	ALL	UCART1	608936.41	4171748.39	2.0798e-09	30YrCancerDerived_InhSoilDermMMilk
14	ALL	UCART1	609011.41	4171748.39	2.0042e-09	30YrCancerDerived_InhSoilDermMMilk
15	ALL	UCART1	609086.41	4171748.39	1.9687e-09	30YrCancerDerived_InhSoilDermMMilk
16	ALL	UCART1	609161.41	4171748.39	1.9203e-09	30YrCancerDerived_InhSoilDermMMilk
17	ALL	UCART1	609236.41	4171748.39	1.8714e-09	30YrCancerDerived_InhSoilDermMMilk
18	ALL	UCART1	609311.41	4171748.39	1.8452e-09	30YrCancerDerived_InhSoilDermMMilk
19	ALL	UCART1	609386.41	4171748.39	1.8318e-09	30YrCancerDerived_InhSoilDermMMilk
20	ALL	UCART1	609461.41	4171748.39	1.8083e-09	30YrCancerDerived_InhSoilDermMMilk
21	ALL	UCART1	609536.41	4171748.39	1.7958e-09	30YrCancerDerived_InhSoilDermMMilk
22	ALL	UCART1	609611.41	4171748.39	1.8083e-09	30YrCancerDerived_InhSoilDermMMilk
23	ALL	UCART1	609686.41	4171748.39	1.8378e-09	30YrCancerDerived_InhSoilDermMMilk
24	ALL	UCART1	609761.41	4171748.39	1.8691e-09	30YrCancerDerived_InhSoilDermMMilk
25	ALL	UCART1	609836.41	4171748.39	1.9318e-09	30YrCancerDerived_InhSoilDermMMilk

Chronic Hazard Index Results by Receptor



	REC	GRP	NETID	X	Y	SCENARIO	CV	CNS	IMMUN	KIDNEY
	1	ALL	UCART1	608036.41	4171748.39	NonCancerChron...	5.7160e-05	5.9899e-05	2.5950e-07	1.945
	2	ALL	UCART1	608111.41	4171748.39	NonCancerChron...	5.4796e-05	5.7422e-05	2.4877e-07	1.864
	3	ALL	UCART1	608186.41	4171748.39	NonCancerChron...	5.2490e-05	5.5005e-05	2.3830e-07	1.786
	4	ALL	UCART1	608261.41	4171748.39	NonCancerChron...	4.9715e-05	5.2097e-05	2.2570e-07	1.691
	5	ALL	UCART1	608336.41	4171748.39	NonCancerChron...	4.7199e-05	4.9461e-05	2.1428e-07	1.606
	6	ALL	UCART1	608411.41	4171748.39	NonCancerChron...	4.4487e-05	4.6619e-05	2.0197e-07	1.513
	7	ALL	UCART1	608486.41	4171748.39	NonCancerChron...	4.0495e-05	4.2436e-05	1.8385e-07	1.378
	8	ALL	UCART1	608561.41	4171748.39	NonCancerChron...	3.8024e-05	3.9846e-05	1.7263e-07	1.293
	9	ALL	UCART1	608636.41	4171748.39	NonCancerChron...	3.5490e-05	3.7190e-05	1.6112e-07	1.207
	10	ALL	UCART1	608711.41	4171748.39	NonCancerChron...	3.2657e-05	3.4222e-05	1.4826e-07	1.111
	11	ALL	UCART1	608786.41	4171748.39	NonCancerChron...	3.0839e-05	3.2317e-05	1.4001e-07	1.049
	12	ALL	UCART1	608861.41	4171748.39	NonCancerChron...	2.9248e-05	3.0650e-05	1.3279e-07	9.953
	13	ALL	UCART1	608936.41	4171748.39	NonCancerChron...	2.8583e-05	2.9953e-05	1.2977e-07	9.726
	14	ALL	UCART1	609011.41	4171748.39	NonCancerChron...	2.7544e-05	2.8864e-05	1.2505e-07	9.373
	15	ALL	UCART1	609086.41	4171748.39	NonCancerChron...	2.7056e-05	2.8353e-05	1.2283e-07	9.206
	16	ALL	UCART1	609161.41	4171748.39	NonCancerChron...	2.6391e-05	2.7655e-05	1.1981e-07	8.980
	17	ALL	UCART1	609236.41	4171748.39	NonCancerChron...	2.5719e-05	2.6952e-05	1.1676e-07	8.752
	18	ALL	UCART1	609311.41	4171748.39	NonCancerChron...	2.5358e-05	2.6573e-05	1.1512e-07	8.629
	19	ALL	UCART1	609386.41	4171748.39	NonCancerChron...	2.5174e-05	2.6380e-05	1.1429e-07	8.566
	20	ALL	UCART1	609461.41	4171748.39	NonCancerChron...	2.4851e-05	2.6042e-05	1.1282e-07	8.456
	21	ALL	UCART1	609536.41	4171748.39	NonCancerChron...	2.4680e-05	2.5863e-05	1.1205e-07	8.398
	22	ALL	UCART1	609611.41	4171748.39	NonCancerChron...	2.4851e-05	2.6042e-05	1.1282e-07	8.456
	23	ALL	UCART1	609686.41	4171748.39	NonCancerChron...	2.5256e-05	2.6467e-05	1.1466e-07	8.594
	24	ALL	UCART1	609761.41	4171748.39	NonCancerChron...	2.5687e-05	2.6918e-05	1.1662e-07	8.741
	25	ALL	UCART1	609836.41	4171748.39	NonCancerChron...	2.6549e-05	2.7821e-05	1.2053e-07	9.034
	26	ALL	UCART1	609911.41	4171748.39	NonCancerChron...	2.7303e-05	2.8612e-05	1.2395e-07	9.291
	27	ALL	UCART1	609986.41	4171748.39	NonCancerChron...	2.8513e-05	2.9880e-05	1.2945e-07	9.702
	28	ALL	UCART1	610061.41	4171748.39	NonCancerChron...	3.0585e-05	3.2051e-05	1.3886e-07	1.040
	29	ALL	UCART1	610136.41	4171748.39	NonCancerChron...	3.1637e-05	3.3153e-05	1.4363e-07	1.076
	30	ALL	UCART1	610211.41	4171748.39	NonCancerChron...	3.4603e-05	3.6261e-05	1.5709e-07	1.177
	31	ALL	UCART1	610286.41	4171748.39	NonCancerChron...	3.8316e-05	4.0152e-05	1.7395e-07	1.303
	32	ALL	UCART1	610361.41	4171748.39	NonCancerChron...	4.2250e-05	4.4275e-05	1.9181e-07	1.437
	33	ALL	UCART1	610436.41	4171748.39	NonCancerChron...	4.6857e-05	4.9102e-05	2.1273e-07	1.594
	34	ALL	UCART1	610511.41	4171748.39	NonCancerChron...	5.1768e-05	5.4248e-05	2.3502e-07	1.761

Acute Hazard Index Results by Receptor



REC	GRP	NETID	X	Y	SCENARIO	CV	CNS	IMMUN	KIDNEY
1	ALL	UCART1	608036.41	4171748.39	NonCancerAcute	3.0152e-05	2.2789e-03	7.6261e-05	0.0000
2	ALL	UCART1	608111.41	4171748.39	NonCancerAcute	3.1183e-05	2.3568e-03	7.8868e-05	0.0000
3	ALL	UCART1	608186.41	4171748.39	NonCancerAcute	3.2000e-05	2.4185e-03	8.0935e-05	0.0000
4	ALL	UCART1	608261.41	4171748.39	NonCancerAcute	3.2607e-05	2.4644e-03	8.2470e-05	0.0000
5	ALL	UCART1	608336.41	4171748.39	NonCancerAcute	3.3118e-05	2.5030e-03	8.3760e-05	0.0000
6	ALL	UCART1	608411.41	4171748.39	NonCancerAcute	3.3711e-05	2.5479e-03	8.5262e-05	0.0000
7	ALL	UCART1	608486.41	4171748.39	NonCancerAcute	3.3628e-05	2.5415e-03	8.5050e-05	0.0000
8	ALL	UCART1	608561.41	4171748.39	NonCancerAcute	3.4350e-05	2.5961e-03	8.6877e-05	0.0000
9	ALL	UCART1	608636.41	4171748.39	NonCancerAcute	3.4341e-05	2.5954e-03	8.6854e-05	0.0000
10	ALL	UCART1	608711.41	4171748.39	NonCancerAcute	3.4657e-05	2.6193e-03	8.7654e-05	0.0000
11	ALL	UCART1	608786.41	4171748.39	NonCancerAcute	3.2247e-05	2.4371e-03	8.1557e-05	0.0000
12	ALL	UCART1	608861.41	4171748.39	NonCancerAcute	3.4872e-05	2.6356e-03	8.8199e-05	0.0000
13	ALL	UCART1	608936.41	4171748.39	NonCancerAcute	3.5159e-05	2.6573e-03	8.8924e-05	0.0000
14	ALL	UCART1	609011.41	4171748.39	NonCancerAcute	3.4926e-05	2.6396e-03	8.8334e-05	0.0000
15	ALL	UCART1	609086.41	4171748.39	NonCancerAcute	3.2646e-05	2.4673e-03	8.2567e-05	0.0000
16	ALL	UCART1	609161.41	4171748.39	NonCancerAcute	3.3053e-05	2.4981e-03	8.3597e-05	0.0000
17	ALL	UCART1	609236.41	4171748.39	NonCancerAcute	3.5022e-05	2.6469e-03	8.8576e-05	0.0000
18	ALL	UCART1	609311.41	4171748.39	NonCancerAcute	3.3850e-05	2.5583e-03	8.5612e-05	0.0000
19	ALL	UCART1	609386.41	4171748.39	NonCancerAcute	3.4406e-05	2.6004e-03	8.7020e-05	0.0000
20	ALL	UCART1	609461.41	4171748.39	NonCancerAcute	3.4309e-05	2.5930e-03	8.6774e-05	0.0000
21	ALL	UCART1	609536.41	4171748.39	NonCancerAcute	3.3769e-05	2.5522e-03	8.5408e-05	0.0000
22	ALL	UCART1	609611.41	4171748.39	NonCancerAcute	3.3521e-05	2.5335e-03	8.4781e-05	0.0000
23	ALL	UCART1	609686.41	4171748.39	NonCancerAcute	3.2294e-05	2.4407e-03	8.1677e-05	0.0000
24	ALL	UCART1	609761.41	4171748.39	NonCancerAcute	3.3988e-05	2.5687e-03	8.5961e-05	0.0000
25	ALL	UCART1	609836.41	4171748.39	NonCancerAcute	3.4027e-05	2.5717e-03	8.6059e-05	0.0000
26	ALL	UCART1	609911.41	4171748.39	NonCancerAcute	3.2814e-05	2.4800e-03	8.2992e-05	0.0000
27	ALL	UCART1	609986.41	4171748.39	NonCancerAcute	3.2853e-05	2.4829e-03	8.3090e-05	0.0000
28	ALL	UCART1	610061.41	4171748.39	NonCancerAcute	3.2997e-05	2.4938e-03	8.3455e-05	0.0000
29	ALL	UCART1	610136.41	4171748.39	NonCancerAcute	3.2056e-05	2.4228e-03	8.1077e-05	0.0000
30	ALL	UCART1	610211.41	4171748.39	NonCancerAcute	3.2094e-05	2.4256e-03	8.1172e-05	0.0000
31	ALL	UCART1	610286.41	4171748.39	NonCancerAcute	3.2362e-05	2.4458e-03	8.1848e-05	0.0000
32	ALL	UCART1	610361.41	4171748.39	NonCancerAcute	3.1570e-05	2.3860e-03	7.9847e-05	0.0000
33	ALL	UCART1	610436.41	4171748.39	NonCancerAcute	2.9396e-05	2.2217e-03	7.4347e-05	0.0000
34	ALL	UCART1	610511.41	4171748.39	NonCancerAcute	3.0456e-05	2.3019e-03	7.7030e-05	0.0000

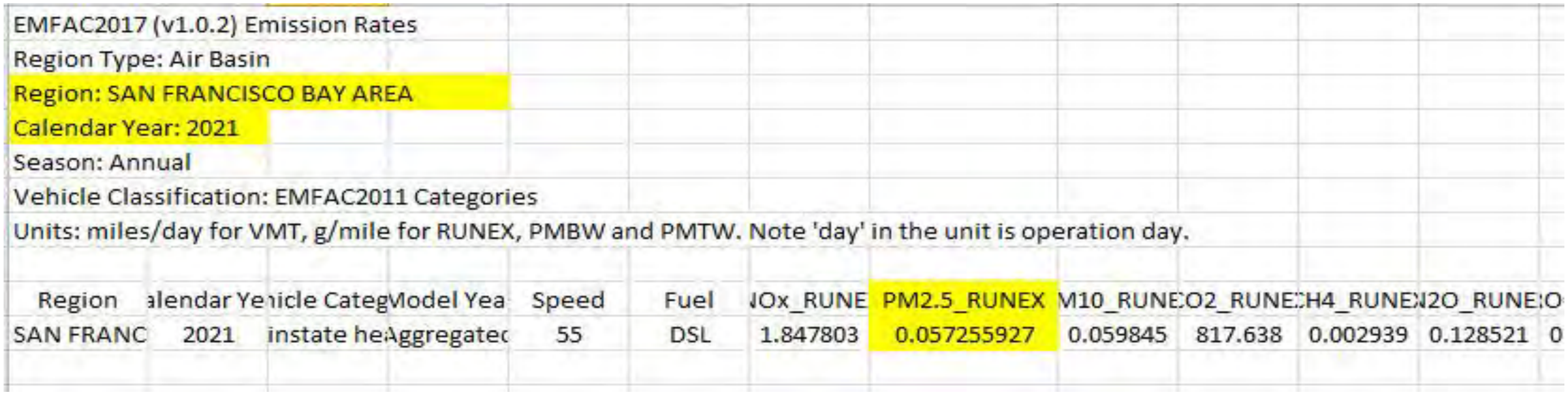
APPENDIX C

Emissions of DPM from I-580

Calculation of Annual Emissions DPM from I-580

	2018 Truck AADT	*% 5+ Axel*	*AADT 5+ Axel*	
Leg A	23,534	76.50%	18,004	From CalTrans 2018 Traffic AADT (Hwy 580)
Leg B	8,650	69.12%	5,979	at First Street
Average	16,092		11,991	

Length of Roadway (1,000 ft)	0.379 miles	
Average EF for PM-2.5/DPM	0.059 gram/mile	From EMFAC 2017 for SF Region HD Trucks @ 55 MPH
Emissions (all Trucks)	268.0 grams/day 0.59 lbs/day	
	215.5 lbs/yr	



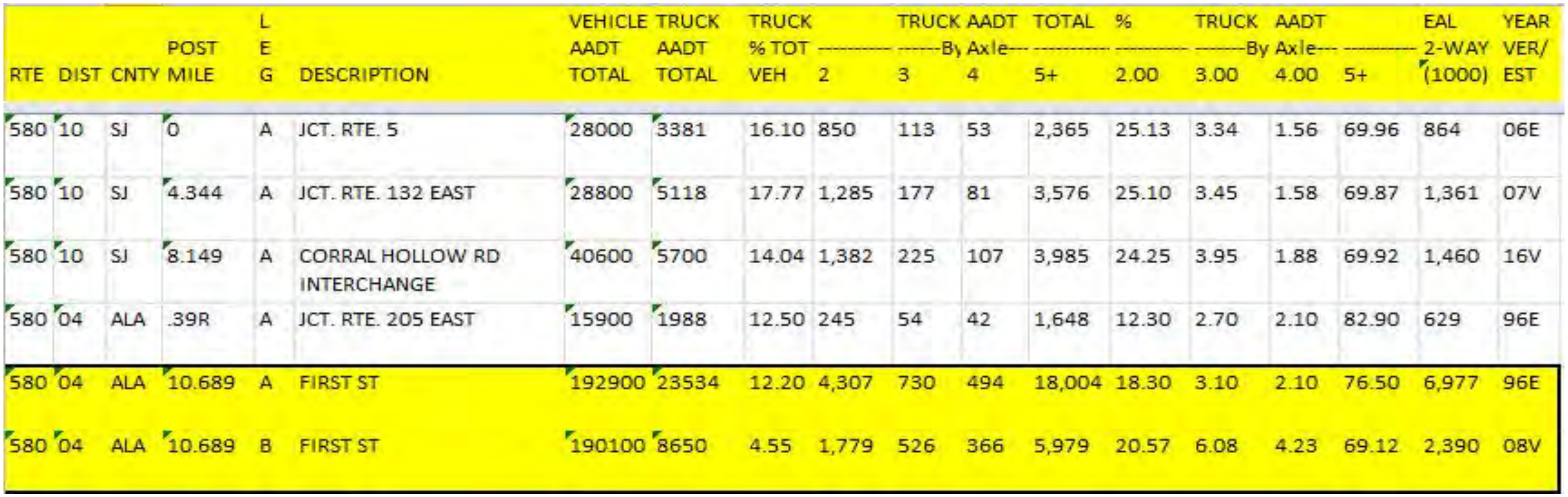
EMFAC2017 (v1.0.2) Emission Rates
Region Type: Air Basin
Region: SAN FRANCISCO BAY AREA
Calendar Year: 2021
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW. Note 'day' in the unit is operation day.

Region	alendar Ye	icle Categ	Model Yea	Speed	Fuel	Ox_RUNE	PM2.5_RUNEX	M10_RUNE	O2_RUNE	H4_RUNE	2O_RUNE	O
SAN FRANC	2021	instate he	Aggregate	55	DSL	1.847803	0.057255927	0.059845	817.638	0.002939	0.128521	0

File: Appendix C DPM Emissions Calcs	Sheet: Hwy Emissions

Calculation of Annual Emissions DPM from I-580

CalTrans Truck Traffic Counts on I-580 at First Street, Livermore.



				L		VEHICLE	TRUCK	TRUCK		TRUCK	AADT	TOTAL	%	TRUCK	AADT		EAL	YEAR
			POST	E		AADT	AADT	% TOT	-----------	------By	Axle---	-----------	-----------	--------By	Axle---	-----------	2-WAY	VER/
RTE	DIST	CNTY	MILE	G	DESCRIPTION	TOTAL	TOTAL	VEH	2	3	4	5+	2.00	3.00	4.00	5+	(1000)	EST
580	10	SJ	0	A	JCT. RTE. 5	28000	3381	16.10	850	113	53	2,365	25.13	3.34	1.56	69.96	864	06E
580	10	SJ	4.344	A	JCT. RTE. 132 EAST	28800	5118	17.77	1,285	177	81	3,576	25.10	3.45	1.58	69.87	1,361	07V
580	10	SJ	8.149	A	CORRAL HOLLOW RD INTERCHANGE	40600	5700	14.04	1,382	225	107	3,985	24.25	3.95	1.88	69.92	1,460	16V
580	04	ALA	.39R	A	JCT. RTE. 205 EAST	15900	1988	12.50	245	54	42	1,648	12.30	2.70	2.10	82.90	629	96E
580	04	ALA	10.689	A	FIRST ST	192900	23534	12.20	4,307	730	494	18,004	18.30	3.10	2.10	76.50	6,977	96E
580	04	ALA	10.689	B	FIRST ST	190100	8650	4.55	1,779	526	366	5,979	20.57	6.08	4.23	69.12	2,390	08V

APPENDIX D

BIOLOGICAL RESOURCES & WETLANDS ASSESSMENT

Wetland & Biological Resources Assessment

Proposed Monte Vista Memorial Gardens Project

189 Contractors Street
Livermore, CA 94551

Prepared By:

BARNETT ENVIRONMENTAL

Prepared For:
Monte Vista Memorial Invesmtent
Group, LLC
December 16, 2021

Table of Contents

Figures

Tables

Appendices

1.0 Introduction

Barnett Environmental has prepared this *Biological Resources Assessment* (BRA) of a ±104-acre property (including approximately 1.85-acre arroyo) located off Las Colinas Road north of Interstate 580 in unincorporated area of Alameda County, CA (APN: 099-0015-016-03). The Study Area is located Township 3 South, Range 2 East of the Livermore, California 7.5-minute USGS quadrangle map (Figure 1). It lies in the San Francisco Bay watershed (Hydrologic Unit Code 18050004) at approximately 470 to 645 feet in elevation above mean sea level (msl) and at approximately 37°42'14" latitude north and 121°45'18" longitude west. The parcel is undeveloped and is bordered by undeveloped grazing land to the north and west. The parcel to the east contains a single-family residence.

Beyond a delineation of wetlands and "other waters of the U.S." and "waters of the State" within the Study Area according to U.S. Army Corps of Engineers (1987) and California Regional Water Quality Control Board (2020) protocol, this report also:

- Identifies and describes extant vegetation communities;
- Records all plant and animal species observed during the field survey(s);
- Evaluates and identifies sensitive habitats and special status plant and animal species that may occur in the Study Area and could be affected by project activities; and
- Provides conclusions and recommendations for mitigating potential adverse impacts to identified resources.

2.0 Regulatory Setting

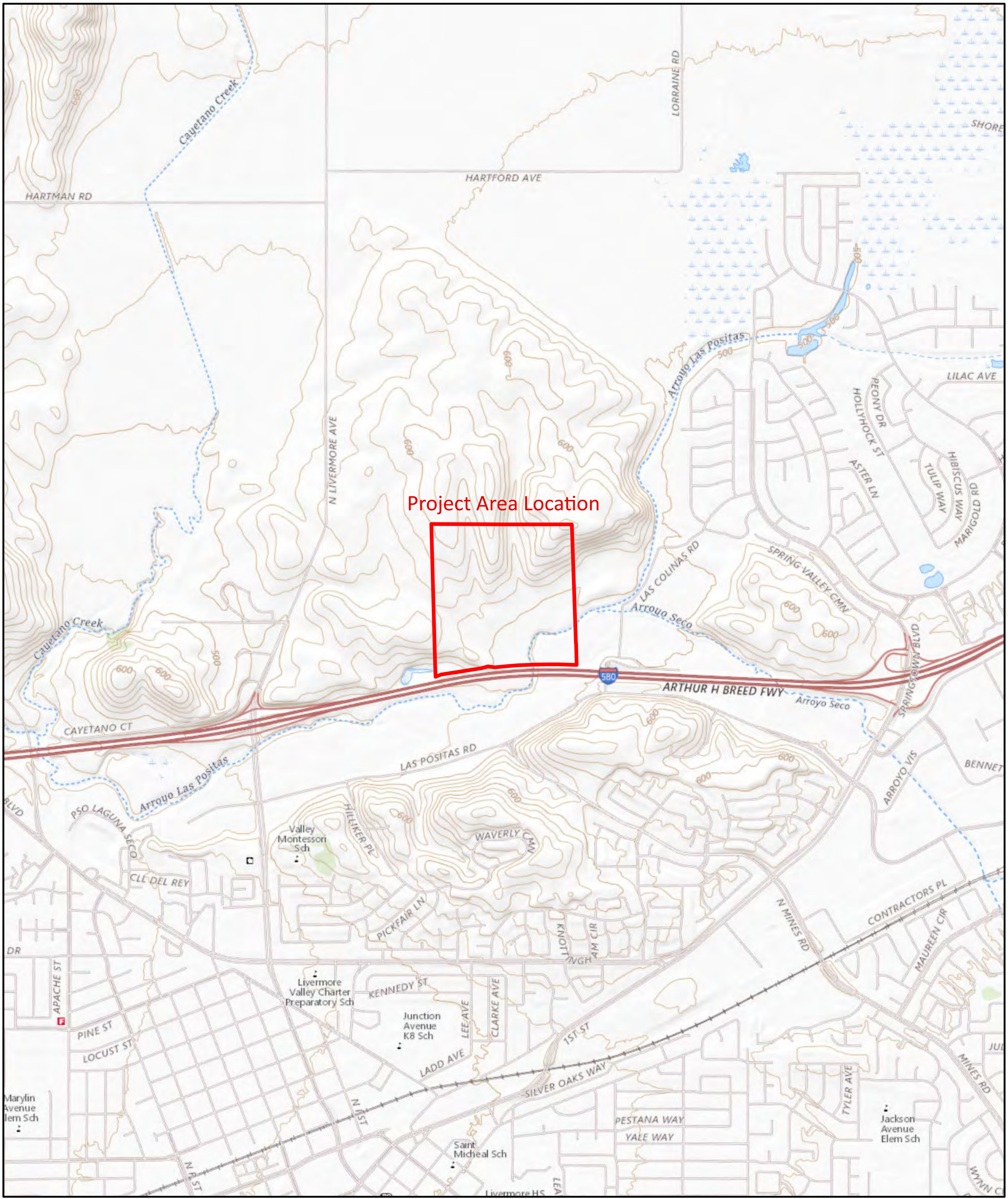
The following federal laws, regulations and/or policies provide the legal framework guiding the protection of biological resources. We have included those laws most relevant to biological and wetland resources in and around the Study Area.

2.1 Federal Laws & Regulations

Federal Endangered Species Act (FESA)

The FESA, enacted in 1973, prohibits the taking, possession, sale, or transport of endangered species. Under the FESA, the Secretary of the Interior and the Secretary of Commerce jointly have the authority to list a species as threatened or endangered. Both the National Marine Fisheries Service (NMFS) and the U.S. Fish & Wildlife Service (USFWS) administer FESA. NMFS is accountable for animals that are threatened or endangered (16 United States Code [USC] 1533[c]) and spend most of their lives in marine waters, including marine fish, most marine mammals, and anadromous fish such as Pacific salmon. The USFWS is accountable for all other federally listed plants and animals.

Pursuant to the requirements of FESA, a federal agency reviewing a project within its jurisdiction must determine whether any federally listed threatened or endangered species could be present in the Study Area and whether



Source: USGS 7.5-Minute Topographic Quad Livermore, CA

FIGURE 1 - PROJECT AREA LOCATION

Date: May 27, 2021

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CA

BARNETT
ENVIRONMENTAL

the project will have a potentially significant impact on such species. In addition, federal agencies are required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3], [4]).

Projects that would result in a "take" of any federally listed threatened or endangered species are required to obtain authorization from NMFS and/or USFWS through either Section 7 (interagency consultation) or section 10(a) (incidental take permit) of FESA, depending on whether the federal government is involved in permitting or funding the project. The Section 7 authorization process is used to determine if a project with a federal nexus would jeopardize the continued existence of a listed species and what mitigation measures would be required to avoid jeopardizing the species. The Section 10(a) process allows take of endangered species or their habitat in non-federal activities.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) regulates or prohibits taking, killing, possession of, or harm to migratory bird species listed in Title 50 Code of Federal Regulations (CFR) Section 10.13. The MBTA is an international treaty for the conservation and management of bird species that migrate through more than one country and is enforced in the United States by the USFWS. Hunting of specific migratory game birds is permitted under the regulations listed in Title 50 CFR 20. The MBTA was amended in 1972 to include protection for migratory birds of prey (raptors).

Bald and Golden Eagle Protection Act

The federal Bald and Golden Eagle Protection Act regulates or prohibits taking, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16 U.S.C. 668(a); 50 CFR 22). "Take" includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb (16 U.S.C. 668c; 50 CFR 22.3).

Federal Clean Water Act (CWA)

Section 404

Section 404 of the CWA identifies the U.S. Army Corps of Engineers (USACE) as the principal authority to regulate activity that could discharge fill or dredge material or otherwise adversely modify wetlands or Waters of the U.S. (WOUS). The USACE implements the federal policy embodied in Executive Order 11990, which, when implemented, is intended to result in no net loss of wetland values or function. U.S. Congress has authorized the Environmental Protection Agency (EPA) to have a specific oversight role over USACE's authority.

Section 401

The State Water Resources Control Board (SWRCB) has authority over wetlands through Section 401 of the CWA, as well as the Porter-Cologne Act, California Code of Regulations Section 3831(k), and California Wetlands Conservation Policy.

The CWA requires that an applicant for a Section 404 permit (to discharge dredged or fill material into waters of the United States) first obtain a certificate from the appropriate state agency stating that the fill is consistent with the State's water quality standards and criteria. In California, the authority to either grant certification or waive the requirement for permits is delegated by the SWRCB to the nine regional boards. The Central Valley Regional Water Quality Control Board (CVRWQCB) is the appointed authority for Section 401 compliance in the project site. The SWRCB additionally requires additional Waste Discharge Requirements under Porter-Cologne to protect aquatic resources that are outside federal jurisdiction.

A request for certification or waiver is submitted to the Regional Board at the same time an application is filed with the USACE. The regional board has 60 days to review the application and act on it. Because no USACE permit is valid under the CWA unless "certified" by the state, these boards may effectively veto or add conditions to any USACE permit.

2.2 State Laws & Regulations

California Endangered Species Act (CESA)

The CESA was enacted in 1984. Under the CESA, the California Fish and Wildlife Commission (CFWC) has the responsibility for maintaining a list of threatened and endangered species, while The California Department of Fish & Wildlife (CDFW) is responsible for enforcement. CDFW also maintains lists of species of special concern. A Species of Special Concern (CSC) is a species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria:

- is extirpated from the State or, in the case of birds, in its primary seasonal or breeding role;
- is listed as Federally-, but not State-, threatened or endangered;
- meets the State definition of threatened or endangered but has not formally been listed;
- is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status;
- has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status.

CESA prohibits the take of California listed animals and plants in most cases, but CDFW may issue incidental take permits under special conditions. Pursuant to the requirements of CESA, a State agency reviewing a project within its jurisdiction must determine whether any state-listed endangered or threatened species could be present in the project site and determine whether the project would have a potentially significant impact on such species. In addition, CDFW encourages consultation on any project that could affect a listed or candidate species.

Fish and Game Code – Sections 1600-1616

Under Sections 1600-1616 of the California Fish and Game Code, the CDFW regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. The limits of CDFW's jurisdiction are defined in the code as the "… *bed, channel or bank of any river, stream, or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit* ..." (Section 1601). In practice, the CDFW usually marks its jurisdictional limit at the top of the stream or bank, or at the outer edge of the riparian vegetation, whichever is wider.

The CDFW also derives its authority to oversee activities that affect wetlands from state legislation. This authority includes Sections 1600-1616 of the Fish and Game Code (lake and streambed alteration agreements), Section 30411 of the California Coastal Act (CDFW becomes the lead agency for the study and identification of degraded wetlands within the Coastal Zone), CESA (protection of state listed species and their habitats - which could include wetlands), and the Keene-Nejedly California Wetlands Preservation Act of 1976 (states a need for an affirmative and sustained public policy program directed at wetlands preservation, restoration, and enhancement). In general, the CDFW asserts authority over wetlands within the state either through review and comment on USACE Section 404 permits, review and comment on CEQA documents, preservation of state listed species, or through stream and lakebed alteration agreements.

Fish and Game Code – Sections 1900-1913

These Sections embody the Native Plant Protection Act, which is intended to preserve, protect, and enhance endangered or rare native plants in the state. The act directs CDFW to establish criteria for determining what native plants are rare or endangered. Under Section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more causes. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens. Under the act, CDFW may adopt regulations governing the taking, possessing, propagation or sale of any endangered or rare native plant.

Section 1913 of that Act allows landowners in conducting certain activities to take actions that will destroy rare or endangered plants, provided that, where the Department of Fish and Game (DFG) has previously notified the owner "that rare or endangered plants are growing" on his or her land, the owner notifies CDFW "at least 10 days in advance of changing the land" to allow the state agency to come and "salvage" the plants. Subject to this requirement, section 1913 states that "the presence of rare or endangered plants" on a property shall not restrict (1) timber operations conducted pursuant to an approved timber harvest plan, (2) "required mining assessment work pursuant to federal or state mining laws," (3) "the removal of endangered or rare native plants from a canal, lateral ditch, building site, or road, other right-of-way by the owner of the land or his agent," or (4) "the performance by a public agency or publicly or privately owned public utility of its obligation to provide service to the public."

Fish and Game Code – Sections 3503, 3503.5, 3513

Fish and Game Code Section 3503 states that it is unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Fish and Game Code Section 3503.5 protects all birds-of-prey (raptors) and their eggs and nests. Section 3513 states that it is unlawful to take or possess any migratory non-game bird as designated in the Migratory Bird Treaty Act.

Fish and Game Code – Sections 3511, 4700, 5050, and 5515

Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code designate certain species as "fully protected." Fully protected species, or parts thereof, may not be taken or possessed at any time, and no provision of the CFWC or any other law may be construed to authorize the issuance of permits of licenses to take any fully protected species. No such permits or licenses heretofore issued may have any force or effect for any such purpose, except that the CFGC may authorize the collecting of such species for necessary scientific research. Legally imported and fully protected species or parts thereof ay be possessed under a permit issued by CDFW. Porter-Cologne Water Quality Control Act

California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act established the SWRCB and each Regional Water Quality Control Board (RWQCB) as the principal state agencies for coordinating and controlling water quality in California. Responsibility for the protection of water quality in California rests with the SWRCB and nine RWQCBs. The SWRCB establishes statewide policies and regulations for the implementation of water quality control programs mandated by federal and state water quality statutes and regulations. Pursuant to the Act, each of California's nine regional boards must prepare and periodically update basin plans that set forth water quality standards for surface and groundwater, as well as actions to control point and non-point sources of pollution to achieve and maintain these standards. Basin plans offer an opportunity to achieve wetlands protection through enforcement of water quality standards.

The Porter-Cologne Water Quality Control Act provides that "All discharges of waste into the waters of the State are privileges, not rights." Waters of the State are defined in Section 13050(e) of the Porter-Cologne Water Quality Control Act as "…any surface water or groundwater, including saline waters, within the boundaries of the state." All dischargers are subject to regulation under the Porter-Cologne Water Quality Control Act, including both point and nonpoint source dischargers. The RWQCB has the authority to implement water quality protection standards through the issuance of permits for discharges to waters at locations within its jurisdiction, which would include the project site. As noted above, the RWQCB is the appointed authority for Section 401 compliance in the project site. If the USACE determines that they have no regulatory authority on the project site and they also determine that a CWA Section 404 permit is not required, the project proponent could still be responsible for obtaining the appropriate CWA Section 401 permit or waiver from RWQCB for impacts to Waters of the State.

In 2019, the State Water Resource Control Board extended their water quality certification to include waste discharge requirements as adopted in the "State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State," which include elements of the Clean Water Act. These procedures also lay out the steps for the submission, review, and approval of applications for activities related to these activities.

California Environmental Quality Act

Although specific federal and state statutes protect threatened and endangered species, California Environmental Quality Act (CEQA) Guidelines Section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants and animals and allows a public agency to undertake a review to determine if a significant effect on a species that has not yet been listed by either the USFWS or CDFW (i.e., species of concern) would occur. Whether a species is rare, threatened, or endangered can be legally significant because, under CEQA Guidelines Section 15065, an agency must find an impact to be significant if a project would "substantially reduce the number or restrict the range of an endangered, rare, or threatened species." Thus, CEQA provides an agency with the ability to protect a species from a project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

2.3 Local Laws and Regulations

Alameda County General Plan

Alameda County has developed the following goals and objectives for natural resource conservation as part of the *Conservation Element* of the *Alameda County General Plan*:

A. Water Resources

Goal: To ensure and maintain a continuing supply of high water quality for the citizens of Alameda County

Objective: To reduce man-caused stream and ground water pollution and general resource denegration through cumulative impacts on surface and ground water systems

Objective: To define areas of periodic flooding and reduce loss through the application of sound land use planning

Objective: To maintain all water resources in their highest quality

B. Vegetative and Wildlife Resources

Goal: To protect and enhance wildlife habitats and natural vegetation areas in Alameda County

Objective: To maintain and, if necessary, restore deteriorating environments to a level of diversity appropriate to this area of California
Agriculture and Soils Resources Management

Goal: To protect and maintain soils in Alameda County in such a manner as to be beneficial to agricultural and open uses

Goal: To protect and maintain the soil resources in Alameda County in such a manner as to be beneficial to all land users.

Alameda County Code, Article II. Permit Requirements

Alameda County regulates construction, erosion repair, planting, and associated activities with the potential to affect watercourses or riparian zone (Section 13.12.020 of the General Ordinance Code of the County of Alameda). Those wanting to conduct any of the activities below must obtain a permit.

A. Discharge into or connect any pipe or channel to a watercourse;

B. Modify the natural flow of water in a watercourse;

C. Carry out development within a setback;

D. Deposit in, plant in, or remove any material from a watercourse including its banks, except as required for necessary maintenance;

E. Construct, alter, enlarge, connect to, change, or remove any structure in a watercourse; or

F. Place any loose or unconsolidated material along the side of or within a watercourse or so close to the side as to cause a diversion of the flow, or to cause a probability of such material being carried away by stormwaters passing through said watercourse.

3.0 Methodology

Prior to our field surveys, we queried the U.S. Fish & Wildlife Service's *National Wetland Inventory* (NWI; Figure 3); EcoAtlas' *California Aquatic Resources Inventory* (CARI; Figure 3); NRCS *Web Soil Survey* (Appendix A; Figure 4); and *Hydric Soil Map Units* for Alameda County, California to determine whether any wetlands or "other waters of the U.S.", "waters of the State", or soils compatible with wetland resources had been historically recorded on or around, or are likely to occur on the site, as defined by the 1987 U.S. Army Corps of Engineers (USACE, 1987) *Wetlands Delineation Manual* and its 2008 *Arid West Regional Supplement*. We also assessed potentially federal and/or state jurisdictional wetlands and "other waters of the U.S." in the Study Area in accordance with the 2014 Corps *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) for Non-perennial Streams in the Arid West Region of the Western United States.*

To provide a vision of what potential biological resources may be present on the property, we queried the following online sources for information on the Study Area's potential plant and wildlife communities.

1. California Department of Fish & Wildlife's Natural Diversity Database (RareFind 5) for observations of special status plant and animal species within five miles of the Study Area (Figure 6; Appendix D),
2. U.S. Fish and Wildlife Service's iPac Database of federally-listed special status species in Alameda County (Appendix E),

3. The California Native Plant Society's Inventory of Rare & Endangered Plants in California

A Barnett Environmental biologist surveyed the Study Area in October 2020 for special status plant and wildlife species and their habitats that could be supported onsite. The survey included recorded observations of: (1) dominant plant communities, (2) plant and animal species (with emphasis on rare and endangered species) observed or their sign (nests, burrows, tracks, scat) and (3) the suitability of onsite habitats and those immediately adjoining the Study Area to support special status plant or animal species. We used generalized plant community classification schemes to classify onsite habitat types (Sawyer, Keeler-Wolf, and Evens, 2009).

4.0 Existing Conditions

4.1 Soils

According to Natural Resource Conservation Service (NRCS), the Study Area is comprised of a eight soil types (Figure 4; Appendix A):

1. Altamont clay 3-15%;
2. Azule clay loam, 3-30%;
3. Clear Lake clay, 0-2%;
4. Clear Lake clay, 3-7%;
5. Linne clay loam, 15-30%;
6. Linne clay loam, 30-45%;
7. Pescadero clay loam, 0-6%; and
8. San Ysidro loam, 0-2%.

Altamont clay soils occur on foothills at elevation ranging from 700 – 1,700 feet above mean sea level (msl). The average annual precipitation of the environment where this soil profile occurs is approximately 16 inches. These soils are deep and well drained and have an approximately 26-inch surface layer consisting of dark brown clay. The subsoil is yellowish brown, calcareous clay that extends to a depth of 50 inches. The permeability is slow with a moderate run-off rate and a water holding capacity of five to nine inches.

Azule clay soils are moderately deep, well drained soils that occur on foothills at elevations ranging from 300 to 1,500 feet above mean sea level (msl). This soils series occurs in areas which experience an average annual precipitation of 20 inches and a mean temperature of 57 degrees Fahrenheit. The surface layer is a grayish brown and slightly acidic clay loam approximately six inches thick. The subsoil is grayish brown to dark grayish brown that grades to a light yellowish brown a depth of 25 inches. The permeability is slow with a high run off rate and a water capacity of three to seven inches.

Clear Lake clay soils are very deep, poorly drained soils that form in alluvium in basins at elevations ranging from 10 to 900 feet above mean sea level (msl). Areas where this soils series occur have an average annual precipitation of 15 to 31 inches and a mean annual temperature of 57 to 61 degrees Fahrenheit. The surface layer is comprised of a very dark gray and moderately alkaline clay approximately 37 inches thick. The subsoil is dark gray, grayish

U. S. Fish and Wildlife Service. Publication date October 2020. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. http://www.fws.gov/wetlands/. Accessed December 4 , 2020. Basemap Earthstar Geographics, Maxar, Esri, HERE, NPS, Esri, HERE, Garmin, USGS, EPA, NPSScale Scale: 1:10,000, original map 8x11.

FIGURE 2 - NATIONAL WETLANDS INVENTORY (NWI) WETLANDS

Date: May 27, 2021

N

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CA

BARNETT ENVIRONMENTAL

brown clay, and silty clay to a depth of 60 inches. The permeability is slow with a rapid run off rate and a water holding capacity of seven to nine inches.

Linne clay loam soils are moderately deep, well drained soils that occur on mountain slopes at elevations ranging from 20 to 2,010 feet above mean sea level (msl). This soils series occurs in environments that have an annual mean precipitation of 12 to 22 inches and an average annual temperature of 57 to 63-degree Fahrenheit. The surface layer contains very dark gray clay loam approximately 29 inches deep. The subsoil is comprised of light gray to white fine sandy loam roughly 50 inches thick. Linne clay loam soils have a moderately slow permeability with a medium to rapid run off rate with a water holding capacity up to six inches.

Pescadero clay loams are very deep, poorly drained soils that occur on basin rims at elevations ranging from 140 to 760 feet above mean sea level (msl). The surface layer contains gray to dark gray clam loam up to 30 inches. The subsoil is made up of gray to light olive gray clay loam that reaches 70 inches in depth. The permeability is low with a low run off rate and a water holding capacity of four inches. This soil is slightly to strongly saline.

San Ysidro loams are very deep, moderately well drained soils that occur on valley floors, terraces, and alluvial fans at elevations ranging from 70 to 1,990 feet above mean sea level (msl). The environment where this soil series occurs have an average precipitation of 13 to 22 inches and a mean annual temperature of 59 to 61 degrees Fahrenheit. The surface layer is made up of light brownish gray to dark yellowish brown fine sandy loam approximately 28 inches thick. The subsoil is comprised of yellowish-brown sandy clay loam at depths of 68 inches. San Ysidro loam has a very low permeability with a moderate runoff rate with a water holding capacity of four inches.

4.2 Hydrology

The project site sits at an elevation between 470 and 645 feet above mean sea level (msl) within the San Francisco Bay watershed (Hydrologic Unit Code 18050004). Topography on the northern side of the site is hilly and turns to flatter grasslands in the southern part of the parcel. Water flows generally from north to south/southeast on the property, where it enters an intermittent stream, Arroyo Las Positas, and then runs southwest off the property. This stream runs through the southeast corner of the parcel, entering on the eastern side and exiting through the southern border as it drains underneath I-580. Considerable storm runoff from the westbound HOV lane of I-580 regularly floods portions of the project site adjacent to the highway following heavy precipitation. No mitigation has to date been installed following construction of the HOV lanes to moderate or reduce this runoff.

4.3 Wetlands and “Other Waters of the U.S.” and “Waters of the State”

A review of the National Wetlands Inventory (NWI; Figure 2) and California Aquatic Resources Inventory (CARI; Figure 3) map databases show very different scenarios for this site. While the NWI accurately shows the Arroyo Las Positas in the SE corner of the parcel, the CARI map shows a number of other streams as well as a wide swath of vernal pools through the site. This latter mapping was not reflected by Barnett Environmental’s (and earlier) wetland delineations of the site and clearly does not reflect current conditions.

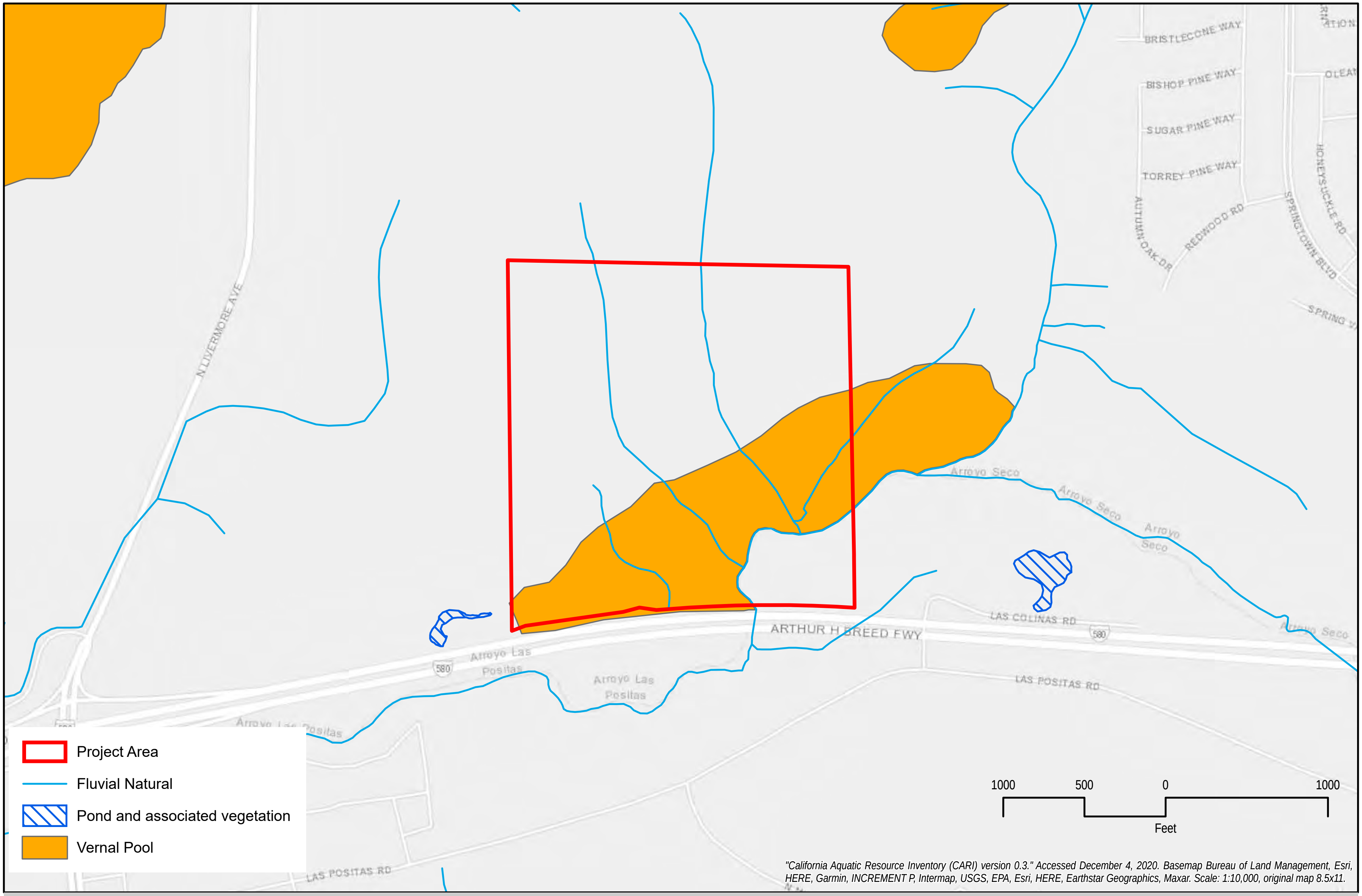
Barnett delineated a total of 2.1 acres of wetlands and "other waters of the U.S." within the Permit Area. These wetlands include 1.85 acre of the intermittent stream, Arroyo Las Positas, and 0.24 acre of seasonal wetland habitat, as shown in Table 1 below and Figure 5.

Table 1: Wetlands and "Other Waters of the U.S."

Description	Area (SF)	Area (AC)
Intermittent Stream		
Las Posadas Stream	80,823	1.85
Intermittent Stream Total	**80,823**	**1.85**
Seasonal Wetlands		
Seasonal wetlands	10,657	0.24
Seasonal Wetlands Total	**10,657**	**0.24**
Grand Total	91,480	2.1

The low-gradient Arroyo through the southeastern corner of the site is relatively wide and deeply incised, its banks are very steep and erodible, and the stream itself is almost 15 feet deeper than the surrounding terrain. The streambed is comprised of a variety of hardpan, cobbles, and fine sediment and contains portions of open water with periodic, dense, fringing perennial marsh vegetation. The arroyo was flowing at one to two cubic feet per second (cfs) during the Barnett Environmental October 2020 site visit, but was dry by the time we completed a California Tiger Salamander habitat assessment in April of 2021, reflecting the very low seasonal precipitation experienced through the region over this past winter.

There are five shallow seasonal wetlands on site which can pond (with sufficient rainfall) during the wet season and support various species of wetland vegetation. The largest of these seasonal wetlands is 0.123 acre and is located just north of Arroyo Las Positas. There was no water in these wetlands during the October 2020 and CTS sampling site visits.



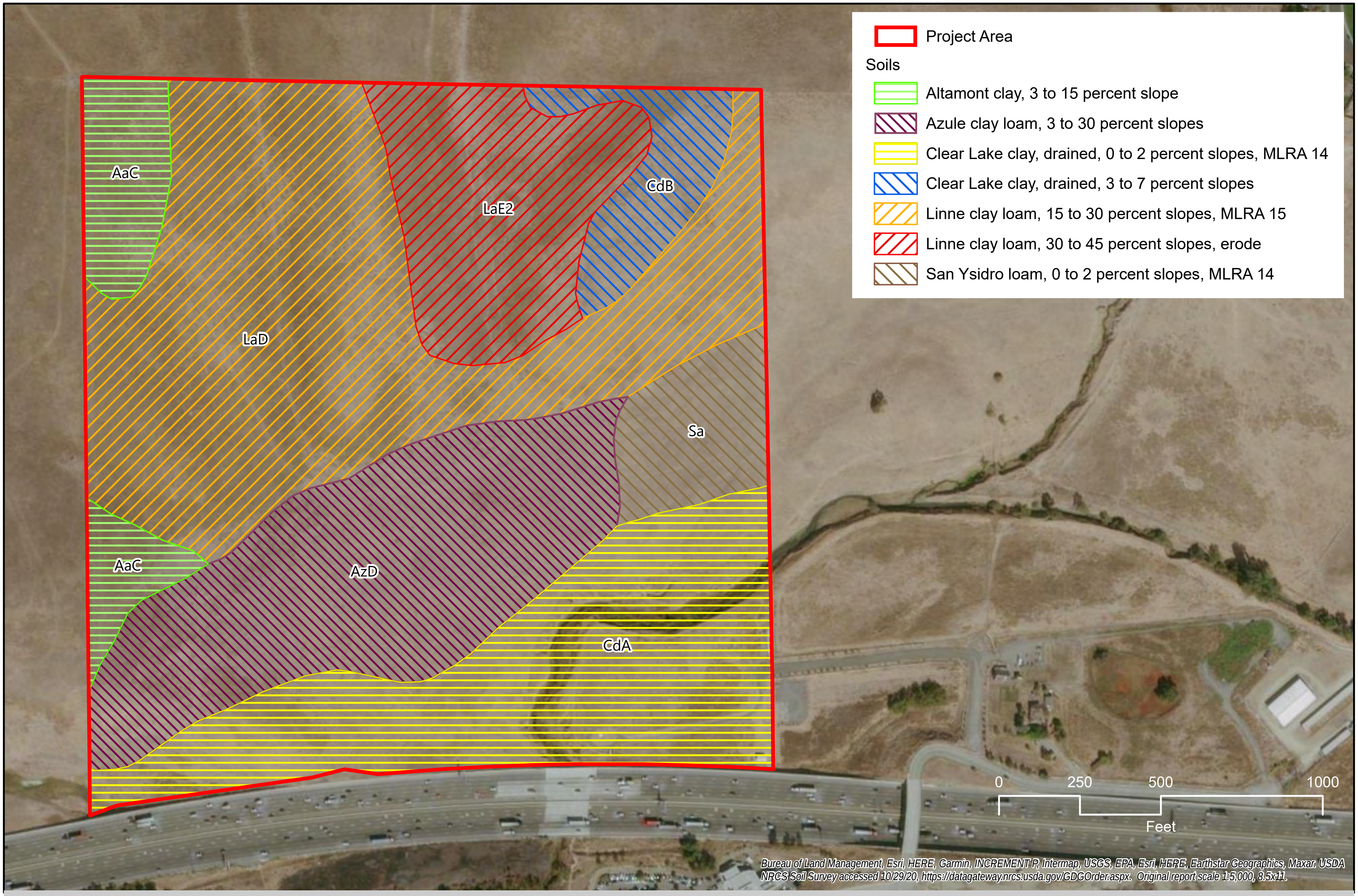
"California Aquatic Resource Inventory (CARI) version 0.3." Accessed December 4, 2020. Basemap Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, EPA, Esri, HERE, Earthstar Geographics, Maxar. Scale: 1:10,000, original map 8.5x11.

FIGURE 3 - CALIFORNIA AQUATIC RESOURCES INVENTORY (CARI) WETLAND

Date: May 27, 2021

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CA

BARNETT ENVIRONMENTAL



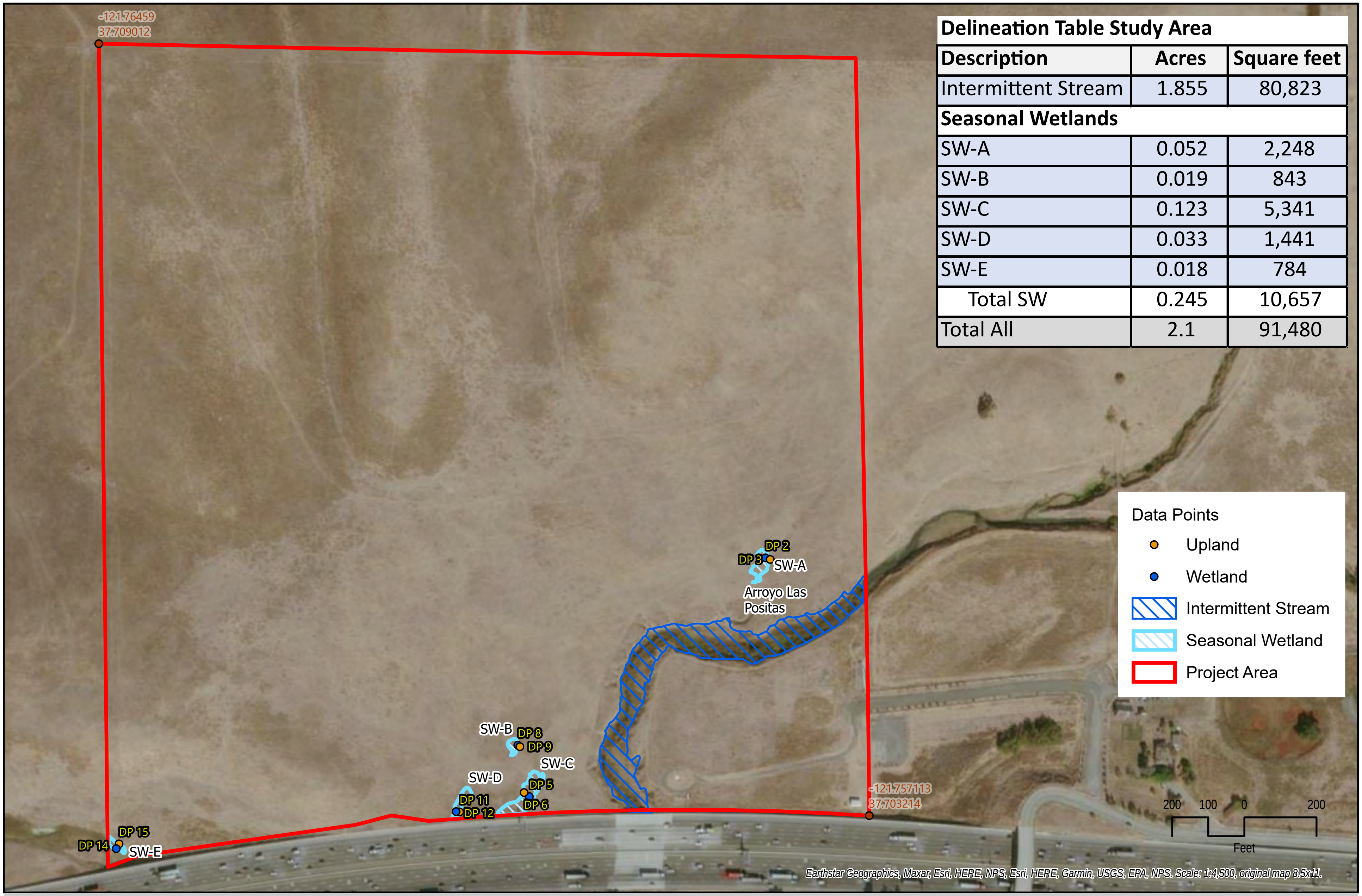
Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, EPA, Esri, HERE, Earthstar Geographics, Maxar. USDA NRCS Soil Survey accessed 10/29/20, https://datagateway.nrcs.usda.gov/GDGOrder.aspx. Original report scale 1:5,000, 8.5x11.

FIGURE 4 - SOILS MAP

Date: May 28, 2021

N

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CA



Delineation Table Study Area

Description	Acres	Square feet
Intermittent Stream	1.855	80,823
Seasonal Wetlands		
SW-A	0.052	2,248
SW-B	0.019	843
SW-C	0.123	5,341
SW-D	0.033	1,441
SW-E	0.018	784
Total SW	0.245	10,657
Total All	2.1	91,480

Earthstar Geographics, Maxar, Esri, HERE, NPS, Esri, HERE, Garmin, USGS, EPA, NPS. Scale: 1:4,500, original map 8.5x11.

FIGURE 5 - PROJECT AREA WETLANDS AND "OTHER WATERS OF THE U.S."

Date: May 27, 2021

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CA

BARNETT ENVIRONMENTAL

4.4 Vegetation Communities

The Study Area supports the following vegetation communities:

A. Annual Grasslands: The majority of the Study Area is dominated by annual grasslands containing wild oats (*Avena fatua*), softchess brome (*Bromus hordeacious*), and rose clover (*trifolium hirtum*). Other species observed within this community included great valley gumweed (*Grindelia camporum*), purple star thistle (*Centaurea calcitrapa*), bristly ox tongue (*Helminthotheca echioides*), and turkey-mullein (*Croton setiger*). The annual grassland of the Study Area appears to be lightly grazed by cattle and contained low amounts of thatch at the time of our field survey.

B. <u>Disturbed Grasslands:</u> The majority of the southeastern portion of the Study Area consists of a ruderal, disturbed vegetation community containing non-native species such as bull thistle (*Cirsium vulgare*), stinkwort (*Dittrichia graveolens*), sweet fennel (*Foeniculum vulgare*), and great valley gumweed. This community is regularly disturbed by either mowing or disking.

   A disked field comprising the south-central portion of the Study Area has been historically disked for vegetation management for many years and had been recently disked at the time of the October 2020 site visit contained no vegetation.

C. <u>Arroyo Las Positas</u> – This perennial stream flows from northeast to southwest through the southeastern portion of the Study Area. Its banks are moderately vegetated by annual grasses and forbs similar to the wild oats and annual brome grasslands with the addition of mugwort (*Artemisia douglasiana*), deer grass (*Muhenbergia rigens*), and tree tobacco (*Nicotiana glauca*). The bed of the stream contains portions of open water and dense perennial marsh vegetation including broad-leaved cattail *(Typha latifolia),* broadfruit bur reed (*Sparganium eurycarpum*), and common tule (*Schoenoplectus acutus* var. *occidentalis*).

   A small arroyo willow thicket along the Arroyo las Positas in the southeastern portion of the Study Area is dominated by large arroyo willows (*Salix lasiolepis*) and an understory of several vegetation species including: bull thistle (*Cirsium vulgare*), stinkwort (*Dittrichia graveolens*), sweet fennel (*Foeniculum vulgare*), and great valley gumweed (*Grindelia camporum*).

D. <u>Seasonal Wetlands:</u> There are several small seasonal wetlands within the wild oats and annual brome grassland in the southernmost portion of the Study Area along I-580. These small shallow features tend to pond water during a healthy rainy season and include a variety of wetland plant species such as Italian ryegrass (*Festuca perennis*), Mediterranean barley (*Hordeum marinum*), and common tarweed (*Centromadia pungens* subsp. *pungens*).

E. <u>Salt Grass:</u> There is a small salt grass flat in the far southwestern corner of the Study Area dominated by salt grass (*Distichlis spicata*) and Mexican rush (*Juncus mexicanus*), seaside heliotrope (*Heliotropium curassavicum* var. *oculatum*), and alkali heath (*Frankenia salina*). Two small blue elderberry shrubs (*Sambucus nigra* subsp. *caerulea*) occur immediately south of this community, along the I-580 sound wall. None of the stems of these shrubs contained exit holes of the valley elderberry longhorn beetle (VELB) at the time of our spring 2021 survey of this area.

There is another seasonal wetland/marsh within this salt grass flat that supports broad-leaved cattail (*Typha latifolia*), Mexican rush, annual rabbit's-foot grass (*Polypogon monspleinsis*), salt grass *(Distichlis spicata),* and alkali mallow (*Malvella leprosa*).

F. Agricultural: The farthest southeastern portion of the Study Area contains an old vineyard that appears to have been fallow for a long time and is now overrun with ruderal and annual grassland plant species.

4.5 Wildlife

Barnett biologists observed many common wildlife species on site during their autumn 2020 and spring 2021 field surveys, including: western fence lizards (*Sceloporus occidentali),* wild turkey (*Meleagris gallopav),* great egret (*Ardea alba),* red-tailed hawk (*Buteo jamaicensis),* Great-horned owl (*Bubo virginianu),* lesser goldfinch (*Carduelis psaltria),* American goldfinch (*Carduelis tristis),* American crow (*Corvus brachyrhynchos),* Anna's hummingbird (*Calypte anna),* Northern mockingbird (*Mimus polyglottos),* European starling (*Sturnus vulgaris),* western scrub jay (*Aphelocoma californica),* rock pigeon (*Columba Iivia),* Black-tailed jackrabbit (*Lepus californicus),* California vole (*Microtus californicus),* Colombian black-tailed deer (*Odocoileus hemionus columbianus),* California ground-squirrel (*Spermophilus beecheyi),* desert cottontail (*Sylvilagus audubonii*), and coyote *(Canis latrans)*

5.0 Special Status Species

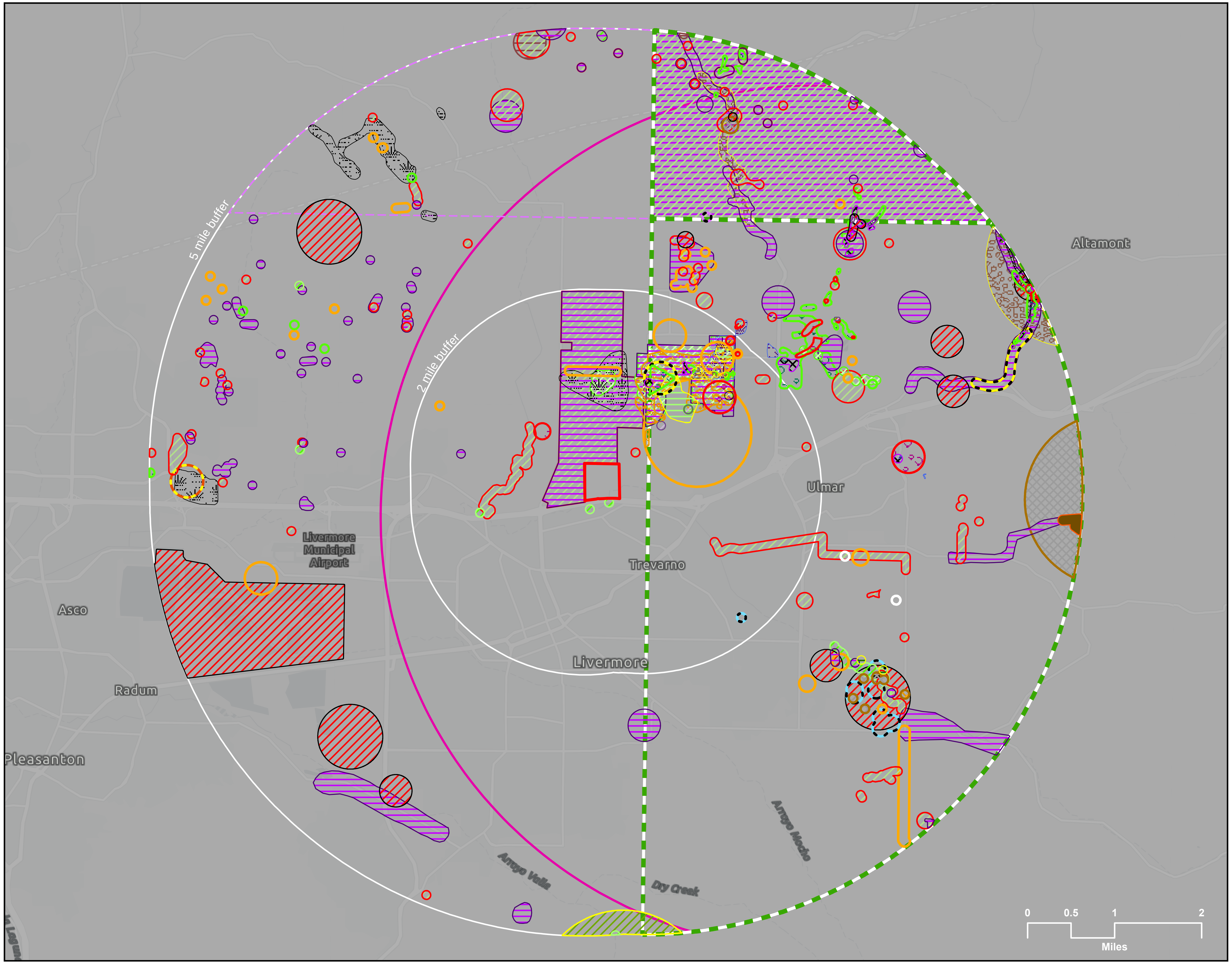
Special status species are those that fall into one or more of the following categories:

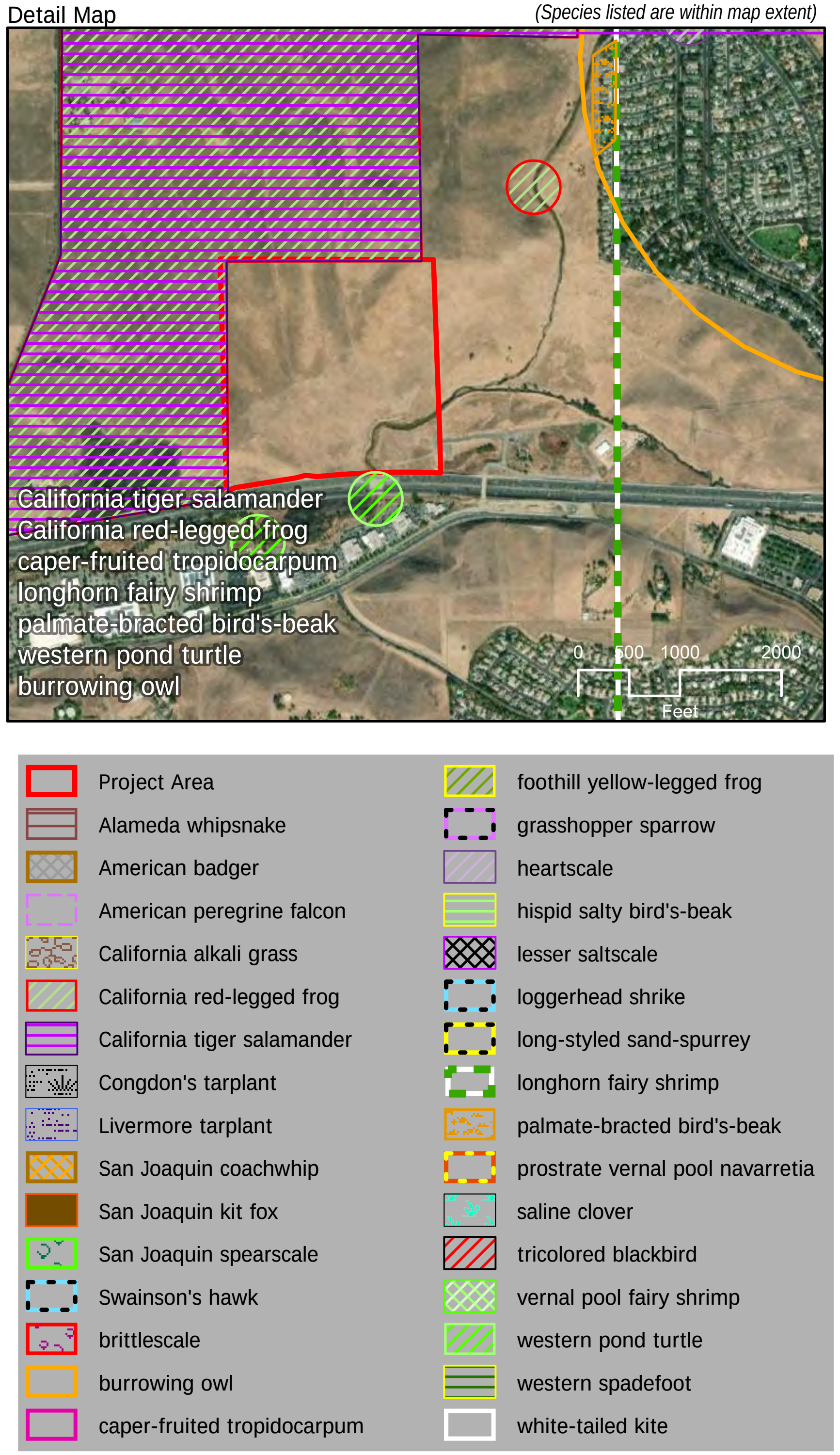
- Listed as endangered or threatened under the Federal Endangered Species Act (FESA) (50 CFR 17.11/17.12) (or formally proposed for listing) (64 FR 205, October 25, 1999; 57533-57547),
- Listed as endangered or threatened under the California Endangered Species Act (CESA) (or proposed for listing) (14 California Code of Regulations [CCR] 670.5),
- Designated as rare, protected, or fully protected pursuant to California Fish and Game Code (FGC, Section 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]).
- Designated a Species of Concern by the California Department of Fish and Game,
- Defined as rare or endangered under the California Environmental Quality Act (CEQA), or
- Occurring on List 1 or 2 maintained by the California Native Plant Society.

We reviewed California Natural Diversity Database (CNDDB), California Native Plant Society (CNPS) Inventory, and U.S. Fish & Wildlife Service (FWS) iPAC database for special status species potentially occurring within the project vicinity (i.e. five-mile radius). While there may be a number of plant and animal species occurring within five miles of the Study Area (Figure 6), we can refine the list of those species with any real potential of occurring in the Study Area by filtering our query for relevant onsite habitats, locations, and elevations. A summary of the results of this query can be found in Table 2.

5.1 Critical Habitat for Special Status Species

The Federal Endangered Species Act (FESA) requires the federal government to designate critical habitat for any listed species. Critical habitat is defined as: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. While there is no designated critical habitat within the Study Area, there is critical habitat for the California red-legged frog, the California tiger salamander, and the vernal pool fairy shrimp within five miles of the Study Area.





CNDDB version 9/2020. Please Note: The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDB about a species or an area can never be used as proof that no special status species occur in an area California Department of Fish and Wildlife. https://www.wildlife.ca.gov/Data/CNDDB, September 29, 2020 USDA FSA, GeoEye, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA Scale 1:78,000 original report 11x17.

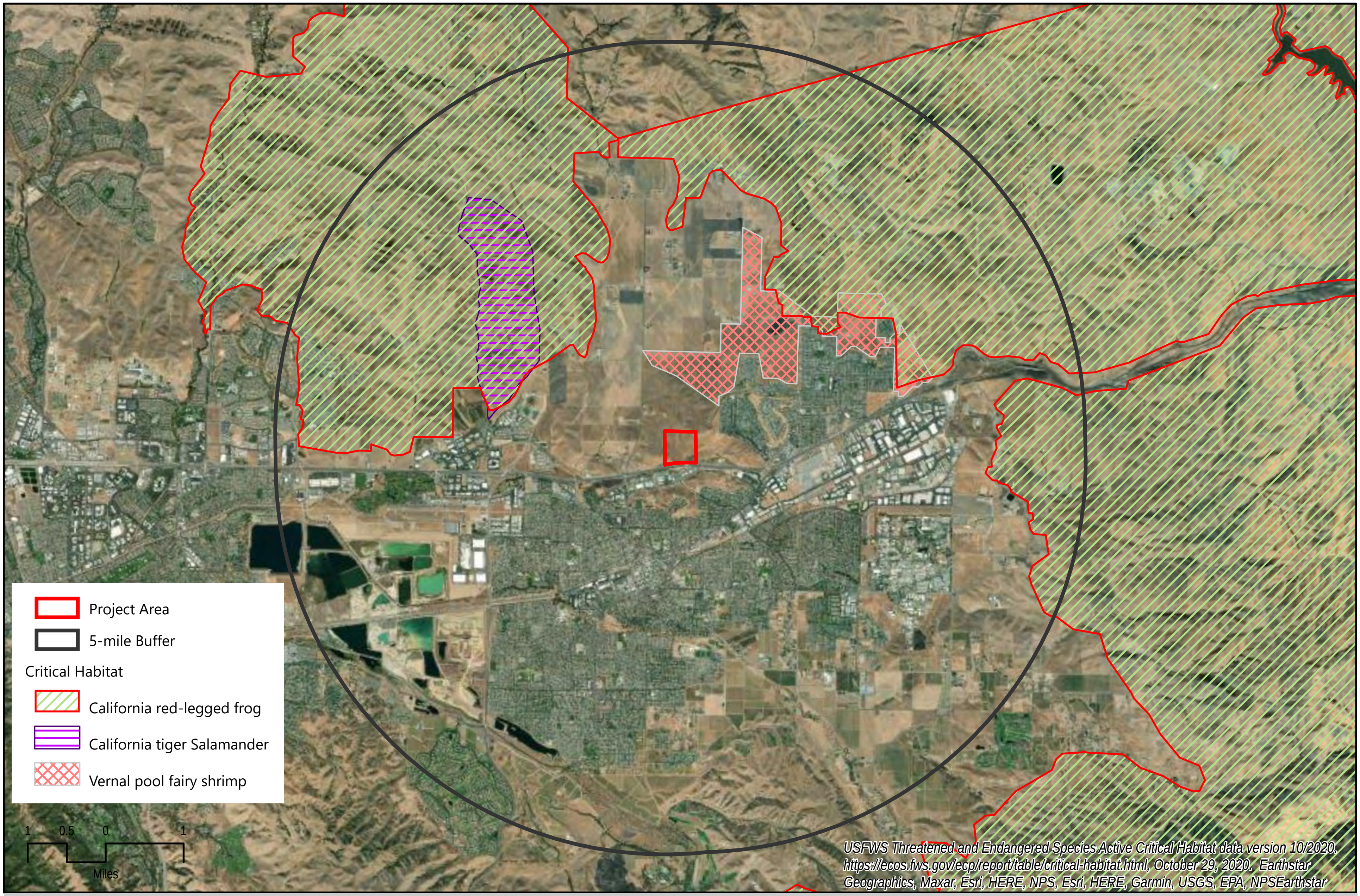
FIGURE 6 - CALIFORNIA NATIONAL DIVERSITY DATABASE (CNDDB) RECORDED SPECIES OBSERVATIONS WITHIN FIVE MILES OF THE PROJECT AREA

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CALIFORNIA

Date: September 29, 2020

N

BARNETT ENVIRONMENTAL



USFWS Threatened and Endangered Species Active Critical Habitat data version 10/2020. https://ecos.fws.gov/ecp/report/table/critical-habitat.html, October 29, 2020. Earthstar Geographics, Maxar, Esri, HERE, NPS, Esri, HERE, Garmin, USGS, EPA, NPSEarthstar

FIGURE 7 - CRITICAL HABITAT

Date: May 27, 2021

N

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CA

BARNETT ENVIRONMENTAL

Table 2: Special Status Species with Potential to Occur in the Study Area

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Plants						
California alkalai grass *Puccinellia simplex*	None	None	1B.2	Typically grows in mineral springs and other moist, saline-soil habitats within the Central Valley.	None	The Study Area contains no saline soil habitat and thus presents no suitable habitat for this species. There have been four CNDDB reported occurrences within five miles, the closest 0.53 miles to the northwest and the most recent in 2018. There was no sign of this species during the Barnett Environmental October 2020 site visit.
Congdon's tarplant *Centromadia parryi ssp. congdonii*	None	None	1B.1	Found at elevations between 0 and 754 feet above sea level, this annual tarplant is found in valley and foothill grasslands (alkaline).	None	The Study Area contains no alkali grasslands and thus presents no suitable habitat for this species. There have been six CNDDB reported occurrences within five miles. The closest was 0.61miles to the north, and the latest in 2019. There was no sign of this species during the Barnett Environmental October 2020 site visit.
Livermore Tarplant *Deinandra bacigalupil*	None	None	1B.1	This annual plant occurs only within 0.5 miles of the City of Livermore in Alameda County, CA. The plant grows in poorly-drained, seasonally-dry, alkaline meadows, and appears to be restricted to Solano fine sandy loam soil.	None.	The Study Area contains no alkali meadows or Solano fine sandy loam on site and thus presents no suitable habitat for this species. There have been four CNDDB reported occurrence within five miles, the closest occurred 1.32 miles to the southwest. There was no sign of this species during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Plants						
San Joaquin spearscale *Atriplex joaquiniana*	-	-	1B.2	This species typically occurs in alkalai grasslands and alkalai meadows or on the margin of alkali scrub.	None	The Study Area contains no alkali grasslands and thus presents no suitable habitat for this species. There have been 11 CNDDB occurrences reported within five miles, the closest was 0.88 miles to the northwest. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Brittlescale *Atriplex depressa*	-	-	1B.2	Occurs in playas and shadescale scrub, valley grassland, alkalai sink, and wetland-riparian.	None	The Study Area contains no alkali soil and thus presents no suitable habitat for this species. There have been five CNDDB occurrences reported within five miles, the closest was 0.51 miles to the northwest and the latest was in 2003. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	-	-	1B.1	This annual herb has habitat in valley grasslands and foothill grasslands (alkaline).	None	The Study Area contains no alkali grasslands and thus presents no suitable habitat for this species. There has been one sole CNDDB occurrence reported within five miles. The closest was 0.88 miles to the northeast. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Plants						
Heartscale *Atriplex cordulata*	-	-	1B.2	This annual herb is as likely to occur in wetlands and non-wetlands. It thrives in communities such as shadescale scrub, valley grassland, and wetland-riparian.	None	The wetland-riparian zone and grasslands provide a suitable habitat in the Study Area for this species. There have been five CNDDB occurrences reported within five miles, the closest was 0.61 miles to the northwest and the most recent was in 2005. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Hispid Salty Bird's Beak *Cordylanthus mollis ssp. hispidus*	-	-	1B.1	Occurs in wetlands, meadows, playas, in alkalai sink, valley grassland, and wetland-riparian communities.	None	The Study Area contains no alkali grasslands and thus presents no suitable habitat for this species. There has been one sole CNDDB occurrences reported within five miles, 0.79 to the northeast in 2003. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Lesser Saltscale *Atriplex miniscula*	-	-	1B.1	Usually occurs in non-wetlands in playas in shadescale scrub, valley grassland, and alkali sink communtities.	None	The Study Area contains no alkali grasslands and thus presents no suitable habitat for this species. There have been eight CNDDB occurrences reported within five miles, the closest was 0.94 miles to the northwest and the most recent in 2018. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Plants						
Long-style sand-spurrey *Spergularia macrotheca var. longistyla*	-	-	1B.2	Occurs in wetlands and non-wetlands in wetland-riparian communities.	Low	There is marginal habitat on site for this species. There have been two CNDDB occurrences reported within five miles; the closest was 0.91 miles to the northeast, and the most recent was in 1993. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Palmate-bracted bird's beak *Chloropyron palmatum*	-	-	1B.1	This species grows in saline-alkaline soils in seasonally-flooded lowland plains and basins at elevations of less than 500 feet.	None	The Study Area contains no alkali grasslands and thus presents no suitable habitat for this species. There has been one sole CNDDB occurrence reported within five miles, the 0.36 miles to the northeast. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Saline Clover *Trifolium hydrophilum*	-	-	1B.2	This annual herb is found in marshes and swamps, valley and foothill grassland (alkaline) and vernal pools.	None	The Study Area contains no alkali grasslands and thus presents no suitable habitat for this species. There has been one CNDDB occurrence reported within five miles, 1.39 miles to the northeast in 2018. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Plants						
Prostrate Vernal Pool Naverettia *Navarettia prostrata*	-	-	1B.1	This annual herb is found at elevations between 10 and 3969 feet in coastal scrub, meadows and seeps, valley and foothill grasslands, and vernal pools.	Low	There is marginal habitat on site for this species. There was only one CNDDB reported occurrence within five miles. This occurred 4.38 to the east in 2010. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Invertebrates						
Vernal Pool Fairy Shrimp *Brachinecta conservatio*	FT	None	N/A	Habitat is grassland vernal pools or similar seasonal wetlands. They require cool water with low alkalinity and low total dissolved solids and tend to be found in smaller pools about six inches (fifteen centimeters) deep that stay flooded for relatively short amounts of time.	Very low	The shallow depressional seasonal wetlands within the Study Area represent suitable habitat for vernal pool fairy shrimp. However, there have been no CNDDB occurrences reported within five miles. There was no sign of this species during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Invertebrates						
Conservancy Fairy Shrimp *Brachinecta conservatio*	FE	None	N/A	This species lives in ephemeral or temporary pools of fresh water (vernal pools) that form in the cool, wet months of the year. Fairy shrimp are not known to occur in permanent bodies of water, and are dependent upon seasonal fluctuations in their habitat, such as absence or presence of water during specific times of the year.	None	Turbid playa vernal pools are not present within the Study Area, and thus there is no habitat present for this species. There have been no CNDDB occurrences reported within five miles. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Longhorn Fairy Shrimp *Brachinecta conservatio*	FE	-	-	This species inhabits clear to rather turbid vernal pools. These include clear-water depressions in sandstone outcroppings near Tracy, grass-bottomed pools in Merced County and claypan pools around Soda Lake in San Luis Obispo County.	Low	The shallow depressional seasonal wetlands within the Study Area represent suitable habitat for vernal pool fairy shrimp. There have been five CNDDB occurrences reported within five miles. The closest was 2.84 miles to the northeast. There was no sign of this species during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Insects						
Valley Elderberry Longhorn Beetle *Demoscerus californicus dimorphus*	FT		NA	Habitat requirements for this species is Sambucus sp. To serve as habitat, the shrubs must have stems 2.5 m (1 in) or greater in diameter at ground level.	Low	There is one elderberry plant on site that could provide habitat for this species. However, no holes in the stems were found to indicate the species were present. In addition, there are no reported CNDDB occurrences reported within five miles. Barnett Environmental observed no sign of this species during the October 2020 site visit.
San Bruno Elfin Butterfly *Callophrys mossi bayensis*	FE	-	NA	This species inhabits rocky outcrops and cliffs in coastal scrub on the San Francisco peninsula. The San Bruno Elfin is restricted to a few small populations, the largest which occurs on San Bruno mountain.	None	Rocky outcrops with extensive populations of broadleaf stonecrop do not occur within the Study Area. In addition, there have been no CNDDB occurrences reported within five miles. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Amphibians and Reptiles						
California red legged frog *Rana draytonii*	FT	NA	NA	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. This includes wetlands, marshes, natural ponds, artificial flowing waters such as diversion canals and artificial standing waters such as dams and impoundments.	High	Arroyo Las Positas and the on-site emergent marsh represents suitable aquatic habitat for the species. There have been 75 CNDDB occurrences reported within five miles, and the most recent in 2016. There was no sign of this species during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Amphibians and Reptiles						
Western Pond Turtle *Emys Marmorota*	None	SSC	NA	The western pond turtle is found in permanent and intermittent waters of rivers, creeks, small lakes and ponds, marshes, irrigation ditches and reservoirs. The western pond turtle basks on land or near water on logs, branches or boulders.	Low	There is suitable habitat on site for this species. There have been nine CNDDB occurrences reported within five miles, and the most recent was in 2017. However, no sign of this species was observed during the Barnett Environmental October 2020 site visit.
California Tiger Salamander *Ambystoma californiense*	FT	CT	NA	Habitat for this species are vernal pools and other seasonal ponds and stock ponds for reproduction; its habitat is limited to the vicinity of large, fishless vernal pools or similar water bodies.	High	The Study Area contain moderate amounts of California ground squirrel burrows that represent suitable upland habitat/ refugia for the species. There is additional suitable breeding habitat is located within a seasonal wetland approximately 0.1-mile west of the Study Area. The grasslands within the Study Area contain moderate amounts of California ground squirrel burrows that represent suitable upland habitat/refugia for the species. There have been 51 CNDDB occurrences reported within five miles. The most recent observance was in 2015. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Amphibians and Reptiles						
Western Spadefoot *Spea hammondii*	NA	SSC	NA	This species is found in a variety of habitats including coastal sage scrub, chapparal, oak woodlands, grasslands, washes, and floodplains along the California coast, central valley, and Sierra Nevada foothills.	Moderate	The on-site emergent marsh represents marginal aquatic habitat for the species. There is a potential breeding aquatic habitat immediately southwest of the Study Area. There have been two CNDDB occurrences reported within five miles, the closest 3.05 miles to the southeast. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Foothill yellow legged frog *Rana Boylii*	FT	None	NA	Historically inhabited lakes, ponds, marshes, meadows, and streams.	None	The Study Area does not contain any permanent sources of deep water to provide suitable habitat for this species. There have been two CNDDB occurrences reported within five miles, the closest was 4.72 miles to the south and the latest in 1974. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
San Joaquin coachwhip *Coluber flagellum ssp. ruddocki*	FT	CT	NA	Enjoys open, hot, dry areas as well as grasslands, chapparal communities, and pastures. It is thought to lay eggs in rodent burrows.	Moderate	The Study Area contains suitable habitat for the species within the onsite grasslands. There has been one sole CNDDB occurrence reported within five miles, the closest was 3.69 miles to the southeast in 2000. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Amphibians and Reptiles						
Alameda whipsnake *Masticophis lateralis euryxanthus*	FE	CE	NA	Found in the habitats of the coast, desert, and foothills of California.	None	The Study Area is not located on the coast, desert, or foothills of California. There have been two CNDDB occurrences reported within five miles, the closest 2.82 miles to the north and the latest was in 2004. In addition, there was no sign of this species during the Barnett Environmental October 2020 site visit.
Birds						
Tricolored blackbird *Agelaius tricolor*	None	CE	NA	Freshwater marsh, swamp, wetlands, and most numerous in Central Valley and vicinity. Requires open water, protected nesting substrates, & foraging area with insect prey within a few km of the colony.	Low	The emergent marsh vegetation and arroyo willows along Arroyo Las Positas and the emergent marsh represent suitable nesting habitat for tricolored blackbird. No shrub or tree vegetation to support these colonies. The annual grasslands within the Study Area represent potential foraging habitat for the species. There have been 12 CNDDB occurrences reported within five miles. The closest was 2.6 miles to the southeast, and the most recent was in 2014. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Birds						
Burrowing Owl *Athene cunicularia*	None	CSC	NA	Open, dry annual or perennial grasslands, deserts & scrublands characterized by low-growing vegetation. The species sis a subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	High	Many ground squirrel burrows were observed within the grasslands; these represent suitable nesting habitat. Burrowing owl pellets observed onsite on a fencepost along the northern boundary. There have been 20 CNDDB occurrences reported within five miles, the most recent in 2017 and the closest was 1.01 miles to the north. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Swainson's hawk *Buteo swainsoni*	None	CT	NA	Great Basin grassland, riparian forest and woodlands, valley and foothill grassland. Breeds in grasslands with scattered trees, juniper-sage flats, savannahs, & agricultural or ranch lands with groves or lines of trees.	Moderate	There is marginal foraging grassland habitat within the Study Area, and there has been one sole recorded CNDDB occurrence within five miles 1.7 miles to the southeast. No Swainson's hawks were observed during the Barnett Environmental October 2020 site visit.
Grasshopper Sparrow *Ammodramus savannarum*	None	SSc	NA	This species thrives in native grasslands of California	Moderate	The grasslands throughout the Study Area represent suitable nesting and foraging habitat. However, there has been only one CNDDB occurrence reported within five miles, 2.96 miles to the northwest in 2016. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Birds						
White-tailed kite *Elanus leucurus*	None	CFP	NA	Open grasslands, fields, and meadows are used for foraging. Isolated trees in close proximity to foraging habitat are used for perching and nesting.	Moderate	The large arroyo willows within the Study Area provide suitable nesting habitat, and the annual grasslands represent suitable foraging habitat. There have been two CNDDB occurrences reported within five miles, the closest was 2.33 miles to the southeast. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
Loggerhead Shrike *Lanius ludovicianus*	None	CE	-	Inhabits open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses and cemeteries.	Moderate	Shrubs and trees near the Arroyo Las Positas and the ranch house represent suitable nesting habitat, and the grasslands throughout the Study Area represent suitable foraging habitat. There has been a sole CNDDB occurrence reported within five miles, the closest was 3.17 miles to the southwest. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
American Peregrine Falcon *Falco peregrinus anatum*	FE	CE	NA	Open grasslands, fields, and meadows are used for foraging. Isolated trees in close proximity to foraging habitat are used for perching and nesting.	Moderate	The large arroyo willows within the Study Area provide suitable nesting habitat, and the annual grasslands represent suitable foraging habitat. There have been two CNDDB occurrences reported within five miles, the closest was 2.33 miles to the southeast. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Species	Federal	State	CNPS	Habitat	Potential for Occurrence	Rationale for Assessing Potential of Occurrence
Mammals						
San Joaquin kit fox *Vuples macrotis mutica*	FE	CE	NA	This species is endemic to California and inhabits grasslands and scrublands, even those than have been extensively modified.	Low	The grasslands throughout the Study Area represent suitable habitat for this species. There has been only one recorded CNDDB occurrence which occurred 0.73 miles to the east. No sign of this species was observed during the Barnett Environmental October 2020 site visit.
American badger *Taxidea taxus*	None	SSC	NA	Badgers prefer to live in dry, open grasslands, meadows, and grassy bald spots on high ridge tops.	Low	The on-site grasslands throughout the Study Area represent suitable habitat for this species. There have been three CNDDB occurrences; the most recent was in 2009 and the closest was 3.2 miles to the southeast. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

Special Status Species Codes:

<u>Federal</u>:	*FE = Federal Endangered*	*FT = Federal Threatened*
<u>State</u>:	*CSC = California Species of Concern*	*CE = California Endangered*
	CFP = California Fully Protected	*CT = California Threatened*
<u>CNPS</u>:	*1B = Rare or threatened in CA and elsewhere*	*2B = Rare, threatened, or Endangered in CA, but more common elsewhere*

Potential for Occurrence Codes:

None:	*No suitable habitat for the special status species within the Study Area*
Very Low:	*Either the special status species is known to occur within five miles and there is marginal suitable habitat exists in the Study Area, or the Study Area provides suitable habitat, but the species is not known to occur within a five-mile radius.*
Low	*Marginally suitable habitat exists in the Study Area and the special status species occurs within 5 miles but surrounding urban land use conditions and regularity of human activity make it unlikely that the species occurs in the Study Area.*
Moderate:	*The special status species is known to occur within a five-mile radius and the Study Area contains suitable habitat, however surrounding urban land use conditions and onsite disturbance reduce the likelihood of occurrence.*
High:	*The Study area provides suitable habitat and there is either documentation of species occurrence within a five-mile radius or evidence gathered by a professional surveyor during an onsite field assessment.*
Present:	*Species known to occur within the Study Area based on record search and/or evidence collect during onsite field surveys.*

5.2 Special Status Plants and Wildlife

There are three special status plant species that have a potential to occur onsite.

1. **Heartscale** (*Atriplex cordulata*)– This species is listed as a rare plant 1B.2 by the state of California. This annual herb is as likely to occur in wetlands as in non-wetlands. It thrives in communities such as shadescale scrub, valley grassland, and wetland-riparian. There have been five CNDDB occurrences reported within five miles; the closest was 0.61 miles to the northwest and the most recent was in 2005. It has a low potential to occur in the Study Area. However, no heartscale was observed within existing irrigation ditches during the Barnett Environmental October 2020 field survey.

2. **Long-style sand-spurrey** (*Spergularia macrotheca var. longistyla*) – This species is listed as a rare plant 1B.2 by the state of California. It is a perennial herb producing a narrow stem up to 15.7 inches long with a woody, thickened base and taproot. They may grow erect or prostrate across the ground. It is covered in sticky glandular hairs, especially in the inflorescence. The stems are lined with fleshy linear leaves, sometimes tipped with spines. The leaves are accompanied by triangular stipules up to a centimeter long each. Flowers occur in clusters at the end of the stem as well as in leaf axils. There have been two CNDDB occurrences reported within five miles; the closest was 0.91 miles to the northeast, and the most recent was in 1993. It has a low potential to occur in the Study Area. No long-style sand-spurrey were observed within existing irrigation ditches during the Barnett Environmental October 2020 field survey.

3. **Prostrate vernal-pool navarettia** (*Navarettia prostrata*) – This species is listed as a rare plant 1B.2 by the state of California. It is a petite annual herb sitting prostrate on the ground with a central stem and flower head and radiating stem branches bearing more heads. The hairless leaves are divided into many threadlike lobes. The

inflorescence is a cluster of flowers surrounded by leaflike bracts. The flowers are just under half an inch long, their blue or white corollas divided into narrow lobes. This annual herb is found at elevations between 10 and 3969 feet in coastal scrub, meadows and seeps, valley and foothill grasslands, and vernal pools. The grasslands on site provides suitable habitat for this species. There was only one CNDDB reported occurrence within five miles. This occurred 4.38 to the east in 2010. No prostrate vermal-pool navarettia were observed during the Barnett Environmental October 2020 field survey. It has a low potential to occur in the Study Area.

5.3 Special Status Wildlife

Federally Listed Species

There are ten federally listed species that have the potential but are not known to occur within the Study Area (Appendix B, Table 2):

4. **Vernal pool fairy shrimp** (*Brachinecta lynchi*) – This species is listed as threatened by the U. S. Fish and Wildlife Service. It is a slender, translucent crustacean generally less than one inch in length. They swim on their back by slowly moving their 11 pairs of swimming legs. Habitat is grassland vernal pools or similar seasonal wetlands. They require cool water with low alkalinity and low total dissolved solids and tend to be found in smaller pools about six inches (fifteen centimeters) deep that stay flooded for relatively short amounts of time. Vernal pool fairy shrimp typically hatch when the first rains of the year fill vernal pools. Adult fairy shrimp live for only one season while there is water in the pools. The shallow depressional seasonal wetlands within the Study Area represent suitable habitat for vernal pool fairy shrimp. However, there have been no CNDDB occurrences reported within five miles. No vernal pool fairy shrimp were observed during the Barnett Environmental October 2020 field survey. This species has a very low potential to occur in the Study Area due to the absence of vernal pools or seasonal wetlands of sufficient ponding duration.

5. **Longhorn fairy shrimp** (*Branchinecta longiantenna*) – This species is listed as endangered by the U. S. Fish and Wildlife Service. It ranges in size from 0.5 to 0.8 inches long. They have delicate elongate bodies, large, stalked compound eyes, no carapaces, and 11 pairs of swimming legs. They glide gracefully upside down, swimming by beating their legs in a complex, wavelike movement that passes from front to back. The shrimp feed on algae, bacteria, protozoa, rotifers and bits of detritus. The shallow depressional seasonal wetlands within the Study Area represent suitable habitat for vernal pool fairy shrimp. There have been three CNDDB occurrences reported within five miles; the closest was 2.84 miles to the northeast. No longhorn fairy shrimp were observed during the Barnett Environmental October 2020 field survey. This species has low potential to occur in the Study Area due to the absence of vernal pools or seasonal wetlands of ponding duration.

6. **Valley elderberry longhorn beetle** *(Desmocerus californicus dimorphus)*. This beetle is federally listed as threatened under the endangered species act. This species is stout-bodied, measuring between ½-1 inch. Adult males have red-orange wing covers with four elongate spots. Habitat requirements for this species is Sambucus sp. To serve as habitat, the shrubs must have stems 2.5 cm (1 in) or greater in diameter at ground level. There is one elderberry plant on site that could provide habitat for this species. However, no holes in the stems were found to indicate the species were present. In addition, there are no reported CNDDB occurrences reported within five miles. Barnett Environmental observed no sign of this species during the October 2020 site visit. There is a low potential for this species to occur on the Study Area.

7. **California red-legged frog** (Rana draytonii). The California red-legged frog is federally listed as threatened under the endangered species act. It is the largest native frog in the western United States, ranging from 1.75 to 5.25 inches in length. From above, this frog can appear brown, grey, olive, red, or orange, often with a pattern of dark specks or spots. The hind legs are well-developed with large, webbed feet. The undersides of adult California red-legged frogs are white, usually with patches of bright red or orange on the abdomen and hind legs. This species inhabits aquatic habitats including pools and backwaters within streams and creeks, ponds, marshes, springs, sag ponds, dunes, and lagoons. Arroyo Las Positas and the on-site emergent marsh represents suitable aquatic habitat for this species. There have been 75 CNDDB occurrences reported within five miles, and the most recent in 2016. There was no sign of this species during the Barnett Environmental October 2020 site visit. This species has a high potential to occur on the property.

8. **California tiger salamander** (*Ambystoma californiense)* – This species is listed as threatened by the U. S. Fish and Wildlife Service and by the state of California. This is a large, stocky salamander, with a broad, rounded snout. Its small eyes, with black irises, protrude from its head. Adult males are approximately 8 inches long, and females are approximately 7 inches in length. "Tiger" comes from the white or yellow bars on California tiger salamanders. The background color is black. The belly varies from almost uniform white or pale yellow to a variegated pattern of white or pale yellow and black. Habitat for this species are vernal pools and other seasonal ponds and stock ponds for reproduction; its habitat is limited to the vicinity of large, fishless vernal pools or similar water bodies. The Study Area contain moderate amounts of California ground squirrel burrows that represent suitable upland habitat/refugia for the species. There is additional suitable breeding habitat is located within a seasonal wetland approximately 0.1-mile west of the Study Area. The grasslands within the Study Area contain moderate amounts of California ground squirrel burrows that represent suitable upland habitat/refugia for the species. There have been 51 CNDDB occurrences reported within five miles. The most recent observance was in 2015. However, no California Tiger Salamander were observed during the Barnett Environmental October 2020 site visit.

   Madrone Ecological Consulting performed a habitat assessment in 2021 in accordance with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife in the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFW and CDFW 2003). conducted protocol surveys in the seasonal wetlands in winter 2021 and found no sign of this species. During this habitat assessment, only one of six aquatic features on the study area and six offsite features within 1.24 miles had potential habitat for the California tiger salamander. Due to private property concerns, only the one onsite feature and two offsite features were surveyed. No California Tiger Salamander eggs, larvae, or adults were observed during the 2021 surveys. The biologists suggested that California Tiger Salamander may have chosen to forgo breeding this season due to the abnormally dry winter. There was only 5.62 inches of precipitation between November 2020 and May 2021 as compared to the average 12.25 inches for this time period. As a result, Madrone recommended additional surveys including one upland drift fence/pitfall trap survey and an additional larvae survey in order to determine the presence or presumed absence of this species in the Study Area.

9. **San Joaquin coachwhip** (*Coluber flagellum ssp. ruddockis)* – This species is listed as threatened by the U. S. Fish and Wildlife Service and by the state of California. This is a slender and fast-moving snake with smooth scales, a large head and eyes, and a long thin tail. Adults are between 36 – 66 inches long, while hatchlings

are only 13 inches long. The San Joaquin coachwhip is tan, olive brown, or yellowish brown. This species enjoys open, hot, dry areas as well as grasslands, chapparal communities, and pastures and lays eggs in rodent burrows. The Study Area contains suitable habitat for the species within the onsite grasslands. There has been one sole CNDDB occurrence reported within five miles, the closest was 3.69 endangered by the U. S. Fish and Wildlife Service. No valley elderberry beetles were observed during the Barnett Environmental October 2020 field survey. This species has a moderate potential to occur in the Study Area.

10. **San Joaquin Kit Fox** (*Vuples macrotis mutica)* – This species is listed as endangered by the U. S. Fish and Wildlife Service and threatened by the state of California. The San Joaquin Kit Fox is the smallest candid species in North America. The legs are long, the body slim, the ears are close set together, and the nose is slim and pointed. Summer coats are tan and winter coats are greyed. The undersides vary from buff to white. The male weighs about five pounds, and the female is smaller. This species is endemic to California and inhabits grasslands and scrublands, even those than have been extensively modified. The grasslands throughout the Study Area represent suitable habitat for this species, however,there has been only one recorded CNDDB occurrence within a five-mile radius which occurred 0.73 miles to the east. No San Joaquin kit fox were observed during the Barnett Environmental October 2020 field survey. It has a low potential to occur in the Study Area.

State-Listed Species

Four state-listed animal species has the potential to occur within the Study Area (Table 2):

1. **Swainson's hawk** (*Buteo swainsoni)* – This raptor is listed as threatened by the state of California. Its habitat is great basin grassland, riparian forest and woodlands, valley and foothill grassland. Swainson's hawk breeds in grasslands with scattered trees, juniper-sage flats, savannahs, and agricultural or ranch lands with groves or lines of trees. The Swainson's hawk has a moderate potential for occurrence given the open grassland on this site that is appropriate foraging habitat, and there have been nine recorded CNDDB occurrences within five miles of the Study Area, with the nearest occurrence 1.7 miles to the east. No Swainson's hawks were observed during the October 2020 field survey.

2. **Loggerhead shrike** (*Lanius ludovicianus)* – This species is listed as a species of special concern by the state of California. It inhabits open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses and cemeteries. Shrubs and trees near the Arroyo Las Positas and the ranch house represent suitable nesting habitat, and the grasslands throughout the Study Area represent suitable foraging habitat. There has been a sole CNDDB occurrence reported within five miles, the closest was 3.17 miles to the southwest. No loggerhead shrikes were observed during the October 2020 field survey.

3. **White-tailed kite** (*Elanus leucurus*) – This raptor is listed as threatened by the state of California. The white-tailed kite uses open grasslands, fields, and meadows for foraging and isolated trees in close proximity to foraging habitat for perching and nesting. The white-tailed kite has a moderate potential for occurrence given the open grassland on this site that is appropriate foraging habitat, and there have been nine recorded CNDDB occurrences within five miles of the Study Area, with the nearest occurrence 1.7 miles to the east. No white-tailed kites were observed during Barnett's October 2020 field survey.

4. **Tricolored blackbird** (*Agelaius tricolor*)– The tricolored blackbird is a California endangered species. Male Tricolored blackbirds are entirely black with a bright red shoulder patch bordered below by a white to cream-colored band. Females are dark gray-brown overall with streaked bellies and backs and a cream-colored eyebrow. Immature male birds are brownish black overall with some gray mottling depending on their age. This species nests in colonies in the vicinity of freshwater marshes or ponds and prefer heavy growths of cattails, tules, or willows. Their breeding requirements include open accessible water, a protected nesting substrate, and a foraging area with insect pray located within a few kilometers of their colony. There have been 12 CNDDB occurrences reported within five miles. The closest was 2.6 miles to the southeast, and the most recent was in 2014. No sign of this species was observed during the Barnett Environmental October 2020 site visit.

California Species of Special Concern (CEQA)

1. **Western burrowing owl** (*Athene cunicularia*) – The western burrowing owl is a species of special concern in California. It is a small, long-legged owl, ranging from seven to 10 inches in height. They have a round head, white eyebrows, yellow eyes, and long heads. Burrowing owls can be found in grasslands, rangelands, agricultural areas, deserts, or any other open dry area with low vegetation. They nest and roost in burrows, such as those excavated by prairie dogs. In the Study Area, many ground squirrel burrows were observed within the grasslands; these represent suitable nesting habitat. There have been 20 CNDDB occurrences reported within five miles, the most recent in 2017 and the closest was 1.01 miles to the north. Burrowing owl pellets observed onsite on a fencepost along the northern boundary. This species has a high potential to occur within the Study Area. However, no western burrowing owls were observed during the Barnett Environmental October 2020 field survey.

2. **Grasshopper sparrow** (*Ammodramus savannarum*) – This California Species of Special Concern is a small, flat-headed sparrow with a deep bill and has an unstreaked and buffy underside and rusty spotting or streaking on the back. This species thrives in native grasslands of California. There has been only one CNDDB occurrence reported within five miles, 2.96 miles to the northwest in 2016. It has a moderate potential to occur in short-grass grasslands within the Study Area. No grasshopper sparrows were observed during the Barnett Environmental October 2020 field survey.

3. **Western spadefoot** (*Spea hammondii*) – A species of special concern in California, the western spadefoot is a small, stout-bodied toad with short legs and warty skin. It is greenish, brown, cream, or gray above, and unmarked and whitish below. This species is found in a variety of habitats including coastal sage scrub, chapparal, oak woodlands, grasslands, washes, and floodplains along the California coast, central valley, and Sierra Nevada foothills. This California Species of Special Concern has a moderate potential to occur within the emergent marsh in the Study Area. There have been two CNDDB occurrences reported within five miles, the closest 3.05 miles to the southeast. However, no western spadefoots were observed during the Barnett Environmental October 2020 field survey.

4. **American badger** (*Taxidea taxus*) – The American badger has a flat body with short legs and a triangular face with a long, pointed, tipped up nose. This species has long brown or black fur with white stripes on its cheeks and one stripe running from its nose to the back of its head. It has small ears on the side of its head

and long, sharp front claws. Badgers prefer to live in dry, open grasslands, meadows, and grassy bald spots on high ridge tops. There have been three CNDDB reported occurrences within five miles; the most recent was in 2009 and the closest was 3.2 miles to the southeast. This California Species of Special Concern has a low potential to occur in short-grass grasslands within the Study Area. No American badgers were observed during the Barnett Environmental October 2020 field survey.

5. **Western pond turtle** (*Emys Marmorata)* – This species is undergoing federal listing review by the U. S. Fish and Wildlife Service and is a species of special concern in the state of California. It is a small to medium sized turtle in the Emydidae family, reaching between seven and nine inches. Its dorsal color is usually dark brown or dull olive with or without streaking. Adult turtles have a yellowish belly, with dark blotches and black spots or lines on top of their heads. The western pond turtle is found in permanent and intermittent waters of rivers, creeks, small lakes and ponds, marshes, irrigation ditches and reservoirs. They bask on land or near water on logs, branches or boulders. The Western pond turtle has a low potential for occurrence given the open grassland on this site. There have been nine CNDDB occurrences reported within five miles. The most recent was in 2017. However, no western pond turtles were observed during the Barnett Environmental October 2020 site visit. This species has a low potential to occur in the Arroyo Las Positas within the Study Area.

6.0 Effects of Proposed Action

6.1 Effects of Proposed Action on Wetlands, "Other Waters of the U.S." or "Waters of the State"

There are 0.553 acre of wetlands and "other waters of the United States" within the Study Area. A Section 404 permit from the U.S. Army Corps of Engineers and a Section 401 water quality certification from the Regional Water Quality Control Board maybe required if there are any activities affecting these features. We would recommend communicating with the Central Valley Regional Water Quality Control Board (RWQCB) to determine whether CA Dredge & Fill Procedures (aka Waste Discharge Requirement; WDR) permitting would be required and with the California Department of Fish & Wildlife to inquire about a possible 1602 Lake & Streambed Alteration Agreement.

Any resource permitting with these agencies could also require mitigation of any wetland habitat loss through purchase of equivalent wetland credits at an approved Mitigation Bank within the project's service area.

6.2 Effects of Proposed Action on Rare Plants and Habitat

The following discussion of biological resources impacts, and mitigation measures is based on implementation of the proposed project in comparison to existing conditions.

Rare plants

According to CNDDB there are three plant species, heartscale, long-style sand spurrey, and prostrate vernal pool naverettia, that have the potential to occur within five miles. However, there have been no documented occurrences of these species within the Study Area, and none were observed during Barnett's October 2020 field surveys.

During the appropriate blooming/flowering season prior to construction, a qualified botanist will conduct special-status plant species presence/absence surveys within areas proposed for grading or modification, in accordance with *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (California Department of Fish and Game 2009) to determine which special-status plants with the potential to occur on site are evident and identifiable onsite. Survey results shall be submitted to the CDFW and Alameda County. If any sensitive plant species are observed during the presence/absence surveys, and it is determined that such plants would be impacted by project activities, MVMG, CDFW, and the USFWS (if the species is also on the federal list of sensitive species) would be consulted to determine appropriate measures to ensure the protection of the species and its habitat. Such mitigation should include avoidance or, if avoidance is not possible, relocation of affected plants to a mitigation site located in similar habitat within the project site, in an area where no impacts are expected to occur. The relocation site should be in an area that is protected from impacts through human disturbance by fencing during the season that special-status plant species would be evident and identifiable—i.e., during their blooming season.

6.3 Potential Adverse Effects of Proposed Action on Wildlife and Habitat with Proposed Mitigation to Reduce Impacts to Less than Significant Levels.

Vernal pool fairy shrimp and longhorn fairy shrimp

Prior to construction, U.S. Fish & Wildlife Service protocol-level (dry- and wet-season) vernal pool crustacean surveys would need to be conducted by a qualified biologist to definitively determine presence or absence of these listed large branchiopods onsite. If no listed large branchiopods are found on-site, and this conclusion confirmed by the USFWS, no further mitigation is required. If, however, listed large branchiopods are found, assumed to be (without surveys), or determined by the USFWS to be onsite, the applicant will need to mitigate the loss of potential habitat in coordination with the USFWS as part of a Clean Water Act, Section 404 permitting process to provide for preservation of off-site lands that provide habitat for listed large branchiopods.

California Red-Legged Frog Mitigation

A qualified biologist shall conduct presence/absence surveys prior to ground-disturbing activities during th species' active season (October 1 – June 30). The project would immediately notify the USFWS, CDFW and Alameda County if any individuals or their sign are observed during these surveys.

A qualified biologist would then conduct California red-legged frog protocol surveys to determine presence/absence of the species if concluded necessary by the USFWS, in accordance with the USFWS guidance (USFWS Revised Guidance on Site Assessments and Field Surveys for the California Red-Legged Frog, USFWS 2005b), which requires up to eight surveys within potential habitat – six surveys within the breeding season (October 1 – June 30) and two surveys during the non-breeding season (July 1 – September 30).

If found onsite, impacts to this species would be minimized and mitigated by erecting temporary exclusion fencing – with the bottom edge buried into the ground around all proposed work areas. A qualified biologist (approved by the USFWS and CDFG) would then relocate California red-legged frog individuals to a pre-determined suitable habitat in an appropriate area that will not be impacted.

Western Spadefoot Toad Mitigation Measure

A qualified biologist (reviewed and approved by the ACPD) shall survey areas of suitable habitat for western spadefoot toad on the project site, including ruts or small pools within on-site grassland, as well as the seasonal detention pond. The survey shall be conducted during the active season of western spadefoot toad (which corresponds with the rainy season). The survey results shall be submitted to the CDFW and Alameda County prior to construction.

If surveys result in the observation of western spadefoot toad within project impact areas in on-site grassland, observed individuals and/or eggs shall be removed from project impact areas (with the prior approval of the CDFG) and be relocated to pre-determined suitable habitat in an appropriate area that will not be impacted.

California Tiger Salamander

A qualified biologist shall conduct presence/absence surveys prior to ground-disturbing activities and during construction during the species' active/breeding season – starting October 15 or when rain occurs. The project would immediately notify the USFWS, CDFW and Alameda County if any individuals or their sign are observed during these surveys. If surveys conducted determined the species to be present, compensatory lands would be purchased at a minimum of a 3:1 basis (or at a ratio determined to be suitable by the USFWS), in order to mitigate for the loss of a portion of the on-site grassland habitat through project activities. This mitigation could be achieved through the purchase of credits at a USFWS-approved mitigation bank, or through the placement of a conservation easement over occupied California tiger salamander habitat. The Natural Resources Conservation District, through the Alameda County Conservation Partnership, provides opportunities for in-lieu fee payments to fund restoration/preservation of California tiger salamander habitat in Alameda County.

San Joaquin Whipsnake and other Special Status Reptiles and Amphibians

The MVMG project area will be intensively surveyed for evidence of these reptile species within 30 days prior to construction. Temporary fencing designed to prevent the entry of San Joaquin whipsnakes shall be installed around the perimeter of all areas proposed for construction. The exclusion fencing will be installed so that its bottom is buried into the ground 12" and 24" is exposed above ground. Following installation of this temporary fencing, a qualified biologist shall conduct a pre-ground disturbing activities survey to locate any San Joaquin whipsnake individuals within the enclosed area. Any special status reptiles or amphibians encountered within the fenced area would be captured and trans-located by the qualified biologist to similar suitable habitat on the project site, in areas not adversely affected by project activities.

Swainson's hawk

No Swainson's hawks were observed during the October 2020 field survey, however, a preconstruction raptor survey during the hawk's breeding period would reveal its presence or absence within the Study Area. Therefore, prior to issuance of a grading permit for development:

1. A pre-construction nesting bird survey shall be conducted on-site within 15 days prior to construction if construction associated with the project would commence between March 1st and September 1st ("the nesting season"). If disturbance associated with the project would occur outside of the nesting season, no surveys shall be required.
2. If Swainson's hawk are identified as nesting on the project site, a non-disturbance buffer of 75-feet shall be established or as otherwise prescribed by a qualified ornithologist. The buffer shall be demarcated with painted orange lath or via the installation of orange construction fencing. Disturbance within the buffer shall be postponed until a qualified ornithologist has determined that the young have attained sufficient flight skills to leave the area or that the nesting cycle has otherwise completed.

Burrowing owl

There are numerous mammal burrows that can act as habitat for this species within the Study Area. We would recommend a preconstruction burrowing owl survey of the proposed development area within 14-days prior to any site disturbance to ensure no subsequent occupation of, or adverse impacts to potential habitat on the parcel.

Therefore, prior to issuance of grading permits, we recommend:

1. A preconstruction survey by a qualified biologist. If possible, a winter survey should be conducted between December 1 and January 31 (when wintering owls are most likely to be present) and the nesting season survey should be conducted between April 15 and July 15 (the peak of breeding season). Surveys conducted from two hours before sunset to one hour after, or from one hour before to two hours after sunrise, are preferable. The survey techniques shall be consistent with the CDFW Staff Report survey protocol and include a 260-foot-wide (buffer) zone surrounding the Study Area. Repeat surveys should also be conducted not more than 30 days prior to initial ground disturbance to inspect for re-occupation and the need for additional protection measures. If no burrowing owls are detected during preconstruction surveys, then no further mitigation is required.
2. If active burrowing owl burrows are identified, project activities shall not disturb the burrow during the nesting season (February 1–August 31) or until a qualified biologist has determined that the young have fledged or the burrow has been abandoned. A no disturbance buffer zone of 160-feet is required to be established around each burrow with an active nest until the young have fledged the burrow as determined by a qualified biologist.
3. If destruction of the occupied burrow is unavoidable during the non-breeding season, September 1– January 31, passive relocation of the burrowing owls shall be conducted. Passive relocation involves installing a one-way door at the burrow entrance, encouraging owls to move from the occupied burrow. No permit is required to conduct passive relocation; however, this process shall be conducted by a qualified biologist and in accordance with CDFW guidelines. In addition, to offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat (calculated on a 300-ft foraging radius around the burrow) per pair or unpaired resident bird, shall be acquired and permanently protected at a location acceptable to the CDFW.

Special-Status Bird Species Mitigation Measure

A qualified biologist would conduct nesting bird surveys within 30 days of initiation of ground disturbing activities within suitable habitat (and within the appropriate nesting season) throughout the project site to avoid impacts to nesting birds associated with construction. Surveys shall be conducted prior to ground disturbing activities. If an active nest is located, all clearing and construction within 300 feet of the nest (500 feet for raptor nests) or as designated appropriate by a biological monitor, shall be postponed until the nest is vacated and juveniles have fledged, and there is no evidence of a second attempt at nesting, as determined by a qualified biologist. Limits of construction to avoid a nest should be established in the field with flagging and stakes or construction fencing. Construction personnel should be instructed on the sensitivity of the area. The project proponent should record the results of the recommended protective measures described. Additional surveys would then be conducted if ground-disturbing activities are delayed due to active bird nesting, until the qualified biologist determines that the young associated with an active nest have fledged.

San Joaquin Kit Fox Mitigation

An intensive survey for active San Joaquin kit fox dens will be conducted by a qualified biologist within and surrounding the proposed construction area no less than 14 days and no more than 30 days prior to construction. The USFWS and the CDFW would be immediately contacted if this/these survey(s) determine that the San Joaquin kit fox does occupy construction areas or within the vicinity (200 feet) of ground disturbing activities, either by direct observation or identification of active den site(s). In addition, all ground disturbing work within 200 feet of any active den(s) shall be postponed until the USFWS and/or CDFW provide guidance regarding how to proceed.

American Badger Mitigation Measure

A qualified biologist shall conduct preconstruction surveys within onsite suitable habitat for American badger burrows within grassland habitat prior to any ground disturbing activities, including grading, construction, or site preparation activities within 30 days of proposed project activities. If badgers are observed within project impact areas in or within 200 feet of onsite grassland, observed individuals shall be captured, removed from project impact areas through humane exclusion from burrows (with the prior approval of the CDFW), and relocated to suitable habitat in an appropriate area that will not be impacted. This relocation area would preferably be onsite but may also include off-site lands approved CDFW and Alameda County that contains suitable grassland habitat. All ground-disturbing work within 200 feet of the active burrow(s) shall be temporarily postponed if the American badger is observed breeding and denning onsite until direction from CDFW provides guidance regarding how to proceed.

7.0 Conclusions

The Study Area contains approximately 2.1 acres of Waters of the U.S along its southern property boundaries. Any development activity causing direct adverse impacts to this ditch could require resource permits from the Regional Water Quality Control Board (401; WDR), and California Department of Fish & Wildlife (1602), or a 404 Nationwide Permit from the Army Corps of Engineers.

There are three special status plant species (heartscale, long-style sand spurrey, prostrate vernal pool navarettia), seven federal special wildlife species (San Joaquin kit fox, San Joaquin coachwhip, longhorn fairy shrimp, vernal pool fairy shrimp, California red-legged frog, the valley elderberry longhorn beetle and the California tiger salamander), four special status state species (loggerhead shrike, white-tailed kite, Swainson's hawk, and tricolored blackbird), and five species of special concern (western burrowing owl, western spadefoot, grasshopper sparrow, the American badger, and the western pond turtle) that have the potential to occur on site. Protocol surveys for the California tiger salamander were conducted of one wetland in the Study Area and found no sign of this species. In order to confirm presence or absence of this and other species of special concern, we recommend pre-construction surveys within two weeks of planned construction.

8.0 References

Army Corps of Engineers. 2008 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) September 2008, U. S. Army Corps of Engineers, ERDC/EL TR-08-28.

California Department of Fish and Wildlife. Rarefind 5. Website https://map.dfg.ca.gov/rarefind/view/RareFind.aspx. Accessed December 13, 2019.

California Department of Fish and Wildlife. March 20, 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities

CNPS, Rare Plant Program. 2015. Inventory of Rare and Endangered Plants (online edition, v8- 02). California Native Plant Society, Alameda, CA. Website http://www.rareplants.cnps.org Accessed December 13, 2019.

CNPS. October 2, 2001. Botanical Survey Guidelines.

Cowardin 1979 Classification of Wetlands and Deepwater Habitats of the United States Lewis M. Cowardin, Virginia Carter, Francis C. Golet, and Edward T. LaRoe US Fish and Wildlife Service, Office of Biological Services, Washington, D.C.

Hickman, J.C. (ed.) 1993. The Jepson Manual: Higher Plants of California. University of California Press.

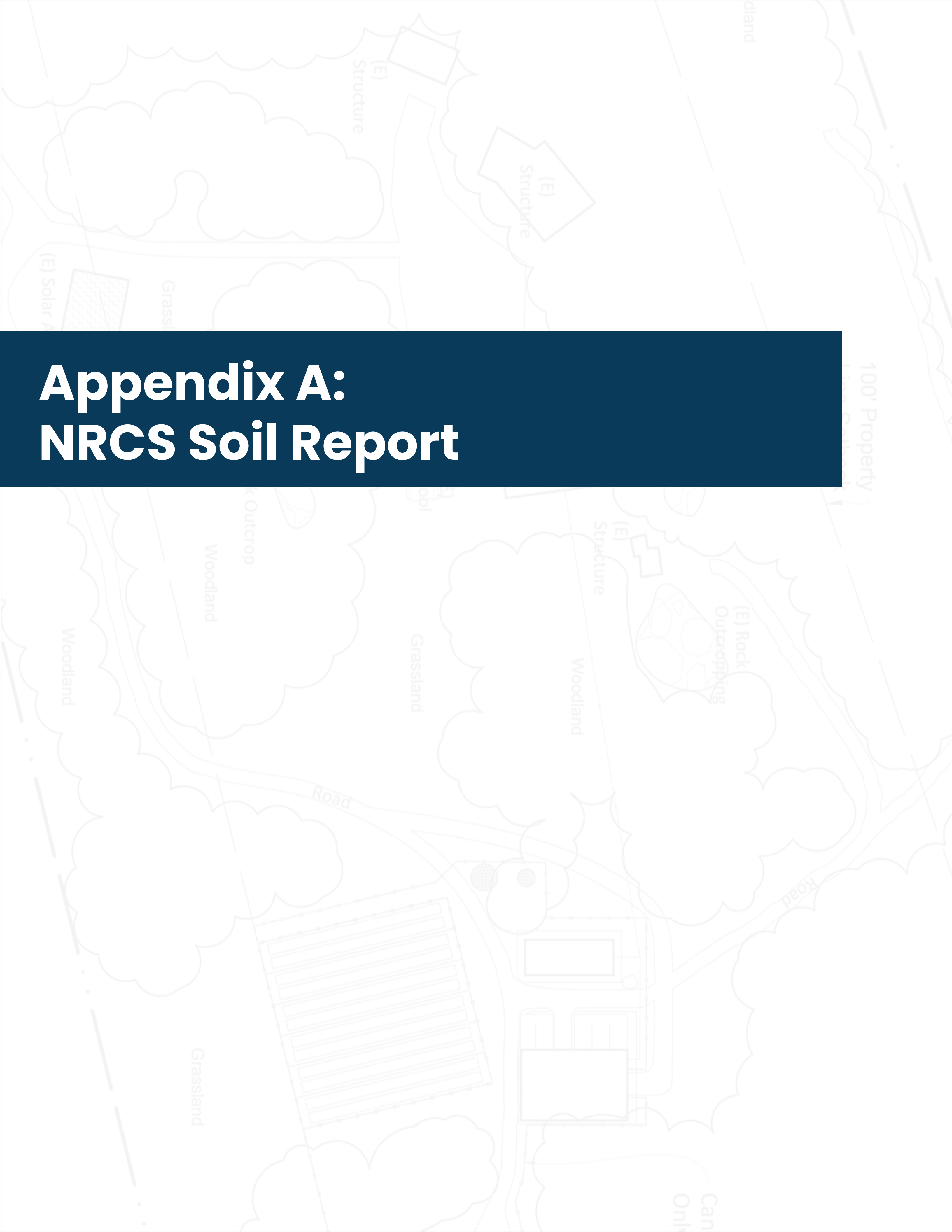
Lichvar, R.W. 2012. The National Wetland Plant List. ERDC/CRREL TR-2-11. Hanover, NH: U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory.

USDA Natural Resource Conservation Service Soils. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed December 19, 2019.

U.S. Fish and Wildlife Service. IPAC Information for Planning and Consultation. https://ecos.fws.gov/ipac/. Accessed December 19, 2019.

U. S. Fish and Wildlife Service. May 1987. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. http://www.fws.gov/wetlands/

U. S. Fish and Wildlife Service. July 2002. General Rare Plant Survey Guidelines. Ellen A. Cypher California State University.



Appendix A: NRCS Soil Report

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Alameda Area, California

KAHNCO (LIVERMORE) MONTE VISTA PROJECT• ALAMEDA COUNTY, CALIFORNIA

February 5, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

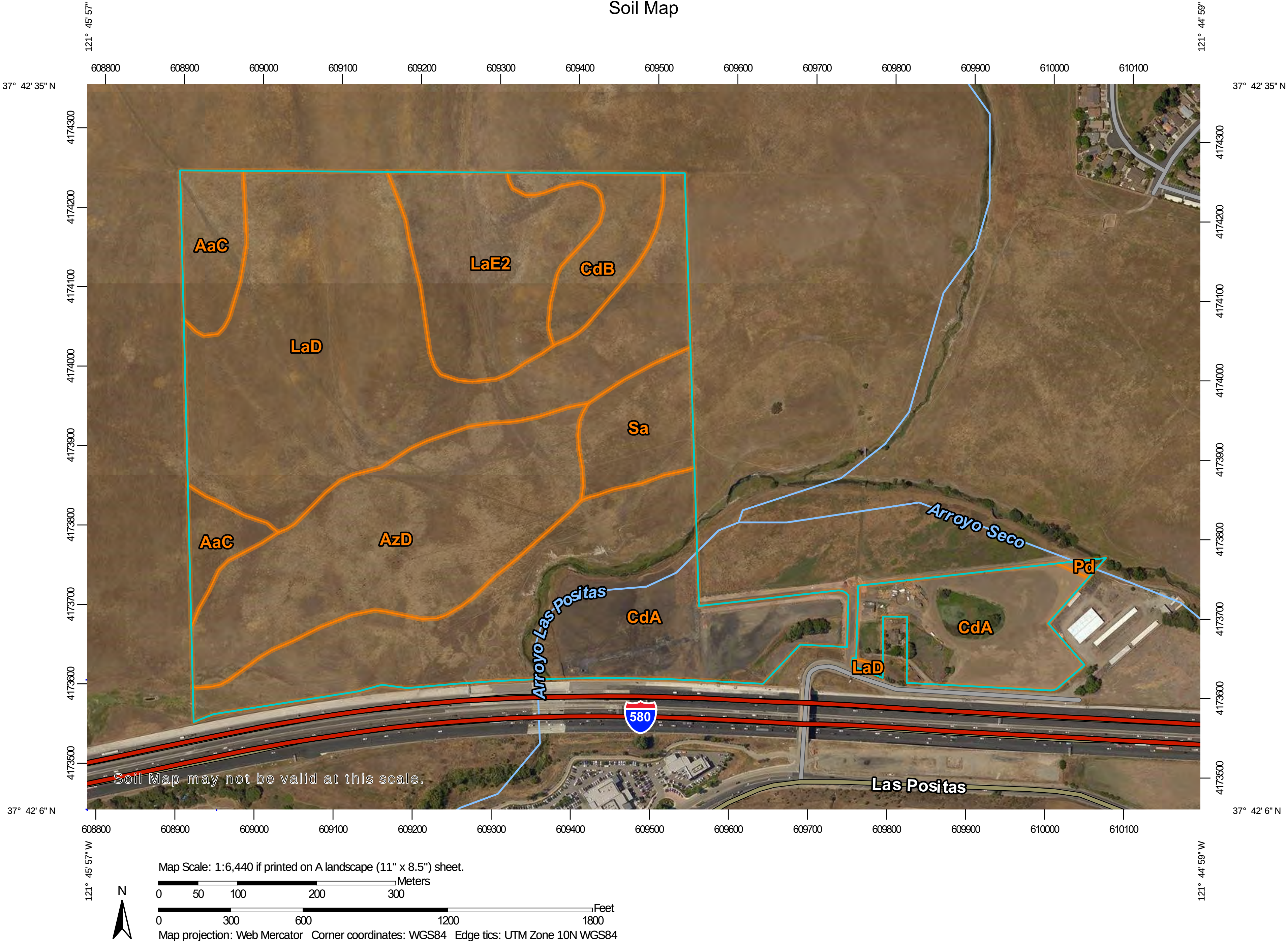
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report

Soil Map



Map Scale: 1:6,440 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 12, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 11, 2015—Jun 17, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AaC	Altamont clay, 3 to 15 percent slopes	5.7	4.9%
AzD	Azule clay loam, 3 to 30 percent slopes	20.8	17.9%
CdA	Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14	33.9	29.2%
CdB	Clear Lake clay, drained, 3 to 7 percent slopes	4.5	3.9%
LaD	Linne clay loam, 15 to 30 percent slopes, MLRA 15	34.7	29.8%
LaE2	Linne clay loam, 30 to 45 percent slopes, eroded	11.7	10.1%
Pd	Pescadero clay loam, 0 to 6 percent slopes, MLRA 14	0.2	0.1%
Sa	San Ysidro loam, 0 to 2 percent slopes, MLRA 14	4.8	4.1%
Totals for Area of Interest		**116.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Alameda Area, California

AaC—Altamont clay, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: hb2n
Elevation: 700 to 1,700 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Altamont and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Altamont

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 28 inches: clay
H2 - 28 to 50 inches: clay, silty clay
H2 - 28 to 50 inches: weathered bedrock
H3 - 50 to 54 inches:

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Diablo

Percent of map unit: 5 percent
Hydric soil rating: No

Linne

Percent of map unit: 5 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 3 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pescadero

Percent of map unit: 2 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

AzD—Azule clay loam, 3 to 30 percent slopes

Map Unit Setting

National map unit symbol: hb2t
Elevation: 300 to 1,500 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 260 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Azule and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Azule

Setting

Landform: Fluvial terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 6 inches: clay loam
H2 - 6 to 21 inches: clay
H3 - 21 to 25 inches: weathered bedrock

Properties and qualities

Slope: 3 to 30 percent
Depth to restrictive feature: 18 to 36 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Positas

Percent of map unit: 5 percent
Hydric soil rating: No

Diablo

Percent of map unit: 5 percent
Hydric soil rating: No

Altamont

Percent of map unit: 5 percent
Hydric soil rating: No

CdA—Clear Lake clay, drained, 0 to 2 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2vbt2
Elevation: 10 to 800 feet
Mean annual precipitation: 15 to 31 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 250 to 275 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Clear lake, drained, and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clear Lake, Drained

Setting

Landform: Basin floors
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Basin alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 6 inches: clay
Bss1 - 6 to 26 inches: clay
Bss2 - 26 to 36 inches: clay
C - 36 to 60 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 4 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.5 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 7.0
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 5 percent
Landform: Alluvial flats
Hydric soil rating: Yes

Campbell, sicl

Percent of map unit: 3 percent
Hydric soil rating: No

Sunnyvale, sic

Percent of map unit: 2 percent
Hydric soil rating: No

CdB—Clear Lake clay, drained, 3 to 7 percent slopes

Map Unit Setting

National map unit symbol: hb31
Elevation: 100 to 900 feet
Mean annual precipitation: 14 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Clear lake and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clear Lake

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 36 inches: clay
H2 - 36 to 65 inches: clay

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Capay

Percent of map unit: 5 percent
Hydric soil rating: No

San ysidro

Percent of map unit: 5 percent
Hydric soil rating: No

LaD—Linne clay loam, 15 to 30 percent slopes, MLRA 15

Map Unit Setting

National map unit symbol: 2w63l
Elevation: 20 to 2,010 feet
Mean annual precipitation: 12 to 22 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 260 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Linne and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linne

Setting

Landform: Hillslopes, mountain slopes
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Residuum weathered from calcareous shale

Typical profile

Ap - 0 to 9 inches: clay loam
A1 - 9 to 14 inches: clay loam
A2 - 14 to 29 inches: clay loam
AC - 29 to 32 inches: sandy clay loam
Ck - 32 to 36 inches: fine sandy loam
Cr - 36 to 51 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 35 to 50 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Diablo

Percent of map unit: 5 percent
Landform: Mountain slopes, hillslopes
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Ecological site: CLAYEY (R015XD001CA)
Hydric soil rating: No

Altamont

Percent of map unit: 4 percent
Landform: Hillslopes
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Clear lake

Percent of map unit: 3 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pescadero

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave, convex
Across-slope shape: Concave
Hydric soil rating: Yes

Haploxerolls, landslides

Percent of map unit: 1 percent
Landform: Slumps, landslides
Hydric soil rating: No

LaE2—Linne clay loam, 30 to 45 percent slopes, eroded

Map Unit Setting

National map unit symbol: hb3n
Elevation: 700 to 1,700 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Linne and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linne

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 36 inches: clay loam
H2 - 36 to 40 inches: weathered bedrock

Properties and qualities

Slope: 30 to 45 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: CLAYEY HILLS (R014XD092CA)
Hydric soil rating: No

Minor Components

Altamont

Percent of map unit: 5 percent
Hydric soil rating: No

Diablo

Percent of map unit: 5 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 3 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pescadero

Percent of map unit: 2 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pd—Pescadero clay loam, 0 to 6 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2xcbf
Elevation: 140 to 760 feet
Mean annual precipitation: 13 to 24 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 329 to 353 days
Farmland classification: Not prime farmland

Map Unit Composition

Pescadero and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pescadero

Setting

Landform: Basin floors, stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave

Across-slope shape: Linear, concave
Parent material: Alluvium derived from sandstone and shale

Typical profile
An - 0 to 2 inches: clay loam
Btng - 2 to 12 inches: clay
Btn - 12 to 20 inches: clay
Bng - 20 to 30 inches: clay
Bkng1 - 30 to 40 inches: clay loam
Bkng2 - 40 to 58 inches: clay loam
Bkng3 - 58 to 72 inches: clay loam

Properties and qualities
Slope: 0 to 6 percent
Depth to restrictive feature: 2 inches to natric
Natural drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 20 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Slightly saline to strongly saline (5.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 95.0
Available water storage in profile: Very low (about 0.4 inches)

Interpretive groups
Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Clear lake
Percent of map unit: 5 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Diablo
Percent of map unit: 5 percent
Hydric soil rating: No

Solano
Percent of map unit: 5 percent
Landform: Rims
Hydric soil rating: No

Sa—San Ysidro loam, 0 to 2 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2tyys
Elevation: 70 to 1,990 feet
Mean annual precipitation: 13 to 22 inches
Mean annual air temperature: 59 to 61 degrees F
Frost-free period: 300 to 360 days
Farmland classification: Not prime farmland

Map Unit Composition

San ysidro and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of San Ysidro

Setting

Landform: Valley floors, terraces, alluvial fans
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

A - 0 to 23 inches: loam
B1 - 23 to 38 inches: clay loam
Bt2 - 38 to 64 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 16 to 24 inches to abrupt textural change
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: LOAMY CLAYPAN (R014XE029CA)
Hydric soil rating: No

Minor Components

Arbuckle

Percent of map unit: 6 percent
Hydric soil rating: No

Rincon

Percent of map unit: 2 percent
Hydric soil rating: No

Solano

Percent of map unit: 2 percent
Hydric soil rating: No

Pleasanton, loam

Percent of map unit: 2 percent
Hydric soil rating: No

Pescadero

Percent of map unit: 1 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Cropley, clay

Percent of map unit: 1 percent
Hydric soil rating: No

Palexeralfs

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

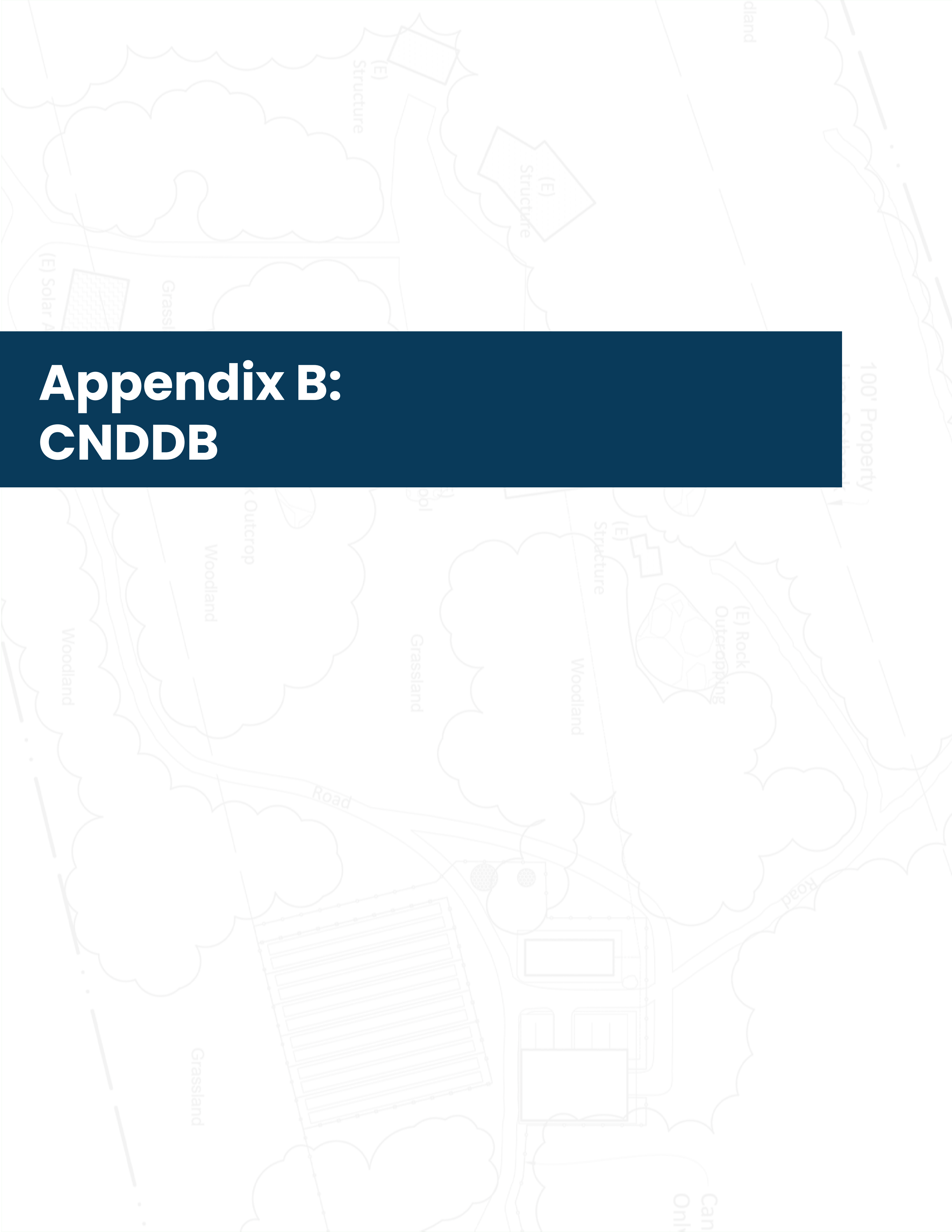
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix B: CNDDB



Multiple Occurrences per Page

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Livermore (3712167))
 AND (Federal Listing Status IS (Endangered OR Threatened) OR State Listing Status IS (Endangered OR Threatened))

Ambystoma californiense

Element Code: AAAAA01180

California tiger salamander

Listing Status:	**Federal:**	Threatened	**CNDDB Element Ranks:** **Global:**	G2G3
	State:	Threatened	**State:**	S2S3
	Other:	CDFW_WL-Watch List, IUCN_VU-Vulnerable		
Habitat:	**General:**	CENTRAL CALIFORNIA DPS FEDERALLY LISTED AS THREATENED. SANTA BARBARA AND SONOMA COUNTIES DPS FEDERALLY LISTED AS ENDANGERED.		
	Micro:	NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS, AND VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.		

Occurrence No.	34	**Map Index:**	10632	**EO Index:**	7276	**Element Last Seen:**	1978-01-04
Occ. Rank:	None			**Presence:**	Extirpated	**Site Last Seen:**	2001-10-30
Occ. Type:	Natural/Native occurrence			**Trend:**	Decreasing	**Record Last Updated:**	2020-10-29

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.67212 / -121.76704	**Accuracy:**	3/5 mile
UTM:	Zone-10 N4170152 E608733	**Elevation (ft):**	515
PLSS:	T03S, R02E, Sec. 16 (M)	**Acres:**	0.0

Location: SOUTH OF L STREET AND ARROYO ROAD, IN THE SOUTHERN PART OF LIVERMORE.

Detailed Location: INCLUDES LOCALITES DESCRIBED AS GRAVEL PITS SOUTH OF L ST IN LIVERMORE, 1.5 MILES SOUTH LIVERMORE ON L ST, 0.5 MI SOUTH OF LIVERMORE ON ARROYO RD, AND RODEO GROUNDS AT LIVERMORE.

Ecological:

General: 1 COLLECTED ON 23 JAN 1965, 2 ON 15 NOV 1966, 2 ON 14 JAN 1968, 1 ON 13 JAN 1970, 2 IN NOV 1972, 40 LARVAE 1 MAY 1973, 1 ON 3 DEC 1974, 1 ON 4 JAN 78. COMPLETELY URBANIZED BY 2001; SITE EXTIRPATED.

Owner/Manager: UNKNOWN

Occurrence No.	109	**Map Index:**	17105	**EO Index:**	12081	**Element Last Seen:**	1991-05-06
Occ. Rank:	None			**Presence:**	Extirpated	**Site Last Seen:**	1991-05-06
Occ. Type:	Natural/Native occurrence			**Trend:**	Decreasing	**Record Last Updated:**	2020-10-29

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.64122 / -121.81027	**Accuracy:**	non-specific area
UTM:	Zone-10 N4166674 E604964	**Elevation (ft):**	498
PLSS:	T03S, R01E, Sec. 25 (M)	**Acres:**	918.0

Location: 1.5 MILES SW OF THE JUNCTION OF HWY 84 AND EAST VINEYARD AVE, PLEASANTON.

Detailed Location: LOCATED ON THE RUBY HILL PROJECT SITE.

Ecological: ORIGINALLY IN GRASSLAND ON NNE-FACING SLOPE WITH OAK WOODLAND ALONG STREAMS. BLUE OAK WOODLAND & SAVANNA UPSLOPE TO WEST. GROUND SQUIRREL BURROWS COMMON. AS OF 1993 HABITAT REDUCED TO 71 ACRE MITIGATION AREA (EO #817).

General: 120+ LARVAE DETECTED IN 3 PONDS IN 1989. 4 MORE BREEDING PONDS FOUND IN 1991. DETECTED IN 7 OF 8 PONDS ON 6 MAY 1991. 2002: SITE HAS BEEN EXTIRPATED.

Owner/Manager: PVT

Occurrence No.	140	**Map Index:**	24130	**EO Index:**	7277	**Element Last Seen:**	1993-01-21
Occ. Rank:	Poor			**Presence:**	Presumed Extant	**Site Last Seen:**	1993-01-21
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-29

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.6519 / -121.80597	**Accuracy:**	non-specific area
UTM:	Zone-10 N4167864 E605329	**Elevation (ft):**	424
PLSS:	T03S, R01E, Sec. 24 (M)	**Acres:**	105.0

Location: ALONG VINEYARD AVENUE, WEST OF HWY 84, SW OF LIVERMORE.

Detailed Location: 3 ADULTS OBSERVED ON VINEYARD AVENUE, ABOUT 0.5 MILE APART, DURING HEAVY RAIN.

Ecological: 1993: SURROUNDING LAND IS VINEYARDS, FALLOW AGRICULTURAL FIELDS, ANNUAL GRASSLANDS, & SPARSELY-SCATTERED HOMES. 2007 AERIAL PHOTO SHOWS AREA SOUTH OF VINEYARD AVE IN AG WITH URBAN DEVELOPMENT TO NE & SW. VERY LITTLE HABITAT REMAINS.

General: 3 ADULT SALAMANDERS OBSERVED MIGRATING TO/FROM BREEDING SITES BETWEEN 8:50 AND 9:05 PM ON 21 JANUARY 1993.

Owner/Manager: UNKNOWN

Occurrence No.	141	**Map Index:**	24123	**EO Index:**	7275	**Element Last Seen:**	1993-01-21
Occ. Rank:	Fair			**Presence:**	Presumed Extant	**Site Last Seen:**	1993-01-21
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	1993-09-09

Quad Summary: Altamont (3712166), Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.66547 / -121.75130	**Accuracy:**	1/5 mile
UTM:	Zone-10 N4169432 E610131	**Elevation (ft):**	550
PLSS:	T03S, R02E, Sec. 15 (M)	**Acres:**	0.0

Location: ALONG WENTE AVENUE, SOUTH OF PLEASANT VIEW LANE, LIVERMORE.

Detailed Location: 1 ADULT OBSERVED ON THE ROAD, DURING A HEAVY RAIN, AT 8:15 PM.

Ecological: SURROUNDING LANDS INCLUDE VINEYARDS, FALLOW AGRICULTURAL FIELDS, ANNUAL GRASSLANDS, AND SPARSELY SCATTERED HOMES.

General: 1 ADULT OBSERVED MIGRATINGTO/FROM A BREEDING SITE.

Owner/Manager: UNKNOWN

Occurrence No.	142 **Map Index:** 24129	**EO Index:**	7281	**Element Last Seen:**	1992-12-28
Occ. Rank:	Good	**Presence:**	Presumed Extant	**Site Last Seen:**	1992-12-28
Occ. Type:	Natural/Native occurrence	**Trend:**	Unknown	**Record Last Updated:**	1993-09-28

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.70165 / -121.82273	**Accuracy:**	specific area
UTM:	Zone-10 N4173365 E603780	**Elevation (ft):**	380
PLSS:	T03S, R01E, Sec. 01 (M)	**Acres:**	12.0

Location: VICINITY OF THE INTERSECTION OF DOOLAN ROAD AND COLLIER CANYON ROAD, ON THE NORTH SIDE OF I-580, NW OF LIVERMORE.
Detailed Location: ONE ADULT OBSERVED CROSSING COLLIER CANYON ROAD AND A SECOND WAS OBSERVED CROSSING DOOLAN ROAD ON 28 DECEMBER 1992, DURING A RAINSTORM.
Ecological: SURROUNDING HABITAT CONSISTS OF ANNUAL GRASSLAND.
General:
Owner/Manager: UNKNOWN

Occurrence No.	143 **Map Index:** 24124	**EO Index:**	7282	**Element Last Seen:**	1992-12-28
Occ. Rank:	Excellent	**Presence:**	Presumed Extant	**Site Last Seen:**	1992-12-28
Occ. Type:	Natural/Native occurrence	**Trend:**	Unknown	**Record Last Updated:**	1993-09-09

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.71172 / -121.82357	**Accuracy:**	80 meters
UTM:	Zone-10 N4174481 E603692	**Elevation (ft):**	460
PLSS:	T02S, R01E, Sec. 35, SE (M)	**Acres:**	0.0

Location: DOOLAN ROAD, 0.7 MILE NORTH OF I-580, NW OF LIVERMORE.
Detailed Location: ONE ADULT OBSERVED CROSSING ROAD, HEADING TOWARD COTTONWOOD CREEK, DURING A RAINSTORM.
Ecological: SURROUNDING HABITAT CONSISTS OF ANNUAL GRASSLAND.
General:
Owner/Manager: UNKNOWN

Occurrence No.	144 **Map Index:** 24125	**EO Index:**	7283	**Element Last Seen:**	2016-05-04
Occ. Rank:	Fair	**Presence:**	Presumed Extant	**Site Last Seen:**	2016-05-04
Occ. Type:	Natural/Native occurrence	**Trend:**	Unknown	**Record Last Updated:**	2020-10-27

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.72556 / -121.82289	**Accuracy:**	specific area
UTM:	Zone-10 N4176018 E603733	**Elevation (ft):**	581
PLSS:	T02S, R01E, Sec. 25, SW (M)	**Acres:**	36.0

Location: ALONG DOOLAN ROAD, 1.5 MILES NORTH OF I-580, NW OF LIVERMORE.
Detailed Location: MAPPED TO PROVIDED COORDINATES.
Ecological: NON-NATIVE ANNUAL GRASSLAND IN ROLLING HILLS TOPOGRAPHY. AERIAL IMAGERY SHOWS DEVELOPMENT NEARBY.
General: 1 ADULT FOUND ALIVE IN A SWIMMING POOL FILTER BASKET AND 1 ADULT CROSSING ROAD TOWARDS POOL IN COTTONWOOD CREEK IN DEC 1992. LARVAE OBSERVED AT 3 SITES IN 2010. LARV OBS AT 1 POND, 3 MAR 2011. 7 EGG MASSES, 2015. 46 LARV OBS, 4 MAY 2016.
Owner/Manager: PVT

Occurrence No.	145	**Map Index:**	24126	**EO Index:**	7284	**Element Last Seen:**	2016-05-04
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2016-05-04
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-27

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.73358 / -121.83806	**Accuracy:**	specific area
UTM:	Zone-10 N4176892 E602384	**Elevation (ft):**	580
PLSS:	T02S, R01E, Sec. 26, NW (M)	**Acres:**	38.0

Location:	ALONG DOOLAN ROAD, 2.5 MILES NORTH OF I-580, NW OF LIVERMORE.
Detailed Location:	MAPPED TO PROVIDED COORDINATES.
Ecological:	NON-NATIVE ANNUAL GRASSLAND IN ROLLING HILL TOPOGRAPHY. 2012 AERIAL PHOTO SHOWS AREA 0.5 MI SW BEING HEAVILY DEVELOPED.
General:	1 ADULT OBSERVED IN 1992 CROSSING ROAD TOWARDS POOL IN COTTONWOOD CREEK. LARVAE OBS AT 3 PONDS ON 25 MAR 2010. LARV OBS AT 4 PONDS ON 3 MAR 2011. 4 EGG MASSES OBS IN JAN AND 1 LARVA AT ON 27 MAY 2015. 30 LARVAE OBS ON 4 MAY 2016.
Owner/Manager:	UNKNOWN

Occurrence No.	146	**Map Index:**	24127	**EO Index:**	7285	**Element Last Seen:**	2008-05-22
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2008-05-22
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-05-21

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.73524 / -121.80890	**Accuracy:**	specific area
UTM:	Zone-10 N4177108 E604952	**Elevation (ft):**	520
PLSS:	T02S, R01E, Sec. 25, NE (M)	**Acres:**	15.0

Location:	ALONG COLLIER CANYON ROAD, 2.5 MILES NORTH OF I-580, NW OF LIVERMORE.
Detailed Location:	1992 (NORTH PART OF FEATURE), MAPPED TO PROVIDED MAP. 2007 (SOUTH PART OF FEATURE), MAPPED TO PROVIDED COORDINATES. 2008 (MIDDLE OF FEATURE - BATTEATE PROPERTY), MAPPED TO PROVIDED COORDINATES.
Ecological:	1992: HABITAT CONSISTS OF ANNUAL GRASSLAND. 2007: HABITAT DESCRIBED AS VALLEY GRASSLANDS, W/RANCHING, RESIDENTIAL, GRAZING, & EQUIPMENT STORAGE. 2008: PONDS, GRASSLAND. WETLAND HABITAT APPEARS DECREASED USGS TOPO, AERIAL IMAGES 1993 & 2007.
General:	IN 1992, ONE ADULT WAS OBSERVED CROSSING THE COUNTY ROAD, HEADING WEST TOWARD THE CREEK AND SEVERAL PONDS (DURING LIGHT RAIN). 4 LARVAE, INDICATING A BREEDING AREA, WERE OBSERVED ON 25 FEB 2007. 4 LARVAE OBSERVED 22 MAY 2008.
Owner/Manager:	PVT

Occurrence No.	147	**Map Index:**	24128	**EO Index:**	7286	**Element Last Seen:**	1992-12-28
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	1992-12-28
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-05-27

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.74238 / -121.81009	**Accuracy:**	80 meters
UTM:	Zone-10 N4177898 E604837	**Elevation (ft):**	620
PLSS:	T02S, R01E, Sec. 24, SE (M)	**Acres:**	0.0

Location: ALONG COLLIER CANYON ROAD, 3 MILES NORTH OF I-580, NW OF LIVERMORE.

Detailed Location:

Ecological: HABITAT CONSISTS OF ANNUAL GRASSLAND. 2007 AERIAL PHOTO SHOWS SOME LOW DENSITY RURAL RESIDENTIAL BUT WITH HABITAT STILL PRESENT.

General: IN 1992, ONE ADULT WAS OBSERVED CROSSING THE COUNTY ROAD, HEADING WEST.

Owner/Manager: UNKNOWN

Occurrence No.	188	**Map Index:**	33751	**EO Index:**	1459	**Element Last Seen:**	2019-12-05
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2019-12-05
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-26

Quad Summary: Altamont (3712166), Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.72301 / -121.73787	**Accuracy:**	non-specific area
UTM:	Zone-10 N4175833 E611229	**Elevation (ft):**	500
PLSS:	T02S, R02E, Sec. 27 (M)	**Acres:**	478.1

Location: SPRINGTOWN, SOUTH OF RAYMOND ROAD AND WEST OF VASCO ROAD, LIVERMORE.

Detailed Location: INCLUDED IN AREA ARE THE SPRINGTOWN PROJECT SITE (SE CORNER) & SPRINGTOWN MITIGATION SITE (MIDDLE WEST).

Ecological: HABITAT CONSISTS OF ALKALI SINK CONTAINING VERNAL POOLS. CORDYLANTHUS PALMATUS, BRANCHINECTA LYNCHI, AND ATHENE CUNICULARIA ALSO FOUND IN AREA. 2007 AERIAL PHOTO SHOWS THAT THE AREA IS STILL AS DESCRIBED IN 1999.

General: LARVAE OBS 1991-93; 2 COLLECTED IN 1992. 1 ADULT OBS, 1993 (IN SWIMMING POOL), ADJ TO A CREEK. 50+ JUVENILES OBS, 1998. JUV OBS, 1999. 356 LARV, 2015. LARV DETECTED IN 2016 AND 2017. NONE FOUND IN 2018. 8 LARV AND 1 DEAD ADULT OBS IN 2019.

Owner/Manager: CITY OF LIVERMORE, PVT

Occurrence No.	238	**Map Index:**	26023	**EO Index:**	5043	**Element Last Seen:**	1996-12-21
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	1997-01-23
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	1999-05-11

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.71919 / -121.76232	**Accuracy:**	non-specific area
UTM:	Zone-10 N4175380 E609080	**Elevation (ft):**	460
PLSS:	T02S, R02E, Sec. 33 (M)	**Acres:**	1097.2

Location: WEST OF LORRAINE STREET AND NORTH OF I-580, LIVERMORE.

Detailed Location:

Ecological: NON-NATIVE ANNUAL GRASSLAND, INTERSPERSED WITH SEASONAL WETLANDS. MIMA-MOUND TOPOGRAPHY. CTS USE GROUND SQUIRREL BURROWS, FOUND IN MORE UPLAND AREAS, FOR AESTIVATION. 2007 AERIAL PHOTO SHOWS THAT THE AREA IS STILL AS DESCRIBED IN 1996.

General: AN UNKNOWN NUMBER OF CTS WERE CAPTURED AND RELEASED ON 31 MARCH 1992. NUMEROUS ADULTS OBSERVED DURING NOCTURNAL SURVEYS OF GROUND SQUIRREL BURROWS AND PITFALL TRAPPING, FROM 12 MAR 1996 THROUGH 23 JAN 1997.

Owner/Manager: PVT

Occurrence No.	432	**Map Index:**	91352	**EO Index:**	33743	**Element Last Seen:**	1998-04-19
Occ. Rank:	None			**Presence:**	Possibly Extirpated	**Site Last Seen:**	2003-09-03
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2014-01-31

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.70783 / -121.85451	**Accuracy:**	specific area
UTM:	Zone-10 N4174017 E600969	**Elevation (ft):**	380
PLSS:	T03S, R01E, Sec. 03, SW (M)	**Acres:**	31.0

Location: JUST NW OF THE JUNCTION OF FALLON ROAD AND I-580, EAST OF DUBLIN.

Detailed Location: MAPPED TO PROVIDED COORDINATES AND MAP.

Ecological: 1998: HABITAT CONSISTED OF A STOCK POND SURROUNDED BY OPEN, ROLLING HILLS OF GRAZED GRASSLAND; SPRING BOX UPSTREAM FROM A LARGE WILLOW TREE. 2004-2012 AIR PHOTOS SUGGEST AREA WAS GRADED FOR DEVELOPMENT, ELIMINATING SUITABLE UPLAND HABITAT.

General: 2 LARVAE COLLECTED (MRJ #1373) ON 19 APRIL 1998; 1 LARVA RELEASED AND 1 DEPOSITED AT CAS (CAS #207146). 1 ADULT FOUND AT BURROW 1 AUG & 4 ADULTS FOUND AT BURROWS 3 SEP 2003; RELOCATED ABOUT 1.8 MI N (SEE EO#561).

Owner/Manager: PVT

Occurrence No.	433	**Map Index:**	91345	**EO Index:**	33744	**Element Last Seen:**	2003-09-02
Occ. Rank:	None			**Presence:**	Extirpated	**Site Last Seen:**	2003-09-02
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2014-01-29

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.71473 / -121.86544	**Accuracy:**	specific area
UTM:	Zone-10 N4174770 E599997	**Elevation (ft):**	380
PLSS:	T02S, R01E, Sec. 33, SE (M)	**Acres:**	90.0

Location: 0.5 MILE NE OF THE INTERSECTION OF I-580 AND TASSAJARA ROAD, EAST OF DUBLIN.

Detailed Location: MAPPED TO PROVIDED COORDINATES AND MAP.

Ecological: 1998: HABITAT CONSISTED OF A STOCK POND SURROUNDED BY OPEN, ROLLING HILLS OF GRAZED GRASSLAND. 2005-2012 AERIAL PHOTOS SHOW THAT THIS AREA HAS BEEN DEVELOPED.

General: 3 LARVAE COLLECTED (MRJ #1374) ON 19 APR 1998; 2 RELEASED AND 1 DEPOSITED AT CAS (CAS #207147). A TOTAL OF 12 ADULTS FOUND AT BURROWS BETWEEN 24 JUN-2 SEP 2003; RELOCATED ABOUT 1.5 MI NNE (SEE EO#561).

Owner/Manager: PVT

Occurrence No.	448	**Map Index:**	38907	**EO Index:**	35563	**Element Last Seen:**	1998-11-07
Occ. Rank:	Fair			**Presence:**	Presumed Extant	**Site Last Seen:**	1998-11-07
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2018-05-08

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.71027 / -121.79050	**Accuracy:**	80 meters
UTM:	Zone-10 N4174358 E606609	**Elevation (ft):**	550
PLSS:	T02S, R02E, Sec. 31, SE (M)	**Acres:**	0.0

Location: 1.2 MILES NW OF THE I-580/NORTH LIVERMORE AVENUE INTERCHANGE, NORTH OF LIVERMORE.

Detailed Location: MAPPED TO LOCATION PROVIDED FOR 1998 DETECTION. 1996 COLLECTION FROM "VERNAL POOL ON LIN PROPERTY, 1.5 MI DIRECTLY SW OF THE JUNCTION OF HARTMAN RD & NORTH LIVERMORE AVE, ALAMEDA COUNTY, CALIFORNIA (T.2S, R.2E, SEC. 31, SE CORNER)."

Ecological: HABITAT CONSISTED OF A VERNAL POOL, SURROUNDED BY OPEN, GRAZED GRASSLAND, WITH LOTS OF STAR THISTLE.

General: LARVA(E) COLLECTED ON 4 APR 1996. 22 JUVENILES OBSERVED ON 7 NOV 1998.

Owner/Manager: PVT

Occurrence No.	453	**Map Index:** 41135	**EO Index:** 41135	**Element Last Seen:**	2015-12-22
Occ. Rank:	Fair		**Presence:** Presumed Extant	**Site Last Seen:**	2016-03-23
Occ. Type:	Natural/Native occurrence		**Trend:** Unknown	**Record Last Updated:**	2021-04-27

Quad Summary: Livermore (3712167), Dublin (3712168)

County Summary: Alameda

Lat/Long:	37.72444 / -121.8754	**Accuracy:**	non-specific area
UTM:	Zone-10 N4175837 E599106	**Elevation (ft):**	428
PLSS:	T02S, R01E, Sec. 28, SW (M)	**Acres:**	39.0

Location: W OF TASSAJARA CR, 0.6 MI NORTH OF SANTA RITA COUNTY REHABILITATION CENTER, N OF DUBLIN. TASSAJARA CREEK REGIONAL PARK.

Detailed Location:

Ecological: HABITAT CONSISTED OF NON-NATIVE GRASSLAND, DOMINATED MAINLY BY EXOTICS AND SOME VERNAL POOLS/WET MEADOWS. 2020 AERIAL PHOTO SHOWS THAT HABITAT STILL REMAINS IN THE AREA, BUT THERE IS DEVELOPMENT TO THE SOUTHEAST.

General: 1 ADULT FOUND IN THE GROUND IN A POSTHOLE ON 21 NOV 1997. 1 ADULT CAPTURED IN TRAP AND RELEASED ON 22 DEC 2015. NONE CAPTURED BETWEEN 23 DEC 2015 AND 23 MAR 2016 (DRIFT FENCE - PITFALL TRAP SURVEY EFFORT).

Owner/Manager: EBRPD, DOD-ARMY

Occurrence No.	455	**Map Index:** 41454	**EO Index:** 41454	**Element Last Seen:**	1999-05-14
Occ. Rank:	Good		**Presence:** Presumed Extant	**Site Last Seen:**	1999-05-14
Occ. Type:	Natural/Native occurrence		**Trend:** Unknown	**Record Last Updated:**	1999-08-10

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.63070 / -121.85659	**Accuracy:**	80 meters
UTM:	Zone-10 N4165456 E600891	**Elevation (ft):**	710
PLSS:	T03S, R01E, Sec. 34 (M)	**Acres:**	0.0

Location: 0.75 MILE EAST OF THE INTERSECTION OF HAPPY VALLEY ROAD & ALISAL STREET, 1.5 MILES SSE OF PLEASANTON.

Detailed Location:

Ecological: HABITAT CONSISTS OF A SMALL STOCKPOND SURROUNDED BY GRAZED ANNUAL GRASSLAND. POND IS 6-8 INCHES DEEP AND 0.02 ACRES IN SIZE; VEGETATED BY XANTHIUM (DEAD PLANTS). 2007 AERIAL PHOTO SHOWS THAT THE AREA IS STILL AS DESCRIBED IN 1999.

General: AT LEAST 5 LARVAE (7.5-9.5CM TOTAL LENGTH) OBSERVED ON 14 MAY 1999.

Owner/Manager: PVT

Occurrence No.	561	**Map Index:**	68176	**EO Index:**	45944	**Element Last Seen:**	2019-08-15
Occ. Rank:	Fair			**Presence:**	Presumed Extant	**Site Last Seen:**	2019-08-15
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-11-03

Quad Summary: Livermore (3712167)

County Summary: Alameda, Contra Costa

Lat/Long:	37.73878 / -121.85611	**Accuracy:**	non-specific area
UTM:	Zone-10 N4177448 E600787	**Elevation (ft):**	824
PLSS:	T02S, R01E, Sec. 22 (M)	**Acres:**	229.0

Location: FROM THE INTERSECTION OF PALLISADES DRIVE AND TASSAJARA ROAD TO ABOUT 1.3 MILES EAST OF THAT INTERSECTION, PLEASANTON.

Detailed Location: MAPPED TO COORDINATES OF DETECTIONS, CAPTURES, AND RELOCATIONS. INCLUDES PORTIONS OF MOLLER RANCH RESIDENTIAL DEVELOPMENT, "TASSAJARA CREEK CONSERVATION AREA," AND DUBLIN RANCH PRESERVE (HENCE "DRP;" LARGE, SE-MOST POLYGON).

Ecological: S PART OF OCCURRENCE CONTAINS BREEDING PONDS & IS PARTIALLY PROTECTED. N PART IS UPLAND HABITAT CURRENTLY BEING DEVELOPED; THE MAJORITY OF 2016 DETECTIONS WERE ADULTS TRAPPED ALONG EXCLUSION FENCE SURROUNDING ACTIVE CONSTRUCTION AREA.

General: DRP: OBSERVED IN 2000; RELOCATED HERE IN '03 FROM EO 432 & 433; REPRODUCTION OBS BTWN 2004-2019. 2 OBS 2004; 3 ADULTS & 2 PONDS W/EGGS, 2013; 91 AD/ JUV, 2016; 150 EGGS, 55 LARV (RELOCATED TO #1378 & 1389) & 30 AD/JUV, 2017; 3 AD/JUV, 2018.

Owner/Manager: PVT, UNKNOWN

Occurrence No.	574	**Map Index:**	46239	**EO Index:**	46239	**Element Last Seen:**	2000-03-10
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2001-04-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2001-10-24

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.62829 / -121.84278	**Accuracy:**	80 meters
UTM:	Zone-10 N4165203 E602113	**Elevation (ft):**	920
PLSS:	T03S, R01E, Sec. 34 (M)	**Acres:**	0.0

Location: 2.5 MILES SE OF PLEASANTON.

Detailed Location:

Ecological: HABITAT CONSISTS OF A VERNAL POOL IN ROLLING HILLS/GRAZED ANNUAL GRASSLAND. LINDERIELLA OCCIDENTALIS ALSO FOUND AT THIS SITE. 2007 AERIAL PHOTO SHOWS THAT THE AREA IS STILL AS DESCRIBED IN 2000.

General: 2 LARVAE OBSERVED ON 10 MAR 2000. NO CTS WERE OBSERVED DURING TWO VISITS IN MAR-APR 2001.

Owner/Manager: PVT-GENERAL ELECTRIC

Occurrence No.	640	**Map Index:**	46699	**EO Index:**	46699	**Element Last Seen:**	1992-10-XX
Occ. Rank:	None			**Presence:**	Possibly Extirpated	**Site Last Seen:**	1992-10-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-05-27

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.66914 / -121.84078	**Accuracy:**	non-specific area
UTM:	Zone-10 N4169738 E602233	**Elevation (ft):**	360
PLSS:	T03S, R01E, Sec. 14 (M)	**Acres:**	287.2

Location:	SHADOW CLIFFS REGIONAL RECREATION AREA. SOUTH OF STANLEY BLVD AND NORTH OF VINEYARD AVE, PLEASANTON.
Detailed Location:	
Ecological:	BREEDING POND. 2007 AERIAL PHOTO SHOWS THAT THIS IS A DEVELOPED RECREATION AREA. THE SURROUNDING AREAS HAVE BEEN DEVELOPED.
General:	UNKNOWN NUMBER OBSERVED. J DI DONATO (EBRPD) IS THE SOURCE OF THE INFORMATION, REPORTED BY LSA.
Owner/Manager:	EBRPD

Occurrence No.	674	**Map Index:**	91336	**EO Index:**	47700	**Element Last Seen:**	2019-05-13
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2019-05-13
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2021-04-27

Quad Summary:	Livermore (3712167), Dublin (3712168)
County Summary:	Alameda, Contra Costa

Lat/Long:	37.73405 / -121.87799	**Accuracy:**	specific area
UTM:	Zone-10 N4176901 E598866	**Elevation (ft):**	663
PLSS:	T02S, R01E, Sec. 28 (M)	**Acres:**	87.0

Location:	W OF CAMINO TASSAJARA (TASSAJARA RD), ABOUT 3 MI NE OF I-580 AT I-680, PARKS RESERVE FORCES TRAINING AREA.
Detailed Location:	NW FEATURE: PARKS RESERVE FORCES TRAINING AREA WETLAND #5 (POND). SE FEATURE: 2003-2004 TRAPLINE SURROUNDING AREA TO BE DEVELOPED; AMBYSTOMA LIKELY USING SURROUNDING UPLANDS FOR MOST LIFE HISTORY CHARACTERISTICS.
Ecological:	SEASONAL WETLAND/POND WITHIN GRASSLAND HABITAT; POND DIMENSIONS WERE 15' X 20' AND LESS THAN 1' AVERAGE DEPTH. POND SUBSTRATE CONSISTED OF DIABLO CLAY SOIL; VEGETATED BY COMMON SPIKERUSH. CAMP PARKS USES FIRE FOR VEGETATION MANAGEMENT.
General:	POND: EGGS & LARVAE, 2002. MANY LARVAE, 2003. JUVENILES, "FEW TO COMMON," 2004. 1 ADULT, 2016. POND DRY, 2014. OBS, 2015. 100S EGGS, 2017. 1 AD, 2 EGGS, & 17 LARVAE, 2019. SE FEATURE: 273 CTS, 2003-2004 SURVEY. 1 AD, 2014. 2 AD, 2015.
Owner/Manager:	DOD-ARMY, EBRPD

Occurrence No.	711	**Map Index:**	49060	**EO Index:**	49060	**Element Last Seen:**	2002-01-02
Occ. Rank:	Poor			**Presence:**	Presumed Extant	**Site Last Seen:**	2002-01-02
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2002-10-16

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.64429 / -121.86145	**Accuracy:**	80 meters
UTM:	Zone-10 N4166959 E600444	**Elevation (ft):**	478
PLSS:	T03S, R01E, Sec. 28 (M)	**Acres:**	0.0

Location:	1.1 MILES EAST OF THE INTERSECTION OF SYCAMORE ROAD AND SUNOL BOULEVARD, PLEASANTON.
Detailed Location:	SITE IS AN OLD STOCK POND NEAR THE RANCH BUILDINGS OF THE LUND RANCH.
Ecological:	HABITAT CONSISTS OF AN OLD STOCK POND; SURROUNDED BY GRAZED OAK WOODLAND ON A SOUTH-FACING SLOPE.
General:	2 ADULTS OBSERVED/COLLECTED (MRJ #1534) ON 2 JAN 2002 AND DEPOSITED AT CAS.
Owner/Manager:	PVT

Occurrence No.	781	**Map Index:**	54123	**EO Index:**	54123	**Element Last Seen:**	2004-01-12
Occ. Rank:	Fair			**Presence:**	Presumed Extant	**Site Last Seen:**	2004-01-12
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2004-01-28

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.62916 / -121.78360	**Accuracy:**	80 meters
UTM:	Zone-10 N4165367 E607333	**Elevation (ft):**	625
PLSS:	T03S, R02E, Sec. 32 (M)	**Acres:**	0.0

Location:	SYCAMORE GROVE PARK. 1 MILE WEST OF THE VETERANS HOSPITAL, SOUTH OF LIVERMORE.
Detailed Location:	
Ecological:	HABITAT CONSISTS OF SEASONAL WETLAND/GRASSLAND; THIS SEASONALLY WET AREA DOES NOT HOLD WATER LONG.
General:	100+ EGG MASSES OBSERVED ON 12 JAN 2004.
Owner/Manager:	LIVERMORE AREA RPD

Occurrence No.	782	**Map Index:**	54124	**EO Index:**	54124	**Element Last Seen:**	2003-12-29
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2003-12-29
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2004-01-28

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.63389 / -121.77622	**Accuracy:**	non-specific area
UTM:	Zone-10 N4165900 E607977	**Elevation (ft):**	460
PLSS:	T03S, R02E, Sec. 32 (M)	**Acres:**	26.4

Location:	SYCAMORE GROVE PARK, SOUTH OF LIVERMORE.
Detailed Location:	
Ecological:	HABITAT CONSISTS OF A STOCK POND AND A MITIGATION POND IN OAK WOODLAND.
General:	110+ EGG MASSES OBSERVED ON 21 DEC 2003 AND 1 ADULT OBSERVED ON 29 DEC 2003.
Owner/Manager:	LIVERMORE AREA RPD

Occurrence No.	816	**Map Index:**	58150	**EO Index:**	58222	**Element Last Seen:**	2008-02-01
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2008-02-01
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-29

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.62681 / -121.80933	**Accuracy:**	80 meters
UTM:	Zone-10 N4165077 E605066	**Elevation (ft):**	690
PLSS:	T03S, R01E, Sec. 36 (M)	**Acres:**	0.0

Location:	0.3 MILES SW OF INTERSECTION OF CAMPINIA PLACE AND W RUBY HILL DRIVE, PLEASANTON.
Detailed Location:	FOLEY POND. CTS LARVAE DETECTED DURING BI-WEEKLY BRANCHIOPOD SURVEYS IN 2003.
Ecological:	HABITAT CONSISTS OF A SEMI-PERMANENT STOCK POND (~20 METERS IN DIAMETER); SURROUNDING GRAZED GRASSLANDS SUPPORT NUMEROUS CALIFORNIA GROUND SQUIRRELS. CRLF ALSO FOUND AT THIS SITE IN 2003.
General:	DETECTED IN 1989. EGGS AND 1 LARVA COLLECTED IN 1994. CTS LARVAE (ESTIMATED >100) FIRST DETECTED ON 27 JAN 2003; DETECTED AGAIN ON 10 FEB 2003. 3 ADULTS RELOCATED FROM EO 815 & 817 TO SITE IN 2008.
Owner/Manager:	PVT

Occurrence No.	817	**Map Index:**	58187	**EO Index:**	58223	**Element Last Seen:**	2008-01-23
Occ. Rank:	Poor			**Presence:**	Presumed Extant	**Site Last Seen:**	2008-01-23
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-11-03

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.62849 / -121.80465	**Accuracy:**	specific area
UTM:	Zone-10 N4165268 E605478	**Elevation (ft):**	629
PLSS:	T03S, R02E, Sec. 31, SW (M)	**Acres:**	18.0

Location:	0.1 MILE SOUTH OF INTERSECTION OF CAMPINIA PLACE AND W RUBY HILL DRIVE, PLEASANTON.
Detailed Location:	PONDS A, 8, AND B. MITIGATION PONDS FOR THE RUBY HILLS DEVELOPMENT PROJECT TO THE NORTH.
Ecological:	HABITAT CONSISTS OF A SMALL STOCK POND (POND 8) THAT APPEARS TO DRY COMPLETELY MOST YEARS AND 2 PONDS CREATED IN 1991; SURROUNDING UPLANDS ARE GRAZED.
General:	CTS DETECTED IN 1989. EGGS AND LARVAE DETECTED IN 1992; EGGS, LARVAE, AND GRAVID ADULTS IN 1993; EGGS AND LARVAE IN 1994. NONE DETECTED BETWEEN 27 JAN 2002 AND 22 APR 2003. LARVAE DETECTED IN 2005. 1 ADULT RELOCATED TO EO 816 IN 2008.
Owner/Manager:	PVT

Occurrence No.	862	**Map Index:**	63652	**EO Index:**	63747	**Element Last Seen:**	2005-12-02
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2005-12-02
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2006-01-12

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.64987 / -121.84535	**Accuracy:**	specific area
UTM:	Zone-10 N4167596 E601856	**Elevation (ft):**	560
PLSS:	T03S, R01E, Sec. 27 (M)	**Acres:**	20.7

Location: EAST OF THE END OF BENEDICT COURT, SE PLEASANTON.

Detailed Location: SITE CONSISTS OF SEVERAL MAN-MADE PONDS ALONG A DRAINAGE FLOWING DOWNHILL TOWARD THE TOWN OF PLEASANTON.

Ecological: HABITAT CONSISTS OF A SMALL SEASONAL DETENTION BASIN WITH SOME TYPHA AND A PERENNIAL STOCK POND; SURROUNDED BY BLUE OAK WOODLAND WITH A GRAZED, NON-NATIVE ANNUAL UNDERSTORY. NUMEROUS CALIFORNIA GROUND SQUIRREL BURROWS FOUND IN THE VICINITY.

General: 1 ADULT MALE AND 1 ADULT FEMALE CAPTURE ~10 METERS FROM THE DETENTION BASIN, AND 1 ADULT MALE TRAPPED ALONG THE SW SIDE OF THE STOCK POND, ON 2 DEC 2005.

Owner/Manager: PVT

Occurrence No.	863	**Map Index:**	63653	**EO Index:**	63748	**Element Last Seen:**	2005-12-02
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2005-12-02
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2006-01-12

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.64556 / -121.84804	**Accuracy:**	80 meters
UTM:	Zone-10 N4167114 E601624	**Elevation (ft):**	665
PLSS:	T03S, R01E, Sec. 27, NE (M)	**Acres:**	0.0

Location: 0.4 MILE SOUTH OF THE END OF BENEDICT COURT, SE PLEASANTON.

Detailed Location: MOST CAPTURES WERE MADE IN TRAPS ALONG THE WEST SIDE OF THE POND.

Ecological: HABITAT CONSISTS OF A STOCK POND SURROUNDED BY SPARSE BLUE OAK WOODLAND TO THE NORTH AND GRAZED, NON-NATIVE GRASSLAND TO THE SOUTH. NUMEROUS CALIFORNIA GROUND SQUIRREL BURROWS FOUND IN THE VICINITY.

General: 3 IMMATURES, 12 ADULT MALES, AND 4 ADULT FEMALES CAPTURED ~10 METERS FROM THE BASIN ON 2 DEC 2005.

Owner/Manager: PVT

Occurrence No.	880	**Map Index:**	64280	**EO Index:**	64359	**Element Last Seen:**	2018-06-08
Occ. Rank:	Fair			**Presence:**	Presumed Extant	**Site Last Seen:**	2018-06-08
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-11-17

Quad Summary:	Livermore (3712167), Tassajara (3712177)
County Summary:	Contra Costa

Lat/Long:	37.75389 / -121.85117	**Accuracy:**	specific area
UTM:	Zone-10 N4179130 E601202	**Elevation (ft):**	611
PLSS:	T02S, R01E, Sec. 15, S (M)	**Acres:**	47.0

Location: ABOUT 1 MILE EAST OF TASSAJARA ROAD, 4 MILES NE OF DUBLIN.

Detailed Location: MOLLER RANCH CONSERVATION AREA.

Ecological: HABITAT CONSISTS OF GRAZED ANNUAL GRASSLAND WITH SEASONAL PONDS.

General: 1 ADULT DISCOVERED ON 8 JUL 2005, DURING EXCAVATION AND GRADING OF AN ACCESS ROAD OFF OF TASSAJARA RD. 10 LARVAE FOUND IN 2010, 144 LARVAE IN 2013, 4 ADULTS AND 1 JUVENILE IN 2014, 6 LARVAE AND 1 ADULT IN 2017, AND 30 LARVAE IN 2018.

Owner/Manager: PVT

Occurrence No.	1080	**Map Index:**	75160	**EO Index:**	76158	**Element Last Seen:**	2012-12-10
Occ. Rank:	Fair			**Presence:**	Presumed Extant	**Site Last Seen:**	2012-12-10
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2014-01-29

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.72609 / -121.84389	**Accuracy:**	specific area
UTM:	Zone-10 N4176053 E601881	**Elevation (ft):**	680
PLSS:	T02S, R01E, Sec. 27, SE (M)	**Acres:**	30.0

Location: 1.7 MILES NORTH OF INTERSTATE 580 BETWEEN FALLON ROAD AND CROAK ROAD, JUST WEST OF COTTONWOOD CREEK.

Detailed Location: MAP REFERENCE #30-40, 57. BANKHEAD. MAPPED FEATURE INCLUDES 1 POND, 1 TEMPORARY DRAINAGE BASIN, AND UPLAND HABITAT WHERE CTS WAS DETECTED TO THE NE. #1083 (MAPNDX 75172) WAS ORIGINALLY PART OF THIS OCCURRENCE, BUT HAS BEEN DEVELOPED.

Ecological: NON-NATIVE GRASSLANDS. TOPOGRAPHY WAS LOW TO MODERATE SLOPING HILLS DIVIDED BY SOUTH FLOWING INTERMITTENT DRAINAGES. SITE SPARSELY DEVELOPED RURAL AREA (2003); 2007-2012 AERIAL PHOTOS SHOW AREA IMMEDIATELY TO SW GRADED FOR DEVELOPMENT.

General: 1 JUVENILE & 10 ADULTS FOUND 7 NOV 2002. 5 LARVAE ON 24 MAR 2003. BREEDING OBSERVED AT POND IN 2007. 10 LARVAE IN TEMPORARY CONSTRUCTION DETENTION BASIN ON 17 APR 2010. 1 ADULT MALE RELOCATED FROM DITCH (SEE EO#1083) TO POND ON 10 DEC 2012.

Owner/Manager: PVT

Occurrence No.	1081	**Map Index:** 75162	**EO Index:**	76161	**Element Last Seen:**	2002-12-16
Occ. Rank:	Unknown		**Presence:**	Presumed Extant	**Site Last Seen:**	2002-12-16
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2009-05-20

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.72043 / -121.84100	**Accuracy:**	specific area
UTM:	Zone-10 N4175429 E602143	**Elevation (ft):**	600
PLSS:	T02S, R01E, Sec. 35, NW (M)	**Acres:**	25.0

Location: 1.2-1.5 MILES NORTH OF INTERSTATE 580, JUST NORTH THE END OF CROAK ROAD, WEST OF COTTONWOOD CREEK.

Detailed Location: MAP REFERENCE #46-51. MANDEVILLE.

Ecological: NON-NATIVE GRASSLANDS. TOPOGRAPHY IS OF LOW TO MODERATE SLOPING HILLS DIVIDED BY INTERMITTENT DRAINAGES THAT FLOW SOUTH. SITE SPARSELY DEVELOPED RURAL AREA (2003); AERIAL IMAGERY (2007) SHOWS AREA 0.28 MI TO NW PREPARED FOR DEVELOPMENT.

General: 2 JUVENILES AND 4 ADULTS OBSERVED ON 16 DEC 2002. THESE OCCURRENCES ARE LIKELY EXTIRPATED OR SOON WILL BE DUE TO GRADING AND HOUSING DEVELOPMENT, 2012 AERIAL.

Owner/Manager: PVT

Occurrence No.	1082	**Map Index:** 75163	**EO Index:**	76162	**Element Last Seen:**	2003-01-21
Occ. Rank:	None		**Presence:**	Extirpated	**Site Last Seen:**	2003-01-21
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2014-01-31

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.71780 / -121.84519	**Accuracy:**	80 meters
UTM:	Zone-10 N4175133 E601778	**Elevation (ft):**	540
PLSS:	T02S, R01E, Sec. 34, NE (M)	**Acres:**	0.0

Location: APPROXIMATELY 1.1 MILES NORTH OF INTERSTATE 580 BETWEEN FALLON ROAD AND CROAK ROAD, JUST WEST OF COTTONWOOD CREEK.

Detailed Location: MAP REFERENCE #55. BANKHEAD. 0.25 MILE WEST OF CROAK ROAD.

Ecological: NON-NATIVE GRASSLANDS. TOPOGRAPHY IS OF LOW TO MODERATE SLOPING HILLS DIVIDED BY INTERMITTENT DRAINAGES THAT FLOW SOUTH. SITE SPARSELY DEVELOPED RURAL AREA (2003); GRADED FOR RESIDENTIAL DEVELOPMENT (2012).

General: 1 ADULT OBSERVED ON 21 JAN 2003. AERIAL IMAGE FROM 2012 SHOWS THIS AND THE SURROUNDING AREA EITHER DEVELOPED AS RESIDENTIAL HOUSES OR GRADED FOR ONGOING DEVELOPMENT.

Owner/Manager: PVT

Occurrence No. 1083 **Map Index:** 75172 **EO Index:** 76170 **Element Last Seen:** 2012-12-10
Occ. Rank: None **Presence:** Possibly Extirpated **Site Last Seen:** 2012-12-10
Occ. Type: Natural/Native occurrence **Trend:** Unknown **Record Last Updated:** 2014-01-29

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long: 37.72402 / -121.84588 **Accuracy:** specific area
UTM: Zone-10 N4175822 E601708 **Elevation (ft):** 660
PLSS: T02S, R01E, Sec. 27, SE (M) **Acres:** 16.0

Location: 1.6 MILES NORTH OF INTERSTATE 580 BETWEEN FALLON ROAD AND CROAK ROAD, JUST WEST OF COTTONWOOD CREEK.

Detailed Location: MAP REFERENCE #29, 41, 42, 45. BANKHEAD. THIS WAS ORIGINALLY PART OF #1080 (MAPNDX 75160), BUT HAS SINCE BEEN IMPACTED BY DEVELOPMENT (2010+) & WILL NO LONGER OFFER UPLAND REFUGE FOR CTS; 2012 DETECTIONS = GHOST OF HABITAT PAST.

Ecological: 2003 VEGETATION WAS NON-NATIVE GRASSLAND; TOPOGRAPHY WAS LOW TO MODERATE SLOPING HILLS WITH INTERMITTENT DRAINAGE. 2012 AERIAL IMAGERY SHOWS THAT THIS AREA IS ALMOST FULLY DEVELOPED; SPECIES MOST LIKELY EXTIRPATED IN AREA.

General: 3 ADULTS OBSERVED ON 7 NOV 2002. 1 ADULT OBSERVED ON 9 DEC 2002. 1 ADULT MALE FOUND IN 1 FT OF WATER WITHIN DITCH ON HOUSING DEVELOPMENT ON 10 DEC 2012; RELOCATED TO BREEDING POND TO THE NORTH (SEE EO#1080); PROBABLY GHOST OF HABITAT PAST.

Owner/Manager: PVT

Occurrence No. 1084 **Map Index:** 75174 **EO Index:** 76176 **Element Last Seen:** 2003-03-24
Occ. Rank: Unknown **Presence:** Presumed Extant **Site Last Seen:** 2003-03-24
Occ. Type: Natural/Native occurrence **Trend:** Unknown **Record Last Updated:** 2009-05-21

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long: 37.70724 / -121.83975 **Accuracy:** specific area
UTM: Zone-10 N4173967 E602271 **Elevation (ft):** 440
PLSS: T03S, R01E, Sec. 02, NW (M) **Acres:** 22.0

Location: 0.4 MILE NORTH OF INTERSTATE 580, JUST EAST OF CROAK ROAD, APPROXIMATELY 4 MILES NORTHWEST OF LIVERMORE.

Detailed Location: MAP REFERENCE #27 (ANDERSON), 43 & 44 (CROAK ROAD), 52-54 (ANDERSON, RIGHETTI), 56 (ANDERSON).

Ecological: NON-NATIVE GRASSLANDS. SURROUNDING TOPOGRAPHY LOW TO MODERATE SLOPING HILLS DIVIDED BY INTERMITTENT DRAINAGES. SITE SPARSELY DEVELOPED RURAL AREA (2003); AERIAL IMAGERY (2007) SHOWS AREA AS RURAL, BUT AREA TO S, W DEVELOPED.

General: 1 ADULT OBSERVED JAN 2001. 2 ADULTS OBSERVED ON 8 NOV 2002. 3 ADULTS OBSERVED ON 16, 26 DEC 2002. 7 LARVAE OBSERVED ON 24 MAR 2003.

Owner/Manager: PVT

Occurrence No.	1085	**Map Index:**	75175	**EO Index:**	76177	**Element Last Seen:**	2001-02-XX
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	2001-02-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-05-21

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.70457 / -121.83415	**Accuracy:**	80 meters
UTM:	Zone-10 N4173677 E602769	**Elevation (ft):**	420
PLSS:	T03S, R01E, Sec. 02, NW (M)	**Acres:**	0.0

Location:	0.25 MILE NORTH OF INTERSTATE 580 AND 0.4 MI EAST OF CROAK ROAD, APPROXIMATELY 4 MILES NORTHWEST OF LIVERMORE.
Detailed Location:	MAP REFERENCE #28. BRANAUGH.
Ecological:	NON-NATIVE GRASSLANDS. SURROUNDING TOPOGRAPHY LOW TO MODERATE SLOPING HILLS DIVIDED BY INTERMITTENT DRAINAGES. AREA SPARSELY DEVELOPED RURAL (2003); AERIAL IMAGERY (2007) SHOWS RURAL DEVELOPMENT IMMEDIATELY S, LAND TO S & W DEVELOPED.
General:	1 ADULT OBSERVED FEB 2001.
Owner/Manager:	PVT

Occurrence No.	1086	**Map Index:**	75176	**EO Index:**	76178	**Element Last Seen:**	2008-05-22
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2008-05-22
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-05-21

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.72260 / -121.81243	**Accuracy:**	80 meters
UTM:	Zone-10 N4175701 E604658	**Elevation (ft):**	616
PLSS:	T02S, R01E, Sec. 36, NE (M)	**Acres:**	0.0

Location:	1.5 MILES NORTH OF INTERSTATE 580 AND 0.2 MILE WEST OF COLLIER CANYON ROAD, NORTH OF LIVERMORE.
Detailed Location:	LOCATION MAPPED ACCORDING TO PROVIDED COORDINATES AND MAP.
Ecological:	HABITAT CONSISTS OF A POND SURROUNDED BY ANNUAL GRASSLAND.
General:	5 LARVAE OBSERVED ON 22 MAY 2008.
Owner/Manager:	PVT

Occurrence No.	1162	**Map Index:** 91357	**EO Index:**	92470	**Element Last Seen:**	2013-03-13
Occ. Rank:	Fair		**Presence:**	Presumed Extant	**Site Last Seen:**	2013-03-13
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2014-01-30

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.71229 / -121.84736	**Accuracy:**	specific area
UTM:	Zone-10 N4174519 E601594	**Elevation (ft):**	430
PLSS:	T02S, R01E, Sec. 34, SE (M)	**Acres:**	7.0

Location:	E OF FALLON SPORTS PARK, 0.8 MI NNE OF I-580 AT FALLON RD, DUBLIN.
Detailed Location:	MAPPED TO PROVIDED COORDINATES, NEAR THE INTERSECTION OF FALLON ROAD AND CENTRAL PARKWAY IN DUBLIN, CA.
Ecological:	CONSTRUCTION SITE WITH SEASONAL WETLANDS, PONDS, AND RIPARIAN CREEK NEARBY. CONSTRUCTION ACTIVITIES, HOUSING DEVELOPMENT, AND ROADS IN CLOSE PROXIMITY.
General:	1 FORAGING ADULT FOUND UNDERNEATH ONE OF THE WATTLES USED FOR EROSION CONTROL ON A HILL SLOPE; RELOCATED TO GROUND SQUIRREL BURROW IN RIPARIAN AREA.
Owner/Manager:	PVT

Occurrence No.	1163	**Map Index:** 91362	**EO Index:**	92474	**Element Last Seen:**	2011-04-01
Occ. Rank:	Excellent		**Presence:**	Presumed Extant	**Site Last Seen:**	2011-04-01
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2020-11-13

Quad Summary:	Livermore (3712167), Tassajara (3712177)
County Summary:	Alameda, Contra Costa

Lat/Long:	37.75083 / -121.83431	**Accuracy:**	specific area
UTM:	Zone-10 N4178809 E602692	**Elevation (ft):**	716
PLSS:	T02S, R01E, Sec. 23, NW (M)	**Acres:**	10.0

Location:	LAKE AT N END OF DOOLAN CANYON, ALONG CCA & ALA BORDER, NE OF DUBLIN.
Detailed Location:	MAPPED TO PROVIDED COORDINATES.
Ecological:	LARGE PERENNIAL LAKE IN DOOLAN CANYON WITH LIMITED EMERGENT VEGETATION AND SMALL STOCK POND. SURROUNDING AREA WAS PASTURE GRAZED BY CATTLE.
General:	3 LARGE (6-7 INCH) LARVAE WERE CAUGHT IN THE NW SECTION OF THE LAKE WITH A SEINE ON 1 APR 2011; THEIR LARGE SIZE SUGGESTS THAT THE LARVAE OVERWINTERED IN THE LAKE. 1 LARVAE FOUND IN SMALL STOCK POND ON 1 APR 2011.
Owner/Manager:	EBRPD

Occurrence No.	1164	**Map Index:**	91363	**EO Index:**	92475	**Element Last Seen:**	2011-04-18
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2011-04-18
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2014-01-30

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.74139 / -121.83305	**Accuracy:**	80 meters
UTM:	Zone-10 N4177764 E602815	**Elevation (ft):**	750
PLSS:	T02S, R01E, Sec. 23, SW (M)	**Acres:**	0.0

Location: E OF DOOLAN CANYON, ABOUT 4.3 MI NW OF I-580 AT LIVERMORE AVE, NE OF DUBLIN.

Detailed Location: MAPPED TO PROVIDED COORDINATES. POND 8.

Ecological: STOCK POND IN PASTURE GRAZED BY CATTLE. SIERRAN TREEFROG LARVAE, CLAM SHRIMP, WATER BOATMEN, DRAGONFLY LARVAE, AND SNAILS ALSO CAUGHT. POND ESTIMATED TO HAVE A MAXIMUM DEPTH OF 6-7 FEET.

General: ONE 2-INCH AND 2.5-INCH SALAMANDER LARVAE CAUGHT WITH DIPNETS ON 18 APR 2011.

Owner/Manager: EBRPD

Occurrence No.	1165	**Map Index:**	91364	**EO Index:**	92476	**Element Last Seen:**	2019-04-23
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2019-04-23
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-11-16

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.73407 / -121.80186	**Accuracy:**	specific area
UTM:	Zone-10 N4176986 E605574	**Elevation (ft):**	689
PLSS:	T02S, R02E, Sec. 30, SW (M)	**Acres:**	38.0

Location: ABOUT 1.6 TO 2.1 MI SE OF CARNEAL RD AT COLLIER CANYON RD, 2.0-2.7 MI N OF I-580, NE OF DUBLIN.

Detailed Location: MAPPED TO PROVIDED COORDINATES. N-MOST TWO POLYGON REPRESENTS DETECTIONS ON PRIVATE EAGLE RIDGE PRESERVE LLC. S-MOST TWO POLYGONS ON MARCIEL MITIGATION PROPERTY (MIDDLE POLY IS ON BORDER BETWEEN PROPERTIES).

Ecological: NON-NATIVE ANNUAL GRASSLAND COMPOSED OF ROLLING HILLS AND SEVERAL STOCK PONDS. ADULTS DETECTED IN STOCK PONDS & GROUND SQUIRREL BURROWS ADJACENT TO PONDS. LARVAE FOUND IN STOCK PONDS.

General: ADULTS OBSERVED IN JAN AND FEB 2013. AN ADULT (DEAD), EGG MASSES & LARVAE OBS IN 2015 (JAN, APR, JUN). LARVAE DETECTED IN 2016 AND 2017. 20 EGGS FOUND IN JAN, BUT NO LARVAE IN APR-JUN 2018. 6 LARVAE FOUND ON 23 APR 2019.

Owner/Manager: PVT

Occurrence No.	1166	**Map Index:**	91371	**EO Index:**	92485	**Element Last Seen:**	2015-04-13
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2015-04-13
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-26

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.71020 / -121.81569	**Accuracy:**	80 meters
UTM:	Zone-10 N4174322 E604388	**Elevation (ft):**	600
PLSS:	T02S, R01E, Sec. 36, SW (M)	**Acres:**	0.0

Location:	0.5 MILES NW OF THE INTERSECTION OF INDEPENDENCE DRIVE AND NORTH CANYONS PARKWAY, LIVERMORE.
Detailed Location:	MAPPED TO PROVIDED COORDINATES. SITE: DOOLAN 107 POND.
Ecological:	STOCK POND IN PASTURE GRAZED BY CATTLE. THE POND CONTAINED ONLY A TINY AMOUNT OF EMERGENT VEGETATION. SIERRAN TREEFROG LARVAE, WATER BOATMEN, AND BACKSWIMMERS WERE ALSO CAUGHT. POND ESTIMATED TO BE ABOUT 6+ FEET DEEP IN APR 2011.
General:	FOUR 2-3 INCH LARVAE WERE CAUGHT WITH A SEINE ON 6 APR 2011. 50 LARVAE CAUGHT AND RELEASED ON 13 APR 2015.
Owner/Manager:	PVT

Occurrence No.	1167	**Map Index:**	91378	**EO Index:**	92493	**Element Last Seen:**	2016-05-04
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2016-05-04
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-11-04

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.73220 / -121.81459	**Accuracy:**	80 meters
UTM:	Zone-10 N4176764 E604454	**Elevation (ft):**	700
PLSS:	T02S, R01E, Sec. 25, NW (M)	**Acres:**	0.0

Location:	1.5 AIR MILES NNW OF THE INTERSECTION OF MERITAGE COMMON AND COLLIER CANYON RD, LIVERMORE.
Detailed Location:	MAPPED TO PROVIDED COORDINATES. DUBLIN PRESERVE PROJECT POND 1.
Ecological:	NON-NATIVE ANNUAL GRASSLAND IN ROLLING HILLS TOPOGRAPHY. LAND USED FOR RANCHING AND GRAZING.
General:	LARVAE FOUND AT SURFACE OF POND ON 25 MAR 2010. 4 LARVAE OBSERVED ON 27 MAY 2015. 10 LARVAE DETECTED ON 4 MAY 2016.
Owner/Manager:	PVT

Occurrence No.	1168	**Map Index:**	91379	**EO Index:**	92496	**Element Last Seen:**	2015-05-27
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2015-05-27
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-27

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.73720 / -121.82429	**Accuracy:**	80 meters
UTM:	Zone-10 N4177308 E603593	**Elevation (ft):**	740
PLSS:	T02S, R01E, Sec. 26, NE (M)	**Acres:**	0.0

Location:	2.1 AIR MILES NNW OF THE INTERSECTION OF MERITAGE COMMON AND COLLIER CANYON RD, LIVERMORE.
Detailed Location:	MAPPED TO PROVIDED COORDINATES. DUBLIN PRESERVE PROJECT POND 5.
Ecological:	NON-NATIVE ANNUAL GRASSLAND IN ROLLING HILLS TOPOGRAPHY. LAND USED FOR RANCHING AND GRAZING.
General:	LARVAE FOUND AT SURFACE OF POND ON 25 MAR 2010. 3 LARVAE OBSERVED ON 21 APR 2010. 1 LARVA OBSERVED ON 27 MAY 2015.
Owner/Manager:	PVT

Occurrence No.	1222	**Map Index:**	99231	**EO Index:**	100759	**Element Last Seen:**	2019-09-25
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2019-09-25
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-11-16

Quad Summary:	Livermore (3712167), Tassajara (3712177)
County Summary:	Alameda, Contra Costa

Lat/Long:	37.75216 / -121.80102	**Accuracy:**	specific area
UTM:	Zone-10 N4178994 E605622	**Elevation (ft):**	693
PLSS:	T02S, R02E, Sec. 19, NW (M)	**Acres:**	37.0

Location:	ALONG UNNAMED TRIBUTARY, 1.6 MI SSE OF MANNING RD AT CARNEAL RD & 1.6 MI W OF N LIVERMORE AVE AT MANNING, LIVERMORE.
Detailed Location:	SITE INLCUDES "ACTC CREATED POND EAST."
Ecological:	CREATED POND SURROUNDED BY CALIFORNIA ANNUAL GRASSLANDS WITH LIMITED GRAZING. ADULT SALAMANDERS WERE FOUND NEAR PG&E TRANSITION STATION AND ACCESS ROAD AND RELOCATED NEAR POND. 2011 DETECTION WAS FROM WETLAND SWALE ALONG CAYETANO CREEK.
General:	1 EGGMASS FOUND IN 2011. 1 LARVA DETECTED IN 2015; POND DRY IN JUN. LARVAE DETECTED ON 29 APR & 13 MAY 2016; POND DRY IN JUN. 20+ LARV DETECTED IN MAY 2017. POND DRY IN 2018. 3 LARV FOUND ON 29 MAY 2019. 10 ADULTS FOUND & RELOCATED IN 2019.
Owner/Manager:	PVT

Occurrence No.	1370	**Map Index:**	B6321	**EO Index:**	119374	**Element Last Seen:**	2019-04-23
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2019-04-23
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-22

Quad Summary:	Altamont (3712166), Livermore (3712167), Byron Hot Springs (3712176)
County Summary:	Alameda

Lat/Long:	37.74982 / -121.74838	**Accuracy:**	non-specific area
UTM:	Zone-10 N4178795 E610263	**Elevation (ft):**	617
PLSS:	T02S, R02E, Sec. 22, NW (M)	**Acres:**	99.0

Location:	BETWEEN 0.5 AND 1.8 MILES NORTHWEST OF BEL ROMA RD AND MAY SCHOOL RD INTERSECTION, NORTH OF LIVERMORE.
Detailed Location:	CALIFORNIA TIGER SALAMANDER SURVEYS ALONG PG&E GAS PIPELINE PROJECT.
Ecological:	NON-NATIVE GRASSLAND HABITAT WITH AGRICULTURAL AND RANCHLAND LAND USE. SITE DISTURBED BY VEHICULAR TRAFFIC AND FREQUENT SOIL DISTURBANCE. SALAMANDERS LIKELY MIGRATING TO AND FROM BREEDING POOL AT LIN LIVERMORE CONSERVATION AREA (EO #1160).
General:	6 ADULTS FOUND IN OCT 2018. 26 ADULTS FOUND IN NOV 2018. 2 JUVENILES AND 17 ADULTS IN DEC 2018. 36 ADULTS AND 3 JUVENILES FOUND IN JAN 2019. 3 ADULTS FOUND IN FEB 2019. 1 ADULT FOUND ON 23 APR 2019.
Owner/Manager:	PVT

Occurrence No.	1373	**Map Index:**	B6331	**EO Index:**	119385	**Element Last Seen:**	2019-01-26
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2019-01-26
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-21

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.72237 / -121.77587	**Accuracy:**	80 meters
UTM:	Zone-10 N4175718 E607882	**Elevation (ft):**	525
PLSS:	T02S, R02E, Sec. 31, NE (M)	**Acres:**	5.0

Location:	HARTMAN RD, 0.3 MILE WEST OF N LIVERMORE AVE, NORTH OF LIVERMORE.
Detailed Location:	MAPPED TO COORDINATES PROVIDED.
Ecological:	RANGELAND SURROUNDED BY SPARSE RESIDENTIAL AND COMMERCIAL DEVELOPMENT.
General:	1 ADULT OBSERVED ON 26 JAN 2019.
Owner/Manager:	UNKNOWN

Occurrence No.	1374	**Map Index:**	B6333	**EO Index:**	119387	**Element Last Seen:**	2017-06-05
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2018-06-25
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-11-16

Quad Summary: Livermore (3712167), Tassajara (3712177)

County Summary: Alameda

Lat/Long:	37.74931 / -121.78796	**Accuracy:**	80 meters
UTM:	Zone-10 N4178692 E606778	**Elevation (ft):**	689
PLSS:	T02S, R02E, Sec. 19, NE (M)	**Acres:**	5.0

Location: 0.6 MILE SOUTH OF SOUTHWEST OF HIGHLAND RD AND MANNING RD INTERSECTION, NORTH OF LIVERMORE.

Detailed Location: SITE NAME: JORDAN POND, EAGLE RIDGE PRESERVE. MAPPED ACCORDING TO PROVIDED MAP.

Ecological: POND IN NON-NATIVE GRASSLAND.

General: LARVAE FOUND ON 28 APRIL 2015. LARVAE FOUND ON 13 MAY 2016. LARVAE DETECTED ON 8 MAY AND 4 FULLY MORPHED SALAMANDERS ON 5 JUN 2017. NONE DETECTED BETWEEN 23 APR AND 25 JUN 2018; POND DRY.

Owner/Manager: UNKNOWN

Occurrence No.	1375	**Map Index:**	B6342	**EO Index:**	119396	**Element Last Seen:**	2017-05-24
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2017-05-24
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-22

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.73033 / -121.7968	**Accuracy:**	80 meters
UTM:	Zone-10 N4176577 E606025	**Elevation (ft):**	790
PLSS:	T02S, R02E, Sec. 30, SW (M)	**Acres:**	5.0

Location: 1.3 AIR MILES NORTH OF POSITAS COMMUNITY COLLEGE CAMPUS, NORTHWEST OF LIVERMORE.

Detailed Location: SITE NAME: POND 5, LAS POSITAS COLLEGE MITIGATION SITE.

Ecological: CATTLE STOCK POND, 30 FT BY 20 FT WIDE AND 3 FT DEEP WITH RELATIVELY TURBID WATER AND SPARSE EMERGENT VEGETATION. SURROUNDED BY GRAZED NON-NATIVE GRASSLAND.

General: 258 LARVAE CAUGHT & RELEASED ON APR 27 AND 123 LARVAE FOUND ON 24 MAY 2017.

Owner/Manager: LAS POSITAS COMMUNITY COLLEGE

Occurrence No.	1376	**Map Index:**	B6343	**EO Index:**	119397	**Element Last Seen:**	2017-05-24
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2017-05-24
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-22

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.72315 / -121.79836	**Accuracy:**	80 meters
UTM:	Zone-10 N4175779 E605898	**Elevation (ft):**	561
PLSS:	T02S, R02E, Sec. 31, NW (M)	**Acres:**	5.0

Location: 0.8 AIR MILES NORTH OF POSITAS COMMUNITY COLLEGE CAMPUS, NORTHWEST OF LIVERMORE.

Detailed Location: SITE NAME: POND 4, LAS POSITAS COLLEGE MITIGATION SITE.

Ecological: CATTLE STOCK POND, 20 FT BY 20 FT WIDE AND 2 FT DEEP WITH RELATIVELY TURBID WATER AND SPARSE EMERGENT VEGETATION. SURROUNDED BY GRAZED NON-NATIVE GRASSLAND.

General: 3 LARVAE CAUGHT & RELEASED ON APR 27 AND 2 LARVAE FOUND ON 24 MAY 2017.

Owner/Manager: LAS POSITAS COMMUNITY COLLEGE

Occurrence No.	1377	**Map Index:**	B6352	**EO Index:**	119406	**Element Last Seen:**	2016-10-25
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2016-10-25
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-26

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.74504 / -121.81824	**Accuracy:**	80 meters
UTM:	Zone-10 N4178185 E604115	**Elevation (ft):**	677
PLSS:	T02S, R01E, Sec. 24, W (M)	**Acres:**	5.0

Location: WEST OF COLLIER CANYON RD, 3 MILES NORTH OF ITS INTERSECTION WITH PORTOLA AVE, NORTH OF LIVERMORE.
Detailed Location:
Ecological: FRESHWATER POND ON A RANCH.
General: 3 ADULTS OBSERVED ON 25 OCT 2016.
Owner/Manager: PVT

Occurrence No.	1378	**Map Index:**	B6353	**EO Index:**	119407	**Element Last Seen:**	2018-06-08
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	2018-11-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-12-03

Quad Summary: Livermore (3712167)
County Summary: Contra Costa

Lat/Long:	37.74729 / -121.86808	**Accuracy:**	80 meters
UTM:	Zone-10 N4178380 E599721	**Elevation (ft):**	563
PLSS:	T02S, R01E, Sec. 21, NE (M)	**Acres:**	5.0

Location: 0.25 MILES SE OF THE INTERSECTION OF WINDEMERE PARKWAY AND CAMINO TASSAJARA, NORTH OF LIVERMORE.
Detailed Location: SITES POND 4 AND 5.
Ecological: STOCK PONDS SURROUNDED BY ANNUAL GRASSLANDS.
General: OVER 70 LARVAE FOUND ON 9 MAY. 42 LARVAE RELOCATED FROM CONSTRUCTION AREA (EO #561) TO SITE ON 26 MAY 2017. 4 FULLY MORPHED SALAMADERS FOUND ON 18 JUN 2017. 1 LARGE INDIVIDUAL SEINED ON 8 JUN 2018; POND DRIED IN NOV.
Owner/Manager: UNKNOWN

Occurrence No.	1379	**Map Index:**	B6357	**EO Index:**	119411	**Element Last Seen:**	1989-04-24
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	1989-04-24
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-28

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.63985 / -121.8233	**Accuracy:**	specific area
UTM:	Zone-10 N4166508 E603816	**Elevation (ft):**	606
PLSS:	T03S, R01E, Sec. 25, SW (M)	**Acres:**	15.0

Location: 0.2 MILES WEST TO 0.3 MILES NW OF INTERSECTION OF ROMANO CIRCLE & GRAVINA PLACE, PLEASANTON.
Detailed Location: AT PONDS 3 AND 4.
Ecological: PONDS SURROUNDED BY GRAZED GRASSLAND AND RESIDENTIAL DEVELOPMENT.
General: LARVAE DETECTED DURING SURVEYS BETWEEEN 4 MAR AND 24 APR 1989.
Owner/Manager: UNKNOWN

Occurrence No.	1380	**Map Index:** B6359	**EO Index:**	119413	**Element Last Seen:**	1989-03-14
Occ. Rank:	Poor		**Presence:**	Presumed Extant	**Site Last Seen:**	1989-03-14
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2020-11-02

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.65819 / -121.84644	**Accuracy:**	1/5 mile
UTM:	Zone-10 N4168517 E601750	**Elevation (ft):**	520
PLSS:	T03S, R01E, Sec. 22, E (M)	**Acres:**	70.0

Location: VICINITY OF ZINFANDEL COURT, PLEASANTON.
Detailed Location: GIVEN LOCALITY: "FROM A GARAGE OF A HOUSE ALONG ZINFANDEL ROAD IN PLEASANTON."
Ecological: RESIDENTIAL NEIGHBORHOOD WITH UNDEVELOPED HILLS TO THE SOUTHEAST.
General: 1 ADULT MALE FOUND ON 14 MAR 1989.
Owner/Manager: PVT

Occurrence No.	1381	**Map Index:** 45705	**EO Index:**	119422	**Element Last Seen:**	1997-XX-XX
Occ. Rank:	Unknown		**Presence:**	Presumed Extant	**Site Last Seen:**	1997-XX-XX
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2020-10-29

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.63668 / -121.79648	**Accuracy:**	80 meters
UTM:	Zone-10 N4166186 E606187	**Elevation (ft):**	500
PLSS:	T03S, R02E, Sec. 30 (M)	**Acres:**	0.0

Location: JUST EAST OF HWY 84 AT VALLECITOS RD INTERSECTION, SOUTHWEST OF LIVERMORE.
Detailed Location:
Ecological: POND SURROUNDED BY RANCHES AND AGRICULTURE.
General: DETECTED IN 1997.
Owner/Manager: UNKNOWN

Rana draytonii **Element Code:** AAABH01022

California red-legged frog

Listing Status:	**Federal:**	Threatened	**CNDDB Element Ranks:**	**Global:**	G2G3
	State:	None		**State:**	S2S3
	Other:	CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable			
Habitat:	**General:**	LOWLANDS AND FOOTHILLS IN OR NEAR PERMANENT SOURCES OF DEEP WATER WITH DENSE, SHRUBBY OR EMERGENT RIPARIAN VEGETATION.			
	Micro:	REQUIRES 11-20 WEEKS OF PERMANENT WATER FOR LARVAL DEVELOPMENT. MUST HAVE ACCESS TO ESTIVATION HABITAT.			

Occurrence No.	221	**Map Index:**	36451	**EO Index:**	31448	**Element Last Seen:**	2020-08-20
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2020-08-20
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2021-04-28

Quad Summary: Livermore (3712167), Tassajara (3712177)

County Summary: Alameda, Contra Costa

Lat/Long:	37.74887 / -121.85474	**Accuracy:**	non-specific area
UTM:	Zone-10 N4178570 E600894	**Elevation (ft):**	601
PLSS:	T02S, R01E, Sec. 22, NW (M)	**Acres:**	58.0

Location: VICINITY OF TASSAJARA CREEK AND MOLLER CREEK DRAINAGE, FROM THE ALAMEDA/CONTRA COSTA COUNTY LINE TO ABOUT 0.7 MI N.

Detailed Location: MAPPED TO DETECTION LOCATIONS, 1992-2020. SINCE 2015 AT LEAST, AREA N OF COUNTY LINE PROTECTED AS MOLLER RANCH CONSERVATION AREA, & WAS RELEASE SITE FOR ANIMALS RELOCATED FROM CONSTRUCTION SITE TO S (OCC #278)

Ecological: ADULTS FOUND MOST YEARS IN IN-CHANNEL POOLS OF SEASONAL DRAINAGES IN CATTLE-GRAZED ANNUAL GRASSLAND; BREEDING DOCUMENTED IN PONDS INCLUDING PONDS #1 AND #2 IN GOOD RAIN YEARS. AREAS DEVELOPED E OF TASSAJARA CRK & ALONG MOLLER CRK.

General: 4 ADULTS & 4 LARVAE OBSERVED 30 APR 1992. 1 OBS 11 JUL 2006. 3 ADULTS RELOCATED HERE FROM CONSTRUCTION SITE, 31 OCT 2015; 1 JUV, 2 ADULTS IN MAY 2016. UP TO 8 ADULTS OBS, 2017. ALL LIFE STAGES OBS 2018. 6+ ADULTS OBS IN 2019, 7+ IN 2020.

Owner/Manager: PVT

Occurrence No.	222	**Map Index:**	34681	**EO Index:**	31453	**Element Last Seen:**	1992-05-20
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	1992-05-20
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	1997-08-18

Quad Summary: Livermore (3712167), Dublin (3712168), Tassajara (3712177)

County Summary: Contra Costa

Lat/Long:	37.74643 / -121.87509	**Accuracy:**	non-specific area
UTM:	Zone-10 N4178277 E599104	**Elevation (ft):**	460
PLSS:	T02S, R01E, Sec. 21, NW (M)	**Acres:**	37.0

Location: TASSAJARA CREEK, APPROX. 0.5 MILE NORTH OF ALAMEDA/CONTRA COSTA CO LINE & 0.15 MILE EAST OF TASSAJARA ROAD, SAN RAMON.

Detailed Location: GLIDES, POOLS AND IMPOUNDMENTS IN CHANNEL, APPROX. 0.75 MILE OF CREEK WITH PAUCITY OF RIPARIAN TREES; GRAZED MARGINS.

Ecological: PATCHES OF WILLOW & BLACKBERRY OCCUR ON BANKS. TYPHA, DUCKWEED & ELODEA WETLAND PLANTS.

General: 7 ADULTS AND MANY (INFINITY SYMBOL ON SURVEY FORM) JUVENILES OBSERVED. STICKLEBACK, HYLA, BUFO AND CLEMMYS PRESENT. SITE QUALITY RATED AS GOOD TO FAIR.

Owner/Manager: PVT

Occurrence No.	227	**Map Index:**	36677	**EO Index:**	31678	**Element Last Seen:**	1997-08-08
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	1997-08-08
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	1999-12-09

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.69702 / -121.82585	**Accuracy:**	80 meters
UTM:	Zone-10 N4172848 E603511	**Elevation (ft):**	375
PLSS:	T03S, R01E, Sec. 02 (M)	**Acres:**	0.0

Location: ARROYO LAS POSITAS, SOUTH OF I-580, BETWEEN LAS POSITAS GOLF COURSE AND THE WEST END OF LIVERMORE MUNICIPAL AIRPORT.

Detailed Location:

Ecological: HABITAT CONSISTS OF A STREAM FLOWING AT 1-2 CFS, WITH A SANDY/COBBLY BOTTOM, VARYING IN WIDTH BETWEEN 5-12 FEET (4-24 INCH DEEP). EMERGENT VEGETATION CONSISTS OF DENSE SCIRPUS CALIFORNICUS AND POLYGONUM SP, WITH NON-NATIVE GRASSES ON BANK.

General: A SINGLE ADULT FROG WAS FOUND IN A SMALL POOL ON 8 AUG 1997.

Owner/Manager: PVT

Occurrence No.	229	**Map Index:**	37736	**EO Index:**	32743	**Element Last Seen:**	1999-03-27
Occ. Rank:	Fair			**Presence:**	Presumed Extant	**Site Last Seen:**	1999-03-27
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2002-09-04

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.70732 / -121.77879	**Accuracy:**	specific area
UTM:	Zone-10 N4174044 E607645	**Elevation (ft):**	450
PLSS:	T03S, R02E, Sec. 05 (M)	**Acres:**	104.7

Location: ALONG CAYETANO CREEK, FROM ARROYO POSITAS UPSTREAM TO 0.6 MILE SOUTH OF HARTMAN ROAD, NORTH OF LIVERMORE.

Detailed Location: CREEK FLOWS THROUGH URBAN AND RURAL AREAS.

Ecological: CREEK FLOWING THROUGH AN ERODED, SANDY CHANNEL WITH LOTS OF SILT. SURROUNDED BY URBAN AREAS AND BY OPEN, GRAZED GRASSLANDS WITH A FEW SCATTERED COAST LIVE OAKS. CLUMPS OF WILLOW AND CATTAILS FOUND AT A FEW ISOLATED AREAS ALONG THE CREEK.

General: 1 JUVENILE FROG COLLECTED (MRJ #1329) ON 15 NOV 1997 AND DEPOSITED AT CAS (CAS #203690). 1 SUBADULT OBSERVED ON 24 MAY 1998. 1 ADULT COLLECTED (MRJ #1457) ON 25 MAR 1999 AND DEPOSITED AT CAS. 27 EGG MASSES OBSERVED ON 26-27 MAR 1999.

Owner/Manager: PVT

Occurrence No.	251	**Map Index:** 38733	**EO Index:**	33740	**Element Last Seen:**	2019-04-23
Occ. Rank:	Fair		**Presence:**	Presumed Extant	**Site Last Seen:**	2019-04-23
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2021-05-07

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.73248 / -121.85514	**Accuracy:**	specific area
UTM:	Zone-10 N4176751 E600881	**Elevation (ft):**	601
PLSS:	T02S, R01E, Sec. 27, NW (M)	**Acres:**	41.0

Location: UNNAMED TRIBUTARY TO TASSAJARA CREEK, 0.5 MILES ESE OF FALLON RD AT TASSAJARA RD, NE OF DUBLIN.

Detailed Location: MAPPED TO INCLUDE PROVIDED COORDINATES. WITHIN NORTH DRAINAGE CONSERVATION AREA (NDCA). INCLUDES REDGEWICK POND SITE. RELEASE SITE FOR FROGS RELOCATED FROM DEVELOPMENT SITES TO SOUTH, 2003-2005.

Ecological: ADULTS, SUBADULTS, JUVENILES AND LARVAE WERE FOUND IN POOLS WITHIN SMALL PERENNIAL STREAM IN OPEN, HEAVILY-GRAZED GRASSLAND, AND IN STOCK PONDS. AREA IS WITHIN A MITIGATION PRESERVE FOR SURROUNDING DEVELOPMENT.

General: 2 JUVENILE FROGS OBSERVED 19 APR 1998. 2 ADULTS & 2 JUVENILES OBS 2 DEC 1999. FOUND IN IN-STREAM POOLS & AT LEAST 3 PONDS; OVER 100 RELOCATED HERE 2003-2010. FOUND IN 1 POND IN 2016. LARVAE FOUND 17 APR & 16 MAY 2018. LARVAE & ADULTS, 2019.

Owner/Manager: PVT

Occurrence No.	278	**Map Index:** 40557	**EO Index:**	35564	**Element Last Seen:**	2016-05-09
Occ. Rank:	Good		**Presence:**	Presumed Extant	**Site Last Seen:**	2016-05-09
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2021-05-03

Quad Summary: Livermore (3712167), Dublin (3712168)

County Summary: Alameda, Contra Costa

Lat/Long:	37.73093 / -121.87207	**Accuracy:**	specific area
UTM:	Zone-10 N4176561 E599391	**Elevation (ft):**	422
PLSS:	T02S, R01E, Sec. 28 (M)	**Acres:**	213.0

Location: TASSAJARA CREEK AND MOLLER CREEK DRAINAGE, FROM ABOUT 1.5 TO 3.0 MILES NORTH OF I-580, NORTH OF PLEASANTON.

Detailed Location: 2006: 1 ADULT RELOCATED HERE (TASSAJARA CREEK) FROM PG&E SUBSTATION. 2015-16: CONSTRUCTION UNDERWAY AT NE PORTION OF OCCURRENCE; ADULTS RELOCATED FROM HERE (MOLLER CK) TO "MOLLER RANCH CONSERVATION AREA" (OCCURRENCE #221).

Ecological: RIPARIAN & RIVERINE HABITAT IN POOLS & DEEPLY-INCISED STREAMS THROUGH OPEN, GRAZED GRASSLANDS. TASSAJARA CK PROTECTED, BUT PORTIONS OF OCCURRENCE HAVE BEEN DEVELOPED. CALIFORNIA TIGER SALAMANDER & WESTERN POND TURTLE ALSO FOUND IN AREA.

General: 5+ ADULTS & 75+ SUBADULTS FOUND, 1998. ALL LIFE STAGES, 2000. 1 EGG MASS, '02. 63+ AD, '04. 76+ AD & 9 SB, '05. 32 AD, 8 SB, 53 UNK, 4 LRV, '06. 44 AD, 15 SB, 3 UNK, '07. 27 AD, 8 SB, '08. 29+, '09. 13+ AD '10. 3 AD '15. 2 AD, 1 JUV '16.

Owner/Manager: PVT

Occurrence No.	279	**Map Index:** 40558	**EO Index:**	35565	**Element Last Seen:**	2020-01-07
Occ. Rank:	Fair		**Presence:**	Presumed Extant	**Site Last Seen:**	2020-01-07
Occ. Type:	Natural/Native occurrence		**Trend:**	Fluctuating	**Record Last Updated:**	2021-05-07

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.71138 / -121.84982	**Accuracy:**	specific area
UTM:	Zone-10 N4174416 E601378	**Elevation (ft):**	420
PLSS:	T02S, R01E, Sec. 34, S (M)	**Acres:**	49.0

Location: ALONG FALLON RD, ABOUT 0.4 MILE NORTH OF THE I-580 JUNCTION, BETWEEN LIVERMORE & PLEASANTON.

Detailed Location: SW-MOST POLYGON MAPPED TO 1998-2020 DETECTIONS; HALF THIS AREA LIKELY LOST TO DEVELOPMENT, BUT 2 REMAINING PONDS SUPPORT CRLF. NE POLY MAPPED TO 2016 DETECTION. 2003, 2011, 2014, 2020 FROGS RELOCATED TO EO #278 OR UNSPECIFIED LOCATIONS.

Ecological: MANMADE PONDS W/TULES & STREAM W/WILLOWS IN GRAZED GRASSLAND. SW PORTION PROB EXTIRPATED DUE TO ROAD REALIGNMENT ('07), N POND FILLED & DEVELOPED ('11). NEW RETENTION BASIN DRAINED TO FINISH CONSTRUCTION ('14). 2016 DETECTION IN "PRESERVE."

General: PRESENT 1998, 2000, 2001. 37 JUV, 10 ADULTS & 29 SUBADULTS RELOCATED IN 2003. 111 LARVAE, 15 JUV, 30 AD IN JUL 2011. 5 LARVAE & 12 JUV FOUND AUG 2012. 6 AD & 1 EGG MASS, MAR 2013. 1,499 FOUND, 2014. 1 JUV, 2016. 52+, 2019. 2 JUVS, 2020.

Owner/Manager: PVT

Occurrence No.	281	**Map Index:** 40560	**EO Index:**	35567	**Element Last Seen:**	2000-06-02
Occ. Rank:	None		**Presence:**	Possibly Extirpated	**Site Last Seen:**	2000-06-02
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2009-06-29

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.70880 / -121.80454	**Accuracy:**	80 meters
UTM:	Zone-10 N4174179 E605373	**Elevation (ft):**	438
PLSS:	T03S, R02E, Sec. 06, NW (M)	**Acres:**	0.0

Location: COLLIER CREEK, AT THE ENTRANCE TO LAS POSITAS COLLEGE, NORTH SIDE OF LIVERMORE.

Detailed Location: 25 FROGS WERE MOVED TO A POND ON PLEASANTON RIDGE; 1 FROG WAS LEFT UNDER THE CULVERT AT THE ENTRANCE TO LAS POSITAS COLLEGE.

Ecological: HABITAT CONSISTS OF AN INTERMITTENT STREAM CHANNEL, CROSSED BY THE BRIDGE TO THE COLLEGE. SURROUNDING AREA CONSISTS OF A MIX OF LIVESTOCK GRAZING AND URBAN (COLLEGE). 2007 AERIAL PHOTO SHOWS THAT THE SITE HAS BEEN COMPLETELY DEVELOPED.

General: 6 JUVENILES OBSERVED ON 12 JUL 1998. 2 ADULTS, 9 JUVENILES, AND 15 LARVAE WERE OBSERVED ON 2 JUN 2000.

Owner/Manager: PVT

Occurrence No.	297	**Map Index:** 26023	**EO Index:**	41047	**Element Last Seen:**	1997-01-23
Occ. Rank:	Good		**Presence:**	Presumed Extant	**Site Last Seen:**	1997-01-23
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	1999-05-13

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.71919 / -121.76232	**Accuracy:**	non-specific area
UTM:	Zone-10 N4175380 E609080	**Elevation (ft):**	460
PLSS:	T02S, R02E, Sec. 33 (M)	**Acres:**	1097.2

Location:	WEST OF LORRAINE STREET AND NORTH OF I-580, LIVERMORE.
Detailed Location:	
Ecological:	HABITAT CONSISTS OF NON-NATIVE ANNUAL GRASSLAND, INTERSPERSED WITH SEASONAL WETLANDS.
General:	5 JUVENILES OBSERVED BETWEEN 21 DEC 1996 AND 23 JAN 1997; MOST LIKELY DISPERSING JUVENILES FROM ALTAMONT CREEK.
Owner/Manager:	PVT

Occurrence No.	432	**Map Index:** 38736	**EO Index:**	45303	**Element Last Seen:**	2005-03-11
Occ. Rank:	None		**Presence:**	Possibly Extirpated	**Site Last Seen:**	2005-03-11
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2021-05-05

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.71243 / -121.85924	**Accuracy:**	specific area
UTM:	Zone-10 N4174522 E600548	**Elevation (ft):**	421
PLSS:	T02S, R01E, Sec. 34, SW (M)	**Acres:**	131.0

Location:	FROM FALLON RD TO ABOUT 0.7 MI W, AND FROM 0.2 TO 0.8 MI N OF DUBLIN BLVD, EAST OF DUBLIN.
Detailed Location:	2003-2005: FROGS RELOCATED FROM THIS OCCURRENCE TO MOLLER CREEK (OCC#278) AND PROTECTED AREAS TO THE NORTH INCLUDING NORTH DRAINAGE CONSERVATION AREA (OCC#251).
Ecological:	HABITAT CONSISTS OF A STOCK POND, SURROUNDED BY OPEN, ROLLINGS HILLS OF GRAZED GRASSLAND; SPRING BOX UPSTREAM FROM A LONE, LARGE WILLOW TREE. SINCE THE TIME OF DETECTION, MOST OF THIS SITE HAS BEEN DEVELOPED.
General:	1 ADULT OBSERVED ON 9 JUL 1999. THE CARCASS OF A CRLF WAS FOUND IN THE SPRING CISTERN BOX ON 4 FEB 2000. 4 JUVENILES OBSERVED ON 24 JUL 2001. SEVERAL HUNDRED RELOCATED FROM CONSTRUCTION SITES, 2003-2005.
Owner/Manager:	PVT

Occurrence No.	445 **Map Index:** 45621	**EO Index:**	45621	**Element Last Seen:**	2013-10-23
Occ. Rank:	Excellent	**Presence:**	Presumed Extant	**Site Last Seen:**	2013-10-23
Occ. Type:	Natural/Native occurrence	**Trend:**	Unknown	**Record Last Updated:**	2021-05-03

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.71249 / -121.75264	**Accuracy:**	specific area
UTM:	Zone-10 N4174648 E609944	**Elevation (ft):**	496
PLSS:	T02S, R02E, Sec. 33, SE (M)	**Acres:**	10.0

Location: ARROYO LAS POSITAS, 0.6 MILE NORTH OF I-580 AND 0.9 MILE EAST OF NORTH LIVERMORE AVENUE, LIVERMORE.

Detailed Location: SPRINGTOWN AREA OF LIVERMORE. SW POLYGON MAPPED TO 1997 DETECTION, NE POLYGON TO 2013 DETECTION.

Ecological: 1997: PERENNIAL CREEK WITH HIGHLY ERODED BANKS; SURROUNDED BY GRAZED GRASSLANDS. VEGETATED BY SOME TYPHA.

General: >10 ADULTS AND >10 JUVENILES OBSERVED ON 23 JAN 1997. 1 SUBADULT OBSERVED ON 23 OCT 2013.

Owner/Manager: PVT

Occurrence No.	449 **Map Index:** 45705	**EO Index:**	45705	**Element Last Seen:**	1997-04-XX
Occ. Rank:	Unknown	**Presence:**	Presumed Extant	**Site Last Seen:**	1997-04-XX
Occ. Type:	Natural/Native occurrence	**Trend:**	Unknown	**Record Last Updated:**	2021-05-14

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.63668 / -121.79648	**Accuracy:**	80 meters
UTM:	Zone-10 N4166186 E606187	**Elevation (ft):**	500
PLSS:	T03S, R02E, Sec. 30 (M)	**Acres:**	0.0

Location: DATJEN POND, SOUTH OF LIVERMORE, 0.7 MILE SW INTERSECTION OF EAST VINEYARD AVE & HWY 84; 25 METERS SOUTH HWY 84.

Detailed Location:

Ecological:

General: CAS #204241; JUVENILE, SVL 30 MM, 3.0 G, TAKEN FROM STOMACH OF RANA CATESBEIANA ON 10 JUL 1996. UNKNOWN NUMBER DETECTED IN MAR-APR 1997.

Owner/Manager: UNKNOWN

Occurrence No. 608 **Map Index:** 50039 **EO Index:** 50039 **Element Last Seen:** 2001-03-16
Occ. Rank: None **Presence:** Possibly Extirpated **Site Last Seen:** 2001-03-16
Occ. Type: Natural/Native occurrence **Trend:** Unknown **Record Last Updated:** 2009-07-23

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long: 37.72197 / -121.84582 **Accuracy:** specific area
UTM: Zone-10 N4175594 E601716 **Elevation (ft):** 600
PLSS: T02S, R01E, Sec. 34, NE (M) **Acres:** 36.0

Location: JUST NORTH OF THE NORTHERN END OF OLD FALLON RD, 1.5 MILES NORTH OF FALLON RD AT I-580, PLEASANTON.
Detailed Location: MAPPED TO PROVIDED UTM COORDINATES & LOCALITY DESCRIPTIONS.
Ecological: 2001: HABITAT CONSISTED OF EPHEMERAL TRIBUTARY AND A STOCK POND WITH TYPHA LATIFOLIA WITHIN NON-NATIVE GRASSLAND. SURROUNDING AREA IS GRAZED AND IN BARLEY PRODUCTION. 2007 AERIAL PHOTO SHOWS AREA WAS GRADED FOR DEVELOPMENT.
General: 3 FROGS OBSERVED ON 16 MAR 2001. 7 OBSERVATIONS IN 2001.
Owner/Manager: PVT

Occurrence No. 661 **Map Index:** 52091 **EO Index:** 52091 **Element Last Seen:** 2003-06-13
Occ. Rank: Unknown **Presence:** Presumed Extant **Site Last Seen:** 2003-06-13
Occ. Type: Natural/Native occurrence **Trend:** Unknown **Record Last Updated:** 2003-08-12

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long: 37.62845 / -121.78780 **Accuracy:** 80 meters
UTM: Zone-10 N4165283 E606964 **Elevation (ft):** 600
PLSS: T03S, R02E, Sec. 31 (M) **Acres:** 0.0

Location: UNNAMED CREEK, 1.6 MILES SW OF THE INTERSECTION OF ARROYO ROAD AND WETMORE ROAD, 3 MILES SOUTH OF LIVERMORE.
Detailed Location:
Ecological: HABITAT CONSISTS OF A POOL IN A LIKELY-INTERMITTENT STREAM; POOL WAS 10' IN DIAMETER & 2' DEEP. TYPHA LATIFOLIA PRESENT IN POOL, AND RIPARIAN CANOPY CONSISTS OF QUERCUS AGRIFOLIA, Q. LOBATA, AND SALIX SP, SURROUNDED BY NON-NATIVE GRASSLAND.
General: 6 LARVAE OBSERVED ON 13 JUN 2003.
Owner/Manager: PVT

Occurrence No.	737	**Map Index:**	54464	**EO Index:**	54464	**Element Last Seen:**	2005-10-06
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2005-10-06
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2006-02-21

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.62795 / -121.78132	**Accuracy:**	80 meters
UTM:	Zone-10 N4165235 E607537	**Elevation (ft):**	645
PLSS:	T03S, R02E, Sec. 32 (M)	**Acres:**	0.0

Location: 0.9 MILE WEST OF THE VETERANS HOSPITAL, SOUTH OF LIVERMORE.

Detailed Location:

Ecological: HABITAT CONSISTS OF A SMALL STOCKPOND CREATED BY DAMMING THE DRAINAGE DECADES AGO; HEAVILY-DOMINATED BY NARROW-LEAF CATTAIL (TYPHA ANGUSTIFOLIA).

General: 2 ADULTS OBSERVED, 25 SEP-9 NOV 2003, DURING BULLFROG MANAGEMENT EFFORTS. 2-3 ADULTS OBSERVED ON 6 OCT 2005, DURING BULLFROG MANAGEMENT EFFORTS.

Owner/Manager: LIVERMORE AREA RPD

Occurrence No.	770	**Map Index:**	75006	**EO Index:**	58186	**Element Last Seen:**	2008-08-18
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2008-08-18
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2017-10-11

Quad Summary: La Costa Valley (3712157), Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.62689 / -121.80945	**Accuracy:**	specific area
UTM:	Zone-10 N4165086 E605055	**Elevation (ft):**	690
PLSS:	T03S, R01E, Sec. 36, SE (M)	**Acres:**	10.0

Location: NW OF HIGHWAY 84, JUST SOUTH OF THE RUBY HILLS SUBDIVISION, 4 MILES SE OF PLEASANTON.

Detailed Location: 2 LOCATIONS, FOLEY POND AND A NATURAL SPRING 0.20 MI SSE OF FOLEY POND (NW OF HWY 84 & SE OF VALLECITOS RD). NOTE HWY 84 WAS RE-ALIGNED IN 2008, FORMERLY RAN THROUGH PRESENT DAY VALLECITOS RD.

Ecological: HABITAT CONSISTED OF A SEMI-PERMANENT STOCK POND (~20 METERS IN DIAMETER); SURROUNDING GRAZED GRASSLANDS SUPPORT NUMEROUS CALIFORNIA GROUND SQUIRRELS. CTS ALSO FOUND AT THIS SITE IN 2003.

General: FOLEY POND: 3 EGG MASSES OBSERVED 10 & 24 FEB; 1 ADULT OBS 24 FEB 2003. MULTIPLE METAMORPHS OBS 10 & 23 JAN & 1 FEB, AND 1 ADULT ON 18 AUG 2008. NATURAL SPRING: 1 ADULT OBS (NOT RELOCATED) ON 18 JUN 2008.

Owner/Manager: PVT

Occurrence No.	778	**Map Index:**	58570	**EO Index:**	58606	**Element Last Seen:**	2004-05-11
Occ. Rank:	None			**Presence:**	Possibly Extirpated	**Site Last Seen:**	2004-05-11
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2021-05-05

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.70323 / -121.86023	**Accuracy:**	specific area
UTM:	Zone-10 N4173500 E600472	**Elevation (ft):**	353
PLSS:	T03S, R01E, Sec. 4, SE (M)	**Acres:**	68.0

Location:	FROM THE N SIDE OF I-580 TO JUST N OF DUBLIN BLVD & FROM THE INTXN OF GRAFTON ST & DUBLIN BLVD TO ABOUT 0.6 MI SE.
Detailed Location:	2003 LOCALITY: SOUTH OF CENTRAL PARKWAY AND NORTH OF I-580, DUBLIN. MAPPED TO DETECTION LOCATIONS FROM 2010 DATASET (DETECTIONS IN 2003 & 2004); RELOCATED TO PROTECTED HABITAT 1.75 MILES NORTH (OCCURRENCES #251, 278).
Ecological:	AREA HAS BEEN IN VARIOUS STAGES OF RESIDENTIAL AND COMMERCIAL DEVELOPMENT SINCE ABOUT 2010 AS WESTPORT VILLAGE, AND LIKELY ANY RESIDUAL POPULATIONS WILL BE EXTIRPATED WITH CURRENT AND FUTURE INFILL DEVELOPMENT.
General:	1 TADPOLE COLLECTED (CAS 228201) ON 25 JUL 2003. MORE THAN 50 INDIVIDUALS OF ALL AGE CLASSES COLLECTED IN 2003 & 2004 FROM CONSTRUCTION AREAS AND RELOCATED TO PROTECTED HABITAT TO NORTH.
Owner/Manager:	UNKNOWN, PVT

Occurrence No.	859	**Map Index:**	75926	**EO Index:**	76909	**Element Last Seen:**	2001-XX-XX
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	2001-XX-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-07-22

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.72320 / -121.84118	**Accuracy:**	specific area
UTM:	Zone-10 N4175736 E602123	**Elevation (ft):**	720
PLSS:	T02S, R01E, Sec. 35, NW (M)	**Acres:**	14.0

Location:	ABOUT 0.25 MI NORTH OF THE NORTH END OF CROAK RD & ABOUT 1.5 MI NNE OF FALLON RD (EL CHARRO RD) AT I-580, PLEASANTON.
Detailed Location:	MAPPED TO PROVIDED UTM COORDINATES AND LOCALITY DESCRIPTIONS.
Ecological:	HABITAT CONSISTED OF A SPRING AT HEAD OF UNNAMED DRAINAGE; SURROUNDED BY NON-NATIVE GRASSLAND. SITE SPARSELY DEVELOPED WITH RURAL RESIDENCES, BARNS, PARKING AREAS, HORSE PADDOCKS AND OUTBUILDINGS; HISTORICALLY USED FOR GRAZING.
General:	2 OBSERVATIONS IN 2001.
Owner/Manager:	PVT

Occurrence No.	860	**Map Index:**	63733	**EO Index:**	63828	**Element Last Seen:**	2003-XX-XX
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	2001-XX-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2006-01-23

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.70496 / -121.84037	**Accuracy:**	80 meters
UTM:	Zone-10 N4173713 E602219	**Elevation (ft):**	415
PLSS:	T03S, R01E, Sec. 02 (M)	**Acres:**	0.0

Location: EAST SIDE OF CROAK ROAD, ABOUT 0.25 MILE NORTH OF I-580, NW OF LIVERMORE.

Detailed Location:

Ecological: HABITAT CONSISTS OF A SPRING AT THE HEAD OF AN UNNAMED DRAINAGE; SURROUNDED BY NON-NATIVE GRASSLAND.

General: 1 OBSERVATION IN 2002.

Owner/Manager: PVT

Occurrence No.	864	**Map Index:**	64242	**EO Index:**	64337	**Element Last Seen:**	2020-03-12
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2020-03-12
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2021-04-23

Quad Summary:	Livermore (3712167), Tassajara (3712177)
County Summary:	Alameda

Lat/Long:	37.75271 / -121.80013	**Accuracy:**	specific area
UTM:	Zone-10 N4179056 E605700	**Elevation (ft):**	700
PLSS:	T02S, R02E, Sec. 18, SW (M)	**Acres:**	22.0

Location: WEST BRANCH CAYETANO CREEK, 0.5 MI SW OF MANNING RD AT HIGHLAND RD, 5 MI NNW OF LIVERMORE & 5.4 MI WSW OF BRUSHY PEAK.

Detailed Location: MAPPED TO INCLUDE PROVIDED COORDINATES. DESCRIBED AS CAYETANO CREEK NORTHERN IN CHANNEL POOL NEAR ACTC EAST POND, EAGLE RIDGE PRESERVE.

Ecological: RIPARIAN CORRIDOR IN CATTLE-GRAZED ANNUAL GRASSLAND. 2005: FOUND DURING TRANSMISSION LINE CONSTRUCTION. 2012: FOUND IN REMNANT POOL. 2017: POOLS IN STREAM ON GRAZED CONSERVATION LAND. 2019: BREEDING POND IN CREEK; ADULTS ON BANKS, IN POND.

General: 28 ADULTS & 3 JUVENILES OBSERVED 9-23 SEP 2005. 9 ADULTS DEC 2005- AUG '06. 1 AD 50-100 LARVAE 2 OCT '12. 4 ADS, 20 LV 21 AUG '17. EGGS, 12 ADS, 200+ LV, '18. 6 ADS, 100 LV 26 AUG '19. EGGS, 2 ADS, 200+ LV, 2020.

Owner/Manager: PVT

Occurrence No.	1019	**Map Index:**	74016	**EO Index:**	75014	**Element Last Seen:**	2008-05-22
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2008-05-22
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-05-11

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.73451 / -121.80921	**Accuracy:**	80 meters
UTM:	Zone-10 N4177027 E604925	**Elevation (ft):**	570
PLSS:	T02S, R01E, Sec. 25, NE (M)	**Acres:**	0.0

Location: ALONG COLLIER CANYON ROAD, 2.5 MILES NORTH OF I-580, NW OF LIVERMORE.

Detailed Location:

Ecological: HABITAT DESCRIBED AS PONDS IN VALLEY GRASSLANDS, W/RANCHING, RESIDENTIAL, GRAZING, & EQUIPMENT STORAGE. CALIF. TIGER SALAMANDER ALSO AT/NEAR LOCATION.

General: AN EGG MASS, INDICATING A BREEDING AREA, WAS OBSERVED ON 25 FEB 2007. 11 LARVAE OBSERVED ON 22 MAY 2008. NUMBERS CAPTURED ARE APPROXIMATE.

Owner/Manager: PVT

Occurrence No.	1215	**Map Index:**	75917	**EO Index:**	76910	**Element Last Seen:**	2001-XX-XX
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	2001-XX-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2009-07-22

Quad Summary: Livermore (3712167)
County Summary: Alameda

Lat/Long:	37.72657 / -121.84554	**Accuracy:**	80 meters
UTM:	Zone-10 N4176106 E601735	**Elevation (ft):**	750
PLSS:	T02S, R01E, Sec. 27, SE (M)	**Acres:**	0.0

Location: ALONG UNNAMED DRAINAGE TO FALLON CREEK, ABOUT 1.7 MI NORTH OF HWY I-580 & FALLON RD JCT.

Detailed Location: MAPPED TO PROVIDED UTM COORDINATES & LOCALITY DESCRIPTION.

Ecological: HABITAT CONSISTED OF NON-NATIVE GRASSLANDS WITH TOPOGRAPHY OF LOW TO MODERATELY SLOPING HILLS DIVIDED BY INTERMITTENT DRAINAGES, WHICH FLOW SOUTHWARD. SITE SPARSELY DEVELOPED; HISTORICALLY USED FOR GRAZING.

General: 1 OBSERVATION IN 2001.

Owner/Manager: PVT

Occurrence No.	1380	**Map Index:**	95341	**EO Index:**	96471	**Element Last Seen:**	2010-04-21
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2010-04-21
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2015-03-02

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.73795 / -121.82492	**Accuracy:**	80 meters
UTM:	Zone-10 N4177390 E603536	**Elevation (ft):**	735
PLSS:	T02S, R01E, Sec. 26, NE (M)	**Acres:**	0.0

Location:	DRAINAGE NE OF DOOLAN CYN/COTTONWOOD CRK, 0.3 MI SW OF VABM DOOLAN 2 BENCHMARK, 2.4 MI N OF N CANYONS PKWY AT DOOLAN RD.
Detailed Location:	"POND 7" IN UNNAMED DRAINAGE. MAPPED TO COORDINATES AND MAP.
Ecological:	SITE USED FOR BREEDING. 3 OTHER PONDS IN VICINITY; CALIFORNIA TIGER SALAMANDER KNOWN FROM ONE.
General:	ADULT AND JUVENILE DETECTED ON 25 MAR, AND 2 ADULTS DETECTED ON 21 APR, 2010.
Owner/Manager:	PVT

Occurrence No.	1381	**Map Index:**	95342	**EO Index:**	96472	**Element Last Seen:**	2011-04-06
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2011-04-06
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2015-03-02

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.73882 / -121.83607	**Accuracy:**	80 meters
UTM:	Zone-10 N4177475 E602553	**Elevation (ft):**	645
PLSS:	T02S, R01E, Sec. 23, SW (M)	**Acres:**	0.0

Location:	E SIDE OF DOOLAN RD & COTTONWOOD CREEK, 1.8 MI E OF FALLON RD AT COUNTY LINE, 2.6 MI NNW OF N CANYONS PKWY AT DOOLAN RD.
Detailed Location:	"POND 9" IN DOOLAN CANYON. MAPPED TO COORDINATES AND MAP.
Ecological:	STOCK POND IN PASTURE GRAZED BY CATTLE. CATTAILS WITHIN POND AWAY FROM EDGES. POND ABOUT 6 FEET DEEP.
General:	THREE ADULTS AND 35 LARVAE DETECTED WITH DIP-NET SAMPLING ON 6 APR 2011.
Owner/Manager:	EBRPD-DOOLAN CANYON

Occurrence No.	1382	**Map Index:** 95343	**EO Index:**	96473	**Element Last Seen:**	2020-01-24
Occ. Rank:	Excellent		**Presence:**	Presumed Extant	**Site Last Seen:**	2020-09-24
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2021-04-23

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.74562 / -121.79046	**Accuracy:**	specific area
UTM:	Zone-10 N4178281 E606562	**Elevation (ft):**	630
PLSS:	T02S, R02E, Sec. 19, E (M)	**Acres:**	10.0

Location: DRAINAGE NW OF CAYETANO CREEK, 0.8 MI SW OF MORGAN TERRITORY RD AT MANNING RD, 3 MI N OF I-580 AT ISABEL AVE, LIVERMORE.

Detailed Location: MAPPED TO PROVIDED COORDINATES AND HABITAT DESCRIPTION. DESCRIBED AS CAYETANO CREEK SOUTHERN IN CHANNEL POOL NEAR ACTC WEST POND, EAGLE RIDGE PRESERVE.

Ecological: 2013: FOUND IN 2-3' DEEP REMNANT POOL IN CREEK CHANNEL, NO FLOWING WATER; RED WILLOW RIPARIAN AREA W/WATERCRESS ALONG SHALLOW PORTIONS. 2015: ON STREAM BANK IN PRIVATELY OWNED PRESERVE. 2020: IN SMALL PLUNGE POOL AREA USED FOR GRAZING.

General: 2 ADULTS & ABOUT 50 TADPOLES DETECTED ON 31 MAY 2013. 1 ADULT OBSERVED ON 20 MAR 2015. UP TO 4 ADULTS, 20 LARVAE OBSERVED 21 AUG 2017. 1 ADULT OBS 9 APR 2018. POSSIBLY OBS, 2019. 1 ADULT OBSERVED ON 24 JAN 2020. ACTC WEST POND DRY IN 2020.

Owner/Manager: PVT

Occurrence No.	1383	**Map Index:** 95344	**EO Index:**	96478	**Element Last Seen:**	2012-05-16
Occ. Rank:	Poor		**Presence:**	Presumed Extant	**Site Last Seen:**	2012-05-16
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2015-03-02

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.69440 / -121.86524	**Accuracy:**	specific area
UTM:	Zone-10 N4172514 E600042	**Elevation (ft):**	345
PLSS:	T03S, R01E, Sec. 09, NE (M)	**Acres:**	1.0

Location: VICINITY OF GULFSTREAM ST AT W LAS POSITAS BLVD, ALONG FLOOD CONTROL CHANNEL UPSTREAM (N) OF ARROYO MOCHO, PLEASANTON.

Detailed Location: MAPPED TO COORDINATES, MAP, AND DESCRIPTION.

Ecological: INDIVIDUALS OBSERVED SHELTERING IN WILLOW THICKET OR ON BANK ABOVE WATER LINE.

General: TWO SUBADULTS OBSERVED ON 16 MAY 2012.

Owner/Manager: ALA COUNTY-FLOOD CONTROL DIST

Occurrence No.	1419	**Map Index:** 99048	**EO Index:**	100568	**Element Last Seen:**	2019-08-23
Occ. Rank:	Excellent		**Presence:**	Presumed Extant	**Site Last Seen:**	2019-08-23
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2020-10-30

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.73231 / -121.80216	**Accuracy:**	specific area
UTM:	Zone-10 N4176790 E605550	**Elevation (ft):**	657
PLSS:	T02S, R02E, Sec. 30, NW (M)	**Acres:**	12.0

Location: ABOUT 1.5 MILES N OF LAS POSITAS COLLEGE & 1.8 MILES SW OF HIGHLAND RD AT MANNING RD, LIVERMORE.

Detailed Location: MARCIEL PROPERTY. MAPPED TO PROVIDED COORDINATES, INCLUDES PONDS 1 & 4.

Ecological: PONDS IN A LIGHTLY GRAZED, NON-NATIVE ANNUAL GRASSLAND PROPOSED AS A HABITAT/SPECIES MITIGATION PROPERTY.

General: 5 LARVAE FOUND IN SOUTH POND AND 1 ADULT FOUND IN NORTH POND ON 23 APR 2015. 6 LARVAE FOUND ON 23 APR 2019. 3 ADULTS AND UP TO 35 SUBADULTS & METAMORPHS FOUND DURING ANNUAL MONITORING IN AUG 2019.

Owner/Manager: PVT

Occurrence No.	1499	**Map Index:** A6988	**EO Index:**	108779	**Element Last Seen:**	2015-09-09
Occ. Rank:	Fair		**Presence:**	Presumed Extant	**Site Last Seen:**	2015-09-09
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2017-10-25

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.62994 / -121.86665	**Accuracy:**	80 meters
UTM:	Zone-10 N4165361 E600005	**Elevation (ft):**	414
PLSS:	T03S, R01E, Sec. 33, E (M)	**Acres:**	5.0

Location: PONDS ON E SIDE OF SANCTUARY LANE, 1.2 MILES SE OF SUNOL BLVD AT I-680, CALLIPE PRESERVE GOLF COURSE, SOUTH PLEASANTON.

Detailed Location:

Ecological: PAIR OF ARTIFICIAL CONCRETE LINED PONDS THAT PROVIDES IRRIGATION TO GOLF COURSE. CRLF COLONIZED PONDS IN 2011 FROM UPSTREAM POND (OCC #1478) AFTER ERADICATION OF BASS & BULLFROGS. DEWATERED TO ERADICATE NON-NATIVE FISH IN 2013.

General: 6 DETECTED IN 2012. 6 CAUGHT AND RELOCATED (TO OCC #1478) ON 14 OCT 2013; 16 CAUGHT AND RELEASED BETWEEN OCT 15 & 17 2013. 14 DETECTED ON 9 SEP 2015.

Owner/Manager: CITY OF PLEASANTON

Occurrence No.	1587	**Map Index:** B2909	**EO Index:**	114840	**Element Last Seen:**	2016-05-04
Occ. Rank:	Good		**Presence:**	Presumed Extant	**Site Last Seen:**	2016-05-04
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2021-05-14

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.71182 / -121.82385	**Accuracy:**	80 meters
UTM:	Zone-10 N4174493 E603667	**Elevation (ft):**	429
PLSS:	T02S, R01E, Sec. 35, SE (M)	**Acres:**	5.0

Location: ALONG COTTONWOOD CREEK & DOOLAN RD ABOUT 0.6 MILES N OF N CANYON PARKWAY, N OF I-580, LIVERMORE.

Detailed Location: ON DUBLIN PRESERVE CONSERVATION BANK. MAPPED TO PROVIDED COORDINATES.

Ecological: POOL AT CULVERT IN COTTONWOOD CREEK DRAINAGE, SURROUNDED BY ANNUAL GRASSLAND WITH EUCALYPTUS GROVES, STOCK PONDS, & WETLANDS ON ROLLING HILLS USED FOR RANCHING. WITHIN 1,200-AC PRESERVE. RURAL RESIDENTIAL & COMMERCIAL DEVELOPMENT TO SOUTH.

General: 20 LARVAE OBSERVED ON 30 MAR 2010. 1 LARVA OBSERVED ON 27 MAY 2015. 30 LARVAE OBSERVED ON 4 MAY 2016.

Owner/Manager: PVT

Occurrence No.	1645	**Map Index:** B6345	**EO Index:**	119399	**Element Last Seen:**	2020-06-18
Occ. Rank:	Good		**Presence:**	Presumed Extant	**Site Last Seen:**	2020-06-18
Occ. Type:	Natural/Native occurrence		**Trend:**	Unknown	**Record Last Updated:**	2021-04-23

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.7403 / -121.80043	**Accuracy:**	specific area
UTM:	Zone-10 N4177679 E605691	**Elevation (ft):**	772
PLSS:	T02S, R02E, Sec. 19, SW (M)	**Acres:**	16.0

Location: ABOUT 1.3 MI SSW OF THE MANNING RD AT HIGHLAND RD, & ABOUT 2.3 MI NNE OF COLLIER CANYON RD AT N CANYON PKWY, LIVERMORE.

Detailed Location: NORTH POLYGON MAPPED TO COORDINATES GIVEN FOR BANKE POND; SOUTH POLYGON MAPPED TO FALLON POND. EAGLE RIDGE PRESERVE.

Ecological: BANKE: FORMER CATTLE STOCK POND NOW USED AS MITIGATION POND. MORE THAN 7 FT DEEP, SURROUNDED BY CATTAILS ON MITIGATION PROPERTY USED FOR CATTLE GRAZING. FALLON: POND CREATED FOR MITIGATION, 2.5 FT DEEP W/ABUNDANT EMERGENT VEG IN AUG 2018.

General: FALLON: 2 ADULTS OBSERVED 15 AUG 2018. 0 IN 2019. 0 IN 2020, POND DRY BY MAY. BANKE: AT LEAST 8 ADULTS & 5 JUVENILES OBS APR-AUG 2018. 3 LARVAE OBS 29 MAY 2019. AT LEAST 3 ADS, 5 LARVAE, & 5 JUVS OBS IN 2019 & 2020.

Owner/Manager: PVT

Occurrence No.	1646	**Map Index:**	B6356	**EO Index:**	119410	**Element Last Seen:**	2017-05-24
Occ. Rank:	Excellent			**Presence:**	Presumed Extant	**Site Last Seen:**	2017-05-24
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-28

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.72574 / -121.80128	**Accuracy:**	80 meters
UTM:	Zone-10 N4176062 E605637	**Elevation (ft):**	592
PLSS:	T02S, R02E, Sec. 30, SW (M)	**Acres:**	5.0

Location: ABOUT 1.4 MI NNE OF COLLIER CYN RD AT N CANYON PKWY & 1.75 MI WNW OF HARTMAN RD AT N LIVERMORE BLVD.

Detailed Location: MAPPED TO COORDINATES PROVIDED FOR POND 3 ON MURRAY RANCH.

Ecological: PERENNIAL STOCK POND ON MITIGATION BANK USED FOR CATTLE RANCHING. POND SUPPORTED LUSH EMERGENT VEGETATION, WITH SUFFICIENT HYDROPERIOD FOR SUCCESSFUL METAMORPHOSIS OF LARVAE.

General: 19 LARVAE DETECTED ON 27 APR & 16 ON 24 MAY 2017. DETECTED DURING CTS SEINING SURVEYS.

Owner/Manager: PVT

Occurrence No.	1647	**Map Index:**	B6358	**EO Index:**	119412	**Element Last Seen:**	2015-01-06
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2015-01-06
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2020-10-28

Quad Summary: Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.7279 / -121.8222	**Accuracy:**	80 meters
UTM:	Zone-10 N4176278 E603790	**Elevation (ft):**	579
PLSS:	T02S, R01E, Sec. 25, SW (M)	**Acres:**	5.0

Location: ABOUT 1.8 MI NW OF COLLIER CYN RD AT N CANYON PKWY & 2.3 MI NE OF I-580 AT FALLON RD, LIVERMORE.

Detailed Location: MAPPED TO PROVIDED COORDINATES.

Ecological: POND IN HEAVILY GRAZED NON-NATIVE GRASSLAND AMONG ROLLING HILLS. RURAL RESIDENTIAL AREA USED FOR CATTLE GRAZINGL RESIDENTIAL DEVELOPMENT 0.9 MI SW OF SITE (2015).

General: 1 ADULT OBSERVED ON 6 JAN 2015. INDIVIDUAL WAS BASKING ON BANK AND JUMPED INTO WATER UPON APPROACH.

Owner/Manager: PVT

Rana boylii

Element Code: AAABH01050

foothill yellow-legged frog

Listing Status:	**Federal:**	None	**CNDDB Element Ranks:**	**Global:**	G3
	State:	Endangered		**State:**	S3
	Other:	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_NT-Near Threatened, USFS_S-Sensitive			
Habitat:	**General:**	PARTLY-SHADED, SHALLOW STREAMS AND RIFFLES WITH A ROCKY SUBSTRATE IN A VARIETY OF HABITATS.			
	Micro:	NEEDS AT LEAST SOME COBBLE-SIZED SUBSTRATE FOR EGG-LAYING. NEEDS AT LEAST 15 WEEKS TO ATTAIN METAMORPHOSIS.			

Occurrence No.	790 **Map Index:** 68481	**EO Index:**	76075	**Element Last Seen:**	1974-08-28
Occ. Rank:	Unknown	**Presence:**	Presumed Extant	**Site Last Seen:**	1993-05-03
Occ. Type:	Natural/Native occurrence	**Trend:**	Unknown	**Record Last Updated:**	2018-08-21

Quad Summary: Mendenhall Springs (3712156), La Costa Valley (3712157), Altamont (3712166), Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.62022 / -121.75491	**Accuracy:**	1 mile
UTM:	Zone-10 N4164408 E609878	**Elevation (ft):**	500
PLSS:	T04S, R02E, Sec. 04 (M)	**Acres:**	0.0

Location: ARROYO DEL VALLE CREEK, NW OF LAKE DEL VALLE, SOUTH OF LIVERMORE.

Detailed Location: INCLUDES LOCALITIES DESCRIBED AS "DEL VALLE REGIONAL PARK," "ARROYO RD, 1 MI N DEL VALLE LAKE," "4 MI S LIVERMORE," "5 MI S LIVERMORE, ARROYO DEL VALLE CREEK," AND SIMPLY "LIVERMORE."

Ecological:

General: COLLECTED IN 1960, 1969, AND 1973. DETECTED IN AUG 1974. NONE DETECTED DURING HERP SURVEYS IN 1993.

Owner/Manager: UNKNOWN

Agelaius tricolor

Element Code: ABPBXB0020

tricolored blackbird

Listing Status:	**Federal:**	None	**CNDDB Element Ranks:**	**Global:**	G1G2
	State:	Threatened		**State:**	S1S2
	Other:	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered, NABCI_RWL-Red Watch List, USFWS_BCC-Birds of Conservation Concern			
Habitat:	**General:**	HIGHLY COLONIAL SPECIES, MOST NUMEROUS IN CENTRAL VALLEY & VICINITY. LARGELY ENDEMIC TO CALIFORNIA.			
	Micro:	REQUIRES OPEN WATER, PROTECTED NESTING SUBSTRATE, AND FORAGING AREA WITH INSECT PREY WITHIN A FEW KM OF THE COLONY.			

Occurrence No.	254	**Map Index:**	24015	**EO Index:**	7280	**Element Last Seen:**	1980-06-XX
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	2014-04-20
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2016-06-02

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.68215 / -121.83944	**Accuracy:**	non-specific area
UTM:	Zone-10 N4171184 E602334	**Elevation (ft):**	332
PLSS:	T03S, R01E, Sec. 11 (M)	**Acres:**	1783.0

Location: N SIDE OF STANLEY BLVD, AREA JUST NE OF VALLEY AVE INTERSECTION, 1.8 MI SW OF I-580 & AIRWAY BLVD INTXN, W OF LIVERMORE.

Detailed Location: 1976-1980 LOCATION DESCRIBED AS "GRAVEL PIT AREA BELONGING TO KAISER GRAVEL COMPANY ON N SIDE OF STANLEY BLVD, 3 MI W OF LIVERMORE, & 3 MI E OF PLEASANTON." COLONY DATA STORED IN UCD TRBL PORTAL; SITE NAME WAS "KAISER GRAVEL COMPANY."

Ecological: HABITAT IN 1976-1980 DESCRIBED AS FRESHWATER CATTAIL MARSH; LARGE SHALLOW POND WITH DEEP MUD BOTTOM. SIZE OF COLONY ABOUT 10 ACRES.

General: 16+ PAIRS OBSERVED BETWEEN 24 APR-7 JUN 1976. HUNDREDS OF PAIRS OBSERVED BETWEEN 28 MAR-30 APR 1978. 125 PAIRS OBSERVED IN JUN 1980. 0 BIRDS OBSERVED ON 20 APR 2014.

Owner/Manager: PVT-KAISER GRAVEL CO

Occurrence No.	255	**Map Index:**	24017	**EO Index:**	7278	**Element Last Seen:**	1974-05-11
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	1974-05-11
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2016-06-02

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.654 / -121.8032	**Accuracy:**	1/5 mile
UTM:	Zone-10 N4168100 E605570	**Elevation (ft):**	409
PLSS:	T03S, R02E, Sec. 19, SW (M)	**Acres:**	70.0

Location: ARROYO DEL VALLE, NE OF THE INTERSECTION OF VINEYARD AVENUE WITH ISABEL AVENUE, SW OF LIVERMORE.

Detailed Location: 1974 LOCATION DESCRIBED AS "INTERSECTION OF ISABEL AVENUE & VINEYARD AVENUE WHERE ARROYO DEL VALLE CROSSES ISABEL AVENUE ON NORTHEAST CORNER." COLONY DATA STORED IN THE UC DAVIS TRICOLORED BLACKBIRD PORTAL; SITE NAME WAS "ARROYO DEL VALLE."

Ecological: HABITAT IN 1974 WAS A CATTAIL MARSH; SURROUNDING AREA MOSTLY MULEFAT, SMALL WILLOWS, GRASS, & LOW SHRUBS. NO SUBSTRATE IN 2011, SURROUNDED BY DEVELOPMENT. GRAVEL PIT, RANCHETTES, & VINEYARDS. SOME WATER IN DRAINAGE IN 2014, MOSTLY WILLOWS.

General: ABOUT 60 PAIRS OBSERVED BETWEEN 4 APR-11 MAY 1974; UNKNOWN IF COLONY FLEDGED YOUNG, HOWEVER, MANY EMPTY NESTS OBSERVED ON 11 MAY. 0 BIRDS OBSERVED ON 17 APR 2011 AND 20 APR 2014.

Owner/Manager: UNKNOWN

Occurrence No.	256	**Map Index:**	24016	**EO Index:**	7279	**Element Last Seen:**	1985-05-26
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	2014-04-20
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2016-06-22

Quad Summary:	Livermore (3712167)
County Summary:	Alameda

Lat/Long:	37.6629 / -121.8129	**Accuracy:**	2/5 mile
UTM:	Zone-10 N4169077 E604701	**Elevation (ft):**	411
PLSS:	T03S, R01E, Sec. 24, N (M)	**Acres:**	280.0

Location:	ABOUT 0.5 MILE WEST OF ISABEL AVENUE AND 0.5 MILE NORTH OF VINEYARD AVENUE, SW OF LIVERMORE.
Detailed Location:	1985 LOCATION DESCRIBED AS "GRAVEL PIT AREA 0.5 MI E OF ISABEL AVE & 0.5 MI N OF VINEYARD AVE... KWIK-SET CO." GRAVEL PIT LOCATED ON W SIDE OF ISABEL RD. COLONY DATA STORED IN UCD TRBL PORTAL; SITE WAS "VINEYARD AVENUE AT ISABEL AVENUE."
Ecological:	NESTING SUBSTRATE CONSISTED OF CATTAILS WITHIN A SHALLOW POND WITH A DEEP MUD BOTTOM. 1994 FLOCK WAS FORAGING ON E SIDE OF ISABEL AVE; THIS AREA HAS SINCE BEEN DEVELOPED WITH RESIDENTIAL HOMES.
General:	SEVERAL THOUSAND PAIRS OBS BTWN 4-26 MAY 1985; PRESUMED NESTING, UNK IF COLONY FLEDGED YOUNG. ACTIVITY REPORTED BY HAMILTON ON 7 APR 1994; SMALL MIXED FLOCK OF TRICOLOREDS & RED-WINGS OBS ON 23 APR. 0 BIRDS OBS IN 2008, 2011 & 2014.
Owner/Manager:	PVT-KWIK SET CO

Occurrence No.	987	**Map Index:**	A2263	**EO Index:**	103872	**Element Last Seen:**	1993-XX-XX
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	1994-04-23
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2016-10-18

Quad Summary:	Livermore (3712167), Tassajara (3712177)
County Summary:	Alameda

Lat/Long:	37.747 / -121.8188	**Accuracy:**	2/5 mile
UTM:	Zone-10 N4178401 E604063	**Elevation (ft):**	759
PLSS:	T02S, R01E, Sec. 24, NW (M)	**Acres:**	280.0

Location:	ABOUT 0.6 MI SSW OF COLLIER CANYON RD & DOOLAN RD INTERSECTION, NNW OF LIVERMORE.
Detailed Location:	MAPPED AS BEST GUESS BY CNDDB TO PROVIDED LOCATION DESCRIPTION OF "HILLSIDE ON WEST SIDE OF COLLIER CANYON ROAD NEAR CONTRA COSTA CO. LINE, NORTH OF LIVERMORE."
Ecological:	TALL GREEN MUSTARD FIELD IN 1993. LITTLE TALL GREEN MUSTARD PRESENT IN 1994; MUSTARD EITHER DRIED UP OR REMOVED.
General:	BREEDING COLONY OBSERVED IN 1993; FIRST OCCUPIED AROUND 1 MAY. 0 BIRDS OBSERVED ON 23 APR 1994.
Owner/Manager:	UNKNOWN

Vulpes macrotis mutica

Element Code: AMAJA03041

San Joaquin kit fox

Listing Status:	**Federal:**	Endangered	**CNDDB Element Ranks:**	**Global:**	G4T2
	State:	Threatened		**State:**	S2
	Other:				
Habitat:	**General:**	ANNUAL GRASSLANDS OR GRASSY OPEN STAGES WITH SCATTERED SHRUBBY VEGETATION.			
	Micro:	NEED LOOSE-TEXTURED SANDY SOILS FOR BURROWING, AND SUITABLE PREY BASE.			

Occurrence No.	1031	**Map Index:**	67980	**EO Index:**	68130	**Element Last Seen:**	1975-07-XX
Occ. Rank:	Unknown			**Presence:**	Presumed Extant	**Site Last Seen:**	1975-07-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2007-01-30

Quad Summary: Livermore (3712167), Dublin (3712168)

County Summary: Alameda

Lat/Long:	37.72666 / -121.87813	**Accuracy:**	non-specific area
UTM:	Zone-10 N4176081 E598862	**Elevation (ft):**	470
PLSS:	T02S, R01E, Sec. 29 (M)	**Acres:**	440.0

Location: SAN RAMON, NEAR TASSAJARA CREEK REGIONAL PARK, ABOUT 1.7 MI N OF INTERSECTION OF HWY 580 & TASSAJARA RD.

Detailed Location:

Ecological:

General: SIGHTING AT DEN SOMETIME FROM 1972 THROUGH JUL 1975.

Owner/Manager: UNKNOWN

Branchinecta lynchi **Element Code:** ICBRA03030

vernal pool fairy shrimp

Listing Status:	**Federal:**	Threatened	**CNDDB Element Ranks:**	**Global:**	G3
	State:	None		**State:**	S3
	Other:	IUCN_VU-Vulnerable			

Habitat:	**General:**	ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MOUNTAINS, AND SOUTH COAST MOUNTAINS, IN ASTATIC RAIN-FILLED POOLS.
	Micro:	INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Occurrence No.	99	**Map Index:**	25002	**EO Index:**	1458	**Element Last Seen:**	1996-12-27
Occ. Rank:	Good			**Presence:**	Presumed Extant	**Site Last Seen:**	2000-XX-XX
Occ. Type:	Natural/Native occurrence			**Trend:**	Unknown	**Record Last Updated:**	2014-09-29

Quad Summary: Altamont (3712166), Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.72272 / -121.76091	**Accuracy:**	non-specific area
UTM:	Zone-10 N4175773 E609198	**Elevation (ft):**	500
PLSS:	T02S, R02E, Sec. 33 (M)	**Acres:**	501.0

Location: SPRINGTOWN & STONECHASE SITES, SOUTH OF RAYMOND RD FROM 0.6 MILE WEST TO 1 MILE EAST OF LORRAINE STREET, LIVERMORE.

Detailed Location: EXACT LOCATIONS FOR 1991-1992 DETECTIONS NOT KNOWN, LOCALITIES "SPRINGTOWN ALKALI SINK" & SIMILAR; MAPPED TO PROPERTY E OF LORRAINE ST PER 1993 SURVEY FORM. 1996 DETECTIONS ON STONECHASE PROPERTY W OF LORRAINE, MAPPED TO PROVIDED LOCATIONS.

Ecological: SPRINGTOWN SITE IS AN ALKALI SINK CONTAINING VERNAL POOLS. STONECHASE PROPERTY SUPPORTED SEASONAL WETLANDS IN NON-NATIVE ANNUAL GRASSLAND WITH VERNAL POOL INDICATOR PLANTS PRESENT.

General: DETECTED 1991-93, COLLECTED IN 1991 & 1992 (USNM #1144065, 1072656, 1072657) FOUND IN 9 POOLS & 3 SWALES IN 1996, COLLECTED (CASIZ #106740-106744, 106747, 107395, 107396). NOT FOUND AT SPRINGTOWN SITE IN 2000.

Owner/Manager: CITY OF LIVERMORE, PVT

Chloropyron palmatum

palmate-bracted bird's-beak

Element Code: PDSCR0J0J0

Listing Status:	**Federal:**	Endangered	**CNDDB Element Ranks:**	**Global:**	G1
	State:	Endangered		**State:**	S1
	Other:	Rare Plant Rank - 1B.1, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden			
Habitat:	**General:**	CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND.			
	Micro:	USUALLY ON PESCADERO SILTY CLAY WHICH IS ALKALINE, WITH DISTICHLIS, FRANKENIA, ETC. 5-155 M.			

Occurrence No.	10 **Map Index:** 10692	**EO Index:**	3037	**Element Last Seen:**	2018-07-24
Occ. Rank:	Good	**Presence:**	Presumed Extant	**Site Last Seen:**	2018-07-24
Occ. Type:	Natural/Native occurrence	**Trend:**	Fluctuating	**Record Last Updated:**	2018-11-30

Quad Summary: Altamont (3712166), Livermore (3712167)

County Summary: Alameda

Lat/Long:	37.72391 / -121.74466	**Accuracy:**	specific area
UTM:	Zone-10 N4175924 E610629	**Elevation (ft):**	510
PLSS:	T02S, R02E, Sec. 27, S (M)	**Acres:**	370.0

Location: SPRINGTOWN WETLANDS RESERVE, APPROX 2.5 MILES NORTH OF LIVERMORE, WEST OF VASCO ROAD, SOUTH OF RAYMOND RD-HARTFORD AVE.

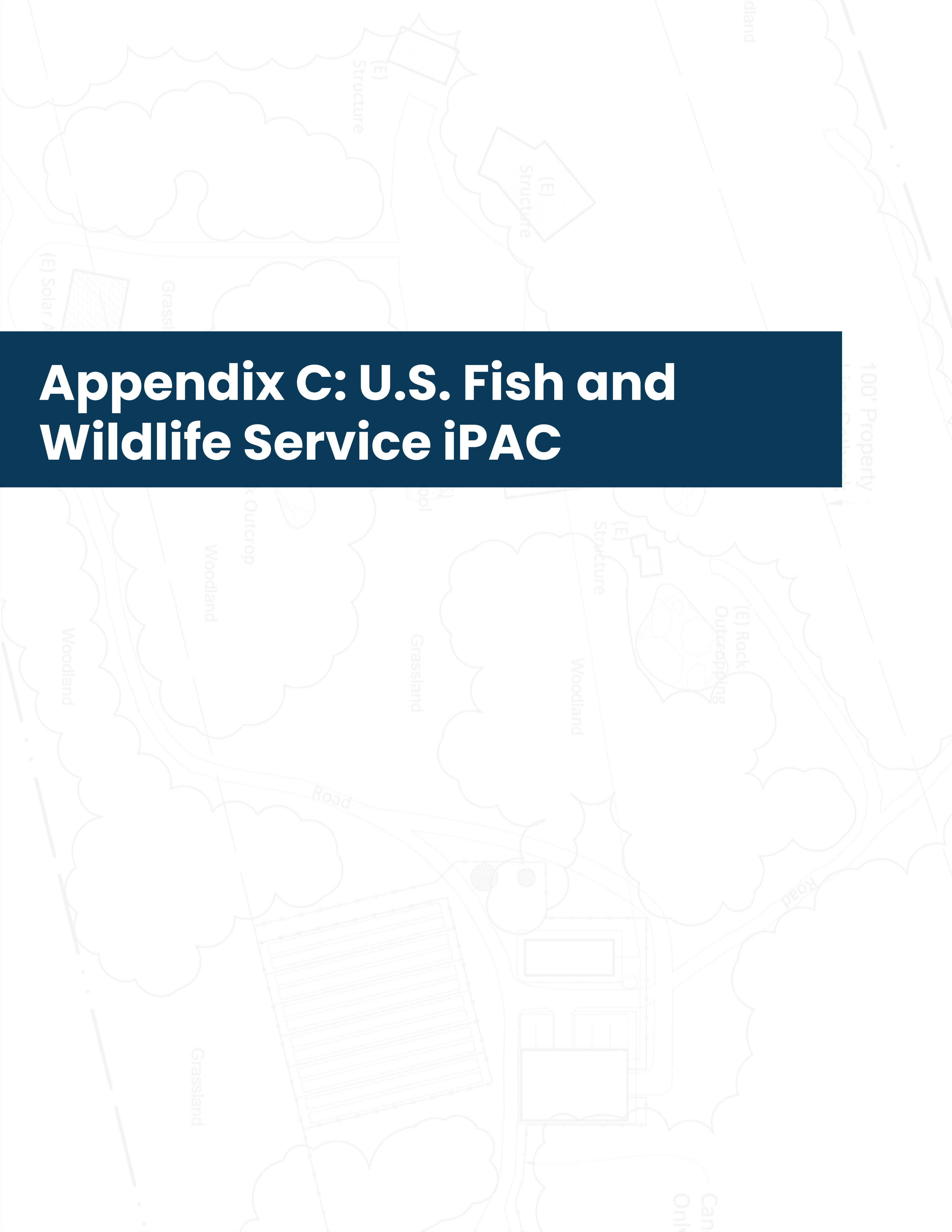
Detailed Location: MAPPED AS 5 POLYGONS BASED MOSTLY ON A 1989 MORENO MAP ENCOMPASSING MULTIPLE YEARS OF DATA. PORTIONS OF POP HAVE BEEN EXTIRPATED BY DEVELOPMENT. DISTRIBUTION OF PLANTS ESP IN E PORTION OF SITE HAS DECREASED SIGNIFICANTLY FROM 1990 TO 2010.

Ecological: ALONG BRAIDED DRAINAGE CHANNELS ON PESCADERO CLAY & SOLANO LOAM. IODINE BUSH & ALKALI GRASSLAND SUBTYPES OF THE VALLEY SINK SCRUB VEGETATION TYPE. OTHER RARE SPECIES: ATRIPLEX DEPRESSA; A. CORDULATA FOUND SOUTH OF BLUEBELL DRIVE.

General: OBS IN 1982-88. 9,994 IN 1990, 10,439 IN 1991, 36,594 IN 1992, ~11,000 IN 1993, 52,954 IN 1997, 130 IN 1999, <50,000 IN 2004, LOCALLY SCATTERED IN 2005, 388 IN 2009, 1000S IN 2010, 1100 IN 2012, 100S IN 2013, 1200+ IN 2017, 947+ IN 2018.

Owner/Manager: PVT, CITY OF LIVERMORE, DFG

Appendix C: U.S. Fish and Wildlife Service iPAC



IPaC resource list

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

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

Project information

NAME

Monte Vista Memorial Gardens

LOCATION

Alameda County, California

DESCRIPTION

The Monte Vista Memorial Gardens (MVMG) is a proposed memorial park that includes a funeral home, extensive cemetery grounds area and a number of associated services described below. The project proposes to develop 6.8 acres in the southeastern portion of the site, east of Arroyo Las Positas, with a funeral home, parking facilities and associated mortuary, crematorium and other interment services. Two bridges would span the Arroyo Las Positas to connect the funeral home area to the cemetery grounds in the western portion of the site. The cemetery grounds also would support several man-made lake features, a flowing waterway, an area of depressional wetlands on the north side of I-580, as well as lawn and other landscape elements requiring the installation and maintenance of on-site water irrigation and management systems. The project intends to re-use onsite surface water as much as possible to minimize groundwater and municipal water demand.

Local office

Sacramento Fish And Wildlife Office

☎ (916) 414-6600
📠 (916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

San Joaquin Kit Fox Vulpes macrotis mutica No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2873	Endangered

Birds

NAME	STATUS
California Least Tern Sterna antillarum browni No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered

Reptiles

NAME	STATUS
Alameda Whipsnake (=striped Racer) Masticophis lateralis euryxanthus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/5524	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander Ambystoma californiense There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt Hypomesus transpacificus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS

San Bruno Elfin Butterfly *Callophrys mossii bayensis* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/3394	Endangered
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Palmate-bracted Bird's Beak *Cordylanthus palmatus* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1616	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 person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- 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 birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Allen's Hummingbird Selasphorus sasin Breeds Feb 1 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9637

Bald Eagle Haliaeetus leucocephalus Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Burrowing Owl Athene cunicularia Breeds Mar 15 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9737

Clark's Grebe Aechmophorus clarkii Breeds Jan 1 to Dec 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Golden Eagle Aquila chrysaetos Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lawrence's Goldfinch Carduelis lawrencei Breeds Mar 20 to Sep 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Lewis's Woodpecker Melanerpes lewis Breeds Apr 20 to Sep 30

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Long-billed Curlew Numenius americanus Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Marbled Godwit Limosa fedoa This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Nuttall's Woodpecker Picoides nuttallii This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9410	Breeds Apr 1 to Jul 20
Oak Titmouse Baeolophus inornatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9656	Breeds Mar 15 to Jul 15
Rufous Hummingbird selasphorus rufus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds elsewhere
Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Song Sparrow Melospiza melodia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Feb 20 to Sep 5
Spotted Towhee Pipilo maculatus clementae This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/4243	Breeds Apr 15 to Jul 20
Tricolored Blackbird Agelaius tricolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Wrentit Chamaea fasciata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 10

Yellow-billed Magpie *Pica nuttalli* Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9726

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence (🟩)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (🟨)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

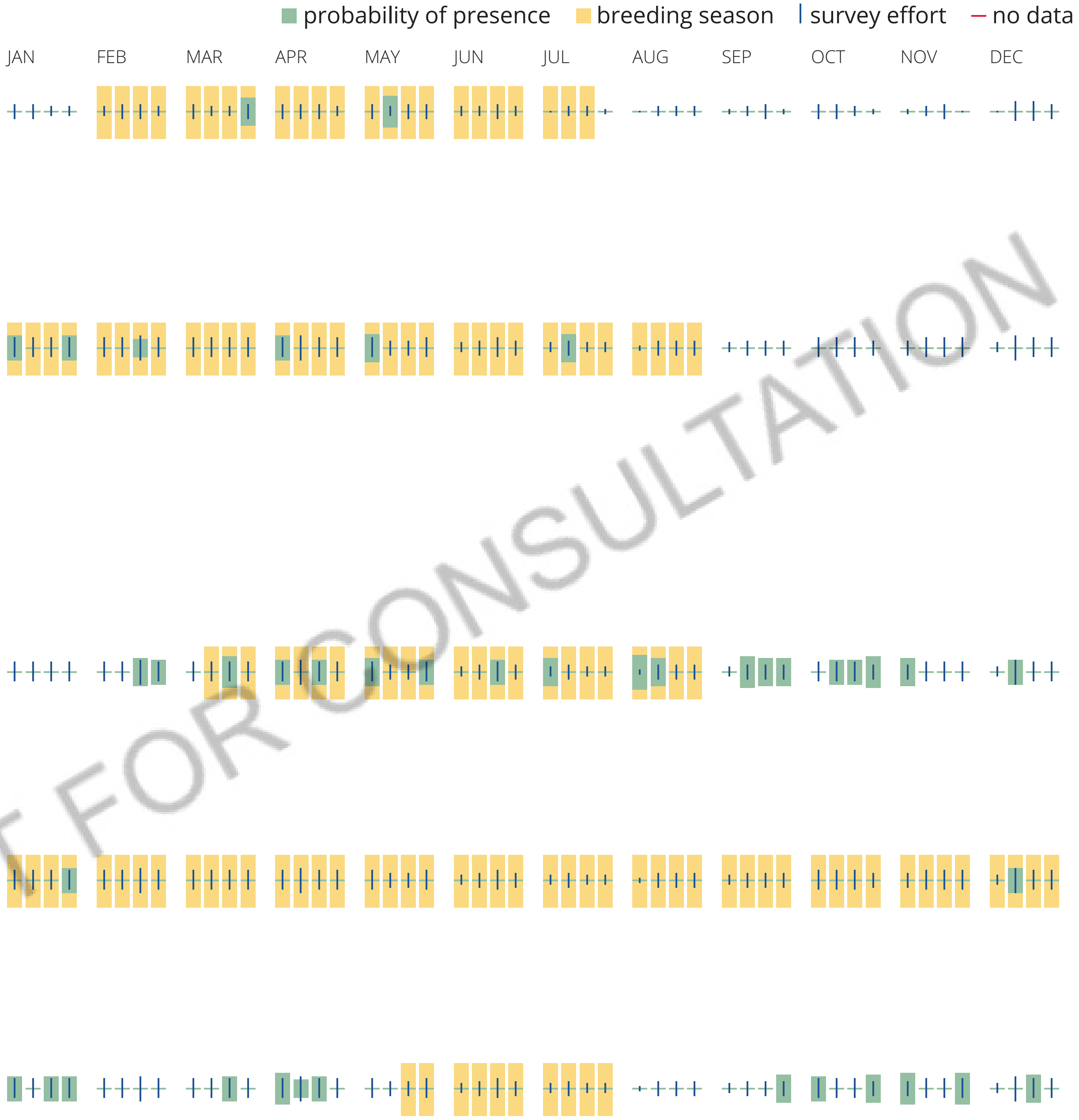
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



SPECIES

Allen's Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

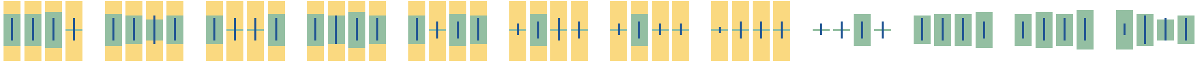
Burrowing Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

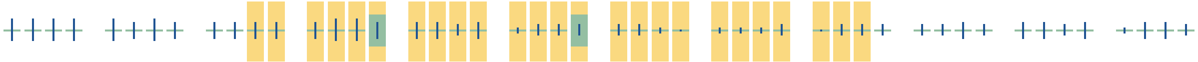
Golden Eagle

Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



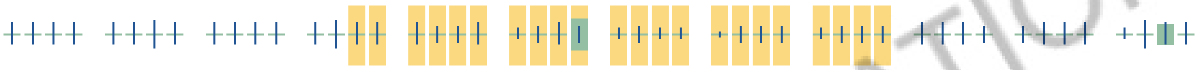
Lawrence's Goldfinch

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



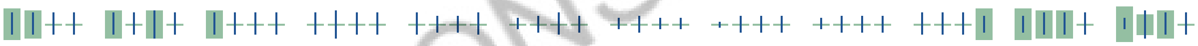
Lewis's Woodpecker

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Long-billed Curlew

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

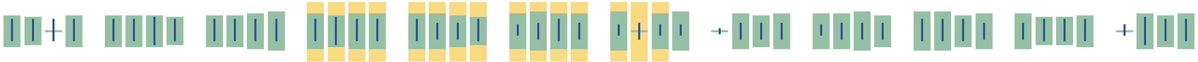


Marbled Godwit

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

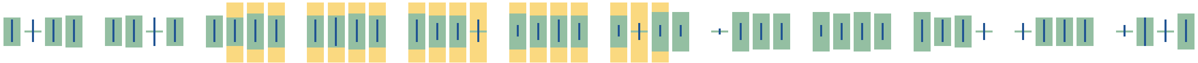
Nuttall's Woodpecker

BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Oak Titmouse

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Rufous Hummingbird

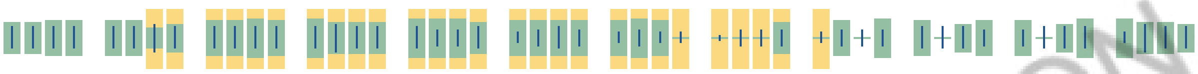
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Short-billed Dowitcher

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

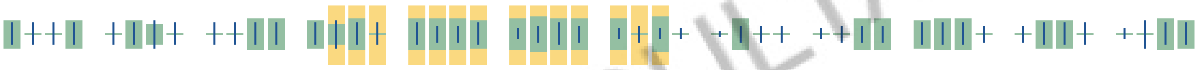
Song Sparrow

BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



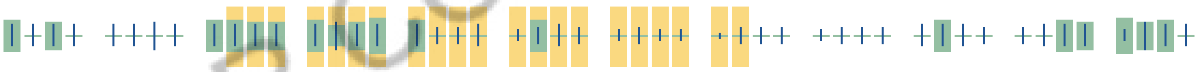
Spotted Towhee

BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Tricolored Blackbird

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

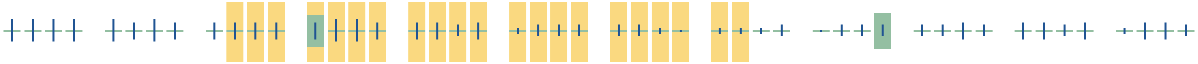


Willet

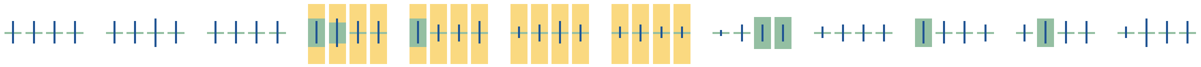
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Wrentit

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Yellow-billed Magpie
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures 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) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, 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 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 on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

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.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND
- PEM1Cx

RIVERINE
- R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

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.

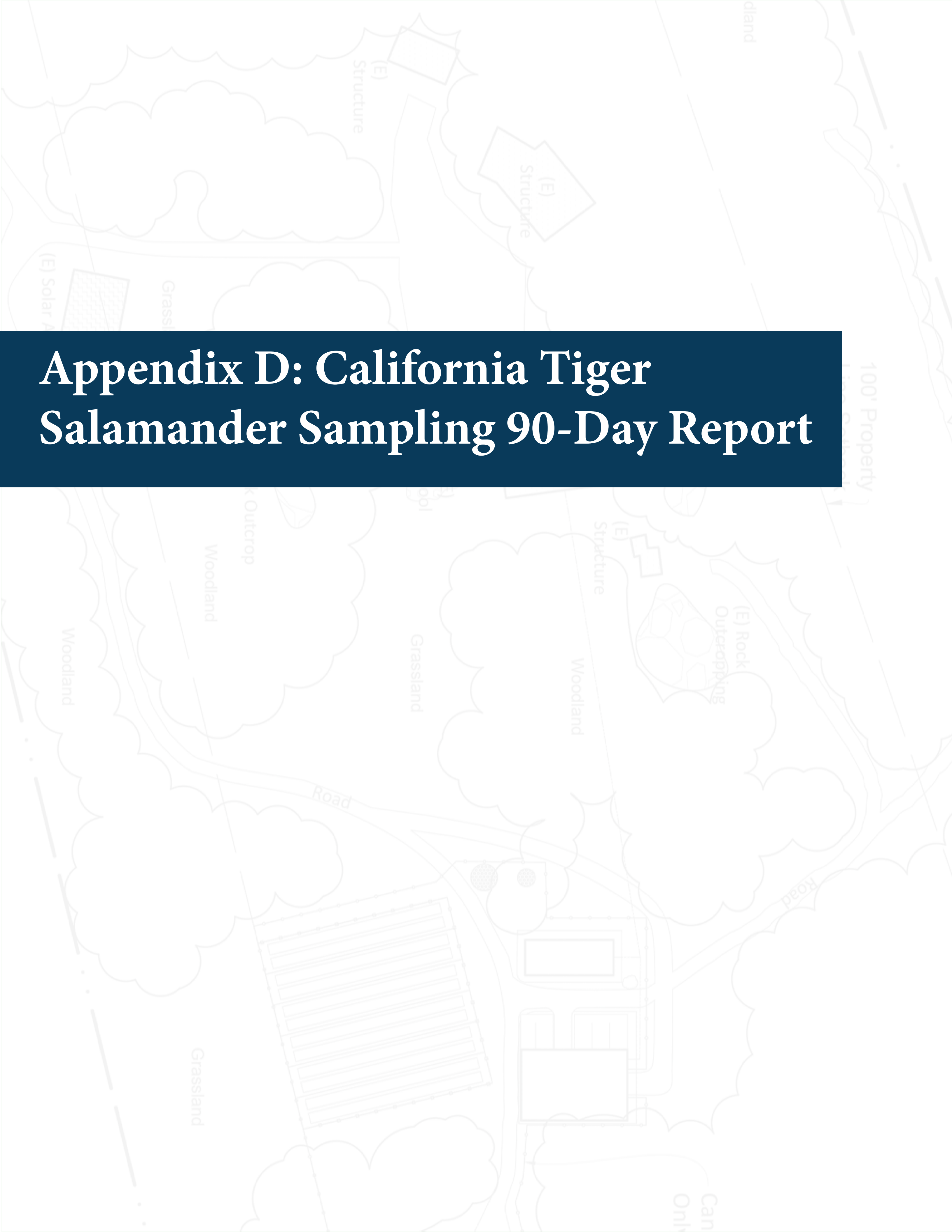
Data exclusions

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.

Appendix D: California Tiger Salamander Sampling 90-Day Report



MADRONE
ECOLOGICAL
CONSULTING

Memo

To: Samantha Lantz, Ph. D., U.S. Fish and Wildlife Service

From: Dustin Brown, Senior Biologist/Regulatory Specialist

Date: 19 May 2021

Subject: Monte Vista Memorial Gardens, 2021 California Tiger Salamander Larvae Sampling 90-Day Report (2021-TA-1331)

This memorandum serves to document the methods and results of the 2021 aquatic larvae sampling for California tiger salamander (*Ambystoma californiense*)(CTS) for the Monte Vista Memorial Gardens project (Study Area). The 2021 survey consists of the first round of CTS larvae sampling with the Study Area.

The Study Area is located at the northern edge of urban development within the City of Livermore immediately north of Interstate 580 and approximately 0.4 mile east of North Livermore Avenue, and 1.0 mile south of Harford Avenue (**Figure 1**). The Study Area corresponds to portions of Section 4, Township 2 North, and Range 2 East of the "Livermore, California" 7.5-minute quadrangle (USGS 2018). The approximate center of the Study Area is located at latitude 37.70604° and longitude -121.760884°.

Prior to the survey a CTS habitat assessment for the Study Area was conducted (Madrone 2021). This habitat assessment was conducted in accordance with the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) in the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS and CDFW 2003). During this habitat assessment only one of the six aquatic features within the Study Area represented potential aquatic habitat for CTS. An additional six offsite features within 2 km of the Study Area were identified as potential CTS aquatic habitat.

Due to private property constraints, this survey targeted the one onsite feature (Feature E on **Attachment A**) and two of the six offsite features (Features 5 and 6 on **Figure 2**). However, it should be noted that all onsite and offsite potential CTS aquatic habitat features, with the exception of offsite Feature 6, remained dry during the 2020-2021 wet season.

Methods

The surveys were conducted in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS and CDFW 2003). Permitted CTS biologist Dustin Brown (Federal Permit #TE85084C-0, CDFW SCP and MOU SC-006845) received approval from the USFWS to conduct the surveys on 19 March 2021 (USFWS Reference Number 2021-TA-1331).

The protocol requires three surveys, spaced at least 10 days, to be conducted during the months of March, April, and May. The CTS larvae surveys were conducted on 26 March, 5 April, and 11 May 2021 by Madrone biologists Dustin Brown and Bonnie Peterson. Only offsite Feature 6 contained water during the 2020-2021 wet season. A 15-foot wide seine net and dip nets with one-eighth-inch mesh were used to sample pools for CTS larvae during all surveys. The number of seine pulls varied based on pool size and other factors such as the presence of abundant vegetation. Seining was performed within the pools until all portions of the pools that could be effectively seined had been sampled. The length of each seine pull was estimated in the field using both surveyor pacing and visual estimates. To prevent the spread of aquatic pathogens, all sampling equipment including nets, buckets, measuring equipment, waders, and boots were decontaminated prior to entering the features with the use of Quat 128 or a mild bleach solution.

Results

No CTS eggs, larvae, or adults were observed during the 2021 surveys. Only one feature identified during the habitat assessment as potential CTS aquatic habitat retained water and was sampled. This feature, Feature 6, is located approximately 0.1 mile west of the Study Area immediately north of I-580. This feature contained two sub basins that are connected only during heavy rain events. This feature is located within the historical streambed of Arroyo Las Positas. The stream was relocated to the south of I-580 during the construction of the interstate. The feature is still hydrologically connected to Arroyo Las Positas by a culvert that goes under I-580. Feature 6 contains abundant trash, notably nylon gloves, Styrofoam, and plastics. The feature also received storm water runoff from the interstate.

Data sheets from the 2021 CTS larvae surveys are found in **Attachment B.** A variety of expected invertebrate species were found in Feature 6 including Corixidae, Copepoda, Ostracoda, Chironomidae, Culicoidea, Hirudinida, and Cladoceran. Adult Sierran chorus frogs (*Pseudacris sierra*) were also observed within Feature 6. See **Attachment B** for photographs of the surveys.

Discussion

From November 2020 through May 2021 Livermore received only 46% of average precipitation (**Table 1**).

Table 1. Current vs. Historical Precipitation

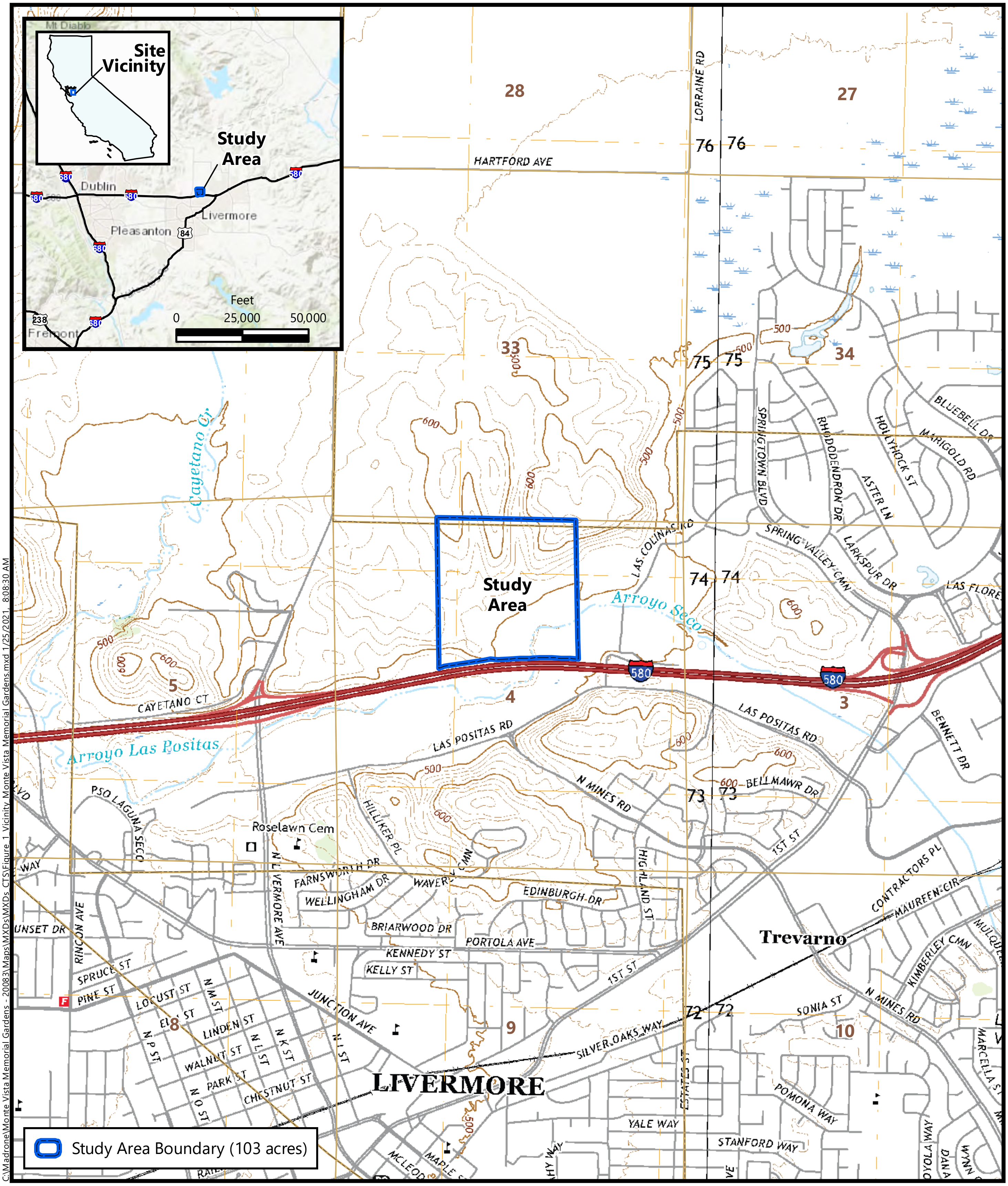
Month	2020-2021 Monthly Precipitation*	Average Monthly Precipitation
November 2020	0.40	1.40
December 2020	1.26	2.53
January 2021	2.71	2.48
February 2021	0.45	2.49
March 2021	0.75	1.87
April 2021	0.05	1.07
May 2021	0.00	0.41
Total	**5.62**	**12.25**

*California Irrigation Management Information System (CIMIS)

Due to the abnormally dry winter, CTS may have chosen to forgo breeding this season. Because of this, it is recommended that additional surveys including one upland drift fence/pitfall trap survey and an additional aquatic larvae survey be conducted to determine the presence or presumed absence of CTS within the Study Area.

Figures and Attachments:
Figure 1. Location and Vicinity
Figure 2. Potential Off-Site CTS Habitats
Attachment A – Aquatic Resources Delineation (Onsite)
Attachment B – Data Sheets
Attachment C – Representative Survey Photographs

CC:
Ryan Olah, U.S. Fish and Wildlife Service



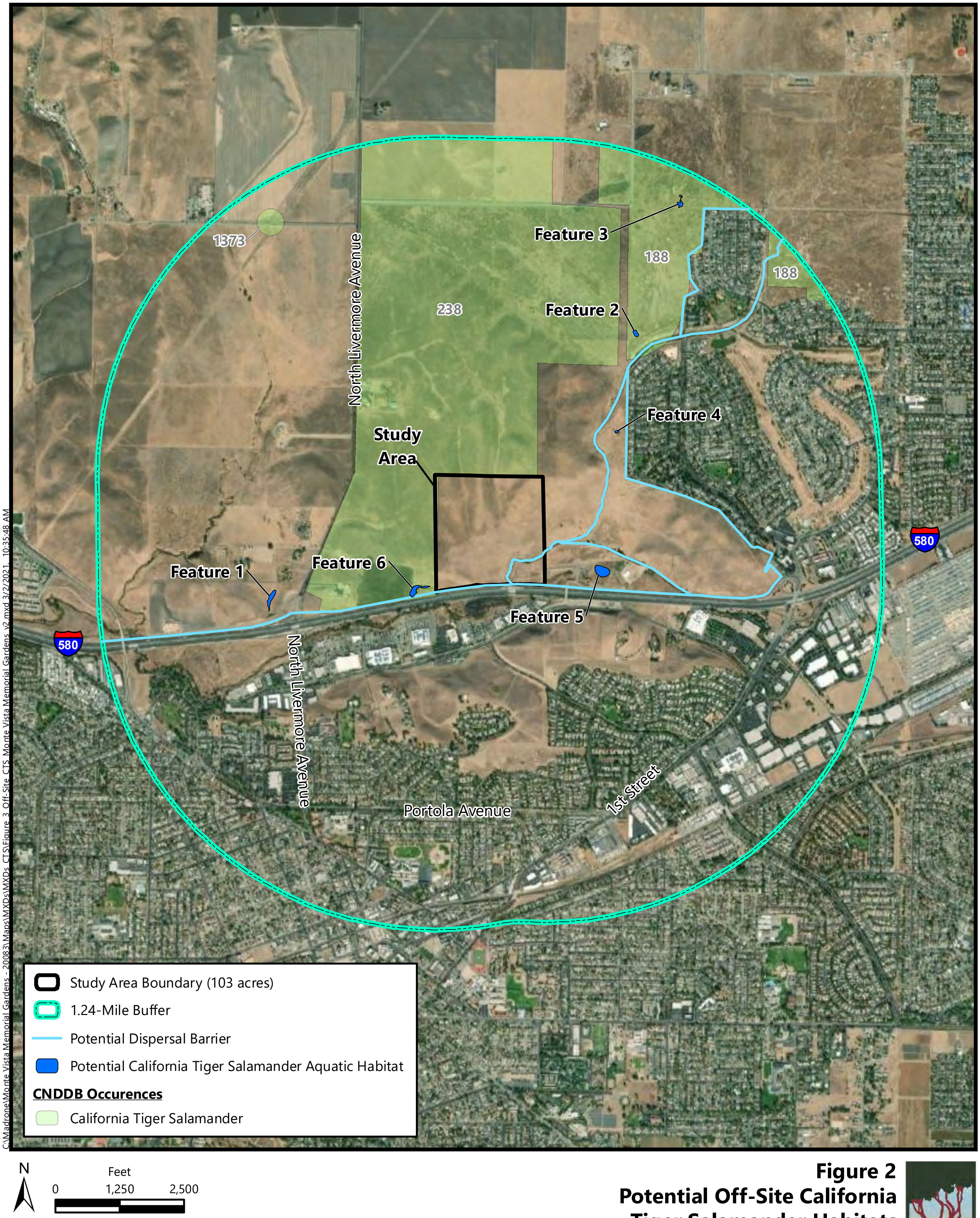
Source: United States Geologic Survey, 2018.
Las Positas Civil Land Grant
Section 4, Township 2 South, Range 2 East, MDB&M
"Livermore, California" 7.5-Minute Topographic Quadrangle
Longitude -121.760884, Latitude 37.70604

Figure 1
Site and Vicinity

Monte Vista Memorial Gardens
Livermore, Alameda County, California

MADRONE ECOLOGICAL CONSULTING

C:\Madrone\Monte Vista Memorial Gardens - 20083\Maps\MXDs\MXDs_CTS\Figure 1 Vicinity Monte Vista Memorial Gardens.mxd 1/25/2021 8:08:30 AM



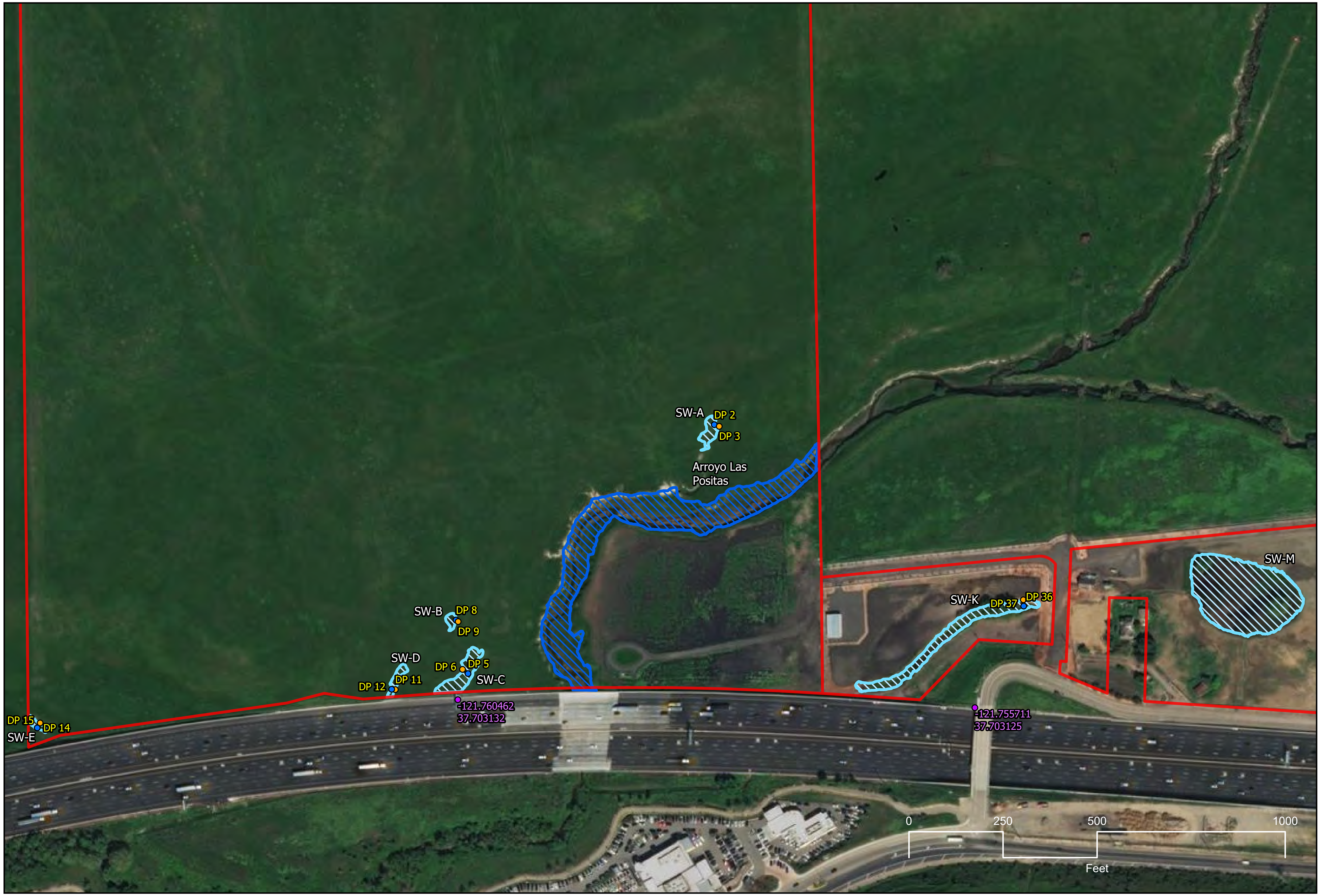
C:\Madrone\Monte Vista Memorial Gardens - 20083\Maps\MXDs\MXDs CTS\Figure 3 Off-Site CTS Monte Vista Memorial Gardens v2.mxd 3/2/2021, 10:35:48 AM

Figure 2
Potential Off-Site California Tiger Salamander Habitats

Monte Vista Memorial Gardens
Livermore, Alameda County, California

MADRONE ECOLOGICAL CONSULTING

Source: *California Department of Fish and Wildlife*, January 2021.
Aerial Source: Maxar, 24 October 2019



Delineation Table Study Area

Description	Area (SF)	Area (AC)
Intermittent Stream	80,823	1.855
Seasonal Wetlands		
SW-A	2,248	0.052
SW-B	843	0.019
SW-C	5,341	0.123
SW-D	1,441	0.033
SW-E	784	0.018
Total SW	10,657	0.245
Total All	91,480	2.1

Delineation Table Adjacent Parcels

Description	Area (SF)	Area (AC)
Seasonal Wetlands		
SW-K	13,340	0.306
SW-M	46,720	1.073
Total	60,060	1.379

Data Points

- ● Upland
- ● Wetland
- ☐ Project Area
- ▨ Intermittent Stream
- ▨ Seasonal Wetland

Microsoft. Field data collected 12/11/2018. Scale: 1:3,300 original report 11x 17.

FIGURE 5 - PROJECT AREA WETLANDS AND "OTHER WATERS OF THE U.S."

KAHNCO (LIVERMORE) MONTE VISTA PROJECT• ALAMEDA COUNTY, CALIFORNIA

Date: February 05, 2019

N

Feature 6-2 sub basin pools

California Tiger Salamander Survey Data Sheet

Date: 3/26/2021

Surveyors: DB, BP, Monte Vista Memorial Gardens, Survey #1

Pool ID: Feature 6

% Cloud Cover: 0

Time: 1050 hrs

Weather: Clear, 3-10 mph

Air Temp.: 60-70°F

Water Temp: 60°F

Current Surface Area (ft2): ≃20,000 + ≃1,500

Current Max Depth (in.): 28" in eastern pool, 34" in western pond

% Inundation: 90%

Turbidity (circle): clear tea-colored [✓ turbid] - moderate

General Hydrology Notes (connected to drainages or receives runoff?):

Pool is connected to Arroyo Las Positas by a culvert under I-580.

Substrate Composition (soil/clay, sand, gravel, cobble, boulder, other): Soil substrate

% submerged vegetation: filamentous algae ≃20%

Submerged Vegetation Type: ≃25% emergent Sparganium

% of Pool Sampled*: 60

Reason for not sampling 100% (circle): too deep unconsolidated bottom [✓ abundant algae or vegetation] heavy cattle grazing high rain year

Other amphibians observed (lifestage): Western spadefoot [✓ Sierran chorus frog] Western toad American bullfrog

Adult

Aquatic Predators: none

Location and numbers of aquatic predators:

Notes: Two sub-basins were sampled within the old Arroyo Las Positas Creek channel. Small pool on the east is 28" in depth, wetted area is ≃12'×60', water is moderately turbid, salt crust observed on the margins of the pool. Pool is surrounded by salt grass with some Rumex crispus and Juncus mexicanus.

*Sample 100% of pool if less than one acre (43,560 ft2). Sample 30% of the pool if more than one acre

	Pull #	Length (ft.)	Width (ft.)	Depth (ave. in in.)	# of CTS Larvae	Size Class*	Late Season Survey SVL (range in in.)	TL (range in in.)	Notes:
Small Pool ↓	1	60	12	20	0	–	–	–	Microturbellaria and Notonectidae
	2	60	12	20	0	–	–	–	"
Large Pool	1	150	15	24	0	–	–	–	"
	2	100	15	24	0	–	–	–	"
	3	175	15	24	0	–	–	–	"
	4	150	15	24	0	–	–	–	"
	Dip net both pools	#50 + 100	–	–	0	–	–	–	

*Total length in inches. Class 1: <0.5, Class 2: 0.5 to <1, Class 3: 1 to <2, Class 4: 2 to <3, Class 5: 3 to <4, Class 6: 4+

California Tiger Salamander Survey Data Sheet

Date: 4/5/2021

Surveyors: DB, BP, Monte Vista Memorial Gardens, Survey #2

Pool ID: Feature 6

% Cloud Cover: 100%

Time: 1100hrs

Weather: 5-15mph wind, overcast

Air Temp.: 62°F

Water Temp: 59°F (Sm.), 65°F (Lg.)

Current Surface Area (ft2): ≈15,000 + ≈1,200

Current Max Depth (in.): 26" in small pool, 30" in large pool

% Inundation: 80%

Turbidity (circle): clear Lg. [✓ tea-colored] [✓ turbid] moderate turbidity (small)

General Hydrology Notes (connected to drainages or receives runoff?): These two subbasins form one large pool when fully innundated. Pools are located in the old Arroyo Las Positas Creek channel. The large pool is Connected to Arroyo Las positas by a culvert under I-580

Substrate Composition (soil/clay, sand, gravel, cobble, boulder, other): Soil

% submerged vegetation: 30

Submerged Vegetation Type: algae, ≈30% emergent Sparganium

% of Pool Sampled*: 70

Reason for not sampling 100% (circle): too deep unconsolidated bottom [✓ abundant algae or vegetation] heavy cattle grazing high rain year

Other amphibians observed (lifestage): Western spadefoot [✓ Sierran chorus frog] Adult Western toad American bullfrog

Aquatic Predators: none

Location and numbers of aquatic predators: –

Notes: Abundant trash in pool, notible are 100's of rubber/latex gloves, styrafoam, and plastics.

*Sample 100% of pool if less than one acre (43,560 ft2). Sample 30% of the pool if more than one acre

	Pull #	Length (ft.)	Width (ft.)	Depth (ave. in in.)	# of CTS Larvae	Size Class*	Late Season Survey SVL (range in in.)	Late Season Survey TL (range in in.)	Notes:
Small pool	1	60	12	18	0	–	–	–	Corixidae, Copepod Ostracod, Cladocera
	2	60	12	18	0	–	–	–	"
Lg. pool	1	150	15	20	0	–	–	–	Corixdae, Adult Chorus frog, mosquito larvae, Ostracod
	2	175	15	20	0	–	–	–	"
	3	200	15	20	0	–	–	–	"
	Dip Netting	50 & 100	-	–	0	–	–	–	"

*Total length in inches. Class 1: <0.5, Class 2: 0.5 to <1, Class 3: 1 to <2, Class 4: 2 to <3, Class 5: 3 to <4, Class 6: 4+

California Tiger Salamander Survey Data Sheet

Date: 5/11/2021
Surveyors: DB, BP, Monte Vista Memorial Gardens, Survey #3
Pool ID: Feature 6
% Cloud Cover: 0
Time: 1015 hours
Weather: Warm, light wind
Air Temp.: 64°F
Water Temp: 62°F
Current Surface Area (ft2): 200 (Sm.), 1,500 (Lg.)
Current Max Depth (in.): 17" (Sm.), 21" (Lg.)
% Inundation: 20
Turbidity (circle): clear [✓ tea-colored] turbid
General Hydrology Notes (connected to drainages or receives runoff?): Same as previous surveys.
Substrate Composition (soil/clay, sand, gravel, cobble, boulder, other): Soil
% submerged vegetation: 25
Submerged Vegetation Type: Algae, 40% emergent Sparganium
% of Pool Sampled*: 70
Reason for not sampling 100% (circle): too deep unconsolidated bottom [✓ abundant algae or vegetation] heavy cattle grazing high rain year
Other amphibians observed (lifestage): Western spadefoot [✓ Sierran chorus frog] Western toad American bullfrog
Adult
Aquatic Predators: none
Location and numbers of aquatic predators: –
Notes: Poor water quality. Trash is abundant along with mosquito larvae and small leeches.

*Sample 100% of pool if less than one acre (43,560 ft2). Sample 30% of the pool if more than one acre

							Late Season Survey		
	Pull #	Length (ft.)	Width (ft.)	Depth (ave. in in.)	# of CTS Larvae	Size Class*	SVL (range in in.)	TL (range in in.)	Notes:
Sm. Pool	1	40	8	12	0	–	–	–	Corixidae, Copepoda, Ostracoda, Chironomidae,
Lg. Pool	1	100	15	15	0	–	–	–	mosquito larvae, Cladoceran, leech.
	2	80	15	15	0	–	–	–	"
	3	80	15	15	0	–	–	–	"
	Dip Nets	30 + 50	–	–	0	–	–	–	"

*Total length in inches. Class 1: <0.5, Class 2: 0.5 to <1, Class 3: 1 to <2, Class 4: 2 to <3, Class 5: 3 to <4, Class 6: 4+

Facing east at the eastern sub basin of Feature 6. Dated 26 March 2021.

Facing east at the western sub basin of Feature 6. Dated 26 March 2021. Note abundant trash.

Looking south at I-580 and culvert entrance that connects Feature 6 to Arroyo Las Positas.

Facing southwest at the western sub basin of Feature 6. Dated 26 March 2021.

Facing west at the eastern sub basin of Feature 6. Dated 5 April 2021.

Facing southwest at the western sub basin of Feature 6. Dated 5 April 2021.

Facing south at the western sub basin of Feature 6. Dated 11 May 2021.

Facing southeast at the eastern sub basin of Feature 6. Dated 11 May 2021.

Photograph of offsite Feature 5. This feature was dry during site visits on 11 February, 26 March, 5 April, and 11 May 2021.

Photograph of offsite Feature 1. This feature was dry during site visits on 11 February, 26 March, 5 April, and 11 May 2021.

Photograph of offsite Feature 2. This feature was dry during site visits on 11 February, 26 March, 5 April, and 11 May 2021.

Appendix E:
Photo Plate

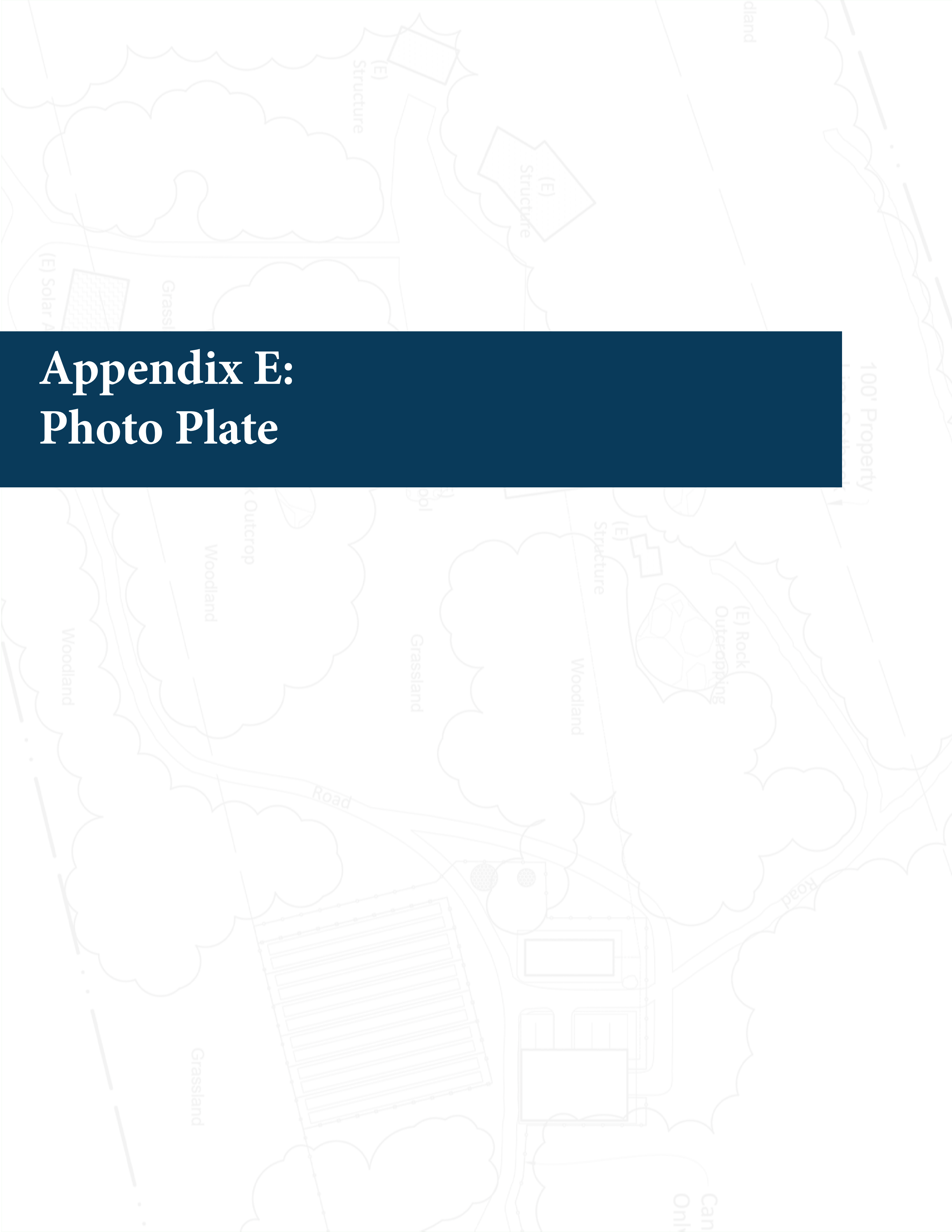


Photo Plate
Monte Vista Memorial Gardens

PHOTO PLATE MAP

Date: January 14, 2021

KAHNCO (LIVERMORE) MONTE VISTA PROJECT • ALAMEDA COUNTY, CA

BARNETT ENVIRONMENTAL

1. Gravel road leading to the property off of Las Colinas.

2. Gravel road leading into the property

3. Grasslands on the property

4. Arroyo Las Positas flowing underneath 1-580, Arthur H Breed, Jr Freeway

5. Arroyo Las Positas flowing towards 1-580, Arthur H Breed, Jr Freeway

6. Photograph from the northwest of Arroyo Las Positas flowing underneath Arthur H Breed, Jr Freeway

7. Arroyo las Positas running through the property

8. Photograph from the south of Arroyo Las Positas' deeply incised channel.

9. Wider stretch of Arroyo Las Positas.

10. Squirrel burrows that could provide habitat for the burrowing owl.

11. Photograph showing grasslands in the central part of the property.

12. Plowed field in the central portion of the property.

13. Photograph showing the grasslands of the site and the elevated hilly terrain of the northern portion of the site.

14. Photograph of seasonal wetland on the southwest portion of the property.

APPENDIX E

CULTURAL RESOURCES ASSESSMENT

This page intentionally left blank

CULTURAL RESOURCE ASSESSMENT FOR THE MONTE VISTA MEMORIAL GARDENS PROJECT, CITY OF LIVERMORE, ALAMEDA COUNTY, CALIFORNIA

Prepared by

Melinda A. Peak
Peak & Associates, Inc.
3941 Park Drive, Suite 20-329
El Dorado Hills, CA 95762
(916) 939-2405

Prepared for

Bruce D. Barnett, Ph.D.
BARNETT ENVIRONMENTAL
Consulting & Regulatory Compliance Services
5214 El Cemonte Ave.
Davis, CA 95618-4418
(530) 758-9235

April 13, 2021
(Job #21-003)

INTRODUCTION

Monte Vista Memorial Gardens (MVMG) – a proposed memorial park project is situated in unincorporated Alameda County along I-580 just north of the City of Livermore between the North Livermore Avenue and the North First Street Exits. Arroyo Las Positas flows in a southwesterly direction through the southeast portion of this approximately 66-acre site. The project includes a funeral home, interment areas and a number of associated services described below.

The MVMG site consists of a relatively flat lowland valley area in the southeast and gently sloping hills and valleys to the north and west. The localized ridges and valleys are oriented in a roughly north-south orientation in the northern portion of the property, and roughly east-west orientation in the western portion of the property, with the valleys draining toward Arroyo Las Positas. Slope gradients range from 2.5:1 to 10:1 (horizontal: vertical) in the surrounding hills (with the steepest slopes in the southwest), and the lowland valley area has a slope gradient shallower than 25:1 (horizontal: vertical). The property bordering the project area to the east of Arroyo Las Positas supports an existing residence and several paved roadways while the area on the west side of the Arroyo is currently undeveloped and used for grazing and dry land farming.

The project proposes to develop 6.8 acres in the southeastern portion of the site, east of Arroyo Las Positas, with a funeral home, parking facilities, an associated mortuary, and a crematorium. Two bridges would span the Arroyo Las Positas to connect the funeral home area to the cemetery grounds in the northwestern portion of the site. The cemetery grounds will support several man-made lake features, a flowing waterway, an area of depressional wetlands on the north side of I-580, as well as lawns and other landscape elements requiring the installation and maintenance of on-site water irrigation and management systems. The project intends to re-use onsite surface water as much as possible to minimize groundwater and municipal water demand as much as possible.

Funeral Home and Site Access

The Funeral Home and associated infrastructure, on 6.8 acres at the southeastern corner of the property, would be accessed from Las Colinas Road (off of Las Positas Road south of I-580) via a proposed driveway to a parking lot with 85 regular and 6 handicapped parking spaces. The Funeral Home facilities would house the mortuary, crematorium, sales offices, staff offices, a chapel, garage, reception area, and associated storage and sanitary facilities.

The approximately 19,623 total square foot, 15,557 square foot Coverage Funeral Home building is designed to look like a Tuscan Winery, with courtyards and gardens. The interior of the building would consist of a chapel accommodating approximately 120 guests with high ceiling, clerestory windows, pulpit, and body or cremains display area. A viewing room is also planned for those individuals who request witnessed cremation.

The building will have capacity for two cremation retorts, an embalming room and refrigeration unit capable of holding 100 cases. In addition to the main body preparation room, there would be a separate family preparation room, for those cultures that must ritualistically cleanse and dress the body.

The main building would have adequate office space for funeral directors, cemetery managers, administration, and sales. It would house the limousines and hearses and will include storage space for inventory.

Funeral Home operations would use approximately 300 gallons per day of potable water from a municipal supply. An on-site septic system would dispose of blackwater. Stormwater runoff from impervious areas such as rooftops and surrounding parking areas would be treated in a bioretention area near the Arroyo prior to discharge, in conformance with local standards.

Cemetery Grounds

The main cemetery with lakes, flowing waterway and monuments to the west of Arroyo Las Positas, would be accessed from the Funeral Home via two 24-foot-wide clear-span bridges designed for both pedestrian and vehicle use. These bridges would provide freeboard of at least one (2) foot above the 500-year flood plain.

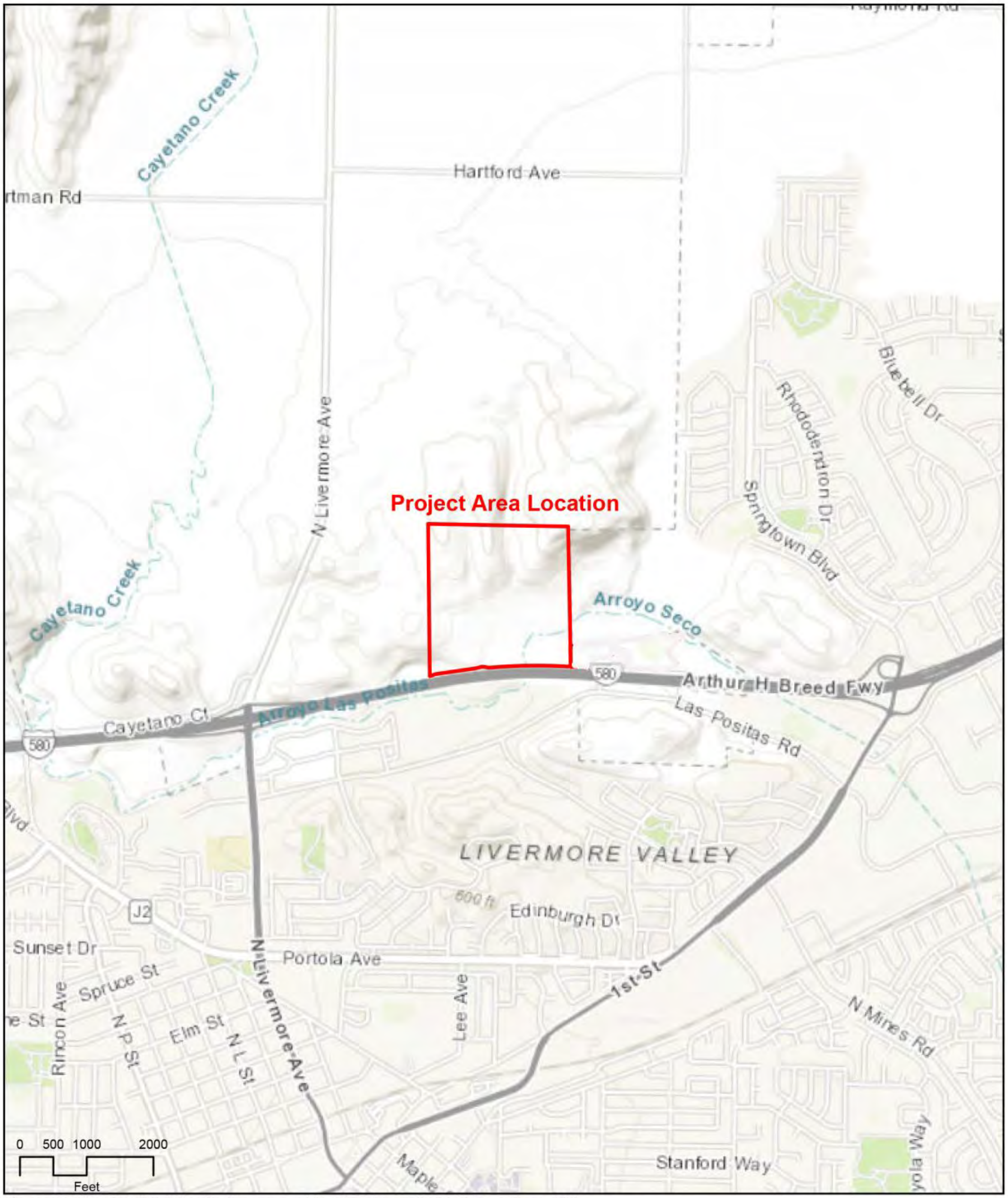
The approximately 40-acre cemetery grounds would consist of various memorial monuments and gardens accessed by a crushed granite access road on the eastern side of Arroyo Las Positas that would circumscribe the cemetery grounds. Two proposed “lakes” or ponds connected by a perennial linear waterway (“creek”) would be the primary landscape feature of the cemetery. A proposed depressional wetland feature is also planned on the south side of the cemetery grounds near the southern property boundary on the north side of I-580. The burial area itself will have an extensive sub-drainage (French Drain) system draining to the lower lake feature to maximize onsite water re-use.

Water Features

The project proposes two large man-made “lakes” or ponds on the western side of the cemetery grounds – an “upper lake” on the northern edge of the site and “lower lake” on the southwestern edge of the site – connected by a man-made perennial, generally linear water feature (“creek”) that would continuously drain excess water from the upper to lower lake. The upper lake would consist of an upper and lower pool connected by a waterfall feature. Water would then flow from the upper lake’s lower pool via the creek down into the lower lake. Water would then be re-circulated from the lower lake back to the upper lake using a water pump.

An onsite groundwater well would supplement water in the upper lake’s upper pool during the summer and early fall to maintain lake levels (with appropriate seasonal draw-down). All water for irrigating the cemetery grounds landscaping during the summer and early fall would be drawn from the lower lake. This irrigation water would then be captured by an extensive French drain system under these lawn areas and returned to the lower lake.

The project area is located within the Las Positas Land Grant, Township 3 South, Range 2 East, as mapped on the United States Geologic Survey (USGS) 7.5-minute series Altamont, California topographic map quadrangle (Figures 1 and 2).



Source: USGS 7.5-Minute Topographic Quadrangle for Livermore, CA

FIGURE 1 - PROJECT AREA LOCATION

KAHNCO (LIVERMORE) MONTE VISTA PROJECT• ALAMEDA COUNTY, CALIFORNIA

Date: February 05, 2019

N

BARNETT ENVIRONMENTAL

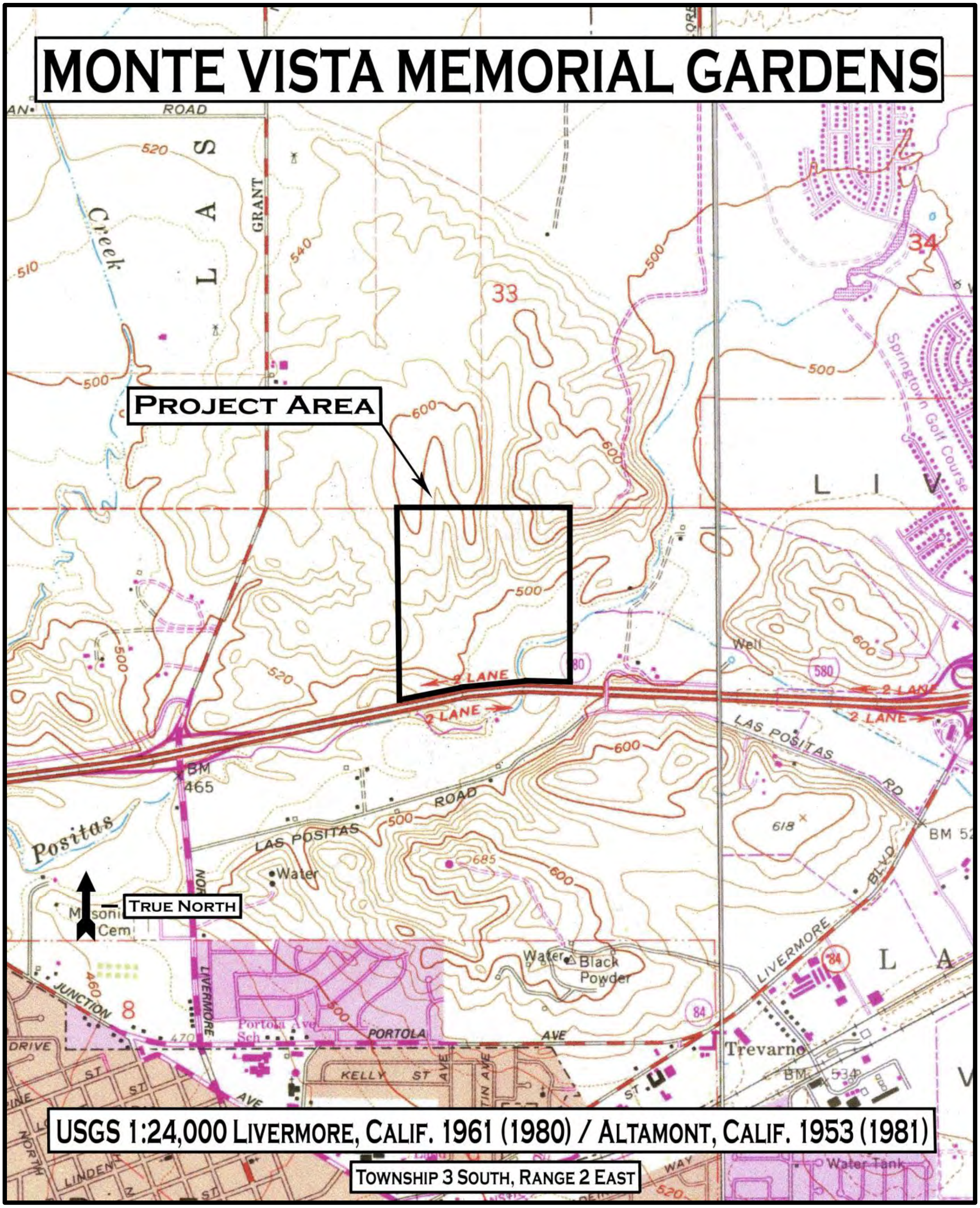

MONTE VISTA MEMORIAL GARDENS
PROJECT AREA
TRUE NORTH
USGS 1:24,000 LIVERMORE, CALIF. 1961 (1980) / ALTAMONT, CALIF. 1953 (1981)
TOWNSHIP 3 SOUTH, RANGE 2 EAST
ROAD
LAS
GRANT
Creek
33
34
Springtown Golf Course
LIV
2 LANE
580
LAS POSITAS RD
LAS POSITAS ROAD
Positas
BM 465
618
685
Water
Black Powder
LIVERMORE BLVD
84
Trevarno
BM 534
Masonic Cem
JUNCTION
LIVERMORE
Portola Ave Sch
PORTOLA AVE
KELLY ST
Water Tank
500
520
540
600
510
460
470

Figure 2

Melinda A. Peak, senior historian/archeologist with Peak & Associates, Inc. served as principal investigator for the study with Michael Lawson (resumes, Appendix 1), completing the field survey.

STATE REGULATIONS

State historic preservation regulations affecting this project include the statutes and guidelines contained in the California Environmental Quality Act (CEQA; Public Resources Code sections 21083.2 and 21084.1 and sections 15064.5 and 15126.4 (b) of the CEQA Guidelines). CEQA Section 15064.5 requires that lead agencies determine whether projects may have a significant effect on archaeological and historical resources. Public Resources Code Section 21098.1 further cites: A project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment.

An "historical resource" includes, but is not limited to, any object, building, structure, site, area, place, record or manuscript that is historically or archaeologically significant (Public Resources Code section 5020.1).

Advice on procedures to identify such resources, evaluate their importance, and estimate potential effects is given in several agency publications such as the series produced by the Governor's Office of Planning and Research (OPR), *CEQA and Archaeological Resources,* 1994. This document is no longer available on line, and no comparable replacement has been issued by that agency. In summary, California law protects Native American burials, skeletal remains, and associated grave goods regardless of the antiquity and provides for the sensitive treatment and disposition of those remains (California Health and Safety Code Section 7050.5, California Public Resources Codes Sections 5097.94 et al).

The California Register of Historical Resources (Public Resources Code Section 5020 et seq.)

The State Historic Preservation Office (SHPO) maintains the California Register of Historical Resources (CRHR). Properties listed, or formally designated as eligible for listing, on the National Register of Historic Places are automatically listed on the CRHR, as are State Landmarks and Points of Interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys.

For the purposes of CEQA, an historical resource is a resource listed in, or determined eligible for listing in the California Register of Historical Resources. When a project will impact a site, it needs to be determined whether the site is an historical resource. The criteria are set forth in Section 15064.5(a) (3) of the CEQA Guidelines, and are defined as any resource that does any of the following:

A. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

B. Is associated with the lives of persons important in our past;

C. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

D. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, the CEQA Guidelines, Section 15064.5(a) (4) states:

The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code section 5020.1(j) or 5024.1.

California Health and Safety Code Sections 7050.5, 7051, and 7054

These sections collectively address the illegality of interference with human burial remains, as well as the disposition of Native American burials in archaeological sites. The law protects such remains from disturbance, vandalism, or inadvertent destruction, and establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project, including the treatment of remains prior to, during, and after evaluation, and reburial procedures.

California Public Resources Code Section 15064.5(e)

This law addresses the disposition of Native American burials in archaeological sites and protects such remains from disturbance, vandalism, or inadvertent destruction. The section establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project and establishes the Native American Heritage Commission as the entity responsible to resolve disputes regarding the disposition of such remains.

Assembly Bill 52

Assembly Bill (AB) 52 establishes a formal consultation process for California tribes as part of CEQA and equates significant impacts on tribal cultural resources with significant environmental impacts. AB 52 defines a “California Native American Tribe” as a Native American tribe located in California that is on the contact list maintained by the Native American Heritage Commission. AB 52 requires formal consultation with California Native American Tribes prior to determining the level of environmental document if a tribe has requested to be informed by the lead agency of proposed projects. AB 52 also requires that consultation address project alternatives, mitigation measures, for significant effects, if requested by the California Native American Tribe, and that consultation be considered concluded when either the parties agree to measures to mitigate or avoid a significant effect, or the agency concludes that mutual agreement cannot be reached. Under

AB 52, such measures shall be recommended for inclusion in the environmental document and adopted mitigation monitoring program if determined to avoid or lessen a significant impact on a tribal cultural resource.

CULTURAL SETTING

Archeology

Early archeological work in the Bay Area concentrated on shell mounds around the shores of San Francisco Bay and San Pablo Bay. By the time archeological interest began to be directed toward the interior valleys, early urbanization and even earlier agricultural use of the land had destroyed or seriously altered much of the archeological record. It is only in relatively recent years that techniques of archeological analysis and the volume of excavation work done in the area, largely as a result of environmental laws, have allowed a synthesis of regional prehistory.

Major archeological projects by the Corps of Engineers (Walnut Creek area), the Department of Water Resources (Los Vaqueros Reservoir area) and others have greatly expanded our knowledge of the archeology of the East Bay interior. This has led to a fairly detailed description of the archeological sequences of coastal and most of interior Contra Costa and Alameda counties.

The early phases of prehistory, before about 4000 B.C., are not very well represented in the Bay Region, probably due in part to fluctuations in mean sea level. By that date the Bay Area was occupied by a relatively sparse population that did not make efficient use of the marine resources available in the area. In interior Contra Costa County, the earliest dated component is Stratum C at the Stone Valley site, CA-CCO-308, where a radiocarbon date of 2500 ± 400 B.C. (UCLA 259) was associated with flexed burials and artifacts that reflected both the later cultures of the Bay Area (the Berkeley Pattern) and early cultures of the Central Valley (the Windmiller Pattern) The excavator concluded that the component, along with bay shore sites of similar time depth, represented very early Berkeley Pattern and that this either derived from Windmiller or was heavily influenced by contemporaneous Windmiller people. Others (c.f. Banks et al. 1984) considered CCO-308 to represent very late Windmiller Pattern, Stone Valley Aspect. As more radiocarbon dates became available, Fredrickson's view seemed more likely, since the earliest dated Windmiller Component in the Central Valley was about 2450 B.C. at the Blossom Site in San Joaquin County.

Over the long time span when Berkeley Pattern cultures occupied the Bay Area (the pattern lasts until about A.D. 500) there was a gradual elaboration of material culture along with local and regional variations. The main characteristics of the material culture, however, remained essentially unchanged over this time span, which is why it can be described as a Pattern. These characteristics include the use of primarily non-stemmed projectile points with the dart and atlatl (throwing board), the predominance of grinding implements over hunting implements and the predominance of the cobble pestle with minimally shaped mortar over other grinding implements. As compared to the Windmiller Pattern, the polished stone industry is minimal but, over time, the industry in bone becomes much more elaborate. The greater density and depth of sites suggests a higher population for Berkeley Pattern. Long range trade relationships, on the other hand, do not appear to be very well established. There are relatively fewer trade goods and these almost always arrive as finished artifacts rather than raw material. The mortuary complex is characterized by flexed burials within the village and few, if any, grave goods (Fredrickson 1973).

Over time, Berkeley Pattern sites become more numerous in the Bay Area and the material culture becomes more elaborate, appearing to reflect a relatively mobile population moving into the area and then becoming sedentary and developing a more elaborate culture. Using radiocarbon dates for initial occupation of Berkeley Pattern sites, Moratto (1984:278-281) sees a movement of Utian people from the Delta to interior Contra Costa County then to the East Bay and finally to the coast, spreading north into the San Francisco peninsula and south to the Monterey Bay region. A similar expansion is also seen on the north side of San Pablo Bay and extending finally to the Bodega Bay vicinity and the Napa Valley. If this view is correct, by the end of Berkeley Pattern times Utian speakers occupied essentially the same territory that they controlled at the time the Spanish arrived more than a thousand years later.

King (1974) has proposed a mechanism that may account for the Utian expansion. Initial settlement in an area would have been at a location with a maximum of resource zones within easy reach of the population, typically, a bay-side or marsh location near a freshwater stream. As the population of this settlement grew, smaller settlements in less ideal ecological settings would be established. As the population approached the carrying capacity of the environment, given the technology available to exploit the environment, pressure would grow for more formal, non-egalitarian social systems to organize the population for more efficient resource exploitation.

The final result of the type of development hypothesized by King can take several forms, such as: a stagnant society that has reached an equilibrium with the environmental carrying capacity that does not allow for growth or substantial change, a collapse and reordering of the mature social pattern, or introduction of new technologies or social systems that allow for a different and more efficient pattern of resource use. In the Bay Area the latter solution was found, resulting in the Augustine Pattern.

The Augustine Pattern in the Bay Area develops out of the Berkeley Pattern with no evidence of movement of people into the area. Socially, trends observed in the later Berkeley Pattern continue and are intensified. These trends include development of status distinctions based on wealth, emergence of group-oriented religions (as opposed to individualistic shamanism), greater complexity of exchange systems to equalize access to resources and regularization of trade relationships between different populations (Fredrickson 1974). Archeologically, the transition to the Augustine Pattern is marked by the introduction of the bow and arrow, resulting in a sudden change in projectile point styles at about A.D. 500. The greater complexity of the ordering of society continues through this period until interrupted by the arrival of the Spanish.

Ethnography

The Native Americans who occupied much of the San Francisco Bay area were known to early ethnographers as Costanoan. The designation “Costanoan” derives from the Spanish term for coastal people and was not used by the Indian people. Today, most of them prefer to be called Ohlone, after an important village in the San Francisco area.

Ancestors of the Ohlone people moved into the San Francisco and Monterey Bay areas from the Delta of the San Joaquin and Sacramento rivers about A.D. 500. The Ohlone territory extended from the Carquinez Strait in the northeast to just south of Chalome Creek in the southeast and from San Francisco to the Sur River along the Coast. This vast territory was broken into eight different language based zones. These eight branches of the Ohlone language family were separate languages, not dialects.

The group that inhabited the project vicinity were the *Souyen* tribelet of the Ohlone according to Milliken (1996:254-255). This little-known group held a part of the far northern portion of Costanoan territory and were bordered by Coast Miwok speakers as well as other Ohlone tribelets.

The Ohlone preferred to situate their permanent villages on high ground above seasonal marshes that were inundated by highwater for a few months of the year. Access to fresh drinking water was a criterium for selecting a village location. The tribelet was the basic unit of Ohlone political organization. Territorial boundaries of tribelets were defined by physiographic features. Tribelet chiefs might be either men or women. The office was inherited matrilineally, usually passing from father to son. When there were no male heirs, the position went to the man's sister or daughter. Accession to the office of chief required approval of the community. The chief was responsible for feeding visitors, providing for the impoverished, directing ceremonial activities, caring for captive grizzly bears and coyote, and directing hunting, fishing, gathering, and warfare expeditions. In all these matters the chief acted as the leader of a council of elders. The chief and council served mainly as advisors to the community (Levy 1978:487).

Ohlone had mixed relations with various peoples. Wars were waged both among the various Ohlone tribelets and with Esselen, Salinan, and Northern Valley Yokuts. At the same time, however, they traded with the Plains Miwok, Sierra Miwok, and Yokuts. They augmented the wealth of locally-available resources by trading with the Miwok and Yokuts. The Ohlone supplied mussels, abalone shells, salt, and dried abalone to the Yokuts, bows to the Plains Miwok, and olivella shells to the Sierra Miwok. In return, they received piñon nuts from the Yokuts and probably clam shell disk beads from the Miwok (Levy 1978:488-489, 493).

The Ohlones followed a seasonal round of subsistence activities, gathering plant and animal foods and materials for baskets and other manufactures. They insured a sustained yield of plant and animal foods by careful management of the land. Large mammals consumed by the Ohlones included black-tailed deer, Roosevelt elk, antelope, grizzly bear, mountain lion, sea lion, and whale. Other mammals eaten included dog, wildcat, skunk, raccoon, brush rabbit, cottontail, jackrabbit, tree squirrel, ground squirrel, woodrat, mouse, and mole. Some of the types of fowl they ate include the Canadian goose, snow goose, pintail mallard, and the mourning dove. In addition to animals, the Ohlones also ate seeds including acorns and buckeye, and berries including blackberries, strawberries, and wild grapes among others (Levy 1978:491).

Religion and ceremony played important roles in life and death. Ohlones observed rituals at important life events such as birth, puberty, and death. Treatment of the dead varied, with northern Ohlone groups, including the *Karkin*, reportedly cremating their dead except when there were no kinsman to gather wood for a funeral pyre, in which case the corpse was buried (Kroeber 1925:469; Levy 1978:490).

Shamans controlled the weather and could cause rain to start or stop. They cured disease by cutting the skin of the patient, sucking out the disease objects and exhibiting them to onlookers. Shamans also used herbs in curing disease and conducted performances to insure good crops of acorns, an abundance of fish, or the stranding of whales (Levy 1978:490).

Spanish explorers of coastal California between 1767 and 1776 described the Ohlones living a traditional existence. Between 1770 and 1797, the Franciscans established seven missions in Ohlone territory and effectively changed the Indian way of life. Unwilling recruits to the missions resisted control by Franciscans. In 1793, a runaway neophyte named Charquin began a three-year struggle during which tribes in the northeast Bay Area engaged in sporadic warfare with the Spanish. The Ohlones also mounted resistance against Mission San Jose in 1800 (Castillo 1978:103). Levy (1978:486) reports that "mission baptismal records demonstrate that the last Ohlone tribelets living an aboriginal existence had disappeared by 1810," and that by 1832 the Ohlone population had decreased to one-fifth or less than its pre-contact size.

After the Mexican government secularized the missions (between 1834 and 1836), some Ohlones returned to traditional religious and subsistence practices while others worked on Mexican ranchos. Former mission residents formed multi-tribal Indian communities in Pleasanton and other locations within Ohlone territory. Although the Ohlone languages were probably extinct by 1935, it has been estimated that more than 200 persons of Ohlone descent were living in 1973 (Levy 1978:487). In addition, there is an on-going program among modern Ohlone to revive their languages to the extent possible.

Historic Context

The lands of the project area were used until recently for the same purpose as they have since the earliest non-Native occupancy of the region: cattle grazing. To the south, the missions ran herds of cattle in the grassy valley and surrounding hills.

Robert Livermore arrived in California in 1822, a young English sailor who deserted the trading ship, the *Colonel Young*. He traveled about, working for Spanish settlers. In 1834, he married Josefa Higuera. By 1835, he and William Gulnac lived in a house in what became identified as Livermore Valley. Gulnac petitioned the governor for Rancho Las Positas, but before the grant was made, Gulnac had turned over his rights to Livermore and José Noriega. In April 1839, Governor Juan Alvarado granted the land to them, a total of about 8,800 acres. Livermore later bought out Noriega's interest.

Livermore became a naturalized citizen of Alta California in 1844. Two years later, he bought a second rancho in the region, Rancho Cañada de Los Vaqueros, primarily in what is now Contra Costa County, but skirting the northern portion of the Livermore Valley. Both ranchos were later confirmed to his ownership, and Livermore became a wealthy man. The rancho was stocked with cattle, and after the fathers at Mission San José, Robert Livermore was the first man to plant both a vineyard and orchards of pear and olives in this part of California.

An early branch line of the Central Pacific Railroad crossed the Livermore Valley, completed in 1869. The line was the route from Sacramento to Niles and became the Southern Pacific Railroad.

William Mendenhall, another early settler in the region, had the town of Livermore laid out in October 1869. Livermore became incorporated in 1876 (Hoover, Rensch and Rensch 1970).

Wine-making began in the early 1880s in the Livermore Valley region and continues to be an important industry in the region.

The area surrounding the City remained agricultural in nature for a number of years. In 1942, former ranch land became the site of the Livermore Naval Air Station. This base was closed in 1946. In 1952, the federal government established the Lawrence Livermore National Laboratory was established on the site and became a major employer in Livermore. The growth of the Bay Area has led to an increasing demand for housing, with subsequent residential an industrial growth in the Livermore region, with decreasing agriculture use and most of the ranches now lie under subdivisions.

RESEARCH

A record search was conducted for the project area and additional acreage no longer part of the project area to the east through the Northwest Information Center of the California Historical Resources Information System on January 29, 2021 (NWIC File No. 20-1349; Appendix 2). The search included a check for the project area and a ¼ mile radius.

The NWIC reported a resource to the east of the project area, the Juanita Vidalin House, also known as the Angelo Schenone House, recorded as P-01-011636. One survey covered the project area (20335: Wiberg, Dean and Holman), but the level of coverage appears to be less than complete coverage, with the overall survey of a large area focusing on visiting locations of historic sites in the North Livermore Master Plan Area. Numerous other surveys with negative results have been conducted in the project vicinity. A complete list of these projects appears in Appendix 2.

FIELD ASSESSMENT

Michael Lawson, an experienced field archeologist, conducted the complete survey of the project area on March 8, 2021. Due to known prehistoric and historical resources found along local creeks, close 3- to 5-meter parallel transects were used on the terraces and slopes within 200 meters of the stream channel, expanding to 15- to 20-meter width on steep slopes and hill tops at north side of survey area. Close, overlapping inspection occurred in areas of exceptional soil visibility and where soil color or types changed (Figure 3).

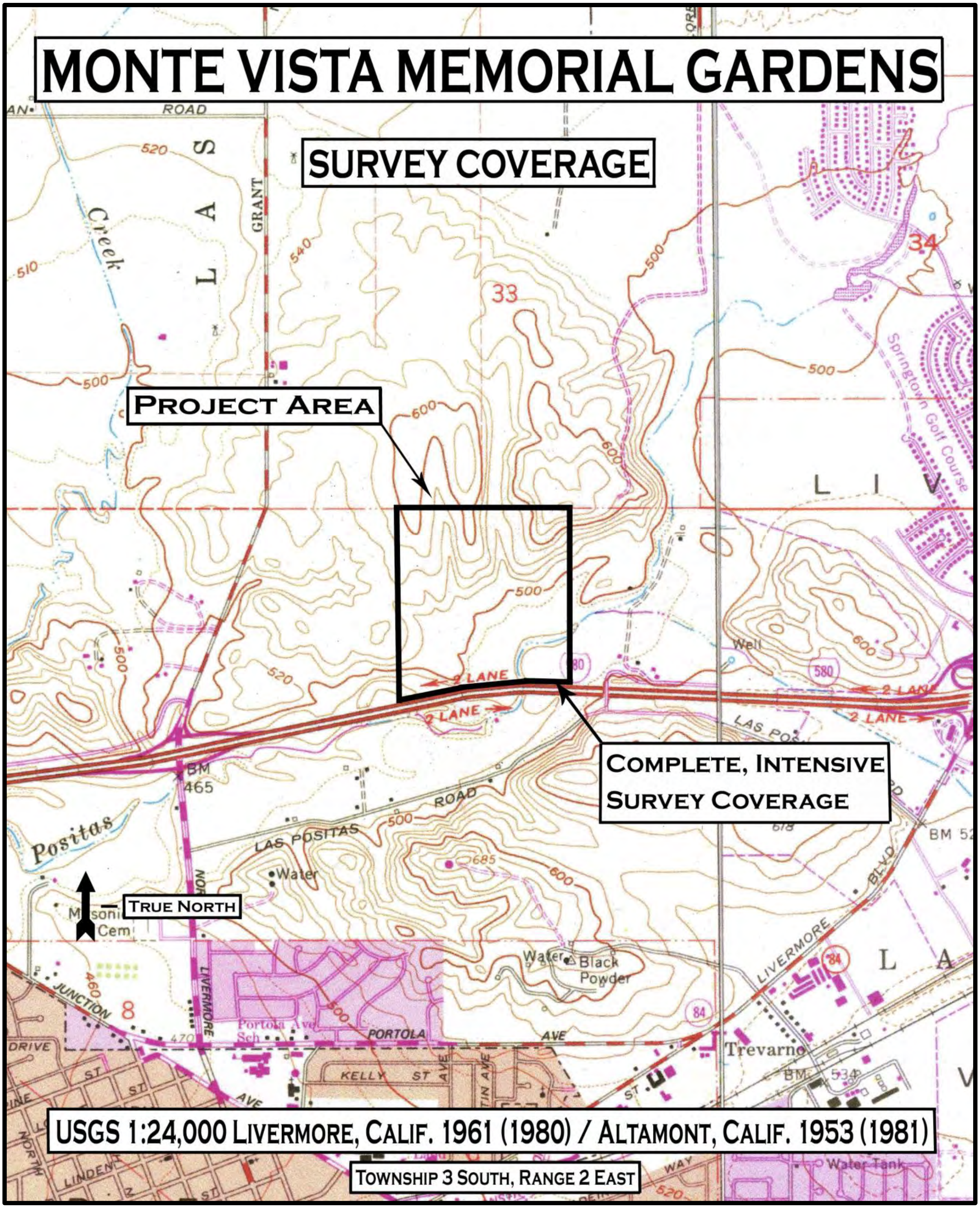

MONTE VISTA MEMORIAL GARDENS
SURVEY COVERAGE
PROJECT AREA
COMPLETE, INTENSIVE SURVEY COVERAGE
TRUE NORTH
USGS 1:24,000 LIVERMORE, CALIF. 1961 (1980) / ALTAMONT, CALIF. 1953 (1981)
TOWNSHIP 3 SOUTH, RANGE 2 EAST
33
34
8
580
84
2 LANE
LAS POSITAS ROAD
LIVERMORE AVE
PORTOLA AVE
LIVERMORE BLVD
Springtown Golf Course
Trevarno
Black Powder
Water
Well
Water Tank
BM 465
BM 534
Masonic Cem
Positas
Creek
GRANT
KELLY ST
JUNCTION AVE
500
520
540
600
685

Figure 3

The landform is hilly, with draws descending between them from north to south and draining into Arroyo Seco, which merges with Las Positas Creek to the east. Narrow terraces stretch away from the creek on both sides, with eroded ledges up to 12' high.

The only vegetation present included short new-growth grasses on the terraces and slopes of the hills, and tule, small willow trees, and introduced bushes within the creek channel.

The soil composition and color changes often throughout the survey area, with dark to medium brown silty or sandy loam on the terraces, sand and silt and cobbles within the creek channel, and medium to light tan clay loam on the slopes and hill tops.

The visibility was fair to good, depending on density of new grass-growth, accumulation of decaying previous-seasons grasses, and disturbed areas, such as cattle trails, ground squirrel burrowing, and erosion.

The terraces next to the creek have abundant rodent activity, animal trails, and erosion, while the slopes and hilltops have more sporadic rodent communities and animal trails. The draws between the hills and slopes showed moderate erosion.

Stone types observed included sandstone, quartzite, crypto crystalline silicates, schist, andesite, and unidentified fine-grained pebbles. No stone outcrops were observed

No cultural resources, historic period or prehistoric period, were observed within the project area.

CONCLUSIONS

The current project will not affect significant cultural resources. The land has been surveyed twice by professional archeologists, and no evidence of cultural resources has been found.

RECOMMENDATIONS

There is always a possibility that a site may exist in the project area and be obscured by vegetation, siltation or historic activities, leaving no surface evidence. If artifacts, exotic rock, shell or bone are uncovered during the construction, work should stop in that area immediately. A qualified archeologist should be contacted to examine and evaluate the deposit.

Discovery of Human Remains

In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area suspected to overlie adjacent remains until the Alameda County Coroner has determined that the remains are not subject to any provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning the treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative. The Coroner shall make his or her determination within two working days from the time the person responsible for the excavation, or his or her authorized representative, notifies the coroner of the discovery or recognition of the human remains.

If the Alameda County Coroner determines that the remains are not subject to his or her authority and 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 (NAHC).

After notification, the NAHC will follow the procedures outlines in Public Resources Code Section 5097.98. that include notifications of the most likely descendants (MLDs), and recommendations for the treatment of the remains. The MLDs will have 48 hours after notification by the NAHC to make their recommendations (PRC Section 5097.98).

REFERENCES

Banks, D., R. Orlins, and H. McCarthy

1984 Final Report of the Walnut Creek Project: Test Excavation and Evaluation of Archeological Site CA-CCo-431, Contra Costa County, California. Ms. on file, Corps of Engineers, Sacramento.

Bennyhoff, James A. and Richard E. Hughes

1984 Shell Beads and Ornament Exchange Networks between California and the Great Basin. In The Archaeology of Monitor Valley, 5: Regional Synthesis and Implications, by David H. Thomas. *Anthropological Papers of the American Museum of Natural History*. New York.

Castillo, Edward D.

1978 The impact of Euro-American exploration and settlement. In *California,* edited by Robert F. Heizer, pp. 99-127. In Handbook of North American Indians. vol. 8, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Elsasser, Albert B.

1978 Development of Regional Prehistoric Cultures. In *Handbook of North American Indians* (vol. 8), edited by Robert F. Heizer, pp. 37-57. Smithsonian Institution, Washington, D.C.

Fredrickson, David A.

1973 *Early Cultures of the North Coast Ranges, California*. Ph.D. dissertation, Department of Anthropology, University of California, Davis.

1984 The North Coastal Region. In *California Archaeology*, edited by Michael J. Moratto, pp. 471-527. Academic Press, New York.

Frickstad, Walter N.

1955 *A Century of California Post Offices: 1848-1954*. Pacific Rotaprinting Company, Oakland.

Groza, Randall G.

2002 An AMS Chronology for Central California *Olivella* Shell Beads. Master's Thesis, Department of Anthropology, California State University, San Francisco.

Hoover, Mildred, Hero E. Rensch, Ethel G. Rensch (William N. Abeloe, editor)

1970 *Historic Spots in California* (Third Edition). Stanford University Press, Stanford.

King, Thomas F.

1974 Manos on the Mountains: Borax Lake Pattern High-Altitude Settlement and Subsistence in the North Coast Ranges of California. Ms. on file, U.S. Forest Service, San Francisco.

Kroeber, Alfred L.

1925 Handbook of the Indians of California. *Bureau of American Ethnology Bulletin 78*. Smithsonian Institution, Washington, D.C.

Levy, Richard S.

1978 Costanoan. In *California,* edited by Robert F Heizer, pp. 485-495. Handbook of North American Indians. vol. 8, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Milliken, Randall

1996 Ethnography of the Los Vaqueros Region. In. *Native American Historic Studies for the Los Vaqueros Project: A Synthesis*. David A. Fredrickson, editor. Ms. on file: Northwest Information Center, Sonoma State University, Rohnert Park.

Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottsfield, Donna Gilette, Viviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson

2007 Punctuated Culture Change in the San Francisco Bay Area. In: Terry L. Jones and Kathryn A. Klar, eds., *California Prehistory: Colonization, Culture, and Complexity.* Alta Mira Press, New York.

Moratto, Michael J.

1984 *California Archaeology.* Academic Press, New York.

Thompson & West

1878 *Official Historical Atlas Map of Alameda County*. Thompson & West, Oakland.

Wiberg, Randy, Randall Dean and Miley Holman

1998 A Cultural Resources Study for the North Livermore Master Plan/Specific Plan Environmental Impact Report, Alameda County, California. On file, NWIC: S-02335.

APPENDIX 1

Resumes

PEAK & ASSOCIATES, INC.
RESUME

MELINDA A. PEAK **January 2021**
Senior Historian/Archeologist
3941 Park Drive, Suite 20 #329
El Dorado Hills, CA 95762
(916) 939-2405

PROFESSIONAL EXPERIENCE

Ms. Peak has served as the principal investigator on a wide range of prehistoric and historic excavations throughout California. She has directed laboratory analyses of archeological materials, including the historic period. She has also conducted a wide variety of cultural resource assessments in California, including documentary research, field survey, Native American consultation and report preparation.

In addition, Ms. Peak has developed a second field of expertise in applied history, specializing in site-specific research for historic period resources. She has completed a number of historical research projects for a wide variety of site types.

Through her education and experience, Ms. Peak meets the Secretary of Interior Standards for historian, architectural historian, prehistoric archeologist and historic archeologist.

EDUCATION

M.A. - History - California State University, Sacramento, 1989
Thesis: *The Bellevue Mine: A Historical Resources Management Site Study in Plumas and Sierra Counties, California*
B.A. - Anthropology - University of California, Berkeley

RECENT PROJECTS

In recent months, Ms. Peak has completed several determinations of eligibility and effect documents in coordination with the Corps of Engineers for projects requiring federal permits, assessing the eligibility of a number of sites for the National Register of Historic Places.

She has also completed historical research projects on a wide variety of topics for a number of projects including the development of navigation and landings on the Napa River, wineries, farmhouses dating to the 1860s, bridges, an early roadhouse, Folsom Dam and a section of an electric railway line.

In recent years, Ms. Peak has prepared a number of cultural resource overviews and predictive models for blocks of land proposed for future development for general and specific plans. She has been able to direct a number of surveys of these areas, allowing the model to be tested.

She served as principal investigator for the multi-phase Twelve Bridges Golf Club project in Placer County. She served as liaison with the various agencies, helped prepare the historic properties treatment plan, managed the various phases of test and data recovery excavations, and completed the final report on the analysis of the test phase excavations of a number of prehistoric sites. She is currently involved as the principal investigator for the Teichert Quarry project adjacent to Twelve Bridges in the City of Rocklin, coordinating contacts with Native Americans, the Corps of Engineers and the Office of Historic Preservation.

Ms. Peak has served as project manager for a number of major survey and excavation projects in recent years, including the many surveys and site definition excavations for the 172-mile-long Pacific Pipeline proposed for construction in Santa Barbara, Ventura and Los Angeles counties. She also completed an archival study in the City of Los Angeles for the project. She also served as principal investigator for a major coaxial cable removal project for AT&T.

Additionally, she completed a number of small surveys, served as a construction monitor at several urban sites, and conducted emergency recovery excavations for sites found during monitoring. She has directed the excavations of several historic complexes in Sacramento, Placer and El Dorado Counties.

Ms. Peak is the author of a chapter and two sections of a published history (1999) of Sacramento County, *Sacramento: Gold Rush Legacy, Metropolitan Legacy*. She served as the consultant for a children's book on California, published by Capstone Press in 2003 in the Land of Liberty series.

PEAK & ASSOCIATES, INC.
RESUME

MICHAEL LAWSON **January 2021**
Archeological Specialist
3941 Park Drive, Suite 20-329
El Dorado Hills, CA 95672
(916) 939-2405

PROFESSIONAL EXPERIENCE

Mr. Lawson has compiled an excellent record of supervision of excavation and survey projects for both the public and private sectors over the past twenty-two years. He has conducted a number of surveys throughout northern and central California, as well as serving as an archeological technician and crew chief for a number of excavation projects.

EDUCATION

B.A. - Anthropology - California State University, Sacramento

Special Course: Comparative Osteology. University of Tennessee, Knoxville. Forensic Anthropology Center. January 2018.

Intensive lab and outdoor study with human example from outdoor research facility, including typical and non-metric examples, compared with fifty non-human species most commonly confused with human remains. Outdoor research facility "The Body Farm" study included survey, photography, collection and identification of faunal and human bone fragments, with a Power Point presentation discussing finds.

EXPERIENCE

- Extensive monitoring of open space, streets and project development areas for prehistoric period and historic period resources. Areas monitored include Sutter Street in Folsom; Mud Creek Archeological District in Chico; Camp Roberts, San Luis Obispo County; Avila Beach, San Luis Obispo County; Edgewood Golf Course, South Lake Tahoe; Davis Water Project, Davis; Star Bend levee section, Sutter County; Feather River levees, Sutter County; Bodega Bay, Sonoma County; San Jose BART line extension, Santa Clara County; and numerous sites for PG&E in San Francisco.
- Over twenty years of experience working in CRM, volunteer, and academic settings in California historic, proto-historic, and prehistoric archaeology.
- Expertise in pedestrian survey, excavation, feature (including burial) exposure, laboratory techniques, research. Field positions include crew chief and lead technician.

APPENDIX 2

NWIC Record Search

CALIFORNIA
HISTORICAL
RESOURCES
INFORMATION
SYSTEM

ALAMEDA
COLUSA
CONTRA COSTA
DEL NORTE
HUMBOLDT
LAKE
MARIN
MENDOCINO
MONTEREY
NAPA
SAN BENITO
SAN FRANCISCO
SAN MATEO
SANTA CLATA
SANTA CRUZ
SOLANO
SONOMA
YOLO

Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928-3609
Tel: 707.588.8455
nwic@sonoma.edu
http://www.sonoma.edu/nwic

1/29/2021 NWIC File No.: 20-1349

Roberty Gerry
Peak & Associates, Inc.
3161 Godman Avenue
Chico, CA 95973

Re: Livermore Kahnco

The Northwest Information Center received your record search request for the project area referenced above, located on the Livermore USGS 7.5’ quad(s). The following reflects the results of the records search for the project area and a ¼ mi. radius:

Resources within project area:	P-01-011636
Resources within ¼ mi. radius:	P-01-011637, P-01-011638
Reports within project area:	S-13870, 20335, 31701, 35826
Reports within ¼ mi. radius:	24390, 28642, 30512, 37251, 48966

Resource Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Resource Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Report Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Record Copies:	☒ enclosed	☐ not requested	☐ nothing listed
Report Copies:	☒ enclosed	☐ not requested	☐ nothing listed
OHP Built Environment Resources Directory:	☒ enclosed	☐ not requested	☒ nothing listed
Archaeological Determinations of Eligibility:	☐ enclosed	☐ not requested	☒ nothing listed
CA Inventory of Historic Resources (1976):	☐ enclosed	☒ not requested	☐ nothing listed
Caltrans Bridge Survey:	☐ enclosed	☒ not requested	☐ nothing listed
Historical Maps:	☐ enclosed	☒ not requested	☐ nothing listed
Local Inventories:	☐ enclosed	☒ not requested	☐ nothing listed
GLO and/or Rancho Plat Maps:	☐ enclosed	☒ not requested	☐ nothing listed

*Notes:

** Current versions of these resources are available on-line:

Caltrans Bridge Survey: http://www.dot.ca.gov/hq/structur/strmaint/historic.htm

Soil Survey: http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=CA

Shipwreck Inventory: http://www.slc.ca.gov/Info/Shipwrecks.html

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

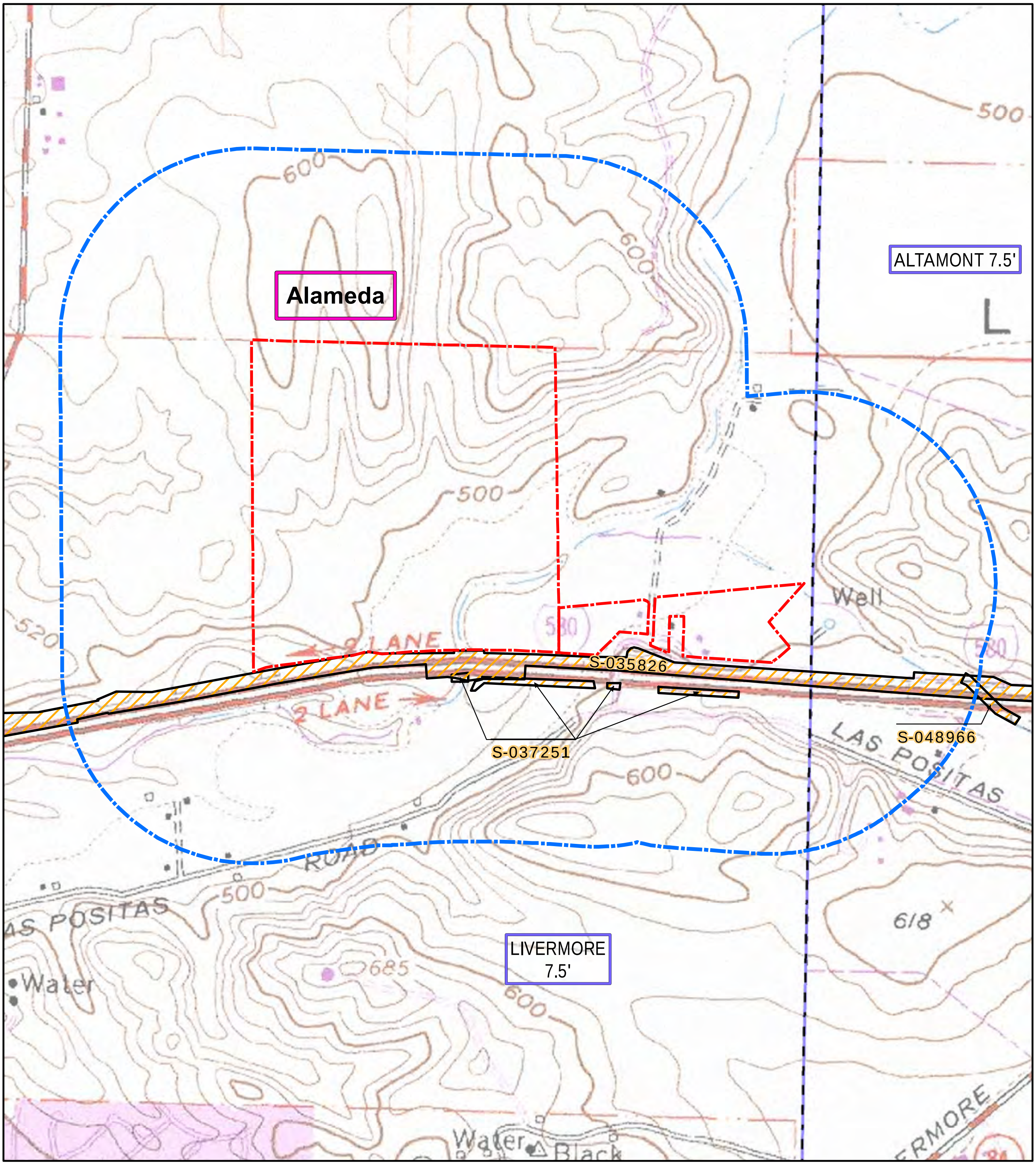
Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Annette Neal

Researcher

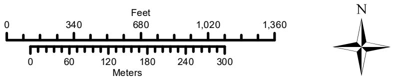
Livermore Kahnco
Results Map #2



Northwest Information Center

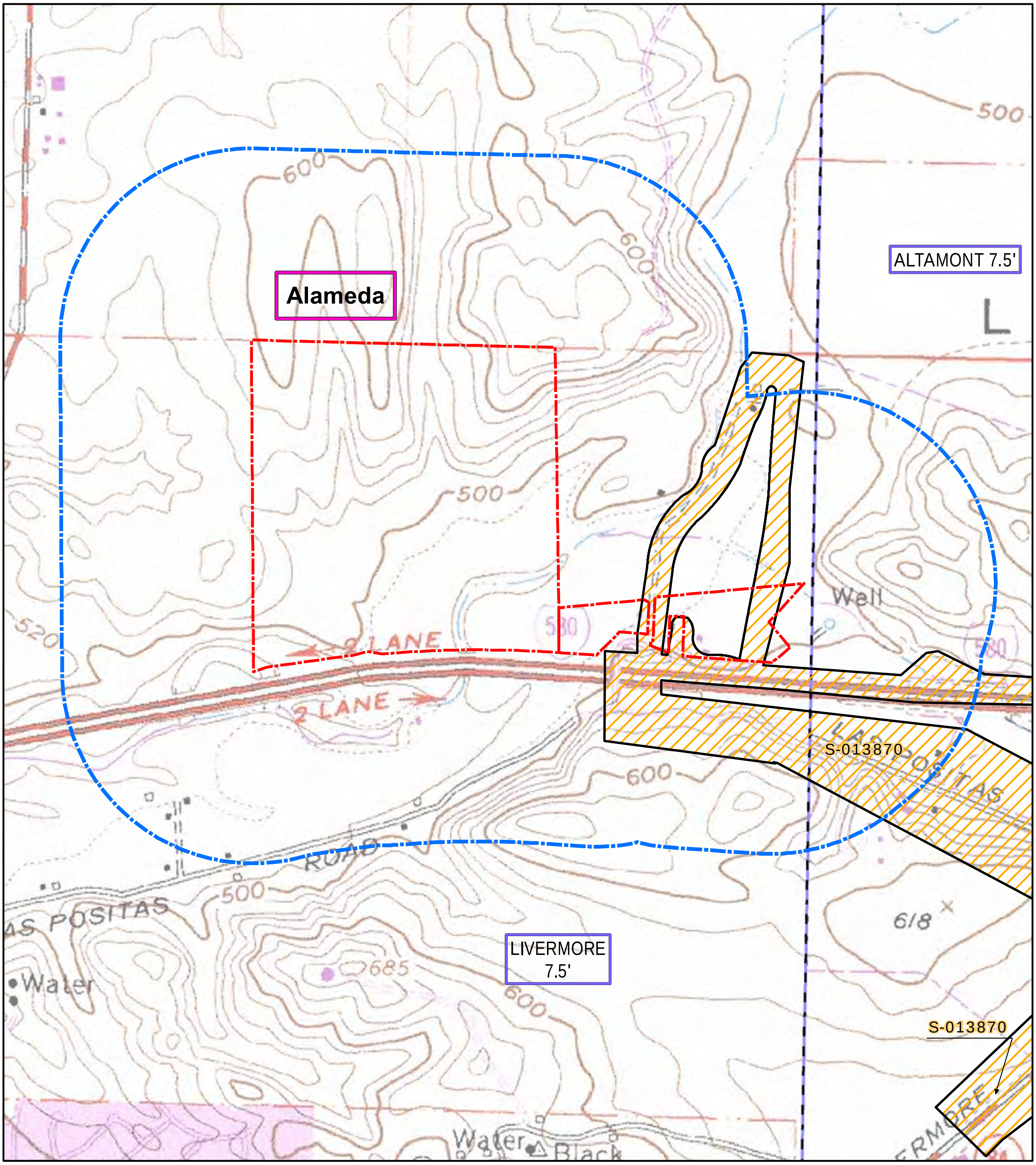
20-1249 29 January 2020 A. Neal

May depict confidential cultural resource locations.
Do not distribute.



- 20-1349_0.25 mi. Buffer
- 20-1349_ALA_APN selection
- ▨ Resources (polygons)
- Reports (lines)
- ▨ Reports (polygons)
- Quad outlines
- County outlines

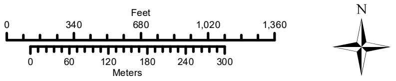
Livermore Kahnco
Results Map #3



Northwest Information Center

20-1249 29 January 2020 A. Neal

May depict confidential cultural resource locations.
Do not distribute.



▭	20-1349_0.25 mi. Buffer	▨	Reports (polygons)
▭	20-1349_ALA_APN selection	▭	Quad outlines
▨	Resources (polygons)	▭	County outlines
—	Reports (lines)		

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
S-013870		1991	Michael R. Fong, Stuart A. Guedon, Steve J. Rossa, and Angela M. Banet	Historic Property Survey Report for the First Street Widening and I-580/First Street Interchange Modifications Project - Phase 1, City of Livermore, Alameda	Basin Research Associates, Inc.	01-006836, 01-011636, 01-011637, 01-011638, 01-011639
S-013870a		1991	Ward Hill	Historic Architectural Survey Report, First Street/Las Positas Road Widening and Intersatate 580/First Street Modifications, Livermore, California	Corbett & Hill	
S-020335		1998	Randy S. Wiberg, Randall Dean, and Miley P. Holman	A Cultural Resources Study for the North Livermore Master Plan/Specific Plan, Environmental Impact Report, Alameda County, California	Holman & Associates	01-000067, 01-002197, 01-002200, 01-002201, 01-002202
S-031701	Caltrans - EA 04258 - 290810; Voided - S-33555	2006	M. Kate Lewis	Historic Property Survey Report: I-580 Eastbound HOV Lane Project: Hacienda Drive to East of Greenville Road, 04-Ala-580 KP 12.6/30.7 (PM R7.8/19.1), EA 04258-290810, Alameda County, California	Parsons	01-000262, 01-000263, 01-002197, 01-002204, 01-010779, 01-010780, 01-010781
S-031701a		2006	Jeffrey Rosenthal and Brian F. Byrd	Archaeological Survey Report for the I-580 Eastbound High Occupancy Vehicle Lane Project, East of Greenville Road to Hacienda Drive, Livermore Valley, Alameda County, California	Far Western Anthropological Reseach Group, Inc.	
S-031701b		2006	Toni Webb	Historical Resources Evaluation Report: I-580 Eastbound HOV Lane Project from East of Greenville Road to Hacienda Drive	JRP Historical Consulting	
S-035826	Caltrans - EA 29082K	2008	Brian F. Byrd	Historic Property Survey Report for the I-580 Westbound High Occupancy Vehicle Lane Project, Greenville Road to San Ramon/Foothill Roads, Alameda County, California: 4-Ala-580, P.M. 8.29/21.43, EA 29082K	Far Western Anthropological Research Group, Inc.	

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
S-024390		2001		Cultural Resources Assessment of the North Trunk Line, City of Livermore, California	Peak & Associates, Inc.	
S-028642		2004	Randy Groza and Benjamin Matzen	A Cultural and Paleontological Resources Study for the Livermore High School Project, Livermore, Alameda County, California	LSA Associates, Inc.	
S-030512		2005	E. Timothy Jones and Ben Matzen	A Cultural and Paleontological Resource Study for the Arroyo Las Positas Trail Extension Project.	LSA Associates, Inc	
S-037251	Caltrans - EA 04258-290810	2009	Brian F. Byrd	Addendum Archaeological Survey Report for the I-580 Eastbound High Occupancy Vehicle Lane Project, Livermore Valley, Alameda County, California: 4-Ala-580, P.M. R7.8/19.1, EA 04258-290810	Far Western Anthropological Research Group, Inc.	
S-048966	Caltrans - 0413000234; Caltrans - EA 4G990	2015	Jennifer Blake	Historic Property Survey Report for the SR-238/I-580 Bridge Rehabilitation Project, Alameda County, California, 4-ALA-238 PM R14.58, 16.03 4-ALA-580 PM 11.04 EA 4G990/0413000234	California Department of Transportation, District 4	01-002245
S-048966a		2015	Jennifer Blake	Archaeological Survey Report for the SR-238/I-580 Bridge Rehabilitation Project, Alameda County California, 4-ALA-238 PM R14.58, 16.03 4-ALA-580 PM 11.04 EA 4G990/0413000234	California Department of Transportation, District 4	

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-01-011636		Resource Name - Juanita Vidalin House; Other - Angelo Schenone House; Other - Map Reference No. 1	Building	Historic	HP02; HP04; HP33	1991 (Ward Hill, Corbett & Hill)	S-013870, S-013871

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-01-011637		Resource Name - Fragulia House; Other - Nicholas Livermore House; Other - Map Reference No. 2	Building	Historic	HP02; HP04; HP33	1991 (Ward Hill, Corbett & Hill)	S-013870, S-013871
P-01-011638		Resource Name - Schenone House; Other - Map Reference No. 3	Building	Historic	HP02; HP04; HP33	1991 (Ward Hill, Corbett & Hill)	S-013870, S-013871

APPENDIX F

GEOTECHNICAL INVESTIGATION

MONTE VISTA MEMORIAL GARDENS
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

GEOTECHNICAL EXPLORATION

SUBMITTED TO
Mike Kliment
Monte Vista Memorial Investment Group, LLC
189 Contractors Avenue
Livermore, CA 94551

PREPARED BY
ENGEO Incorporated

December 21, 2018

PROJECT NO.
15426.000.000

ENGEO
Expect Excellence

GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES
CONSTRUCTION SERVICES

Project No.
15426.000.000

December 21, 2018

Mr. Mike Kliment
Monte Vista Memorial Investment Group, LLC
189 Contractors Avenue
Livermore, CA 94551

Subject: Monte Vista Memorial Gardens
3656 Las Colinas Road
Livermore, California

GEOTECHNICAL EXPLORATION

Dear Mr. Kliment:

ENGEO prepared this geotechnical report for Monte Vista Memorial Investment Group as outlined in our agreement dated September 6, 2018. We characterized the subsurface conditions at the site to provide the enclosed geotechnical recommendations for design.

Our experience and that of our profession clearly indicate that the risk of costly design, construction, and maintenance problems can be significantly lowered by retaining the design geotechnical engineering firm to review the project plans and specifications and provide geotechnical observation and testing services during construction. Please let us know when working drawings are nearing completion, and we will be glad to discuss these additional services with you.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Spencer Waganaar

Spencer Waganaar, EIT

Brooks Ramsdell, CEG

J. Brooks Ramsdell
No. 2356

sw/af/br/jjt/jf

Andrew H. Firmin
No. 3025
EXP 12/31/19

Andy Firmin, GE

Josef J. Tootle
2677
Exp: 6/30/20

Josef J. Tootle, GE

2010 Crow Canyon Place, Suite 250 • San Ramon, CA 94583 • (925) 866-9000 • Fax (888) 279-2698
www.engeo.com

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

ENGEO prepared this geotechnical report for design of a memorial cemetery in Livermore, California. We prepared this report as outlined in our agreement dated September 9, 2018. Memorial Investment Group authorized ENGEO to perform the following scope of services:

- Subsurface field exploration
- Soil laboratory testing
- Data analysis and conclusions
- Report preparation

For our use, we received a Preliminary Grading Plan prepared by ACS Consultant Engineer, dated May 5, 2018, delivered on September 23, 2018.

This report was prepared for the exclusive use of our client and their consultants for design of this project. In the event that any changes are made in the character, design or layout of the development, we must be contacted to review the conclusions and recommendations contained in this report to evaluate whether modifications are recommended. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 PROJECT LOCATION

The subject site is located in Livermore, California, just north of Interstate 580 as shown on the Vicinity Map (Figure 1). The site is approximately 66 acres and is bisected by Arroyo Las Positas in the southeast, splitting the site into two areas. The site generally consists of a relatively flat lowland valley area in the southeast, with gently sloping hills and valleys to the north and west. The localized ridges and valleys are oriented roughly north-south in the northern portion of the property, and roughly east-west in the western portion of the property, with valleys draining toward Arroyo Las Positas. Site slope gradients range from 2.5:1 to 10:1 (horizontal:vertical) in the surrounding hills (with the steepest slopes in the southwest), and the lowland valley area has a slope gradient shallower than 25:1 (horizontal:vertical). Furthermore, the site is bordered by an existing residence to the east and private undeveloped grazing land to the west and north. Currently, the portion of the site to the east of Arroyo Las Positas contains paved roadways with no further development, and the area on the west side of the arroyo remains undeveloped.

Arroyo Las Positas, an existing creek running northeast-southwest, bisects the property. The creek is roughly 14 to 16 feet deeper than adjacent terrain with bank gradients that are generally 1.5:1 (horizontal:vertical) or flatter. The creek banks are well vegetated with grasses and shrubs. Recent bank erosion as well as some near-vertical creek bank sections were also observed along the creek. Refer to the Site Plan (Figure 2) for approximate locations of near-vertical creek bank sections along the creek and additional information.

The Site Plan (Figure 2) shows the boundaries of the project site and approximate locations of our explorations.

1.3 PROJECT DESCRIPTION

Based on our discussion with Monte Vista Memorial Investment Group, LLC and review of the proposed development plan (Figure 8) and information provided, we understand that the following general site improvements are proposed:

1. Earthwork cuts and fills of up to approximately 30 and 25 feet, respectively.

2. Two manmade lakes extending approximately 8 to 25 feet below planned future grade connected by a manmade creek.

3. Construction of a manmade island within a manmade lake in the southwestern portion of the site.

4. A two-story funeral home with an underground basement extending one level below grade (three stories total), and an adjacent one-story pavilion located on the eastern side of Arroyo Las Positas. For design purposes, we assumed the funeral home basement may extend up to 12 feet below existing grade.

5. Construction of two vehicular bridges crossing Arroyo Las Positas.

6. Construction of a pedestrian walkway connecting the manmade island to the lakeshore.

7. Paved streets, parking, and drive lanes.

8. Pedestrian walkways and boardwalks through a reconstructed wetland and connecting to the manmade island.

9. Solar trellis structures located in the southwestern portion of the site.

10. Utilities and other infrastructure improvements.

11. Retaining walls up to 25 feet in height, associated with a manmade waterfall, bridge abutments and office building basement.

12. Exterior concrete flatwork.

2.0 FINDINGS

2.1 FIELD EXPLORATION

Our field exploration included drilling 15 borings, excavating 8 test pits and advancing 6 Cone Penetration Test (CPT) soundings at various locations on the site. We performed our field exploration between October 5 and October 10, 2018. We also performed geologic field mapping concurrent with field exploration activities.

The location and elevations (NAVD88 Datum) of our explorations are approximate and were estimated by pacing from features shown on the site plan, they should be considered accurate only to the degree implied by the method used.

2.1.1 Borings

We observed drilling of 15 borings at the locations shown on the Site Plan, Figure 2. An ENGEO representative observed the drilling and logged the subsurface conditions at each location. We retained a truck-mounted drill rig and crew to advance 6 of the borings using 6-inch-diameter mud rotary drilling methods and retained a separate truck-mounted drill rig and crew to advance the remaining 9 borings using 6-inch-diameter solid flight auger drilling methods. The borings were advanced to depths ranging from 10 to 50 feet below existing grade. We permitted and backfilled the borings in accordance with the requirements of Zone 7 Water Agency.

We obtained bulk soil samples from drill cuttings and retrieved disturbed samples at various intervals in the borings using standard penetration tests and, 2½-inch O.D. split-spoon sampler.

The standard penetration resistance blow counts were obtained by an automatic trip hammer, which drops a 140-pound hammer through a 30-inch free fall. The samplers were driven 18 inches and the number of blows was recorded for each 6 inches of penetration. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows to drive the last 1 foot of penetration; the blow counts have not been converted using any correction factors. When sampler driving was difficult, penetration was recorded only as inches penetrated for 50 hammer blows.

We used the field logs to develop the report logs in Appendix A. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time.

2.1.2 Test Pits

We observed excavation of 8 test pits at the locations shown on the Site Plan, Figure 2. An ENGEO representative observed the test pit excavation and logged the subsurface conditions at each location. We retained a DS 480 backhoe to excavate the test pits using a 4-foot-wide bucket and logged the type, location, and uniformity of the underlying soil/rock. The maximum depth excavated by the test pits was approximately 15 feet.

We obtained bulk disturbed soil samples from the test pits using hand-sampling techniques. The test pit logs present descriptions and graphically depict the subsurface conditions encountered.

We used the field logs to develop the report logs in Appendix B. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time.

2.1.3 Cone Penetration Tests

We retained a Cone Penetration Test (CPT) track rig to push the cone penetrometer to a maximum depth of about 50 feet. The CPT track rig has a 20-ton compression-type cone with a 15-square-centimeter (cm^2) base area, an apex angle of 60 degrees, and a friction sleeve with a surface area of 225 cm^2. The cone, connected with a series of rods, is pushed into the ground at a constant rate. Cone readings are taken at approximately 5-cm intervals with a penetration rate of 2 cm per second in accordance with ASTM D-5778. Measurements include the tip resistance to penetration of the cone (Qc), the resistance of the surface sleeve (Fs), and pore pressure (U) (Robertson and Campanella, 1988). CPT logs are presented in Appendix C.

The CPT subcontractor conducted pore pressure dissipation testing in 1-CPT3, 1-CPT4 and 1-CPT6. At these locations, the CPT cone was halted at select depths, and the variation of the penetration pore pressure with time was measured until the pore pressure stabilized. The pore water dissipation test was only able to successfully estimate the ground water elevation in 1-CPT4, while the other tests yielded inconclusive results. Results of the pore-pressure dissipation tests are included in Appendix C.

2.1.4 Geologic Field Mapping

During our field explorations, an ENGEO geologist observed the surface conditions and visible geologic features at the site. We mapped the geologic features and summarize our findings on the Site Plan, Figure 2.

2.2 SITE BACKGROUND

The property is currently vacant of any structures besides a small pump house on the east site of Arroyo Las Positas, and a gravel roadway which connects the property southeast of Arroyo Las Positas to Las Colinas Road. The remaining area of the site is covered with seasonal grass.

We reviewed historic aerial photographs using www.historicaerials.com, Google Earth, and aerials available through the University of California, Santa Barbara with various readily available aerial photographs spanning from 1940 to 2017. Based on these aerial photographs, the subject property appears to have been used primarily for agricultural purposes in the 1940s, with a single house located just to the east of the property along with several dirt roads in the surrounding region. Beginning in the 1950s, row crops disappeared from the site and the site was used primarily for grazing land. Construction of Interstate 580, located immediately south of the site, also began in the 1950s. In addition, an embankment was constructed along Las Colinas Road to facilitate construction of the Las Colinas Road overpass. Since construction of these improvements, there has been little change to the site, with the exception of stockpile placement and the installation of a well at the southeastern portion of the site in June 2012. Based on our review of historic aerial photographs covering the site, it appears that aside from construction activities near the site, the site itself has remained relatively unchanged.

Additionally, available historic topographic maps were reviewed. The historic topographic maps support our observations made during the aerial photograph review, illustrating a relatively unchanged surface with little to no change in elevation between 1906 and 2015.

2.3 GEOLOGY AND SEISMICITY

2.3.1 Geology

The site is situated within the Livermore Valley basin, approximately 5 miles west of the Altamont Pass. Based on our geologic mapping and subsurface explorations, as well as review of regional geologic maps, the site is underlain by young colluvial and alluvial deposits, as well as older Livermore Gravel deposits (Figure 3). Faulting in this area is common, and the region around the site has experienced folding and at least two uplift events. Bedding was observed to be shallowly dipping to relatively flat, however Barlock (1988) shows a roughly N70°W trending gently dipping anticline transecting the site in the northwest. This indicates that bedding is generally gently dipping to the southwest in the southwestern portion of the property and to the northeast in the northeastern portion of the property. Landslide mapping, by Nilsen (1975), indicates no landslides within the project boundaries – no hillside landslides were observed or encountered onsite during our geotechnical explorations.

Barlock (1988, 1989) describes the units onsite as Holocene alluvium, and late Miocene to early Pleistocene Livermore Gravels. Furthermore, Dibblee (1980) confirms both the unit geology, and the presence of regional folding onsite. We observed these units onsite, as well as Holocene colluvium and residual soil.

In general, the site is blanketed by roughly 2 to 6 feet of colluvium or residual soil, with the units thickening towards the lowland valley near Arroyo Las Positas. The colluvium was generally observed to be dark gray to dark olive brown silty to sandy fat clay (CH), with a medium to high plasticity. The colluvial deposits were generally observed to be very stiff to hard, and ranged from dry to moist. These deposits also displayed some weak- to well-developed partings and contained various concentrations of carbonate blebs and streamers, with some indications of paleosols occurring at depth.

The geologic unit underlying the surficial soils and alluvium at the site is interpreted as belonging to the Upper Livermore Gravels unit. The Upper Livermore Gravels is described by Barlock (1989) as, “composed predominantly of clasts of Franciscan graywacke, lithic sandstone, metamorphic rock, volcanic rock, and traces of fine-grained vein quartz. Thick, horizontally bedded, clast-supported, well imbricated, gravel beds interlayered with planar cross-bedded and trough cross-bedded sandstone intervals are typical. Indistinctly bedded, matrix-supported, cobble to boulder gravel occurs rarely. The Upper Livermore represents deposition by gravelly braided streams on an alluvial fan.” Based on the site geomorphology, as interpreted in stereo-paired aerial photographs and Google Earth, the flatlands immediately surrounding Arroyo Las Positas indicate the presence of paleo channels, terraces, and flood deposits. This is consistent with the regional geologic mapping which describes the alluvium as “unconsolidated sand and gravel, recent terrace deposits, stream deposits, and cemented fanglomerate” (Barlock, 1988). In addition, we encountered a very fine-grained silty sand overlying the colluvium in the southeastern portion of the property on the north bank of Arroyo Las Positas, which we have interpreted as relatively recent flood deposits.

In general, the observed site geology consisted of light-gray to dark yellowish- to dark reddish-brown massive fine- to coarse-grained sand, silt, and clay units, with plus-or-minus well-rounded gravels of varying size. These sand, silt, and clay units are interlain by clast-supported well-imbricated conglomerate (or gravel) beds. The sand and clay units vary from having a low to high expansion potential, and are generally medium stiff to hard clays, and loose to very dense sands. Moisture-content increases with depth from dry to wet. The provenance of the observed units appears to be Franciscan derived. These observations are consistent with the previously mapped regional geologic units and interpretations of Barlock and Dibblee (1988/1989; 1980).

For simplicity, we have used our aerial photo interpretations and field observations to create a geologic map of the site (Figure 2). However, the Upper Livermore Gravels, which are interpreted as having been deposited in a braided stream environment, are overlain by younger alluvial deposits. This basically means that the older alluvial deposits of the Upper Livermore Gravels blend into the younger alluvial deposits above them. As a result, we have labelled areas as being alluvium or Upper Livermore Gravels on the geologic map. In general, it is believed that the alluvium (Qal) is at least 1 to 2 feet thick where noted on the site geology (Figure 2).

2.3.2 Seismicity

The Livermore area contains numerous active earthquake faults. Nearby active faults include the Greenville, Mount Diablo Thrust, Calaveras, Great Valley, Hayward, and the Green Valley. An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 11,000 years) (Bryant and Hart, 2007).

Numerous small earthquakes occur every year in the San Francisco Bay Region, and larger earthquakes have been recorded and can be expected to occur in the future. Figure 5 shows the approximate locations of these faults and significant historic earthquakes recorded within the San Francisco Bay Region.

The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of active faults is believed to exist within the site. Fault rupture through the site, therefore, is not anticipated.

The site does lie within a seismically active region. According to the 2008 National Hazards Program the nearest active fault is the Greenville Connected, which is mapped approximately 3.3 miles east of the site. This fault is considered capable of a moment magnitude earthquake of 7.0. Other active faults in the region are summarized in the table below and include the Mount Diablo Thrust fault approximately 4.0 miles away, capable of a moment magnitude of 6.8 and the Calaveras fault approximately 9.0 miles away capable of a moment magnitude of 6.8.

TABLE 2.3.2-1: Active Faults Capable of Producing Significant Ground Shaking at the Site

FAULT NAME	DISTANCE FROM SITE (MILES)	DIRECTION FROM SITE	MAXIMUM MOMENT MAGNITUDE
Greenville Connected	3.3	East	7.0
Mount Diablo Thrust	4.0	Northwest	6.5
Calaveras	9.0	West	7.0
Great Valley	13.0	East	6.9
Hayward	14.9	West	7.3
Green Valley Connected	18.6	Northwest	6.8

The third version of Uniform California Earthquake Forecast (UCERF3) developed by the Working Group on California Earthquake Probabilities (Field et al., 2013) provides updated estimates of the 30-year probability of various magnitudes earthquakes in the San Francisco Bays Area. The results of the study are summarized in the following table:

TABLE 2.3.2-2: 30-Year Probability of Earthquake in the Bay Area

EARTHQUAKE MAGNITUDE	30-YEAR PROBABILITY OF ONE OR MORE EVENTS
5 or Greater	100%
6 or Greater	98%
7 or Greater	51%
8 or Greater	4%

The state of California Seismic Hazard Zones map by California Geologic Survey maps the area around the creek as lying within a potential liquefaction hazard zone (Figure 4). Witter (2006) also maps the alluvial deposits, near Arroyo Las Positas, as having moderate liquefaction susceptibility. The evaluation of liquefaction hazards are provided later in this report. In addition, the state of California Seismic Hazard Zones map by California Geologic Survey maps the hillside areas located at the northern and western portions of the site as earthquake-induced landslide zones (Figure 4). The evaluation of hazards are provided later in this report.

2.4 SURFACE CONDITIONS

As described earlier, the site is bisected by Arroyo Las Positas. The area on the west side of the arroyo, which will comprise the cemetery and a majority of the improvement is undeveloped and is currently used as grazing land. This portion of the site contains areas of dilapidated fences and is bordered by sloping hillsides along the west and north and I-580 to the south. In general, these hillsides are gradually sloping, with slopes ranging from 4:1 to 10:1 (horizontal:vertical), however steeper areas are located in the southwest portion of the site with slopes inclined at a maximum of approximately 2.5:1. The site elevations on the west side of the arroyo range from 662 feet (NAVD88) along the north and west borders, to 491 feet near the arroyo.

On the east side of Arroyo Las Positas, the site is relatively flat with site grades ranging from 490 feet near the arroyo to 493 feet at the eastern border of the property. The entrance to the site lies on a fill slope with an approximate slope gradient of 2.5:1 (horizontal:vertical). Additionally, this side of the property contains minor improvements such as a gravel road, and existing electrical lines and water lines. Furthermore, tilling and disturbed soils were observed at the surface within the project site east of the arroyo.

2.5 SUBSURFACE CONDITIONS

Overall, soils found at the site generally consist of interbedded layers of fine- and coarse-grained material associated with alluvial deposits and the Livermore Gravel Formation. In general, the upper approximately 2 to 10 feet consisted of predominately medium to high plasticity clay with moderate to high expansive potential except at 1-B13, which consisted of very dense sand in the upper 15 feet underlain by stiff lean clay. An approximately 5- to 10-foot-thick layer of generally medium dense to very dense coarse-grained material consisting of clayey sand, clayey gravel, silty sand, sand, and gravel underlies the surficial clay layer. Below this granular layer lies hard lean clay and silty clay with varying amounts of sand and gravel representative of the Livermore Gravel Formation that extended throughout the remainder of the borings.

Consult the Site Plan and exploration logs for specific subsurface conditions at each location. We include our exploration logs in Appendix A. The logs contain the soil type, color, consistency, and visual classification in general accordance with the Unified Soil Classification System. The logs graphically depict the subsurface conditions encountered at the time of the exploration.

2.6 GROUNDWATER CONDITIONS

We observed groundwater in several of our subsurface boring explorations. Due to the mud rotary drilling methods, we did not measure groundwater in select boring locations. We summarize our observations in the table below:

TABLE 2.6-1: Groundwater Observations

EXPLORATION LOCATION	APPROX. DEPTH TO GROUNDWATER (FEET)	APPROX. GROUNDWATER ELEVATION (FEET)
1-B2	14	476
1-B3	15	476
1-B6	16	471
1-B14	14	477
1-B8	5	487
1-B9	14	478

We performed pore-pressure-dissipation tests at select CPT locations. We calculated the groundwater elevation at each location based on the pore pressure dissipation test results. The table below provides a summary of the calculated groundwater depth and elevation at the CPT locations.

TABLE 2.6-2: Groundwater Elevation Based on Pore Pressure Dissipation Tests

CPT LOCATION	DEPTH OF CONE (FEET)	MEASURED PORE PRESSURE (PSI)	CALCULATED GROUNDWATER DEPTH (FEET)	CALCULATED GROUNDWATER ELEVATION* (FEET)
1-CPT4	44.4	11.5	34.3	491

**Elevation Datum NAVD88*

Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practice, creek flow, and other factors not evident at the time measurements were made.

2.7 LABORATORY TESTING

We performed laboratory tests on selected soil samples to evaluate their engineering properties. For this project, we performed moisture content, dry density, strength testing, plasticity index, hydrometer, resistance value, compaction, permeability sulfate and soil corrosion potential testing. Moisture contents and dry densities are recorded on the boring logs in Appendix A; other laboratory data is included in Appendix B.

2.8 LABORATORY TESTING

As previously discussed, two manmade lakes are planned to be constructed onsite. Through conversations with Monte Vista Memorial Investment Group, we understand the lake liner will be constructed with native clay onsite. We performed hydraulic conductivity testing on representative in-situ liner and remolded bulk soil samples that we collected on the site to evaluate the use of onsite soil for this purpose. The bulk soil sample was prepared to 95 percent relative compaction (ASTM 1557) prior to performing the hydraulic conductivity test. The results of the hydraulic conductivity tests are summarized below.

TABLE 2.8.-1: Laboratory Hydraulic Conductivity Test Results (ASTM D5084, Method C)

		FACTOR OF SAFETY		
LOCATION	SOIL CLASSIFICATION	REMOLDED RELATIVE PERCENT COMPACTION	HYDRAULIC CONDUCTIVITY (CM/S) TEST RUN 1	HYDRAULIC CONDUCTIVITY (CM/S) TEST RUN 2
1-B5 @ 38 feet	Lean Clay	---	1.37×10^{-6}	1.17×10^{-6}
TP-4 @ 11-12 feet	Lean Clay	95%	2.09×10^{-5}	2.09×10^{-5}

3.0 CONCLUSIONS

From a geotechnical engineering viewpoint, in our opinion, the site is suitable for the proposed development, provided the geotechnical recommendations in this report are properly incorporated into the design plans and specifications.

The primary geotechnical concerns that could affect development on the site are presence of expansive soil, seismic ground motions, liquefaction settlement and shallow groundwater. We summarize our conclusions below.

3.1 EXPANSIVE SOIL

We observed potentially expansive clay near the surface of the site at a majority of exploration locations with exception to Boring 1-B13. Our laboratory testing indicates that these soils exhibit moderate to high shrink/swell potential with variations in moisture content.

Expansive soils change in volume with changes in moisture. They can shrink or swell and cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. Building damage due to volume changes associated with expansive soils can be reduced by: (1) using a rigid mat foundation that is designed to resist the settlement and heave of expansive soil, (2) deepening the foundations to below the zone of moisture fluctuation and/or (3) using a layer of select fill below building locations.

Successful performance of structures on expansive soils requires special attention during construction. It is imperative that exposed soils be kept moist prior to placement of concrete for foundation construction. It can be difficult to remoisturize clayey soils without excavation, moisture conditioning, and recompaction.

We have also provided specific grading recommendations for compaction of clay soil at the site. The purpose of these recommendations is to reduce the swell potential of the clay by compacting the soil at a high moisture content and controlling the amount of compaction. Expansive soil mitigation recommendations are presented in Section 5.2 of this report.

3.2 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, soil liquefaction, lateral spreading, and landslides. The following sections present a discussion of these hazards as they apply to the site. Based on topographic and lithologic data, the risk of regional subsidence or uplift, tsunamis, ground lurching or seiches is considered low to negligible at the site.

3.2.1 Ground Rupture

Since there are no known active faults crossing the property and the site is not located within an Earthquake Fault Special Study Zone, it is our opinion that ground rupture is unlikely at the subject property.

3.2.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the San Francisco Bay Region could cause considerable ground shaking at the site, similar to that which has occurred in the past. To mitigate the shaking effects, structures should be designed using sound engineering judgment and the latest California Building Code (CBC) requirements, as a minimum. Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead-and-live loads. The code-prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake (SEAOC, 1996).

3.2.3 2016 California Building Code (CBC) Seismic Design Parameters

The 2016 CBC utilizes design criteria set forth in the 2010 ASCE 7 Standard. Based on the subsurface conditions encountered, we characterized the site as Site Class D in accordance with the 2016 CBC. We provide the 2016 CBC seismic design parameters in Table 3.2.3-1 below, which include design spectral response acceleration parameters based on the mapped Risk-Targeted Maximum Considered Earthquake (MCER) spectral response acceleration parameters.

TABLE 3.2.3-1: 2016 CBC Seismic Design Parameters, Latitude: 37.70394 **Longitude:** -121.75845

PARAMETER	VALUE
Site Class	D
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S (g)	1.65
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1 (g)	0.61
Site Coefficient, F_A	1.00
Site Coefficient, F_V	1.50
MCE_R Spectral Response Acceleration at Short Periods, S_{MS} (g)	1.65
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1} (g)	0.92
Design Spectral Response Acceleration at Short Periods, S_{DS} (g)	1.10
Design Spectral Response Acceleration at 1-second Period, S_{D1} (g)	0.61
Mapped MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA (g)	0.63
Site Coefficient, F_{PGA}	1.00
MCE_G Peak Ground Acceleration adjusted for Site Class effects, PGA_M (g)	0.63

3.2.4 Liquefaction

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded, fine-grained sands below the groundwater table. Empirical evidence indicate that low plasticity silt and clay are also potentially liquefiable, though this phenomenon is commonly referred to as cyclic softening. For the purpose of this report, we will refer to cyclic softening as liquefaction. When seismic ground shaking occurs, the soil is subjected to cyclic shear stresses that can cause excess hydrostatic pressure to develop.

As previously discussed, the subsurface soils consist of mostly clay and silty clay, with interbedded layers of silty sand, sandy silt, and poorly graded sand. We used visual classification, in-situ dilatancy test, and index testing results from the boring soil samples in conjunction with the Bray and Sancio (2006) screening criteria to determine which of the samples of fine-grained soils from the borings may be liquefiable. We also used these data to establish a relationship between soil that is identified as potentially liquefiable in the CPTs by comparing them to nearby borings. To perform this comparison, we compared the calculated Soil Behavior Type Index (I_C) to soil zones that were considered potentially liquefiable in the adjacent borings. This comparison allows us to calibrate the results of CPT testing at this site with soil behavior recovered from our borings. The following nearby borings and CPTs were used to perform these calibrations.

Nearby Boring and CPT Pairs

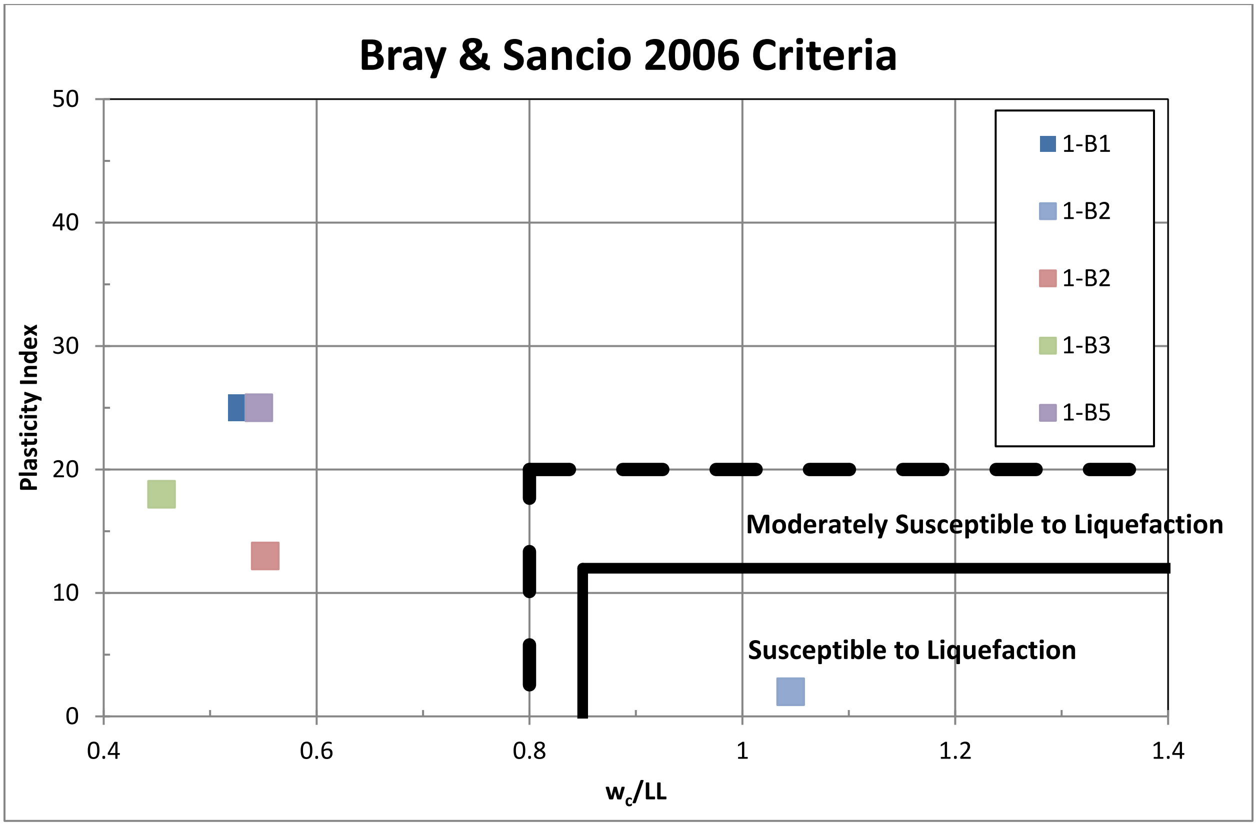
Pair 1: 1-B1 and 1-CPT5
Pair 2: 1-B2 and 1-CPT3
Pair 3: 1-B3 and 1-CPT2
Pair 4: 1-B5 and 1-CPT4

Four soil samples, were plotted well outside the limits of susceptibility to liquefaction according to the Bray and Sancio procedure (Chart 3.2.4-1), and had a soil behavior index (I_c) ranging from of 2.25 to 2.44, as shown in Table 3.2.4-1. Based on this screening (Bray and Sancio, 2006) we established an I_c cutoff value of 2.30 in areas where there is no adjacent boring or lab testing, as the boundary where liquefaction will not occur in clay-like soils at the site. This value represents the I_c value that plasticity index and fines content testing indicate that are clay, which is not susceptible to liquefaction.

TABLE 3.2.4-1: “Clay-like” Soil Samples

BORING	SAMPLE DEPTH (FEET)	I_c
1-B1	20	2.40
1-B2	16.5	2.20
1-B2	28	2.44
1-B3	16	2.29
1-B5	28	2.25

CHART 3.2.4-1: Bray and Sancio (2006) Screening of I_C > 2.2 Soils



We evaluated the data from CPTs for triggering of liquefaction using the calibrated I_C value to represent transitions in soil type and behavior. In performing our analysis, we assumed a design groundwater level of 10 feet below existing grade across the site. Furthermore, we used the mapped maximum considered earthquake (MCE) geometric mean peak ground acceleration (PGA_M) of 0.63g based on the 2016 California Building Code. We assumed a moment magnitude of 7.0 for our analyses to represent the highest level of ground shaking on the controlling faults. As discussed earlier, we also used an I_C cut-off of 2.30, based on our site-specific data, for areas where there was no adjacent soil boring or laboratory tests.

We utilized the software package, CLiq Version 2.2.1.4 by Geologismiki Geotechnical Software, to evaluate liquefaction susceptibility from the CPT data. We performed our analyses using the method outlined by Robertson (2009). Based off the I_c analysis, we omitted non-liquefiable layers from the above Cliq analysis. Additionally, we estimated liquefaction settlement in granular materials at boring locations where there was no accompanying CPT using Standard Penetration (SPT) blow counts, converted Modified California sampler blow counts and the above seismic input parameters as outlined by Idriss and Boulanger (2008). Final estimated liquefaction-induced settlements are summarized below.

TABLE 3.2.4-2: Summary of Liquefaction-Induced Settlement Calculations

EXPLORATION LOCATION	TOTAL SETTLEMENT (INCHES)
1-CPT1	0.1
1-CPT2/1-B3	0.2
1-CPT3/1-B2	1.3
1-CPT4/1-B5	1.0
1-CPT5/1-B1	0.5
1-CPT6	0.6
1-B4	0.0
1-B6	0.6
1-B7	2.5
1-B8	0.2
1-B11	1.0
1-B12	0.5

The estimated liquefaction-induced settlement in the overall site area is up to 2.5 inches; however, this is an isolated area located in the eastern portion of the site, near the entrance. If restricted to areas where vertical structures and bridges are to be constructed, estimated liquefaction-induced settlement is a maximum of 1.3 inches.

3.2.5 Liquefaction-Induced Surface Rupture

In order for liquefaction-induced ground failure to occur, the pore water pressure generated within the liquefied strata must exert a sufficient force to break through the overlying soil and vent to the surface resulting in sand boils or fissures.

In 1985, Ishihara presented preliminary empirical criteria to assess the potential for ground surface disruption at liquefiable sites based on the relationship between thickness of liquefiable sediments and thickness of overlying non-liquefiable soil. A more recent study by Youd and Garris (1995) expanded on the work of Ishihara to include data from over 300 exploratory borings, 15 different earthquakes, and several ranges of recorded peak ground acceleration.

The potentially liquefiable soils at the site are generally thin layers of alluvial soils with a minimum 14-foot cap of non-liquefiable soil. Based on the above studies, the potentially liquefiable soils are capped by a sufficient thickness of non-liquefiable soils to prevent venting and surface rupture or sand boils during a strong seismic event.

3.2.6 Lateral Spreading

Lateral spreading is a failure within weak soils, typically due to liquefaction, which causes a soil mass to move toward a free face, such as an open channel, or down a gentle slope. There are relatively thin layers of potentially susceptible liquefiable layers at the project, however these soils were not encountered above the creek flow line at exploration locations adjacent to Arroyo Las Positas, and generally appear discontinuous across the site and below any free face condition. Therefore, lateral spreading is considered a low risk in our opinion.

Although lateral spreading is considered a low risk, there is potential for creek bank instability considering that portions of Arroyo Las Positas are deeply incised, there is evidence of recent bank erosion as well as some near-vertical creek bank sections. This concern is further analyzed and discussed in a subsequent section.

3.2.7 Earthquake-Induced Landsliding

No indications of previous deep-seated landsliding were observed during the field exploration at the site, and no features indicative of deep-seated slope instability were observed in historical aerial photographs of the site. Therefore, based on our observations in the field and due to the consistency of material encountered during our subsurface exploration, the potential for deep-seated earthquake-induced landsliding is low.

3.3 CREEK BANK STABILITY AND SETBACKS

As discussed above, Arroyo Las Positas, an existing creek running northeast-southwest, bisects the property. The creek is roughly 14 to 16 feet deep from adjacent terrain with in general 1.5:1 (horizontal:vertical) or flatter bank gradients. The creek banks are well vegetated with grasses and shrubs. Recent bank erosion as well as some near-vertical creek bank sections were also observed along the creek. Refer to the Site Plan (Figure 2) for approximate locations of bank failures along the creek and additional information.

Based on analysis, the top of the existing creek bank may experience some movement and displacement as a result of a strong earthquake event and/or continued erosion. Proposed improvements located within 40 feet from the top of the creek bank may experience some movement. We recommend that proposed improvements be set back a distance of at least 40 feet from the top of the existing creek bank (riparian edge), or at least beyond a 3:1 line of projection extending up from the base of the creek bank, whichever is greater. Additional measures could be used to reduce the above recommended distances, such as a geotechnical corrective grading, geogrid reinforcement, ground improvement, buried retaining walls, and/or sheet piling. These options require site-specific analyses and could be assessed once grading plans are further refined.

3.4 SOIL CORROSION POTENTIAL

As part of this study, we obtained two representative soil samples and submitted to a qualified analytical lab, CERCO, for determination of pH, resistivity, sulfate, and chloride. Additionally, we tested five soil samples in our laboratory for sulfate ion concentration determination. The results, which include a brief corrosivity evaluation of the tested soil sample by CERCO, are included in Appendix B and summarized in the table below.

TABLE 3.4-1: Corrosivity Test Results

SAMPLE LOCATION	DEPTH (FT)	REDOX (mV)	PH	RESISTIVITY (OHMS-CM)	CHLORIDE (MG/KG)	SULFATE (MG/KG)
1-B2	11.5	230	7.38	1,700	62	120
1-B3	32.0	330	8.67	1,200	61	40
1-B1*	5.5	---	---	---	---	N.D.**
1-B2*	25.0	---	---	---	---	N.D.**
1-B3*	11.5	---	---	---	---	N.D.**
1-B4*	21.0	---	---	---	---	N.D.**
1-B6*	5.5	---	---	---	---	1000

* ASTM D4327

** None Detected

The 2016 CBC references the 2014 American Concrete Institute Manual, ACI 318-14, Section 19.3.1 for concrete durability requirements. ACI Table 19.3.1.1 provides the following exposure categories and classes, and Table 19.3.2.1 provides requirements for concrete in contact with soil based upon the exposure class.

TABLE 3.4-2: ACI Table 19.3.1.1: Exposure Categories and Classes

CATEGORY	SEVERITY	CLASS	CONDITION	
F Freezing and thawing	Not Applicable	F0	Concrete not exposed to freezing-and-thawing cycles	
	Moderate	F1	Concrete exposed to freezing-and-thawing cycles and occasional exposure to moisture	
	Severe	F2	Concrete exposed to freezing-and-thawing cycles and in continuous contact with moisture	
	Very Severe	F3	Concrete exposed to freezing-and-thawing cycles and in continuous contact with moisture and exposed to deicing chemicals	
			WATER- SOLUBLE SULFATE IN SOIL % BY WEIGHT*	**DISSOLVED SULFATE IN WATER MG/KG (PPM)****
S Sulfate	Not applicable	S0	$SO_4 < 0.10$	$SO_4 < 150$
	Moderate	S1	$0.10 \leq SO_4 < 0.20$	$150 \leq SO_4 \leq 1{,}500$ seawater
	Severe	S2	$0.20 \leq SO_4 \leq 2.00$	$1{,}500 \leq SO_4 \leq 10{,}000$
	Very severe	S3	$SO_4 > 2.00$	$SO_4 > 10{,}000$
			CONDITION	
P Requiring low permeability	Not applicable	P0	In contact with water where low permeability is not required.	
	Required	P1	In contact with water where low permeability is required.	
C Corrosion protection of reinforcement	Not applicable	C0	Concrete dry or protected from moisture	
	Moderate	C1	Concrete exposed to moisture but not to external sources of chlorides	
	Severe	C2	Concrete exposed to moisture and an external source of chlorides from deicing chemicals, salt, brackish water, seawater, or spray from these sources	

* Percent sulfate by mass in soil determined by ASTM C1580
**Concentration of dissolved sulfates in water in ppm determined by ASTM D516 or ASTM D4130

In accordance with the criteria presented in the above table, these soils are categorized as Not Applicable for all classes except , and are within the F0 freeze-thaw class, S0 sulfate exposure class, P0 exposure class The presence of groundwater indicates the soils should be classified as C1 corrosion class. Cement type, water-cement ratio, and concrete strength, are not specified for these ranges.

Considering a 'Not Applicable' sulfate exposure, there is no requirement for cement type or water-cement ratio, however, a minimum concrete compressive strength of 2,500 psi is specified by the building code. For this sulfate range, the structural designer may consider Type II cement and a concrete mix design for foundations and building slabs-on-grade that incorporates a maximum water-cement ratio of 0.50. It should be noted, however, that the structural engineering design requirements for concrete may result in more stringent concrete specifications.

A brief corrosivity evaluation of the site soils is provided by CERCO in Appendix B. If desired to investigate this further, we recommend a corrosion consultant be retained to evaluate if specific corrosion recommendations are advised for the project. Note that ASTM Test Method D4327 was used in lieu of the ACI-designated sulfate test methods as it provides better test results.

3.5 EXCAVATABILITY

We used a CAT 313L Excavator during our exploratory test pit work. Based upon our observation and experience, we provide the following conclusions regarding excavation resistance at the site:

1. Conventional grading and backhoe equipment will likely be able to excavate the soil deposits.

2. We observed the upper 15 feet of the site soils to be moderately cemented at depth. Conventional grading and backhoe equipment will likely be able to excavate the site soils using light to moderate effort. Deeper grading excavations may encounter lenses of gravel that may require moderate effort with a CAT D8 or larger bulldozer, equipped with single or multi-shank rippers.

We provide the above excavatability information for general planning purposes only. This information is not intended for bidding purposes.

3.6 SHALLOW GROUNDWATER

Groundwater was encountered at depths of 5 to 16 feet below the existing ground surface during field exploration activities at select exploration locations. Refer to the table in the previous section.

Based on the above, we recommend considering a design high groundwater depth of 5 feet below existing grade for project design such as planned roadway improvements on the eastern portion of the site in the vicinity of 1-B7 through 1-B9 and 1-B15. We recommend considering a design groundwater depth of 10 feet below existing grade for project design such as the funeral home building, bridge improvements, and cemetery improvements on the remaining portions of the site.

Fluctuations in groundwater levels should be expected during seasonal changes or over a period of years because of precipitation changes, perched zones, changes in drainage patterns, and irrigation.

4.0 CONSTRUCTION MONITORING

Our experience and that of our profession clearly indicate that the risk of costly design, construction, and maintenance problems can be significantly lowered by retaining the design geotechnical engineering firm to:

1. Review the final grading and foundation plans and specifications prior to construction to evaluate whether our recommendations have been implemented, and to provide additional or modified recommendations, as needed. This also allows us to check if any changes have occurred in the nature, design or location of the proposed improvements and provides the opportunity to prepare a written response with updated recommendations.

2. Perform construction monitoring to check the validity of the assumptions we made to prepare this report. Earthwork operations should be performed under the observation of our

representative to check that the site is properly prepared, the selected fill materials are satisfactory, and that placement and compaction of the fills has been performed in accordance with our recommendations and the project specifications. Sufficient notification to us prior to earthwork is important.

If we are not retained to perform the services described above, then we are not responsible for any party's interpretation of our report (and subsequent addenda, letters, and verbal discussions).

5.0 EARTHWORK RECOMMENDATIONS

The relative compaction and optimum moisture content of soil and aggregate base referred to in this report are based on the most recent ASTM D1557 test method. Compacted soil is not acceptable if it is unstable. It should exhibit only minimal flexing or pumping, as observed by an ENGEO representative.

As used in this report, the term "moisture condition" refers to adjusting the moisture content of the soil by either drying if too wet or adding water if too dry.

We define "structural areas" in this report as any area sensitive to settlement of compacted soil. These areas include, but are not limited to building pads, sidewalks, pavement areas, and retaining walls.

5.1 DISTURBED NEAR-SURFACE SOIL

As described previously, we anticipate the presence of disturbed near-surface soil throughout the site. Such soil can undergo excessive settlement, especially under new fill or building loads. The proposed building foundation excavation will remove a portion of the disturbed soil. However, in areas outside of the proposed excavation for the basement level of the building, we recommend removal of the material down to undisturbed soil as determined by an ENGEO representative, which we anticipate to be approximately 12 to 24 inches below ground surface. The bottom of the removed area should then be scarified and moisture conditioned before placing new engineered fill. Fill placement specifications may be found in the Fill Compaction Section.

5.2 GENERAL SITE CLEARING

Areas to be developed should be cleared of surface and subsurface deleterious materials, including existing building foundations, slabs, buried utility and irrigation lines, pavements, debris, and designated trees, shrubs, and associated roots. Clean and backfill excavations extending below the planned finished site grades with suitable material compacted to the recommendations presented in Fill Compaction Section. ENGEO should be retained to observe and test backfilling.

Following clearing, strip the site to remove surface organic materials. Strip organics from the ground surface to a depth of at least 2 to 3 inches below the surface. Remove strippings from the site or, if considered suitable by the landscape architect and owner, use them in landscape fill.

It may also be feasible to mulch organics in place, depending on the amount and type of vegetation present at the time of grading as well as the proposed mulching method. If desired, ENGEO can evaluate site vegetation at the time of grading to assess the feasibility of mulching organics in place.

5.3 OVER-OPTIMUM SOIL MOISTURE CONDITIONS

The contractor should anticipate encountering excessively over-optimum (wet) soil moisture conditions during winter or spring grading, during or following periods of rain or high flow in Arroyo Las Positas, and within 5 feet of the groundwater level. In addition, wet soil conditions may be found during excavation for the basement level of the funeral home as well as along the entrance roadway in the eastern portion of the site. Wet soil can make proper compaction difficult or impossible. Wet soil conditions can be mitigated by:

1. Frequent spreading and mixing during warm dry weather.
2. Mixing with drier materials.
3. Mixing with a lime, lime-flyash, or cement product; or
4. Stabilizing with aggregate, geotextile stabilization fabric, or both.

Options 3 and 4 should be evaluated by ENGEO prior to implementation.

5.4 ACCEPTABLE FILL

Onsite soil material is suitable as fill material provided it is processed to remove concentrations of organic material, debris, and particles greater than 8 inches in maximum dimension. ENGEO should be made aware if any import material is to be used and allowed to sample and test proposed imported fill materials at least 5 days prior to delivery to the site.

5.5 FILL COMPACTION

5.5.1 Grading in Structural Areas

Perform subgrade compaction prior to fill placement, following cutting operations, and in areas left at grade as follows.

1. Scarify to a depth of at least 12 inches.

2. Moisture condition soil to at least 4 percentage points over the optimum moisture content; **and**

3. Compact the soil to between 87 and 92 percent relative compaction. Compact the upper 6 inches of finish pavement subgrade to at least 90 percent relative compaction prior to aggregate base placement.

After the subgrade has been compacted, place and compact acceptable fill as follows:

1. Spread fill in loose lifts that do not exceed 12 inches.

2. Moisture condition lifts to at least 4 percentage points over the optimum moisture content; **and**

3. Compact fill to between 87 and 92 percent relative compaction; compact the upper 6 inches of fill in pavement areas to at least 90 percent relative compaction prior to aggregate base placement.

Compact the pavement Caltrans Class 2 Aggregate Base section to at least 95 percent relative compaction (ASTM D1557). Moisture condition aggregate base to or slightly above the optimum moisture content prior to compaction.

5.5.2 Underground Utility Backfill

The contractor is responsible for conducting trenching and shoring in accordance with CALOSHA requirements. Project consultants involved in utility design should specify pipe-bedding materials.

Place and compact granular trench backfill as follows:

1. Trench backfill should have a maximum particle size of 6 inches.

2. Moisture condition trench backfill to a minimum moisture content of optimum. Moisture condition backfill outside the trench.

3. Place fill in loose lifts not exceeding 12 inches.
   and

4. Compact fill to a minimum of 90 percent relative compaction (ASTM D1557).

Where utility trenches cross perimeter building foundations, backfill with native clay soil for pipe bedding and backfill for a distance of 2 feet on the exterior side of the foundation. This will help prevent the normally granular bedding materials from acting as a conduit for water to enter beneath the building. As an alternative, a sand cement slurry (minimum 28-day compressive strength of 500 psi) may be used in place of native clay soil in both sides of the foundation.

Jetting of backfill is not an acceptable means of compaction. We may allow thicker loose lift thicknesses based on acceptable density test results, where increased effort is applied to rocky fill, or for the first lift of fill over pipe bedding.

5.5.3 Landscape Fill

Process, place and compact fill in accordance with the Fill Compaction Section except compact to at least 85 percent relative compaction (ASTM D1557).

5.6 SLOPES

5.6.1 Gradients

We recommend the following slope gradient guidelines for cut and fill slopes:

TABLE 5.6.1-1: Slope Gradient Guidelines

SLOPE GRADIENT (HORIZONTAL:VERTICAL)	CUT SLOPE HEIGHT (FEET)	FILL SLOPE HEIGHT (FEET)
2:1	10 or less	10 or less
3:1	Up to 50	Up to 50

Where slopes higher or steeper than those recommended above are desired, or based upon final grading plan slope stability analysis, supplemental slope stabilization techniques such as slope rebuilding, use of select fill materials, or incorporation of geogrid-reinforcing materials may be required.

To improve performance of slopes against erosion, in addition to typical erosion control protection such as hydroseeding or other techniques, we recommend that all finished slopes (cut and fill) receive roughly a 6-inch-thick layer of track-walked moistened strippings placed on a roughened, moistened slope. This will promote quick revegetation of slopes that will help hinder slope erosion.

The contractor is responsible to construct temporary construction slopes in accordance with CALOSHA requirements.

5.6.2 Fill Placed on Existing Slopes

We recommend keying and benching where fills are placed on original grade with a gradient of 8:1 or steeper.

Construct a minimum 18-foot-wide key inward from the toe of the new fill slope. Extend the key at least 2 feet below original grade into firm competent soil/rock, as evaluated by ENGEO. Slope the key bottom at least 2 percent downward toward the heel of the key. Deeper keys may be recommended by ENGEO based on actual soil/rock conditions observed during construction.

Cut benches into original grade after the key has been nearly filled and compacted in accordance with Fill Compaction Section. Construct benches into original slope grade as filling proceeds every 2 feet vertically, to remove loose soil/rock. Deeper bench depths may be recommended by ENGEO depending on actual conditions observed during construction. Bench widths may vary depending on the original slope grade and actual bench depth. Keyway and bench subdrain alternatives are presented on Figure 6.

Planned slopes will be reviewed and analyzed with respect to slope stability as part of the 40-scale grading plan review, at which time applicable remedial grading plans showing locations of keyways, select fill, and subdrains will be prepared. Supplemental stability analysis will also be performed as part of this review process to confirm minimum Factors of Safety will be achieved.

5.6.3 Subsurface Drainage

Subsurface drainage systems should be installed in keyways and swales or natural drainage areas. Typical keyway subdrains are shown on Figure 7.

We recommend that ENGEO be retained to review the final grading plans and show the approximate locations of recommended subdrains on a remedial grading plan. Depending on the actual conditions encountered during grading, similar subsurface drainage facilities may be recommended within low-lying areas. Subdrains should also be added where wet conditions are encountered during grading.

5.7 MANMADE LAKES

Based on preliminary plans and discussions with Monte Vista Memorial Investment Group, we understand two manmade lakes are to be constructed as a part of the overall site development. These lakes and associated stream connecting the two lakes will serve to catch a portion of the stormwater runoff from the site and will be continually circulated throughout both lakes.

One lake is to be located in the northern portion of the site, and will have a maximum depth elevation of 508 feet (approximately 8 feet below final grade). Additionally, this lake will be bisected by a concrete waterfall with the upslope side of the lake being at most 3 feet deep adjacent to the back of the wall and up 15 feet deep on the downslope side. The other lake will be located in the southwestern portion of the site and will have a maximum depth elevation of 489 feet (approximately 25 feet below final grade). The material excavated from these two areas will be used in the construction of the internal roadway throughout the site. Excavation of the manmade lakes and associated stream connecting these two features should comply with the recommendations provided in the Slope Gradient section.

5.7.1 Southern Lake Island

The construction of the southern manmade lake also includes the creation of an island near the northeast edge of the manmade lake. This island will house a pagoda chapel structure and pedestrian walkway connecting the island to the lakeshore. We understand that the island is to be constructed of engineered fill after the main excavation of the lake is completed. Based on preliminary grading plans, the finished grade of this island is set at 513 feet. Furthermore, the planned bottom elevation of the lake, at its deepest point, is approximately 489 feet. We recommend that fill slopes adhere to the recommendations provided in the Slope Gradient Section. All engineered fill should be placed in general conformance with the recommendations provided in the Fill Compaction section.

We recommend that ENGEO be retained to review the final grading plans and lake designs to confirm they are designed in general accordance with our recommendations, and provide supplemental recommendations as needed.

5.7.2 Lake Design Considerations

As described in Section 2.8, we performed hydraulic conductivity tests on in-situ and remolded samples of the native clay to evaluate the reuse as a clay liner. Based on our lab testing and review of existing data, it is our opinion that the onsite near surface clay soils may be suitable to use as material for the manmade lake liners; however, the lake designer should review the laboratory testing and confirm if the resulting hydraulic conductivity parameters are acceptable.

Once final grading plans of lake have been finalized, and in coordination with the lake designer, we can perform infiltration testing or seepage analysis to supplement the above recommendations and determine if an additive to reduce the hydraulic conductivity, such as bentonite, will be necessary.

5.8 SITE DRAINAGE

5.8.1 Surface Drainage

The project civil engineer is responsible for designing surface drainage improvements. With regard to geotechnical engineering issues, we recommend that finish grades be sloped away from buildings and pavements to the maximum extent practical. The latest California Building Code Section 1804.4 specifies minimum slopes of 5 percent away from foundations. Where development conditions restrict meeting this slope requirement, we recommend that specific drainage requirements be developed. As a minimum, we recommend the following:

1. Discharge roof downspouts into closed conduits and direct away from foundations to appropriate drainage devices.

2. Do not allow water to pond near foundations, pavements, or exterior flatwork.

5.9 STORMWATER INFILTRATION AND SELECT PROJECT RISK LEVEL FACTORS

Due to the density of the site soils and fines content (percentage passing the No. 200 sieve) generally exceeding 30 percent, the near-surface site soils are expected to have a low permeability value for stormwater infiltration in grassy swales or permeable pavers, unless subdrains are installed. Therefore, Best Management Practices should assume that limited stormwater infiltration will occur at the site.

5.10 STORMWATER BIORETENTION AREAS

We understand bioretention areas are planned as part of the overall site development; therefore, we recommend that, when practical, they be planned a minimum of 5 feet away from structural site improvements, such as buildings, streets, retaining walls, and sidewalks/driveways. When this is not practical, bioretention areas located within 5 feet of structural site improvements can either:

1. Be constructed with structural side walls capable of withstanding the loads from the adjacent improvements, or

2. Incorporate filter material compacted to between 85 and 90 percent relative compaction (ASTM D1557, latest edition) and a waterproofing system designed to reduce the potential for moisture transmission into the subgrade soil beneath the adjacent improvement.

In addition, one of the following options should be followed.

1. We recommend that bioretention design incorporate a waterproofing system lining the bioswale excavation and a subdrain, or other storm drain system, to collect and convey water to an approved outlet. The waterproofing system should cover the bioretention area excavation in such a manner as to reduce the potential for moisture transmission beneath the adjacent improvements.

2. Alternatively, and with some risk of movement of adjacent improvements, if infiltration is desired, we recommend the perimeter of the bioretention areas be lined with an HDPE tree root barrier that extends at least 1 foot below the bottom of the bioretention areas/infiltration trenches.

Site improvements located adjacent to bioretention areas that are underlain by base rock, sand, or other imported granular materials, should be designed with a deepened edge that extends to the bottom of the imported material underlying the improvement.

Where adjacent site improvements include buildings greater than three stories, streets steeper than 3 percent, or design elements subject to lateral loads (such as from impact or traffic patterns), additional design considerations may be recommended. If the surface of the bioretention area is depressed, the slope gradient should follow the slope guidelines described in earlier section(s) of this document. In addition, although not recommended, if trees are to be planted within bioretention areas, HDPE Tree Boxes that extend below the bottom of the bioretention system should be installed to reduce potential impact to subdrain systems that may be part of the bioretention area design. For this condition, the waterproofing system should be connected to the HPDE Tree Box with a waterproof seal.

Given the nature of bioretention systems and possible proximity to improvements, we recommend ENGEO be retained to review design plans and provide testing and observation services during the installation of linings, compaction of the filter material, and connection of designed drains.

It should be noted that the contractor is responsible for conducting all excavation and shoring in a manner that does not cause damage to adjacent improvements during construction and future maintenance of the bioretention areas. As with any excavation adjacent to improvements, the contractor should reduce the exposure time such that the improvements are not detrimentally impacted.

5.11 LANDSCAPING CONSIDERATION

As the near-surface soils are moderately to highly expansive, we recommend greatly restricting the amount of surface water infiltration near structures, pavements, flatwork, and slabs-on-grade. This may be accomplished by:

- Selecting landscaping that requires little or no watering, especially within 3 feet of structures, slabs-on-grade, or pavements.
- Using low precipitation sprinkler heads.
- Regulating the amount of water distributed to lawn or planter areas by installing timers on the sprinkler system.
- Providing surface grades to drain rainfall or landscape watering to appropriate collection systems and away from structures, slabs-on-grade, or pavements.
- Preventing water from draining toward or ponding near building foundations, slabs-on-grade, or pavements.
- Avoiding open planting areas within 3 feet of the building perimeter.

We recommend that these items be incorporated into the landscaping plans.

5.12 REMEDIAL GRADING PLANS

Due to the complex geology, and hillside topography, we recommend that ENGEO be retained to prepare remedial grading plans, for this project once final grading plans have been completed. This is important to clarify our geotechnical recommendations related to keyways, benches and subdrains. In preparing these plans, we intend to overlay the grading plans with graphic representations of our grading and subsurface drainage recommendations presented in this report. This allows the unique hillside geotechnical recommendations to be clearly displayed on the grading plans. This can assist in obtaining more accurate earthwork bids as well as clarifying the geotechnical recommendations as they apply to the final grading plan.

6.0 FOUNDATION RECOMMENDATIONS

We developed foundation recommendations using data obtained from our field exploration, laboratory test results, and engineering analysis. We recommend the funeral home and pavilion building foundations consist of a conventional structural mat foundation. Furthermore, we developed deep foundation recommendations for the two single span bridges and auxiliary solar panel trellis and pedestrian boardwalk through the wetland area.

6.1 CONVENTIONAL MAT FOUNDATION

The proposed funeral home and pavilion building can be supported on a structural mat foundation. The mat foundations should be designed to impose a maximum allowable uniform bearing pressure of 1,500 pounds per square foot (psf) for dead plus long-term live loads. The allowable bearing capacity may be increased to 2,000 psf in areas of loading concentration. These values may be increased by one-third when considering transient loads, such as wind or seismic. We recommend that structural mat foundations be designed for an edge-cantilever distance of 5 feet, and unsupported interior free span of 10 feet. A modulus of subgrade reaction of 75 kips per cubic foot can be used for engineered fill or native soil.

The design should incorporate 1½-inch total and ¾-inch differential settlement due to liquefaction settlement. The differential settlement may be assumed to occur over a horizontal distance of 30 feet or between adjacent column supports, whichever is closer.

Differential settlement between the proposed at-grade and below grade portions of the funeral home structure is also a geotechnical concern considering the structure will have a multi-level building pad. Assuming the at-grade and below-grade portions of the building are structurally connected, we recommend that foundation and structural design incorporate an additional ½ inch of differential settlement between the at-grade and below grade portions of the structure.

Resistance to lateral loads may be provided by frictional resistance between the foundation concrete and the subgrade soils and by passive earth pressure acting against the side of the foundation. A coefficient of friction of 0.30 can be used between concrete and the subgrade. If a waterproofing membrane is placed below the mat, a coefficient of friction of 0.20 should be used. Passive pressures can be taken as equivalent to the pressure developed by a fluid having a weight of 250 pounds per cubic foot (pcf).

6.1.1 Below-Grade Building Pad Subgrade Preparation

Based on our field exploration and laboratory testing, we anticipate low to moderately expansive soils will be encountered at the below-grade levels of the structure. Depending on the depth of the basement excavation and time of construction, the subgrade soils may be weak and/or near saturation. We recommend assuming the upper 18 inches of subgrade soils will require stabilization prior to improvements construction. This may be accomplished by overexcavation and one or more of the following options:

- Construction of a working pad of 18 inches of clean crushed rock and incorporating a geotextile stabilization fabric if needed.

- Construction of a lean concrete rat slab.

- Chemical treatment of the subgrade soils.

Even after stabilization, the building pad will be susceptible to disturbance under construction equipment loads. The contractor should limit the use of heavy and/or rubber-tired equipment on the subgrade to reduce potential for creation of unstable areas. Where the subgrade is disturbed during construction, the disturbed material should be removed and replaced with crushed rock or lean concrete.

6.1.2 Buoyancy Impacts

The below-grade basement may be founded below the 10-foot design groundwater level and may be subject to buoyancy impacts. The foundation should be designed to resist hydrostatic uplift pressures due to the design groundwater level of 10 feet below existing grade. Uplift resistance can be provided by the weight of the foundation elements and the dead loads of the building. The Structural Engineer should evaluate the buoyancy uplift on the structure and determine if additional resistance is necessary. Viable alternatives for added uplift resistance include hold-down piers or anchors. These can be designed as active or passive systems for which ENGEO can provide more details as necessary.

6.1.3 Waterproofing Considerations

The mat foundation and basement walls should be waterproofed and designed to resist hydrostatic and/or uplift pressures. The waterproofing should be designed by a specialty consultant that specializes in permanent waterproofing construction. Waterstops should be placed at all construction joints.

6.2 BUILDING RETAINING WALLS

It is anticipated the funeral home building will include below-grade retaining walls up to 12 feet in height. The building retaining walls should be designed to resist lateral earth pressures from natural materials and/or backfill and from any surcharge loads. Provided that adequate drainage is included as recommended below, the restrained walls may be designed using an at-rest equivalent fluid pressure of 80 pcf. The design should account for one-half of any vertical surcharge loads applied as a uniform lateral load to the top 10 feet of the wall.

If the structure is designed to resist hydrostatic pressures because of limited below-grade drainage, then the building walls should have drainage facilities above the design groundwater depth of 10 feet below existing grade to reduce the potential for build-up of hydrostatic pressures. The wall design should include an additional 40 pcf hydrostatic pressure for depths greater than the design depth to groundwater of 10 feet below ground surface.

We recommend the seismic performance of the basement retaining walls be evaluated using an active equivalent fluid weight of 50 pcf for drained conditions and an active equivalent fluid weight of 90 pcf for undrained conditions, and a seismic increment of 25 pcf, in accordance with Lew, et al. (2010). This evaluation should be separate from the static design using at-rest earth pressures. Passive pressures acting on foundations should be designed in accordance with the recommendations in Section 6.1 above.

6.2.1 Wall Drainage

In general, all walls retaining more than 2 feet of soil that are not designed to resist hydrostatic pressures should be provided with drainage facilities to prevent the build-up of hydrostatic pressures behind the walls. Wall drainage may be provided using a 4-inch-diameter perforated pipe embedded in either free-draining gravel surrounded by synthetic filter fabric (minimum 6-ounce) or Class 2 permeable material (Part 2 of Supplemental Recommendations, Section 2.05B). The width of the drain blanket should be at least 12 inches, and the drain blanket should extend to about 1 foot below the finished grades. The upper 1 foot of wall backfill should consist of compacted site soils. Drainage should be collected into solid pipes and directed to an outlet approved by the Civil Engineer. Synthetic filter fabric should meet the minimum requirement listed in the Supplemental Recommendations and be preapproved by the Geotechnical Engineer prior to delivery.

Design details for draining the below grade retaining walls above the groundwater level should be determined during the design process. A sump system may be needed for drainage unless the storm drain system will allow for gravity connection and outfall. Construct either graded rock drains or geosynthetic drainage composites behind the retaining walls to reduce hydrostatic lateral forces. For rock drain construction, we recommend two types of rock drain alternatives:

1. A minimum 12-inch-thick layer of Class 2 Permeable Filter Material (Caltrans Specification 68-1.025) placed directly behind the wall, or

2. A minimum 12-inch-thick layer of washed, crushed rock. Envelop rock in a minimum 6-ounce, nonwoven geotextile filter fabric.

For both types of rock drains:

- Place the rock drain directly behind the walls of the structure.

- Extend rock drains from a depth of 10 feet below the existing ground surface to within 12 inches of the top of the wall.

- Place a minimum of 4-inch-diameter perforated pipe at the base of the drain material, inside the rock drain and fabric, with perforations placed down.

- Place pipe at a gradient of at least 1 percent to direct water away from the wall by gravity to a sump or drainage facility.

ENGEO should review and approve geosynthetic composite drainage systems prior to use.

6.2.2 Wall Backfill

Backfill behind retaining walls should be placed and compacted in accordance with fill placement recommendations. Use light compaction equipment within 5 feet of the wall face. If moderate to heavy compaction equipment is used, the walls should be temporarily braced to avoid excessive wall movement. Alternatively, the wall design can incorporate additional surcharge loading to allow moderate to heavy equipment.

6.3 TEMPORARY EXCAVATIONS

The Contractor should be familiar with applicable local, state, and federal regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. It is the responsibility of the Contractor to provide stable, safe trench and construction slope conditions and to follow OSHA safety requirements. Since excavation procedures may be dangerous, it is also the responsibility of the Contractor to provide a trained “competent person” as defined by OSHA to supervise all excavation operations, ensure that all personnel are working in safe conditions and have thorough knowledge of OSHA excavation safety requirements.

6.4 TEMPORARY DEWATERING

Temporary dewatering during construction may be necessary to keep the excavation and working areas reasonably dry. Dewatering should be performed in a manner such that water levels are maintained not less than 2 feet below the bottom of excavation prior to and continuously during shoring installation. As the excavations progress, it may be necessary to dewater the soils ahead of the excavation, such as by continuous pumping from sumps, to control the tendency for the bottom of the excavation to heave under hydrostatic pressures and to reduce inflow of water or soil from beneath temporary shoring, should shoring be utilized. An active dewatering system such as dewatering wells should be considered but may be inefficient and cost-prohibitive considering the clayey site soils. Selection of temporary dewatering method(s) should be coordinated with selection of temporary shoring systems.

Ultimately, the selection of equipment and method should be determined by the contractor/designer. The dewatering system implemented should be selected to have minimal impact on the groundwater level surrounding the proposed excavations. The dewatering system should be designed to prevent pumping soil fines with the discharge water. Uncontrolled dewatering could cause settlement of the general area and affect existing improvements in the vicinity of the site. Therefore, adjacent improvements should be monitored for vertical movement during construction.

Groundwater management including temporary storage in Baker tanks (or similar) and testing should be considered prior to discharge of generated water. Requirements of potential receiving facilities should be determined in advance of construction. Impacted groundwater may require discharge to a specialty facility.

7.0 BRIDGE FOUNDATION RECOMMENDATIONS

We understand that two vehicular bridges are proposed to span across Arroyo Las Positas. Based on preliminary plans, the bridges will be single-span of approximately 80 to 100 feet, and we estimate each bridge will be approximately 30 feet wide. We recommend the bridge abutments be supported on cast-in-drilled-hole (CIDH) pier foundations.

As discussed, we also provide preliminary design recommendations to support the bridge abutments on helical pile foundations.

The recommendations below should be considered preliminary in nature. Once additional information, including foundation type(s) and loading are developed, we should revisit and update our recommendations.

7.1 DRILLED PIERS

Based on the soil conditions encountered at the site, we recommend that the vehicular bridges be supported on cast-in-drilled-hole (CIDH) straight-shaft friction piers. The soil cirteria for the drilled piers are listed below. The proposed minimum pier depths for each support is based on estimated loads from previous single span bridge projects.

• Minimum diameter:	2 feet.
• Minimum pier depth:	Southern Bridge: 40 feet at both abutments Northern Bridge: 40 feet at both abutments

TABLE 7.1-1: Ultimate Skin Friction Values for Southern Bridge

LOCATION	ELEVATION (FEET)	ULTIMATE SKIN FRICTION-STATIC (PSF)	ULTIMATE SKIN FRICTION-SEISMIC (PSF)
West and East Abutments Approximate Surface Elevation = 487 feet	482 – 487	0	400*
	477 – 482	500	400*
	472 – 477	700	600*
	462 – 472	700	200*
	Below 462	2,500	2,500

**Apply as a downdrag load, factor of safety should not be applied.*

TABLE 7.1-2: Ultimate Skin Friction Values for Northern Bridge

LOCATION	ELEVATION (FEET)	ULTIMATE SKIN FRICTION-STATIC (PSF)	ULTIMATE SKIN FRICTION-SEISMIC (PSF)
North Abutment Approximate Surface Elevation = 487 feet	482 – 487	0	0
	472 – 482	500	400*
	467 – 472	700	200*
	Below 467	2,500	2,500
South Abutment Approximate Surface Elevation = 487 feet	482 – 487	0	0
	472 – 482	500	400*
	462 – 472	700	200*
	Below 462	2,500	2,500

** Apply as a downdrag load, factor of safety should not be applied.*

The Structural Engineer should design the foundation elements for the actual loading requirements, including the steel reinforcement.

Research has shown that the lateral capacity of a group of piles is generally less than that of a single pile for pile spacings less than 6 to 8 pile diameters. For pile groups with a minimum spacing of 3 pile diameters, we recommend reducing the single pile allowable lateral capacities by the following percentages in Table 7.1-3.

TABLE 7.1-3: Group Reduction Percentages

NO. OF PILES IN GROUP	PERCENTAGE TO REDUCE SINGLE PILE CAPACITY BY
2	25
4	30
9	43
16	48
25	54

Please contact us if group reduction percentages are needed for additional pile group configurations.

Based on the shallow groundwater and the granular layers found in the exploratory points, dewatering and casing of the proposed piers may be necessary.

The bottoms of pier excavations should be dry, reasonably clean, and free of loose soil before reinforcing steel is installed and concrete is placed. We recommend that the excavation of piers be performed under our direct observation to establish that the piers are founded in suitable materials and constructed in accordance with the recommendations presented in this letter.

Due to the potential for caving, each shaft may need to be cased. If groundwater is encountered, remove it from excavations prior to concrete placement. If groundwater cannot be removed from excavations prior to concrete placement, then we recommend that concrete be placed by tremie pipe. The concrete should be tremied to the bottom of the hole keeping the tremie pipe below the surface of the concrete to avoid entrapment of water in the concrete. As concrete is poured, water is displaced out of the hole.

7.1.1 Lateral Pile Capacities

We anticipate the computer program, L-Pile, will be used in pile lateral loading computations. Based on our field data, the soil parameters for the computer input were developed. The following tables list the input criteria for the computer software.

TABLE 7.1.1-1: Southern Bridge - East and West Abutment

ELEVATION (FEET)	GENERALIZED SOIL PROFILE	L-PILE SOIL TYPE	SOIL STRENGTH (KSF) OR FRICTION ANGLE (DEGREES)	k (PCI)	E_{50}	EFFECTIVE UNIT WEIGHT (PCF)
Above 477	Sandy Clay	Stiff Clay	1.0	500	0.007	120
Between 477 and 462*	Clayey Sand	Sand	30°	60	---	60
Below 462	Clay	Very Stiff Clay	4.0	1,000	0.005	60

*Use liquefaction P-Multiplier of 0.12 for this layer.

TABLE 7.1.1-2: Northern Bridge – North Abutment

ELEVATION (FEET)	GENERALIZED SOIL PROFILE	L-PILE SOIL TYPE	SOIL STRENGTH (KSF) OR FRICTION ANGLE (DEGREES	k (PCI)	E_{50}	EFFECTIVE UNIT WEIGHT (PCF)
Above 477	Sandy Clay	Stiff Clay	1.0	500	0.007	120
Between 472 and 477	Sandy Clay	Stiff Clay	1.0	500	0.007	60
Between 467 and 472*	Clayey Sand	Sand	30°	60	---	60
Below 467	Clay	Very Stiff Clay	4.0	1,000	0.005	60

*Use liquefaction P-Multiplier of 0.12 for this layer.

TABLE 7.1.1-3: Northern Bridge – South Abutment

ELEVATION (FEET)	GENERALIZED SOIL PROFILE	L-PILE SOIL TYPE	SOIL STRENGTH (KSF) OR FRICTION ANGLE (DEGREES	k (PCI)	E_{50}	EFFECTIVE UNIT WEIGHT (PCF)
Above 477	Sandy Clay	Stiff Clay	1.0	500	0.007	120
Between 472 and 477	Sandy Clay	Stiff Clay	1.0	500	0.007	60
Between 462 and 472*	Clayey Sand	Sand	30°	60	---	60
Below 462	Clay	Very Stiff Clay	4.0	1,000	0.005	60

*Use liquefaction P-Multiplier of 0.12 for this layer.

7.2 HELICAL PILES

We provide the following preliminary design recommendations for use in the design of the helical anchor foundations for the bridges:

TABLE 7.2-1: Preliminary Design Recommendations

LOCATION	EMBEDMENT ELEVATION (FEET)	ALLOWABLE END BEARING CAPACITY (PSF)
Southern Bridge	461	11,000 x Area*
Northern Bridge	460	11,000 x Area*

*Area = Area of the circular plate

The above design capacities are based off a 50-foot embedment depth of the helical pile and one helical plate at the end of the pile. If multiple plates are to be used and the spacing of each helix is greater than 3B (where B is the diameter of the helical plate) from one another, the above capacities can be multiplied by the number of helical plates along the pile. Additionally, no more than five helical plates may be used along the pile.

Uplift capacities can utilize the end bearing capacities and design methodology presented above, however a reduction factor of 0.8 should be applied to the end bearing capacity values to account for soil disturbance above the helical plate as a result of installation.

Finally, due to the limited capabilities of vertical helical piles to resist lateral loads, we recommend a number of helical piles be battered to resist lateral loads. Lateral load analysis may utilize the input criteria presented in the previous Lateral Pile Capacity Section.

7.2.1 Wing Walls and Abutment Walls

If backfilled with onsite soils, wing and abutment walls should be designed for lateral fluid pressure as provided in the following Lateral Soil Pressure Section. Additionally, we recommend the retaining walls include dynamic seismic earth pressures. If Caltrans structural back fill material is used behind wing and abutment walls, the associated Caltrans loading criteria should be assumed.

Applicable loading, including surcharges due to traffic, buildings, stockpiles, construction equipment, etc. should be incorporated into shoring design when the surcharge loading is situated above a 1:1 line of projection extending up the bottom of wall. Appropriate safety factors against overturning and sliding should be incorporated into the design calculations.

Foundation plans should be submitted to the Geotechnical Engineer for review when they are available.

8.0 SITE RETAINING WALLS

8.1 LATERAL SOIL PRESSURES

Unrestrained drained retaining walls constructed on level ground may be designed using the following active equivalent fluid weights in pounds per cubic foot (pcf).

TABLE 8.1-1: Active Equivalent Fluid Pressures

BACKFILL SLOPE CONDITION (HORIZONTAL:VERTICAL)	ACTIVE PRESSURE (POUNDS PER CUBIC FOOT)
Level	50
3:1	60
2:1	70

Appropriate surcharge loads from vehicles, sidewalk/hardscape, buildings, and other potential surcharge loadings, as applicable, should be incorporated when the surcharge loading is situated above a 1:1 (horizontal:vertical) line of projection extending up from the bottom of the wall. If needed, vertical surcharge loads may be applied as uniform, horizontal surcharge loading equal to 50 percent of the vertical surcharge load. Unless appropriate surcharge loading for construction equipment is incorporated in the wall designs, light hand-operated equipment should be used during backfill compaction of engineered fill and improvement construction behind the walls, to reduce potential for possible overstressing of the walls

8.1.1 Wall Seismic Design

Seismic conditions should be considered in the design of the perimeter retaining walls. Under seismic conditions, the active incremental seismic force along the face of a retaining wall should be added to the static active pressures, and can be calculated as follows:

$$\Delta P = 14 \text{ x } H^2$$

H is the design height of the wall (in feet) and ΔP is the active incremental seismic force in pounds per foot of wall. This force has a horizontal direction and should be applied at $^1/_3$ x H from the base of the wall. This force should be combined with the appropriate active equivalent pressure.

8.2 RETAINING WALL DRAINAGE

Drainage facilities should be installed behind retaining walls to prevent the build-up of hydrostatic pressures on the walls. Wall drainage may be provided using 4-inch-diameter perforated (SDR 35 or approved equivalent) pipe encapsulated in either Class 2 permeable material, or free-draining gravel surrounded by synthetic filter fabric.

The width of the gravel-type drain blanket should be at least 12 inches. The drain blanket should extend from the base of the wall to about 1 foot below the finished grade at top of wall. The upper 1 foot of wall backfill should consist of clayey soil or other approved, relatively impervious material.

If preapproved by the Geotechnical Engineer, prefabricated wall drain panels could be considered in lieu of the granular drain blanket above the pipe system. Drainage should be collected by solid pipes and directed to an outlet approved by the Civil Engineer.

8.3 FOUNDATIONS

8.3.1 Shallow Continuous Footings

We recommend that retaining wall footings be designed using an allowable bearing pressure of 2,500 pounds per square foot (psf) for dead-plus-live-loading conditions. This value may be increased by one-third when evaluating the short-term effects of wind or seismic loading.

For a level foreground condition, the footing should be embedded at least 24 inches below lowest adjacent grade. We recommend a minimum footing thickness of 12 inches. Actual footing design (sizing, reinforcement, etc.) should be determined by the structural engineer based on structural design considerations. Footings located adjacent to utility trenches should have their bearing surfaces below an imaginary 1:1 plane projected upward from the bottom edge of the trench to the footing.

Passive pressures acting on footing foundations may be assumed as 250 pcf. Unless the surface directly in front of the wall is confined by a slab or pavement, we recommend starting passive pressure resistance at a depth of 1 foot below lowest adjacent grade, or that depth necessary to achieve a horizontal distance of 10 feet between the outer base edge of the footing and nearest free face, whichever is shallower. The friction factor for sliding resistance may be assumed as 0.30. Appropriate safety factors against overturning and sliding should be incorporated into the design calculations.

8.3.2 Drilled Pier Foundations

We recommend concrete waterfall retaining wall at the upper lake be supported on CIDH piers because of the sloping foreground below the wall. Additionally, we understand that a number of auxiliary structures may be constructed using drilled piers including: solar trellises, pedestrian boardwalks, and a pagoda chapel located on the island within the southern lake. The following recommendations should be used for design of these structures:

TABLE 8.3.2-1: Design Parameters for Drilled Piers

PIER DESIGN ELEMENT	AUXILIARY STRUCTURE DESIGN PARAMETERS	CONCRETE WATERFALL DESIGN PARAMETER
Minimum pier diameter:	12 inches.	12 inches.
Minimum pier depth:	8 feet	10 feet
Downward load capacity (allowable skin friction):	350 psf. This value may be increased by one-third when considering seismic or wind loads. Exclude the upper 2 feet of the pier shaft from pier load capacity computations	500 psf. This value may be increased by one-third when considering seismic or wind loads. Exclude the upper 2 feet of the pier shaft from pier load capacity computations

PIER DESIGN ELEMENT	AUXILIARY STRUCTURE DESIGN PARAMETERS	CONCRETE WATERFALL DESIGN PARAMETER
Minimum pier spacing:	3 pier diameters, center-to-center	3 pier diameters, center-to-center
Passive Resistance Pressure:	250 pcf acting on 2 times the pier diameter. This value may be increased by one-third when considering seismic or wind loads. Passive resistance may start at the depth required to provide 10 feet of lateral confinement in front of the drilled piers. The passive resistance may be applied over two pier diameters	300 pcf acting on 2 times the pier diameter. This value may be increased by one-third when considering seismic or wind loads. Passive resistance may start at the depth required to provide 10 feet of lateral confinement in front of the drilled piers. The passive resistance may be applied over two pier diameters.

Appropriate safety factors against bending of wall elements and pier embedment should be incorporated into the design calculations. Actual pier depths and spacing should be determined by the structural engineer based on structural design considerations.

9.0 PAVEMENT DESIGN

9.1 FLEXIBLE PAVEMENTS

We obtained a representative bulk sample of the surface soil from the site area and performed R-value tests to provide data for pavement design. The results of the test are included in Appendix B and indicate an R-value of 11 and 15. Because surface soils vary across the site, it is our opinion that an R-value of 10 is applicable for design. Using estimated traffic indices for various pavement loading requirements, we developed the following recommended pavement sections using Topic 633 of the Caltrans Highway Design Manual (including the asphalt factor of safety), presented in the table below.

TABLE 9.1-1: Recommended Asphalt Concrete Pavement Sections

TRAFFIC INDEX	SECTION	
	ASPHALT CONCRETE (INCHES)	CLASS 2 AGGREGATE BASE (INCHES)
5	3	11
6	3.5	14
7	4	17

The civil engineer should determine the appropriate traffic indices based on the estimated traffic loads and frequencies.

9.2 RIGID PAVEMENTS

Use concrete pavement sections to resist heavy loads and turning forces in areas such as fire lanes or trash enclosures. Final design of rigid pavement sections, and accompanying reinforcement, should be performed based on estimated traffic loads and frequencies. We recommend the following minimum design sections for rigid pavements:

- Use a minimum section of 6 inches of Portland Cement concrete over 12 inches of Caltrans Class 2 Aggregate Base.

- Concrete pavement should have a minimum 28-day compressive strength of 3,500 psi.

- Provide minimum control joint spacing in accordance with Portland Cement Association guidelines.

9.3 SUBGRADE AND AGGREGATE BASE COMPACTION

Compact finish subgrade and aggregate base in accordance with Fill Compaction Section. Aggregate Base should meet the requirements for ¾-inch maximum Class 2 AB in accordance with Section 26-1.02B of the latest Caltrans Standard Specifications.

9.4 CUT-OFF CURBS

Saturated pavement subgrade or aggregate base can cause premature failure or increased maintenance of asphalt concrete pavements. This condition often occurs where landscape areas directly abut and drain toward pavements. If desired to install pavement cutoff barriers, they should be considered where pavement areas lie downslope of any landscape areas that are to be sprinklered or irrigated, and should extend to a depth of at least 4 inches below the base rock layer. Cutoff barriers may consist of deepened concrete curbs or deep-root moisture barriers.

If reduced pavement life and greater than normal pavement maintenance are acceptable to the owner, then the cutoff barrier may be eliminated.

10.0 SLABS-ON-GRADE

10.1 EXTERIOR FLATWORK

Exterior flatwork includes items such as concrete sidewalks, steps, and outdoor courtyards exposed to foot traffic only. Provide a minimum section of 4 inches of concrete over 4 inches of aggregate base. Compact the aggregate base to at least 90 percent relative compaction (ASTM D1557). Consideration should be given to thicken flatwork edges to at least 10 inches to help control moisture variations in the subgrade and place rebar within the middle third of the slab to help control the width and offset of cracks. Construct control and construction joints in accordance with current Portland Cement Association Guidelines.

11.0 GROUND HEAT EXCHANGE

Based on our findings and review of the proposed development, we consider the site to be *highly* suitable for using a Ground Heat-Exchange (GHX) system to achieve energy savings and to potentially eliminate the need for outdoor air conditioner units, if desired.

For the thermal properties of the soil and groundwater conditions at the site, an open-loop GHX system would likely be well suited and could be implemented on select buildings, or integrated into a project-wide system.

As project planning progresses into architectural design, we can meet with you, your architect, and your MEP designer to further assess and develop GHX energy saving opportunities and efficiencies.

12.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents geotechnical recommendations for design of the improvements discussed in Section 1.3 for the Monte Vista Memorial Investment Group project. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the owner to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, and designers. The conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strived to perform our professional services in accordance with generally accepted geotechnical engineering principles and practices currently employed in the area; no warranty is expressed or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks or provide insurance; therefore, we are unable to guarantee or warrant the results of our services.

This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data. We assumed that our subsurface exploration data is representative of the actual subsurface conditions across the site. Considering possible underground variability of soil, rock, stockpiled material, and groundwater, additional costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, notify ENGEO immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

Our services did not include excavation sloping or shoring, soil volume change factors, flood potential, or a geohazard exploration. In addition, our geotechnical exploration did not include work to determine the existence of possible hazardous materials. If any hazardous materials are encountered during construction, notify the proper regulatory officials immediately.

This document must not be subject to unauthorized reuse, that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document’s applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications or other changes to ENGEO’s documents. Therefore, ENGEO must be engaged to prepare the necessary clarifications, adjustments, modifications or other changes before construction activities commence or further activity proceeds. If ENGEO’s scope of services does not include on-site construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.

We determined the lines designating the interface between layers on the exploration logs using visual observations. The transition between the materials may be abrupt or gradual. The exploration logs contain information concerning samples recovered, indications of the presence of various materials such as clay, sand, silt, rock, existing fill, etc., and observations of groundwater encountered. The field logs also contain our interpretation of the subsurface conditions between sample locations. Therefore, the logs contain both factual and interpretative information. Our recommendations are based on the contents of the final logs, which represent our interpretation of the field logs.

SELECTED REFERENCES

Barlock, V.E., 1988, Geologic map of the Livermore gravels, Alameda County, California: U.S. Geological Survey, Open-File Report OF-88-516, scale 1:24,000.

Barlock, V.E., 1989, Sedimentology of the Livermore gravels (Miocene-Pleistocene), southern Livermore Valley, California: U.S. Geological Survey, Open-File Report OF-89-131, scale 1:48,000.

Bray, J. D., & Sancio, R. B, (2006). Assessment of the liquefaction susceptibility of fine-grained soils. Journal of Geotechnical and Geoenvironmental Engineering, 132(9), 1165-1177.

Bryant, W. and Hart, E., 2007, Special Publication 42, “Fault-Rupture Hazard Zones in California”, Interim Revision 2007, California Department of Conservation.

California Building Code, 2013.

California Division of Mines and Geology, 1982, Official map of Alquist-Priolo Earthquake Fault Hazard Zones, Livermore Quadrangle: California Division of Mines and Geology, scale 1:24,000.

California Geologic Survey, 2008, Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California.

Caltrans. (2013). “Seismic Design Criteria Version 1.7.” California Department of Transportation.

Dibblee, T.W., 1980, Preliminary geologic map of the Livermore quadrangle, Alameda and Contra Costa Counties, California: U.S. Geological Survey, Open-File Report OF-80-533-B, scale 1:24,000.

Dibblee, T.W., and Minch, J.A., 2006, Geologic map of the Livermore quadrangle, Contra Costa & Alameda Counties, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-196, scale 1:24,000.

Division of Mines and Geology, 1997, Special Publication 117, Guidelines for Evaluation and Mitigating Seismic Hazards in California, Adopted March 13.

ENGEO, January 31, 2012, Geotechnical Exploration, Los Gatos Highlands, Backbone Infrastructure, Los Gatos, California, Project No. 9312.000.000.

Idriss, I. M., & Boulanger, R. W. (2008). Soil liquefaction during earthquakes. Earthquake Engineering Research Institute.

Ishihara, K. (1985). Stability of Natural Deposits During Earthquakes, Proceedings of the 11th International Conference on Soil Mechanics and Foundation Engineering, Vol 1, A. A. Balkema, Rotterdam, The Netherlands, 321-376.

SELECTED REFERENCES (Continued)

Majmundar, H.H., 1991, Landslide hazards in the Livermore Valley and vicinity, Alameda and Contra Costa counties, California: Landslide Hazard Identification Map No. 21: California Division of Mines and Geology, Open-File Report 91-02, scale 1:24,000.

Nilsen, T.H., 1975, Preliminary photointerpretation maps of landslide and other surficial deposits of 56 - 7.5 minute quadrangles, Alameda, Contra Costa, and Santa Clara Counties, California: U.S. Geological Survey, Open-File Report OF-75-277, scale 1:24,000.

Robertson, P. K. (2009). Performance based earthquake design using the CPT, Gregg Drilling and Testing, Inc.

V.A. Sowa, Pulling capcity of concrete cast in-situ bored piles, Canadian Geotechnical Journal 7 (4) (1970) 482-493.

Youd, T. L. and Garris, C. T. (1995). Liquefaction induced Ground-Surface Description: Journal of Geotechnical Engineering, 121(11), 805-809.

Witter, R.C., Knudsen, K.L., Sowers, J.M., Wentworth, C.M., Koehler, R.D., Randolph, C.E., Brooks, S, K., and Gans, K.D., 2006, Maps of Quaternary deposits and liquefaction susceptibility in the central San Francisco Bay region, California: U.S. Geological Survey, Open-File Report OF-2006-1037, scale 1:200,000.

FIGURES

Esri, HERE, Garmin, © OpenStreetMap contributors, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

ENGEO
Expect Excellence

VICINITY MAP
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO. : 15426.000.000
SCALE: AS SHOWN
DRAWN BY: QRL
CHECKED BY: AHF
FIGURE NO. 1

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

— — —	GEOLOGIC CONTACT
1-CPT5 ●	CONE PENETRATION TEST (ENGEO, 2018)
1-TP8 ▨	TEST PIT (ENGEO, 2018)
1-B15 ●	SOLID FLIGHT AUGER BORING (ENGEO, 2018)
1-B6 ●	MUD ROTARY BORING (ENGEO, 2018)

Qaf	ARTIFICIAL FILL
Qc	COLLUVIUM
Qhal	HOLOCENE ALLUVIUM
Qal	OLDER ALLUVIUM AND ALLUVIAL TERRACE DEPOSITS
QTlu	LIVERMORE GRAVELS

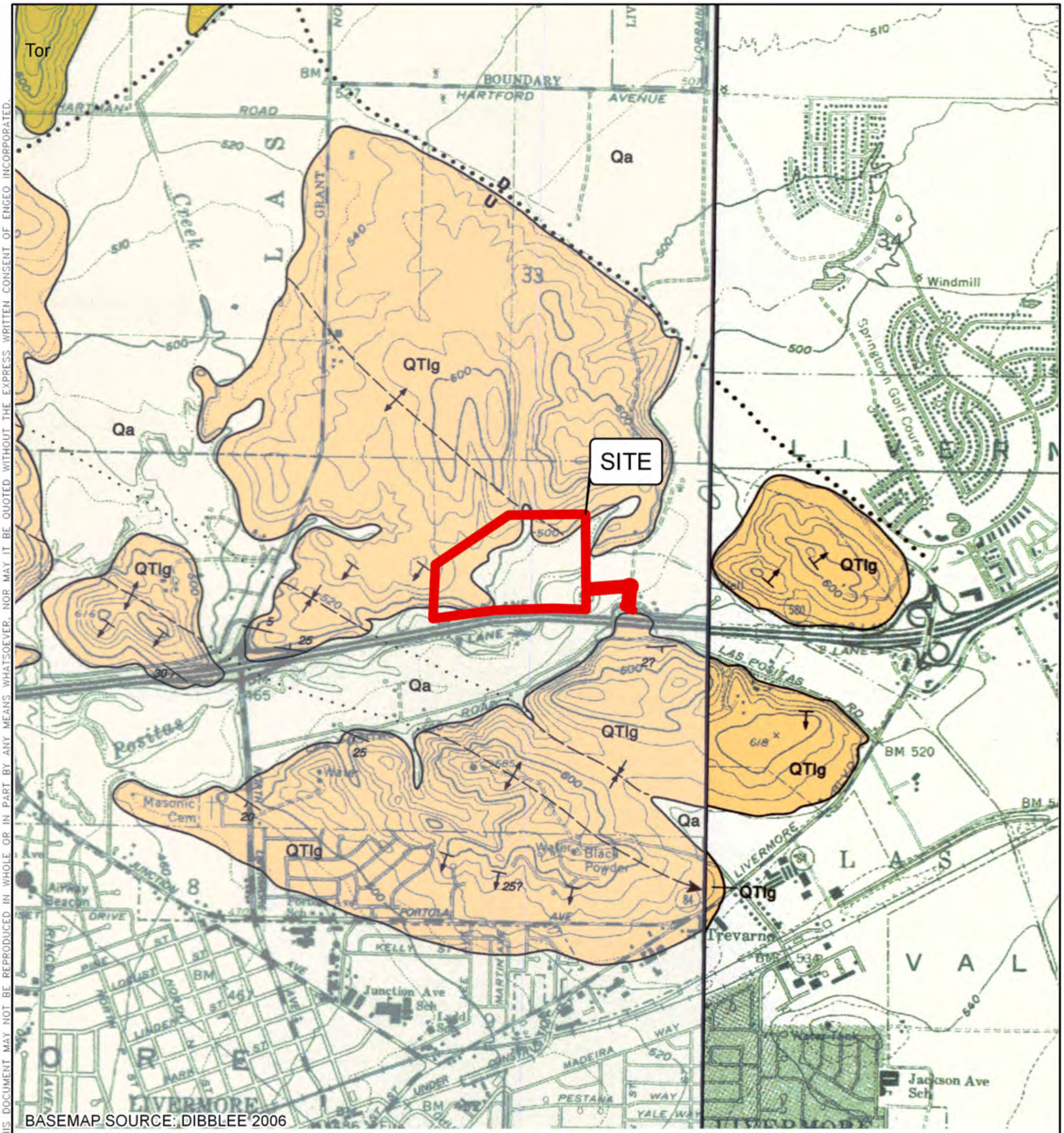
BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO
Expect Excellence

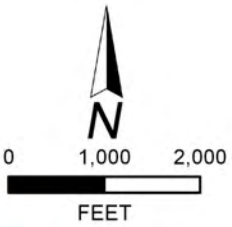
SITE PLAN
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO.: 15426.000.000
SCALE: AS SHOWN
DRAWN BY: LL
CHECKED BY: AHF
FIGURE NO. 2

ORIGINAL FIGURE PRINTED IN COLOR



BASEMAP SOURCE: DIBBLEE 2006



EXPLANATION

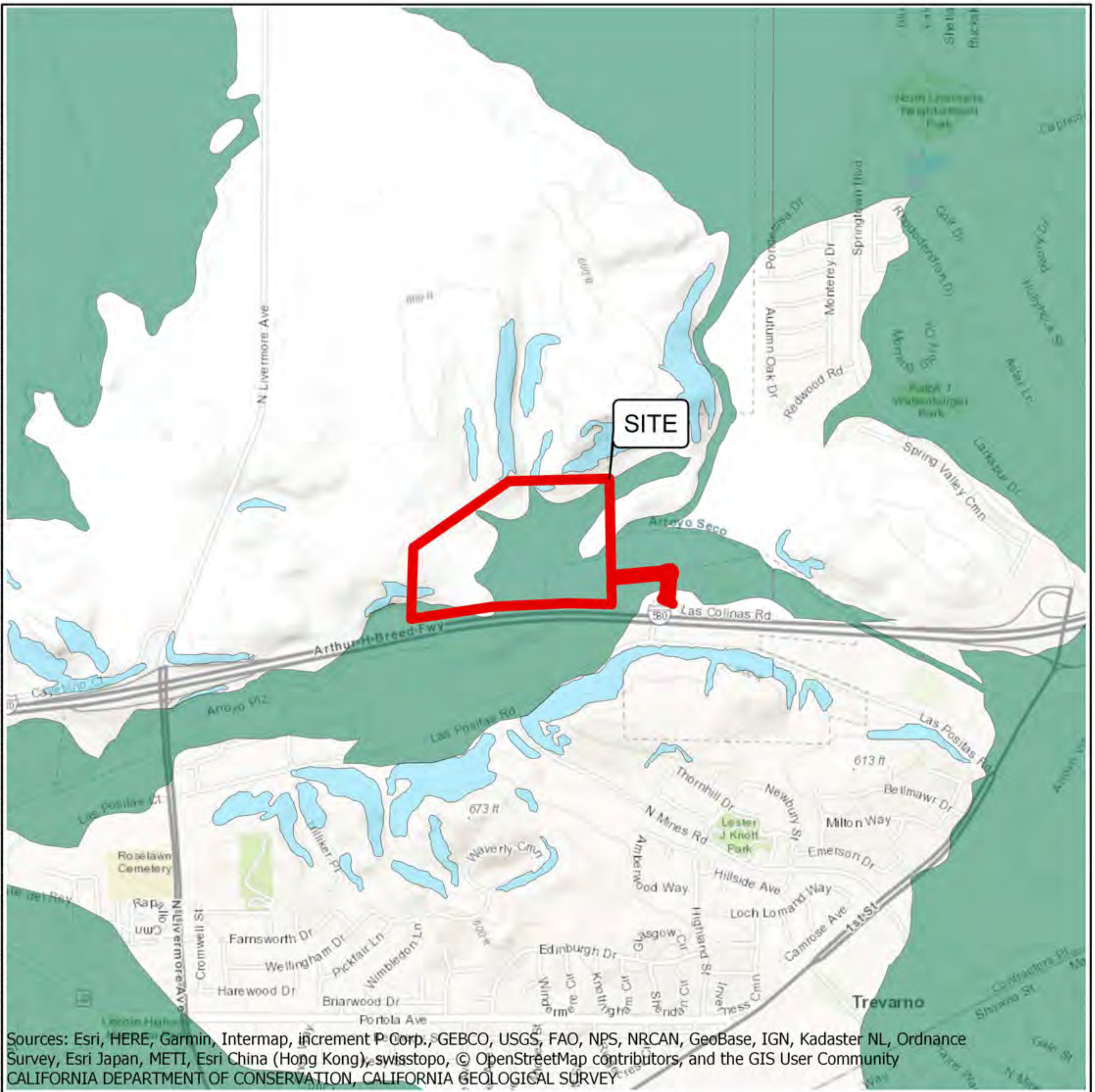
ALL LOCATIONS ARE APPROXIMATE

Qa	ALLUVIUM GRAVEL
QTlg	LIVERMORE GRAVEL
Tor	ORINDA FORMATION

ENGEO
Expect Excellence

REGIONAL GEOLOGIC MAP
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO. : 15426.000.000
SCALE: AS SHOWN
DRAWN BY: QRL CHECKED BY: AHF
FIGURE NO. 3



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
CALIFORNIA DEPARTMENT OF CONSERVATION, CALIFORNIA GEOLOGICAL SURVEY

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

N

0 1,000 2,000 FEET

🟩 **Liquefaction Zone**
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.

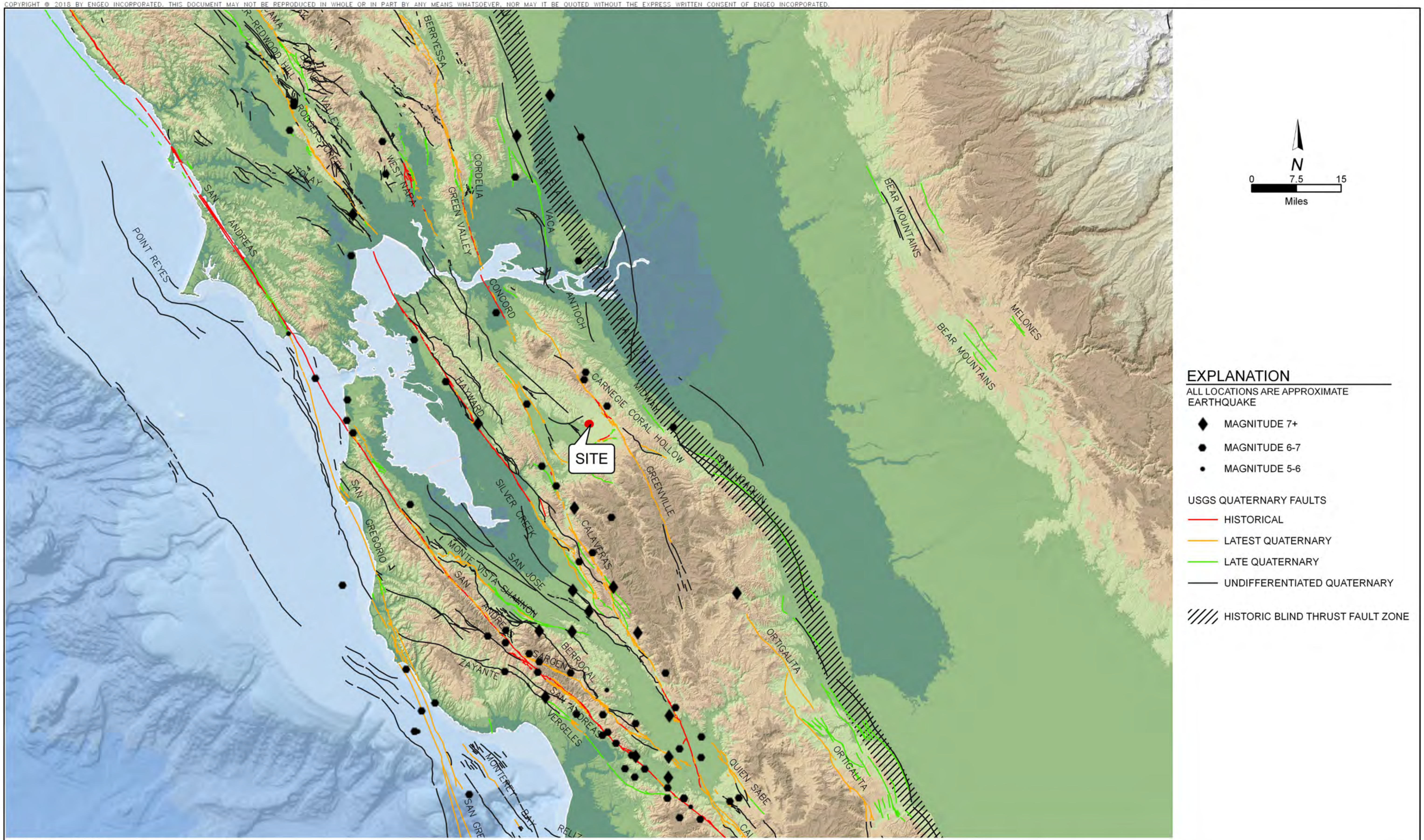
ENGEO
Expect Excellence

SEISMIC HAZARDS ZONE MAP
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO. : 15426.000.000	FIGURE NO. 4
SCALE: AS SHOWN	
DRAWN BY: QRL	CHECKED BY: AHF

PATH: G:\DRAFTING\DRAFTING2_DWG_13000 PLUS\15426\000\112018-GEX\GIS\15426.APRX
USER: QLIANG

ORIGINAL FIGURE PRINTED IN COLOR



BASE MAP SOURCE
ESRI, GARMIN, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS
COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATA SET (NED) AT 30 METER RESOLUTION
U.S.G.S. QUATERNARY FAULT DATABASE, 2018
U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800-PRESENT)

ENGEO
Expect Excellence

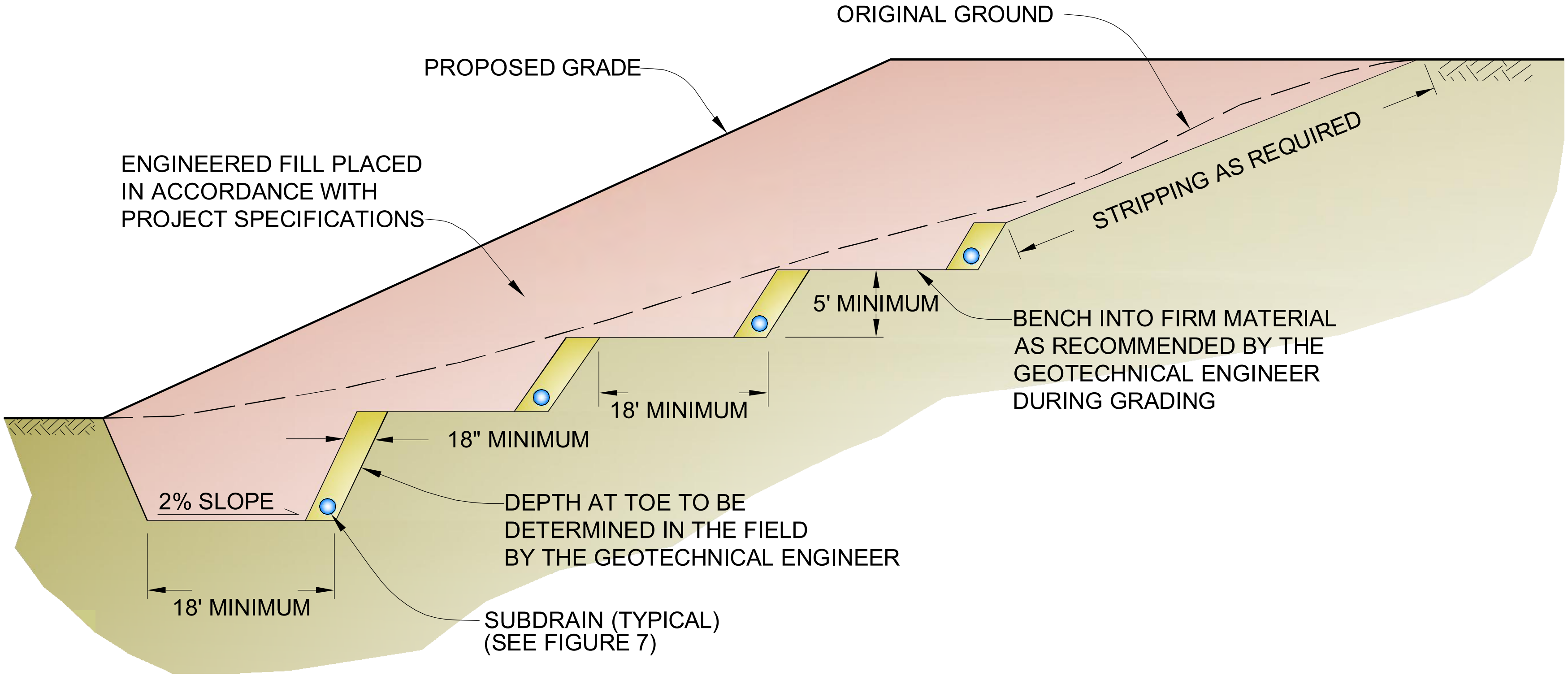
REGIONAL FAULTING AND SEISMICITY
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO. : 15426.000.000
SCALE: AS SHOWN
DRAWN BY: QRL
CHECKED BY: AHF
FIGURE NO. 5

PATH: G:\DRAFTING\DRAFTING2_DWG_13000 PLUS\15426\000\GIS\15426.APRX

ORIGINAL FIGURE PRINTED IN COLOR

G:\Drafting\DRAFTING2_Dwg_13000 Plus\15426\000\112018-GEX\1067000000-GEX-6-7-TypicalDetails-1118.dwg Plot Date:11-26-18 llee



ENGEO
Expect Excellence

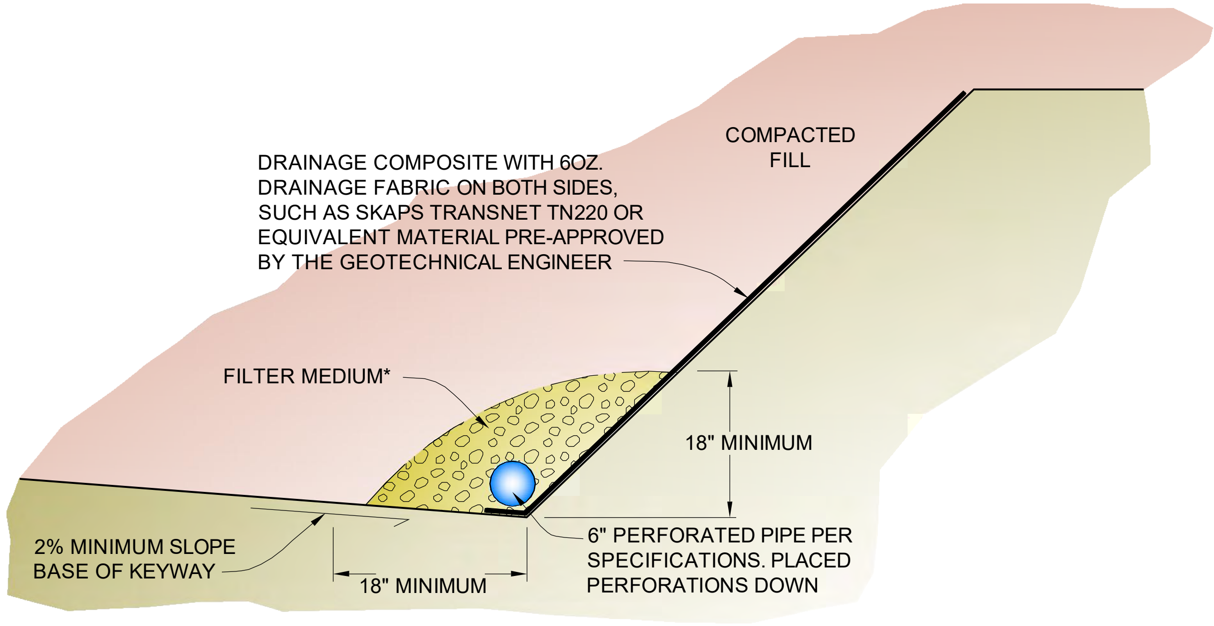
TYPICAL KEYWAY DETAIL

3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

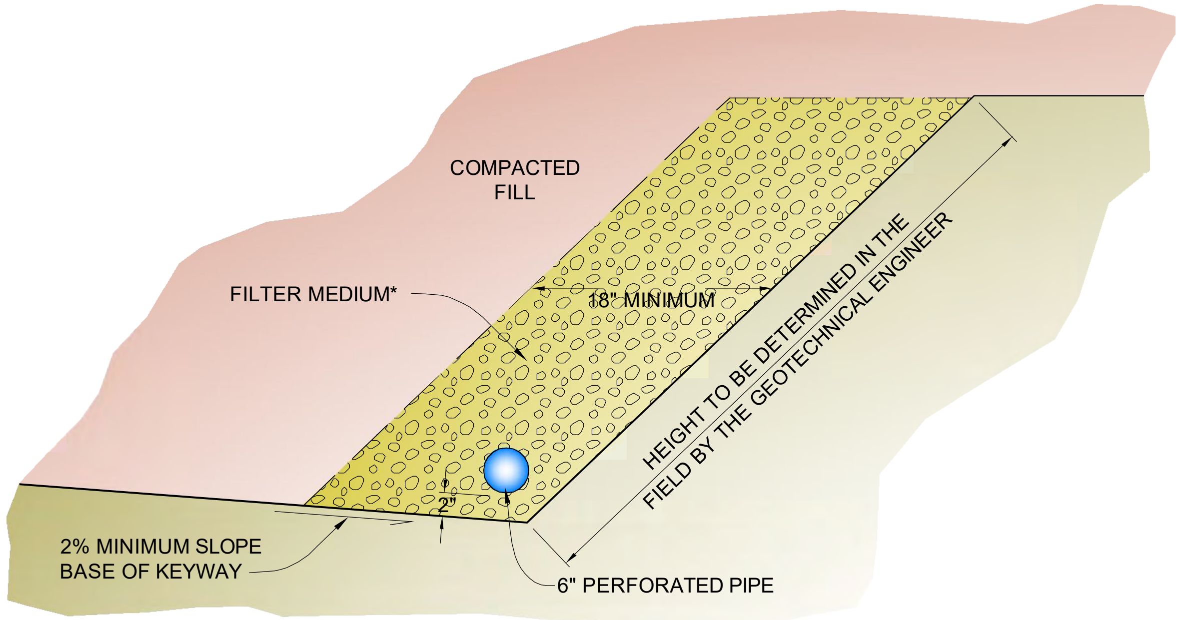
PROJECT NO.: 15426.000.000	
SCALE: NO SCALE	
DRAWN BY: LL	CHECKED BY: AHF

FIGURE NO.
6

ORIGINAL FIGURE PRINTED IN COLOR



KEYWAY SUBDRAIN - OPTION 1



KEYWAY SUBDRAIN - OPTION 2

*FILTER MEDIUM

ALTERNATIVE A

CLASS 2 PERMEABLE MATERIAL

MATERIAL SHALL CONSIST OF CLEAN, COARSE SAND AND GRAVEL OR CRUSHED STONE, CONFORMING TO THE FOLLOWING GRADING REQUIREMENTS:

SIEVE SIZE	% PASSING SIEVE
1"	100
3/4"	90-100
3/8"	40-100
#4	25-40
#8	18-33
#30	5-15
#50	0-7
#200	0-3

ALTERNATIVE B

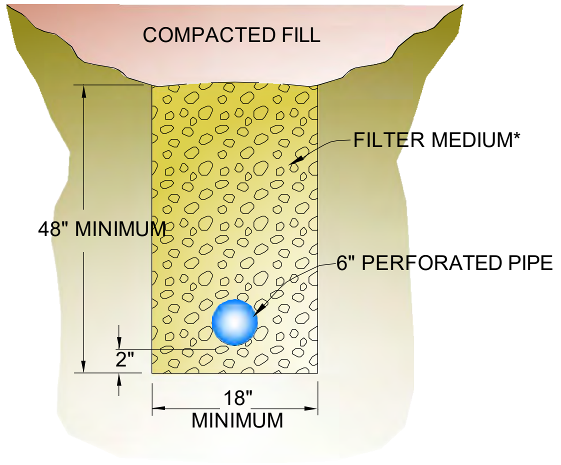
CLEAN CRUSHED ROCK OR GRAVEL WRAPPED IN FILTER FABRIC

ALL FILTER FABRIC SHALL MEET THE FOLLOWING MINIMUM AVERAGE ROLL VALUES UNLESS OTHERWISE SPECIFIED BY ENGEO:

GRAB STRENGTH (ASTM D-4632)	180 lbs
MASS PER UNIT AREA (ASTM D-4751)	6 oz/yd ^{2}
APPARENT OPENING SIZE (ASTM D-4751)	70-100 U.S. STD. SIEVE
FLOW RATE (ASTM D-4491)	80 gal/min/ft
PUNCTURE STRENGTH (ASTM D-4833)	80 lbs

NOTES:

1. ALL PIPE JOINTS SHALL BE GLUED
2. ALL PERFORATED PIPE PLACED PERFORATIONS DOWN
3. 1% FALL (MINIMUM) ON ALL TRENCHES AND DRAIN LINES

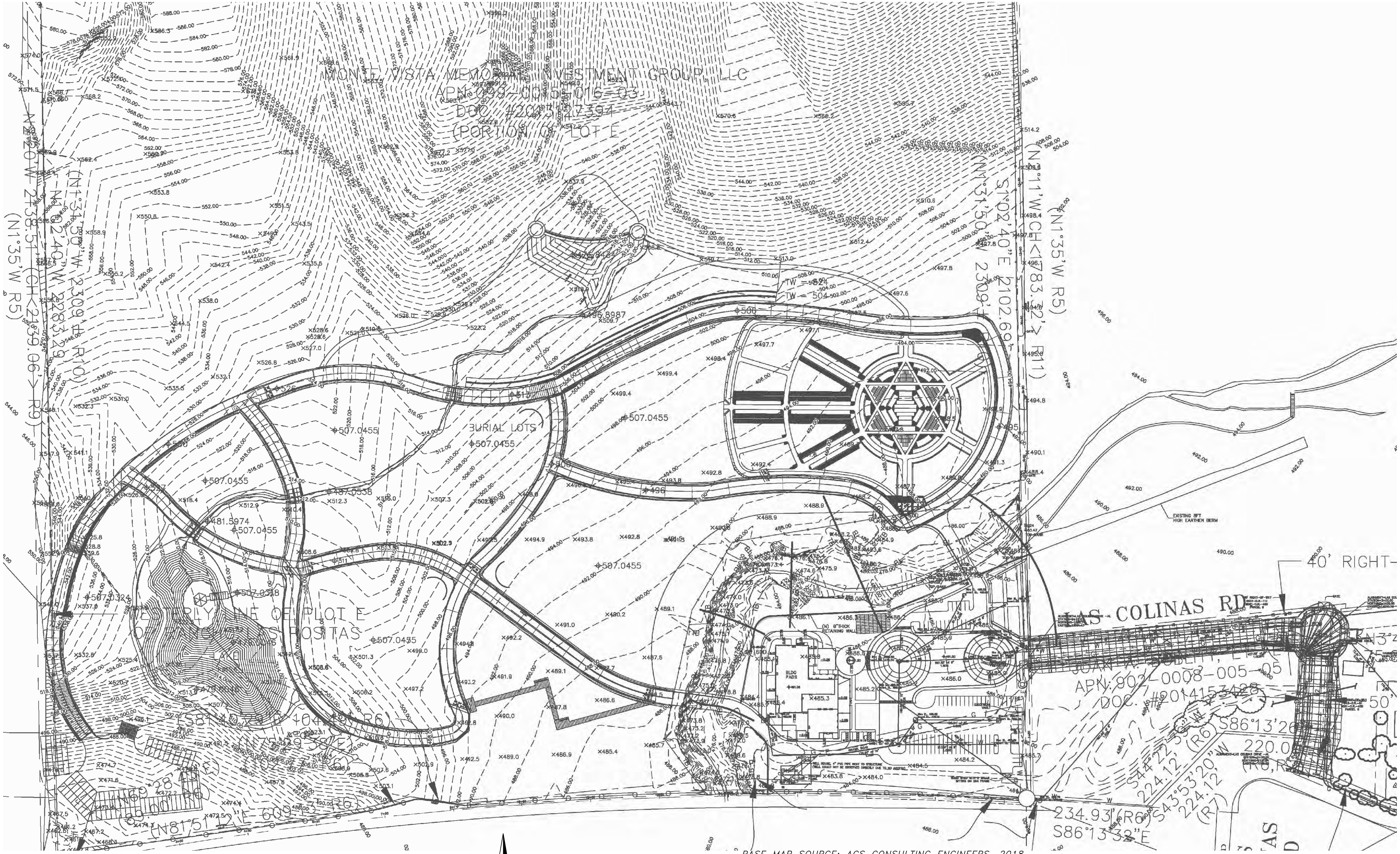


SWALE SUBDRAIN

ENGEO
Expect Excellence

SUBDRAIN AND SWALE DETAILS
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO.: 15426.000.000
SCALE: NO SCALE
DRAWN BY: LL
CHECKED BY: AHF
FIGURE NO. 7



BASE MAP SOURCE: ACS CONSULTING ENGINEERS, 2018

PROPOSED DEVELOPMENT
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO.: 15426.000.000
SCALE: AS SHOWN
DRAWN BY: LL
CHECKED BY: AHF

FIGURE NO.
8

ORIGINAL FIGURE PRINTED IN COLOR

G:\Drafting\DRAFTING2_Dwg_13000 Plus\15426\000\112018-GEX\15426000000-GEX-8-PROP-DEV-1218.dwg

APPENDIX A

BORING LOG KEY
EXPLORATION LOGS

KEY TO BORING LOGS

MAJOR TYPES				DESCRIPTION
COARSE-GRAINED SOILS MORE THAN HALF OF MAT'L LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	▨	GW - Well graded gravels or gravel-sand mixtures
			▨	GP - Poorly graded gravels or gravel-sand mixtures
		GRAVELS WITH OVER 12 % FINES	▨	GM - Silty gravels, gravel-sand and silt mixtures
			▨	GC - Clayey gravels, gravel-sand and clay mixtures
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	▨	SW - Well graded sands, or gravelly sand mixtures
			▨	SP - Poorly graded sands or gravelly sand mixtures
		SANDS WITH OVER 12 % FINES	▨	SM - Silty sand, sand-silt mixtures
			▨	SC - Clayey sand, sand-clay mixtures
FINE-GRAINED SOILS MORE THAN HALF OF MAT'L SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50 % OR LESS		▨	ML - Inorganic silt with low to medium plasticity
			▨	CL - Inorganic clay with low to medium plasticity
			▨	OL - Low plasticity organic silts and clays
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50 %		▨	MH - Elastic silt with high plasticity
			▨	CH - Fat clay with high plasticity
			▨	OH - Highly plastic organic silts and clays
	HIGHLY ORGANIC SOILS		▨	PT - Peat and other highly organic soils

For fine-grained soils with 15 to 29% retained on the #200 sieve, the words "with sand" or "with gravel" (whichever is predominant) are added to the group name.

For fine-grained soil with >30% retained on the #200 sieve, the words "sandy" or "gravelly" (whichever is predominant) are added to the group name.

GRAIN SIZES

U.S. STANDARD SERIES SIEVE SIZE — CLEAR SQUARE SIEVE OPENINGS

200 | 40 | 10 | 4 | 3/4 " | 3" | 12"

SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS AND GRAVELS	BLOWS/FOOT (S.P.T.)
VERY LOOSE	0-4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	OVER 50

CONSISTENCY

SILTS AND CLAYS	STRENGTH*
VERY SOFT	0-1/4
SOFT	1/4-1/2
MEDIUM STIFF	1/2-1
STIFF	1-2
VERY STIFF	2-4
HARD	OVER 4

SAMPLER SYMBOLS

■	Modified California (3" O.D.) sampler
☰	California (2.5" O.D.) sampler
◪	S.P.T. - Split spoon sampler
☐	Shelby Tube
▯	Continuous Core
☒	Bag Samples
✋	Grab Samples
NR	No Recovery

MOISTURE CONDITION

DRY	Dusty, dry to touch
MOIST	Damp but no visible water
WET	Visible freewater

LINE TYPES

————	Solid - Layer Break
– – – – – –	Dashed - Gradational or approximate layer break

GROUND-WATER SYMBOLS

▽	Groundwater level during drilling
▼	Stabilized groundwater level

(S.P.T.) Number of blows of 140 lb. hammer falling 30" to drive a 2-inch O.D. (1-3/8 inch I.D.) sampler

* Unconfined compressive strength in tons/sq. ft., asterisk on log means determined by pocket penetrometer

ENGEO
INCORPORATED

ENGEO
Expect Excellence

LOG OF BORING 1-B1

LATITUDE: -121.758879
LONGITUDE: 37.704003

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/8/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.
LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
	490		FAT CLAY (CH), dark gray, hard, slightly moist, high plasticity, trace organics and fine sand.	▨											
5			SANDY LEAN CLAY (CL), pale olive, hard, moist, medium plasticity, some fine to coarse sand, trace fine gravel	▨											
	485	■		▨		33	43	13	30		16	114	4417		UC
10			POORLY GRADED SAND WITH CLAY (SP), yellowish brown, medium dense to dense, slightly moist, sand is fine to coarse subangular to subrounded, trace fines and gravel.	░											
	480	◣		░		30				10					
15			LEAN CLAY WITH GRAVEL AND SAND (CL), pale olive mottled with grayish green, very stiff, slightly moist, medium plasticity, some fine to coarse gravel, trace sand and organics.	▨											
	475	■		▨		44					17	107	2152		UC
			switched to mud rotary	▨											
20															

LOG OF BORING 1-B1

LATITUDE: -121.758879 LONGITUDE: 37.704003

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/8/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
	470		SANDY LEAN CLAY (CL), pale olive, hard, moist, low to medium plasticity, trace fine sand. [LIVERMORE GRAVELS]			35	44	19	25	70	23	101	5421		UU
25			Trace organics and seams of fine sand												
	465					52								4.5*	PP
						57				87	21	107			
30															
	460														
			Increasing sand and gravel content			50/4"									
			POORLY GRADED GRAVEL (GP), yellowish brown, very dense, wet, fine to coarse gravel. [LIVERMORE GRAVELS]												
35															
	455		CLAYEY SAND (SC), dark yellowish brown to olive brown, very dense, saturated, sand is fine to coarse, subangular to subrounded, some fines content. [LIVERMORE GRAVELS]												
						50/2"				14	20				
40															

ENGEO
Expect Excellence

LOG OF BORING 1-B1

LATITUDE: -121.758879
LONGITUDE: 37.704003

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/8/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.
LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
	450		CLAYEY SAND (SC), dark yellowish brown to olive brown, very dense, saturated, sand is fine to coarse, subangular to subrounded, some fines content. [LIVERMORE GRAVELS]	▨											
			LEAN CLAY (CL), olive, moist, medium plasticity, medium toughness, trace fine sand and gravel, active weathering. [LIVERMORE GRAVELS]	▨											
		■		▨		56	43	20	23	90	23	104		4.5*	PP
45				▨											
	445			▨											
50			Calcium carbonate veins	▨											
	440	◣		▨		40									
			End boring at 51.5 feet below ground surface. Groundwater not encountered during drilling.												

LOG OF BORING 1-B2

LATITUDE: -121.759259 LONGITUDE: 37.703817

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/8/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 490 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			FAT CLAY (CH), dark gray, hard, slightly moist, high plasticity, trace organics and fine sand.												
			SANDY LEAN CLAY (CL), pale olive to olive, stiff to very stiff, moist, medium plasticity, some fine to medium sand.												
5	485														
						14	41	16	25		18	104	1396		UC
			POORLY GRADED GRAVELLY SAND (SP), yellowish brown, medium dense, moist, gravel is fine to medium, some fine to coase subangular sand, trace fines.												
10	480														
						56									
			grades to more gravelly and becomes wet			28				8					
			switched to mud rotary		▽										
15	475		CLAYEY SAND (SC), olive brown to dark yellowish brown, very dense, low plasticity, sand is fine to medium, some fines.			50/2"									
						54	22	20	2	23	20	107			
20	470														

ENGEO
Expect Excellence

LOG OF BORING 1-B2

LATITUDE: -121.759259
LONGITUDE: 37.703817

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/8/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 490 ft.
LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
		■	CLAYEY SAND (SC), olive brown to dark yellowish brown, very dense, low plasticity, sand is fine to medium, some fines. increasing fines conent			34				30	17				
			switched to mud rotatary												
25	465	■	LEAN CLAY (CL), pale olive, very stiff to hard, moist, low to medium plasticity, trace fines. [LIVERMORE GRAVELS]			36								4.0*	PP
		■	increasing sand content			68	29	16	13		16	96	5965		UC
30	460														
		■	decreasing sand content			50					26	100	6284		UU
35	455														
		■	interbedded fine sand seams			62									
40	450														

ENGEO
Expect Excellence

LOG OF BORING 1-B2

LATITUDE: -121.759259
LONGITUDE: 37.703817

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/8/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 490 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			LEAN CLAY (CL), pale olive, very stiff to hard, moist, low to medium plasticity, trace fines. [LIVERMORE GRAVELS]	▨											
		■	POORLY GRADED SAND (SP), yellowish brown, medium dense, saturated, sand is fine to medium grained. [LIVERMORE GRAVELS]	░		55					20	107		4.0*	PP
45	445		SANDY LEAN CLAY (CL), pale olive to olive, very stiff, moist, low to medium plasticity, some fine sand, calcium carbonate veins. [LIVERMORE GRAVELS]	▨											
50	440	■	color changes to olive and becomes hard, decreasing sand content	▨		48								4.5*	PP
			End boring at 51.5 feet below ground surface. Groundwater encountered at approximately 14 feet below ground surface.												

ENGEO
Expect Excellence

LOG OF BORING 1-B3

LATITUDE: -121.757617
LONGITUDE: 37.704775

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/9/2018
HOLE DEPTH: Approx. 50 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			FAT CLAY (CH), dark gray, hard, slightly moist, high plasticity, trace organics and fine sand.	▨											
	490														
5		■													
	485	■	increasing sand content, trace weathered gravels			47	56	17	39		18	93	7558		UC
			CLAYEY SAND (SC), olive to grayish green, loose, moist, sand is fine to medium, subrounded to subangular, some fines.	▨											
10		■				10									
	480	◣	LEAN CLAY (CL), olive to olive brown, stiff, moist, medium plasticity, trace fine sand.	▨		15									
			increasing sand content		▽										
15		■													
	475	■	CLAYEY SAND (SC), olive to olive brown, medium dense, moist, sand is fine to coarse, trace fines.	▨		58	35	17	18	19	16	118			
			switched to mud rotary												
		◣				20									
20															

LOG OF BORING 1-B3

LATITUDE: -121.757617 LONGITUDE: 37.704775

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/9/2018
HOLE DEPTH: Approx. 50 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
	470		LEAN CLAY (CL), olive to yellowish brown, hard, moist, medium plasticity, trace fine sand and gravel. [LIVERMORE GRAVELS]			59					24	102	6196		UU
25	465		POORLY GRADED GRAVEL (SP), olive brown, very dense, saturated, sand is fine to coarse, trace fines and gravel. [LIVERMORE GRAVELS]			50/3"									
			CLAYEY SAND (SC), olive brown, dense, saturated, sand is fine to coarse, subrounded, some fines and trace gravel.[LIVERMORE GRAVELS]			40					13				
30	460		LEAN CLAY (CL), light grayish green mottled with reddish yellow, hard, moist, low to medium plasticity, trace sand and gravel. [LIVERMORE GRAVELS]			29									
35	455		increasing plasticity, slow dilation			61					25	101	7025		UU
40															

ENGEO
Expect Excellence

LOG OF BORING 1-B3

LATITUDE: -121.757617 LONGITUDE: 37.704775

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/9/2018
HOLE DEPTH: Approx. 50 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
	450		LEAN CLAY (CL), light grayish green mottled with reddish yellow, hard, moist, low to medium plasticity, trace sand and gravel. [LIVERMORE GRAVELS]	▨											
		■	color change to olive mottled with light grayish green, trace weathered gravels and calcium carbonate veins	▨		50/5"									
45	445			▨											
		■	color change to olive brown	▨		72					25	101			
50			End boring at 50.0 feet below ground surface. Groundwater encountered at approximately 15 feet below ground surface.												

ENGEO
Expect Excellence

LOG OF BORING 1-B4

LATITUDE: -121.760394
LONGITUDE: 37.706317

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/9/2018
HOLE DEPTH: Approx. 49½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 525 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			SANDY FAT CLAY (CH), dark gray, hard, slightly moist, high plasticity	▨											
			SILTY SAND (SM), light yellowish brown, dense, slightly moist, fine to coarse sand, some fines content, trace fine gravel.	🟩											
5	520	■		🟩		46				50	15	103			
10	515	■	color change to yellowish brown, decreasing gravel content	🟩		55									
			FAT CLAY (CH), yellowish brown, hard, moist, high plasticity, trace fine sand.	▨										>4.5*	PP
15	510	■		▨		36	52	20	32		28	91.3	1484		UC
			LEAN CLAY (CL), yellowish brown mottled with olive, hard, moist, trace fine sand and calcium carbonate. [LIVERMORE GRAVELS]	▨											
20	505														

ENGEO
Expect Excellence

LOG OF BORING 1-B4

LATITUDE: -121.760394
LONGITUDE: 37.706317

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/9/2018
HOLE DEPTH: Approx. 49½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 525 ft.
LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			LEAN CLAY (CL), yellowish brown mottled with olive, hard, moist, trace fine sand and calcium carbonate. [LIVERMORE GRAVELS]			43					28	96.3	3650		UU
			switched to mud rotary												
25	500														
			decreasing sand content			60									
30	495		LEAN CLAY (CL), olive mottled with yellowish olive, hard, moist, low to medium plasticity, some fine sand, trace carbonates. [LIVERMORE GRAVELS]												
						31									
						24				88	27	96.1			
35	490														
			decreasing sand content			82									
40	485														

ENGEO
Expect Excellence

LOG OF BORING 1-B4

LATITUDE: -121.760394 LONGITUDE: 37.706317

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/9/2018
HOLE DEPTH: Approx. 49½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 525 ft.

LOGGED / REVIEWED BY: S. Waganaar /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			SILTY SAND (SM), olive, very dense, moist, sand is fine to coarse, trace fine gravel. [LIVERMORE GRAVELS]	🟩											
		■		🟩		77				46	20	108			
45	480			🟩											
		■	increasing gravel content	🟩		50/5"									
			End boring at 49.5 feet below ground surface. Groundwater not encountered during drilling.												

ENGEO
Expect Excellence

LOG OF BORING 1-B5

LATITUDE: -121.76312
LONGITUDE: 37.703837

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/10/2018
HOLE DEPTH: Approx. 50 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 519 ft.

LOGGED / REVIEWED BY: A. Light /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			FAT CLAY (CH), dark gray, medium stiff to stiff, slightly moist, high plasticity, some fine gravel.	▨											
	515														
5		■	SILTY SAND (SM), gray with light yellowish brown, medium dense, slightly moist, sand is fine grained, some fines.	▩		32				46					
	510														
10		■	color changes to olive, increasing fines content			35									
			LEAN CLAY (CL), olive, hard, moist, low to medium plasticity, trace fine sand. [LIVERMORE GRAVELS]	▨										>4.5*	PP
		◣				26	42	20	22		23				
	505		SANDY LEAN CLAY (CL), olive mottled with yellowish brown, hard, moist, low to medium plasticity, trace fine to coarse sand. [LIVERMORE GRAVELS]	▨											
15		■				47				72	22	117	5047		UC
			switched to mud rotary												
	500														
20															

LOG OF BORING 1-B5

ENGEO
Expect Excellence

LATITUDE: -121.76312
LONGITUDE: 37.703837

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/10/2018
HOLE DEPTH: Approx. 50 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 519 ft.

LOGGED / REVIEWED BY: A. Light /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
		■	LEAN CLAY (CL), olive, hard, moist, low to medium plasticity, trace sand and carbonates. [LIVERMORE GRAVELS]	▨		52					32	106		>4.5*	PP
	495			▨											
25				▨											
		■		▨		42	46	21	25	83	25	100			
	490			▨											
30			SANDY SILT (ML), olive, hard, moist, trace fine sand. [LIVERMORE GRAVELS]	▥											
		■		▥		50				57	18	111			
	485			▥											
35			LEAN CLAY (CL), olive, hard, moist, low to medium plasticity, trace fine to coarse sand. [LIVERMORE GRAVELS]	▨											
		■		▨		45	40	20	20	93					
	480			▨											
40															

ENGEO
Expect Excellence

LOG OF BORING 1-B5

LATITUDE: -121.76312
LONGITUDE: 37.703837

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/10/2018
HOLE DEPTH: Approx. 50 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 519 ft.
LOGGED / REVIEWED BY: A. Light /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			LEAN CLAY (CL), olive mottled with gray, hard, moist, low to medium plasticity, trace fine to coarse sand and carbonates. [LIVERMORE GRAVELS]	▨											
		■		▨		45					26	97			
	475			▨											
45				▨											
	470	■	increasing fine sand content	▨		46									
50															
			End boring at 50.0 feet below ground surface. Groundwater not encountered during drilling.												

ENGEO
Expect Excellence

LOG OF BORING 1-B6

LATITUDE: -121.758387 LONGITUDE: 37.705501

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/10/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 495 ft.

LOGGED / REVIEWED BY: A. Light /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

							Atterberg Limits								
Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			FAT CLAY (CH), dark gray to grayish brown, stiff, slightly moist, high plasticity, trace organics and fine sand.	▨											
5	490	■	color changes pale olive to olive.	▨		27	67	19	48	48	23	102		1.5*	PP
10	485	■	LEAN CLAY WITH GRAVEL (CL), olive to light grayish green, medium stiff, moist, medium plasticity, trace weathered gravel.	▨		18					26	103	987		UC
15	480	■	CLAYEY SAND (SC), olive to light grayish green, medium dense, saturated, sand is fine to coarse, trace fines and weathered gravels. [LIVERMORE GRAVELS]	▨	∇	32									
		◣		▨		24				13	19				
			switched to mud rotary color changes to olive brown	▨											
20	475														

LOG OF BORING 1-B6

LATITUDE: -121.758387
LONGITUDE: 37.705501

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/10/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 495 ft.
LOGGED / REVIEWED BY: A. Light /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
		■	LEAN CLAY WITH SAND (CL), olive mottled with yellowish brown, hard, moist, medium plasticity, trace fine to medium sand, calcium carbonate veins. [LIVERMORE GRAVELS]	▨		36								4.5*	PP
25	470	◣	GRAVELLY LEAN CLAY WITH SAND (CL), olive mottled with yellowish brown, hard, moist, medium plasticity, trace fine to medium sand, calcium carbonate veins. [LIVERMORE GRAVELS]	▨		30				53					
30	465	■	increasing sand content	▨		47					21	109		3.75*	PP
35	460	■	trace gravel	▨		50/5"									
40	455														

ENGEO
Expect Excellence

LOG OF BORING 1-B6

LATITUDE: -121.758387
LONGITUDE: 37.705501

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/10/2018
HOLE DEPTH: Approx. 51½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 495 ft.

LOGGED / REVIEWED BY: A. Light /
DRILLING CONTRACTOR: H1 Drilling
DRILLING METHOD: SFA, Switch to Mud
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			CLAYEY GRAVEL (GP), olive brown mottled with white, dense, moist, gravels are weathered and friable, some fines and trace fine to coarse sand. [LIVERMORE GRAVELS]			76									
			SANDY CLAY (CL), olive brown, dense, moist, low plasticity, some fine sand. [LIVERMORE GRAVELS]												
			LEAN CLAY WITH SAND (CL), olive mottled with light grayish green, hard, moist, medium plasticity, friable, trace fine to coarse sand and calcium carbonate veins. [LIVERMORE GRAVELS]												
45	450					74									
50	445					29									
			End boring at 51.5 feet below ground surface. Groundwater encountered at approximately 16 feet below ground surface.												

ENGEO
Expect Excellence

LOG OF BORING 1-B7

LATITUDE: -121.754982 LONGITUDE: 37.703983

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 16½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 492 ft.

LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			LEAN CLAY (CL), dark gray to brownish gray, very stiff, moist	▨											
	490														
		■	With coarse gravels			24					22				
5					▽										
		■				10								2.75*	PP
			Increasing fine to coarse grained sand												
			Becomes soft increasing sand content												
	485														
			SILTY SAND WITH GRAVEL (SM), gray, loose, wet	░											
10															
		◣				7				27	20				
	480														
15															
		◣	color changes to light yellowish brown and becomes dense			43									
			End boring at approximately 16.5 feet below ground surface. Groundwater was encountered at approximately 10 feet below ground surface.												

ENGEO
Expect Excellence

LOG OF BORING 1-B8

LATITUDE: -121.756418
LONGITUDE: 37.704111

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 16½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 492 ft.

LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			LEAN CLAY (CL), gray to brownish gray, very stiff, moist	▨											
	490			▨											
5		■		▨		27					34	87		1.75*	PP
	485			▨											
10		■	color changes to brownish gray mottled with greenish yellow	▨		27								2.5*	PP
	480			▨											
			SILTY SAND (SM), gray, medium dense, very moist, some fines.	🟩											
				🟩	▽										
15		◣		🟩		24									
			End boring at approximately 16.5 feet below ground surface. Groundwater was encountered at approximately 14.5 ft below ground surface.												

ENGEO
Expect Excellence

LOG OF BORING 1-B9

LATITUDE: -121.757068 LONGITUDE: 37.704082

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 11½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.

LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			FAT CLAY (CH), gray to brownish gray, very stiff, moist, high plasticity	▨											
	490			▨											
		■		▨		27								2.75*	PP
5		■	POORLY GRADED SAND (SP), yellowish red mottled with very dark gray, moist, trace fines.	▒											
	485		SANDY CLAY (CL), pale olive mottled with very dark gray, very stiff, moist, medium plasticity, trace fine sand.	▨											
		■		▨		22					24	98		2.75*	PP
10		■	color changes to dark grayish brown, becomes medium stiff to stiff	▨		30								0.75*	PP
	480	■	color changes to pale olive mottled with dark gray	▨										1.75*	PP
			End boring at approximately 11.5 feet below ground surface. Groundwater was not encountered during drilling.												

ENGEO
Expect Excellence

LOG OF BORING 1-B10

LATITUDE: -121.75818
LONGITUDE: 37.703375

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 11½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 489 ft.
LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			LEAN SILTY CLAY (CL), gray to brownish gray, very stiff, moist to slightly moist, medium plasticity, some fine sand, trace of organics	▨											
	485	■		▨		22					25	83			
5		■	No organics, becomes hard	▨		22								4.5*	PP
	480			▨											
10		■	color changes to olive mottled with gray	▨		27								2.5*	PP
			End boring at approximately 11.5 feet below ground surface. Groundwater was not encountered during drilling.												

ENGEO
Expect Excellence

LOG OF BORING 1-B11

LATITUDE: -121.758798
LONGITUDE: 37.704886

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 16½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 494 ft.
LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			SANDY LEAN CLAY (CL), dark yellowish brown, hard, moist, some fine-to-coarse sand, with fine gravel.												
	490					27	46	13	33		18	81		>4.5*	PP
5			Increasing sand content.			40								>4.5*	PP
	485														
10			POORLY GRADED GRAVEL (GP), pale yellow to pale olive, medium dense, moist			35									
	480		SANDY SILT (ML), pale yellow mottled with yellowish red, medium dense, moist												
15						20				77					
			End boring at approximately 16.5 feet below ground surface. Groundwater was not encountered during drilling.												

LOG OF BORING 1-B12

LATITUDE: -121.757627 LONGITUDE: 37.704127

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 21½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.

LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits Liquid Limit	Atterberg Limits Plastic Limit	Atterberg Limits Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			FAT CLAY (CH), dark gray, hard, moist, trace fine sand.	▨											
	490			▨											
5	485	■		▨		42					25	92	5494		UC
10	480	■	color changes to light gray to pale olive, increasing sand content, becomes very stiff	▨		26					19	109		3.25*	PP
			SANDY SILT (ML), dark gray, trace fines content and fine gravel.	▥	▽										
15	475	■		▥		25				76					
		◩		▥		27									
20															

ENGEO
Expect Excellence

LOG OF BORING 1-B12

LATITUDE: -121.757627
LONGITUDE: 37.704127

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 21½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 491 ft.
LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
	470	◣	SANDY SILT (ML), dark gray, trace fines content and fine gravel. color changes to reddish brown with olive	🟩		21								2.5*	PP
			End boring at approximately 21.5 feet below ground surface. Groundwater was encountered at approximately 14 feet below ground surface.												

ENGEO
Expect Excellence

LOG OF BORING 1-B13

LATITUDE: -121.760909
LONGITUDE: 37.704085

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 21½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 496 ft.
LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			SILTY SAND WITH GRAVEL (SM), yellowish brown, very dense, moist, some fine gravel and trace fines.	🟩											
	495			🟩											
5		■		🟩		50/6"				15					
	490			🟩											
			Trace coarse gravel.	🟩											
10		■	color changes to reddish yellow	🟩		50/6"					19	106			
	485			🟩											
15		◣	LEAN CLAY (CL), yellowish brown, hard, moist, with trace of fine sands. [LIVERMORE GRAVELS]	▨		38								>4.5*	PP
	480			▨											
20															

ENGEO
Expect Excellence

LOG OF BORING 1-B13

LATITUDE: -121.760909
LONGITUDE: 37.704085

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 21½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 496 ft.
LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
	475	■	LEAN CLAY (CL), yellowish brown, hard, moist, with trace of fine sands. [LIVERMORE GRAVELS]	▨		50/6"					25	100		>4.5*	PP
			End boring at approximately 21.5 feet below ground surface. Groundwater was not encountered during drilling.												

ENGEO
Expect Excellence

LOG OF BORING 1-B14

LATITUDE: -121.760515 LONGITUDE: 37.705616

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 11½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 508 ft.

LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			SANDY CLAY (CL), dark yellowish brown, hard, moist, some medium to coarse sand, with trace gravels.	▨											
	505	■				50				70	45	74		>4.5*	PP
5		■	Some fine to coarse sand and fine gravel			65								>4.5*	PP
	500														
10		■	Trace fine-to-medium-grained sands			50/6"								>4.5*	PP
			End boring at approximately 11.5 feet below ground surface. Groundwater was not encountered during drilling.												

ENGEO
Expect Excellence

LOG OF BORING 1-B15

LATITUDE: -121.755233
LONGITUDE: 37.704226

Geotechnical Exploration
3656 Las Colinas Road
Livermore, CA
15426.000.000

DATE DRILLED: 10/4/2018
HOLE DEPTH: Approx. 11½ ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (NAVD88): Approx. 492 ft.

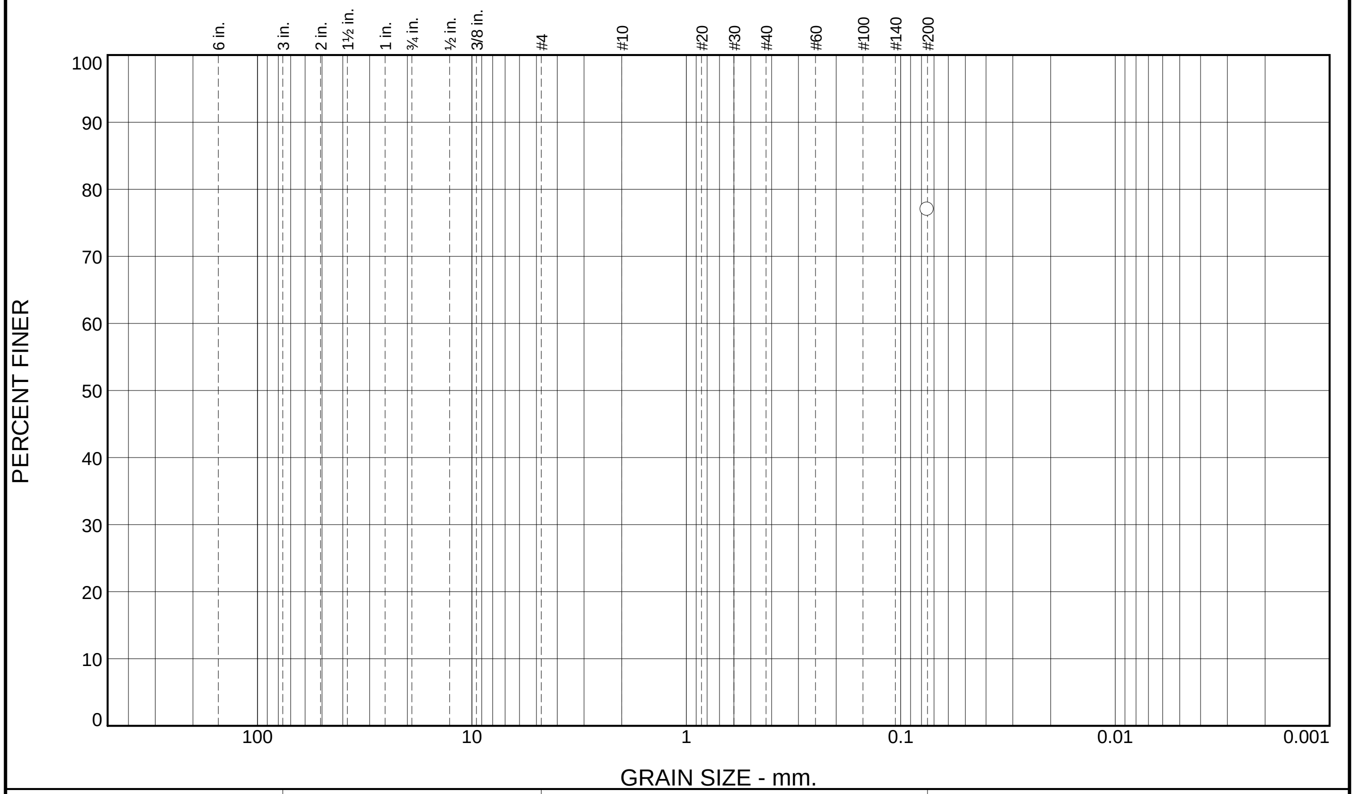
LOGGED / REVIEWED BY: B. Xu /
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			LEAN CLAY (CL), brownish gray with pale olive	▨											
	490			▨											
		■	FAT CLAY (CH), very dark gray, medium stiff, moist, high plasticity	▨		16								1.25*	PP
5				▨											
		■		▨		20	63	20	43		31				
	485			▨											
10		■	color changes to dark gray to brownish gray	▨		24								1*	PP
			End boring at approximately 11.5 feet below ground surface. Groundwater was not encountered during drilling.												

APPENDIX B

LABORATORY TEST DATA

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						77.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	77.0		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 138.07; Soak Time = 31.81

Sample Number: 1-B11 @ 15

Date: 11/5/2018

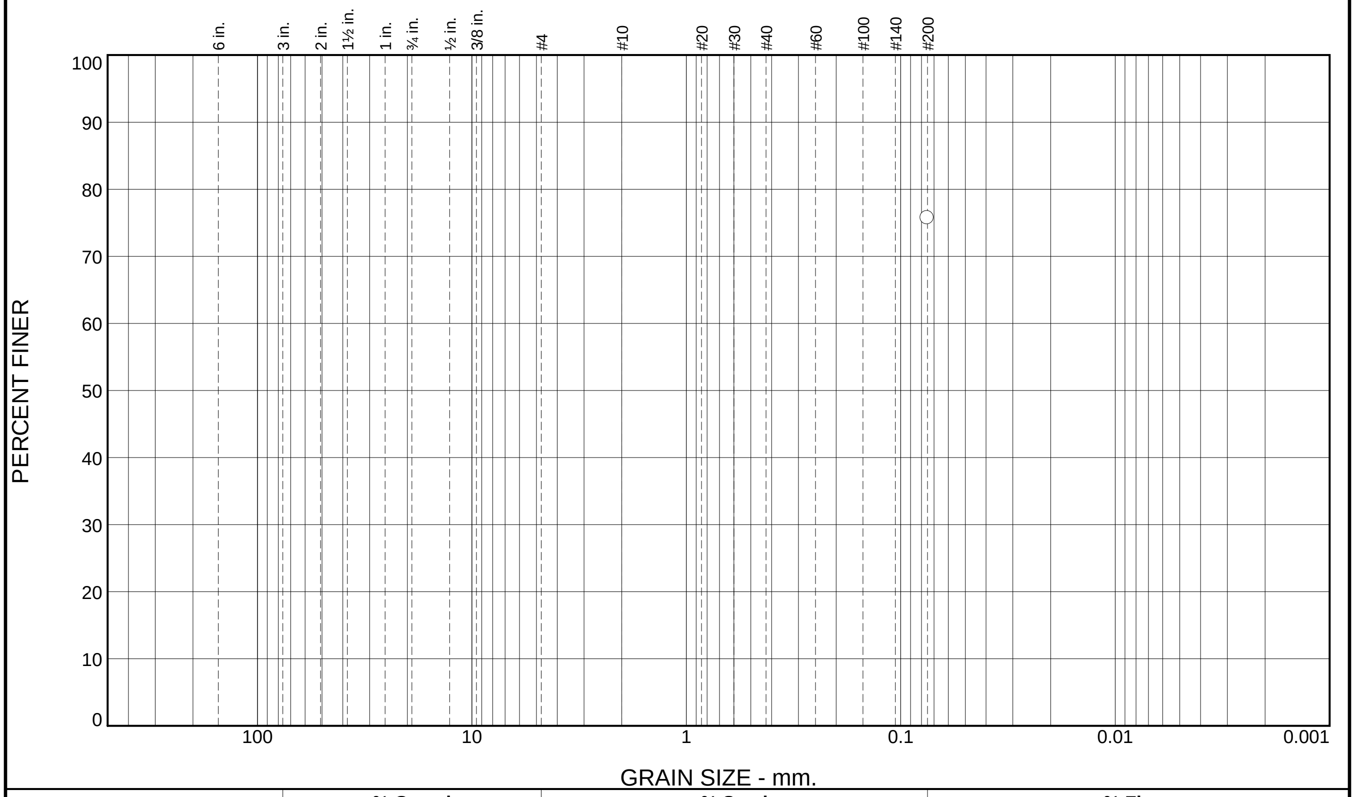
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						75.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	75.7		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 163.83; Soak Time = 4 hrs

Sample Number: 1-B12 @ 15.5

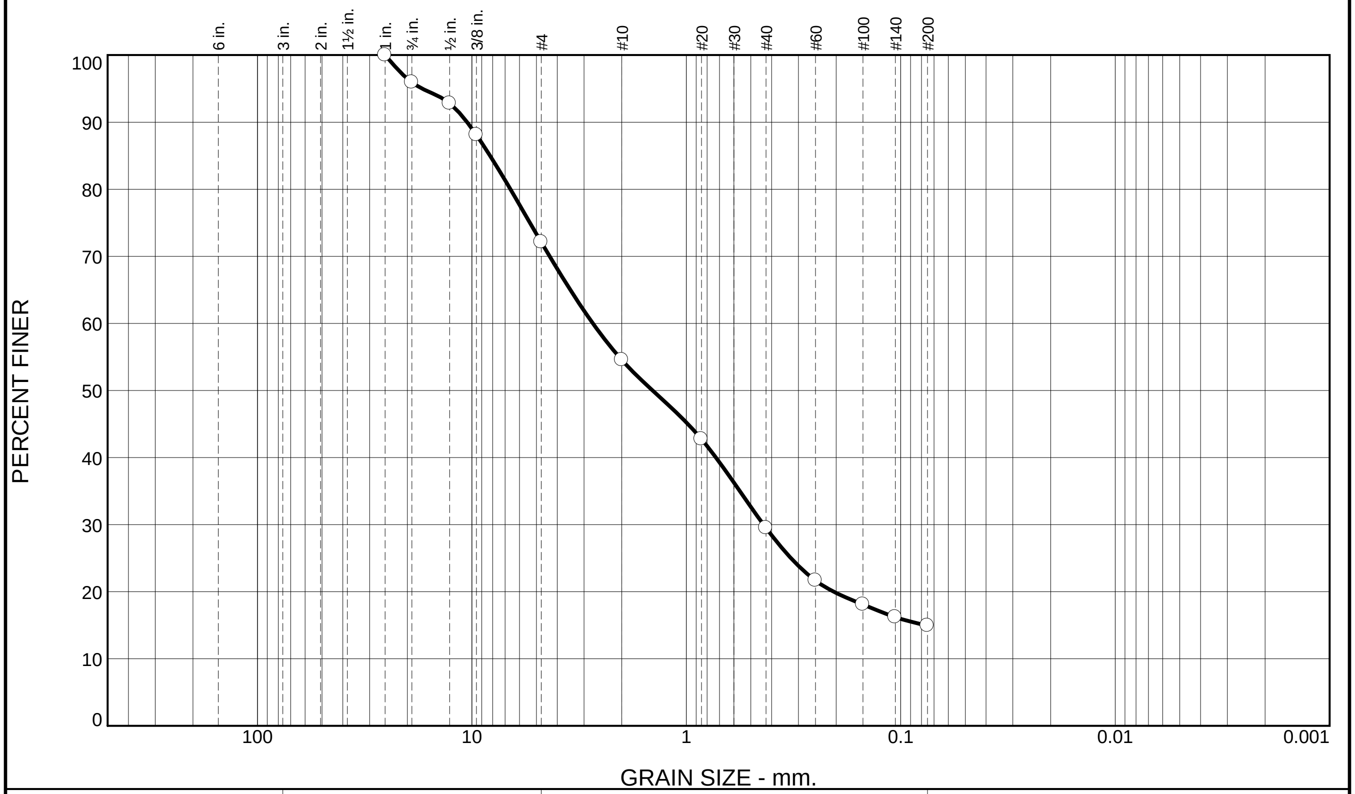
Date: 11/5/2018

ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road
Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.1	23.8	17.5	25.1	14.6	14.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	95.9		
1/2	92.8		
3/8	88.1		
#4	72.1		
#10	54.6		
#20	42.7		
#40	29.5		
#60	21.7		
#100	18.1		
#140	16.2		
#200	14.9		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 10.5265 D_{85}= 8.2257 D_{60}= 2.7271
D_{50}= 1.4374 D_{30}= 0.4366 D_{15}= 0.0767
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D6913

Sample Number: 1-B13 @ 5

Date: 11/6/18

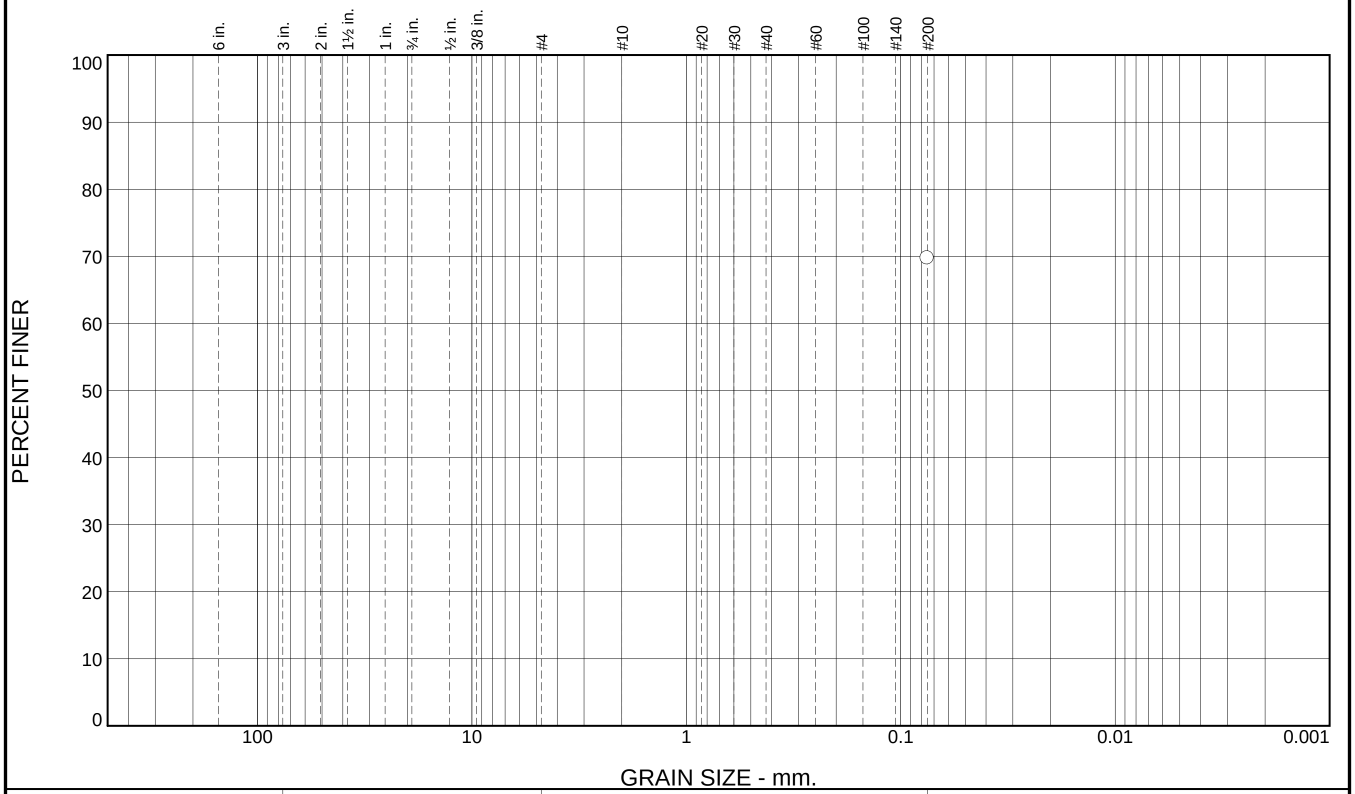
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Quasem **Checked By:** M. Bromfield

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						69.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	69.7		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 65.34; Soak Time = 4 hrs

Sample Number: 1-B14 @ 4

Date: 11/6/18

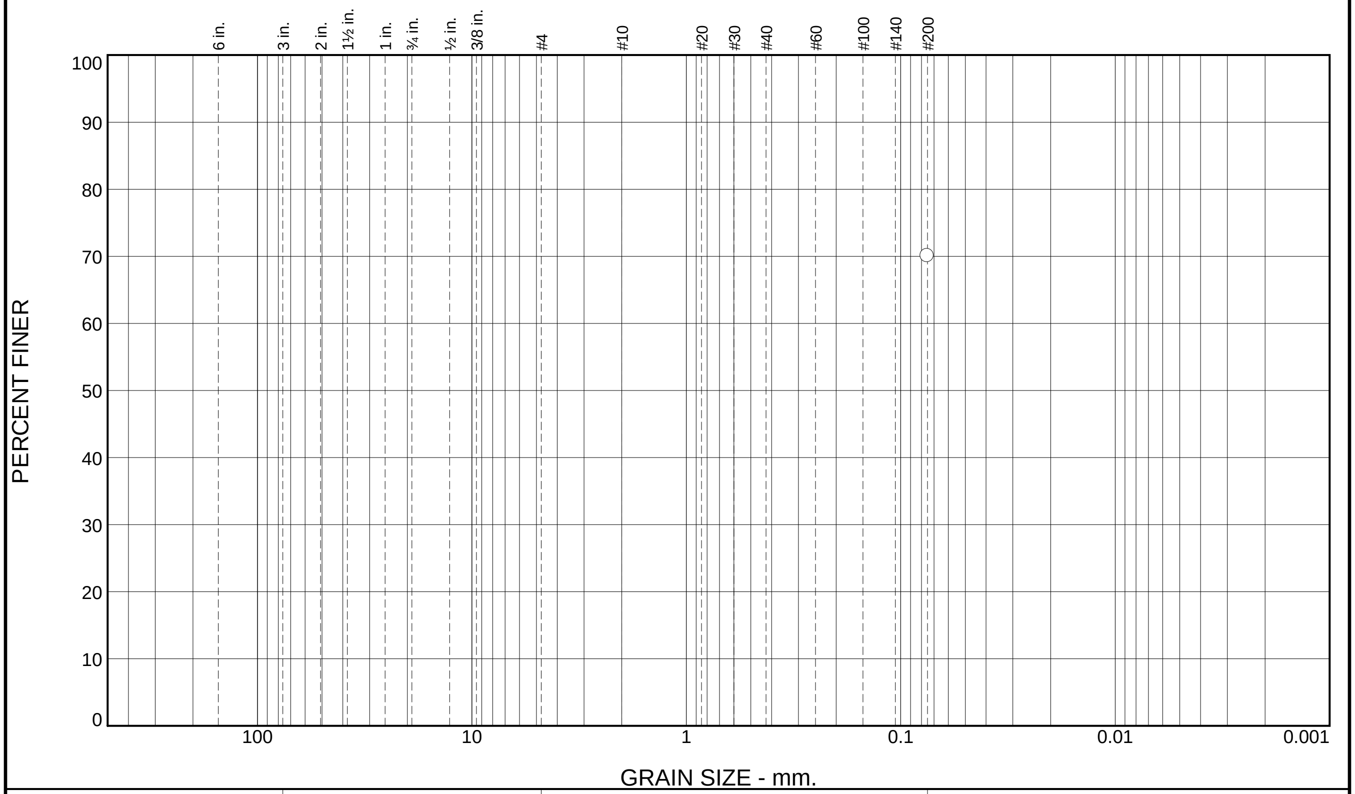
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Quasem **Checked By:** M. Bromfield

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						70.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	70.1		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= 19 LL= 44 PI= 25

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 1-B1 @ 21

Date: 11/6/18

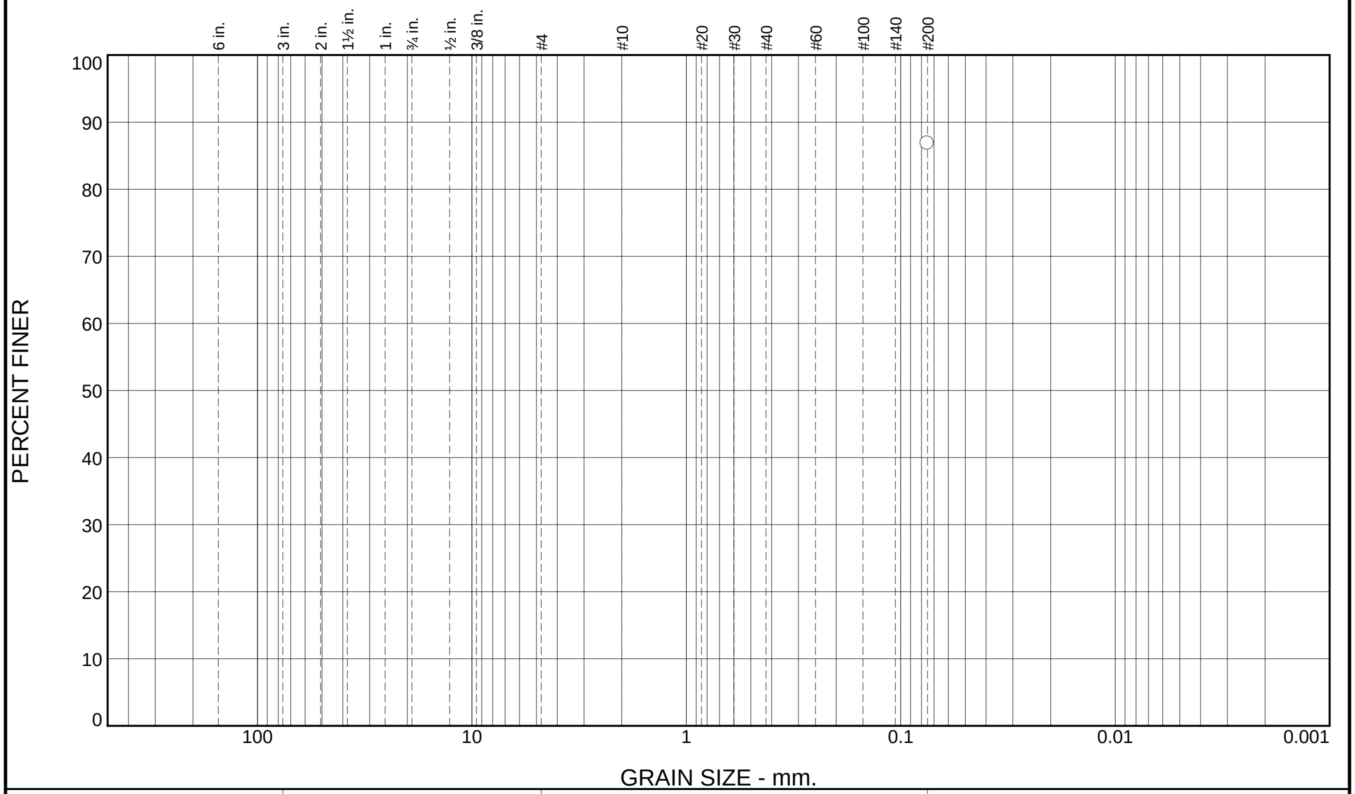
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Quasem **Checked By:** M. Bromfield

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						86.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	86.8		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= 19 LL= 41 PI= 22

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140, Method B
Dry Sample Weight = 42.55; Soak Time = 4 hrs
PI: ASTM D4318, Wet method

Sample Number: 1-B1 @ 28

Date: 11/5/2018

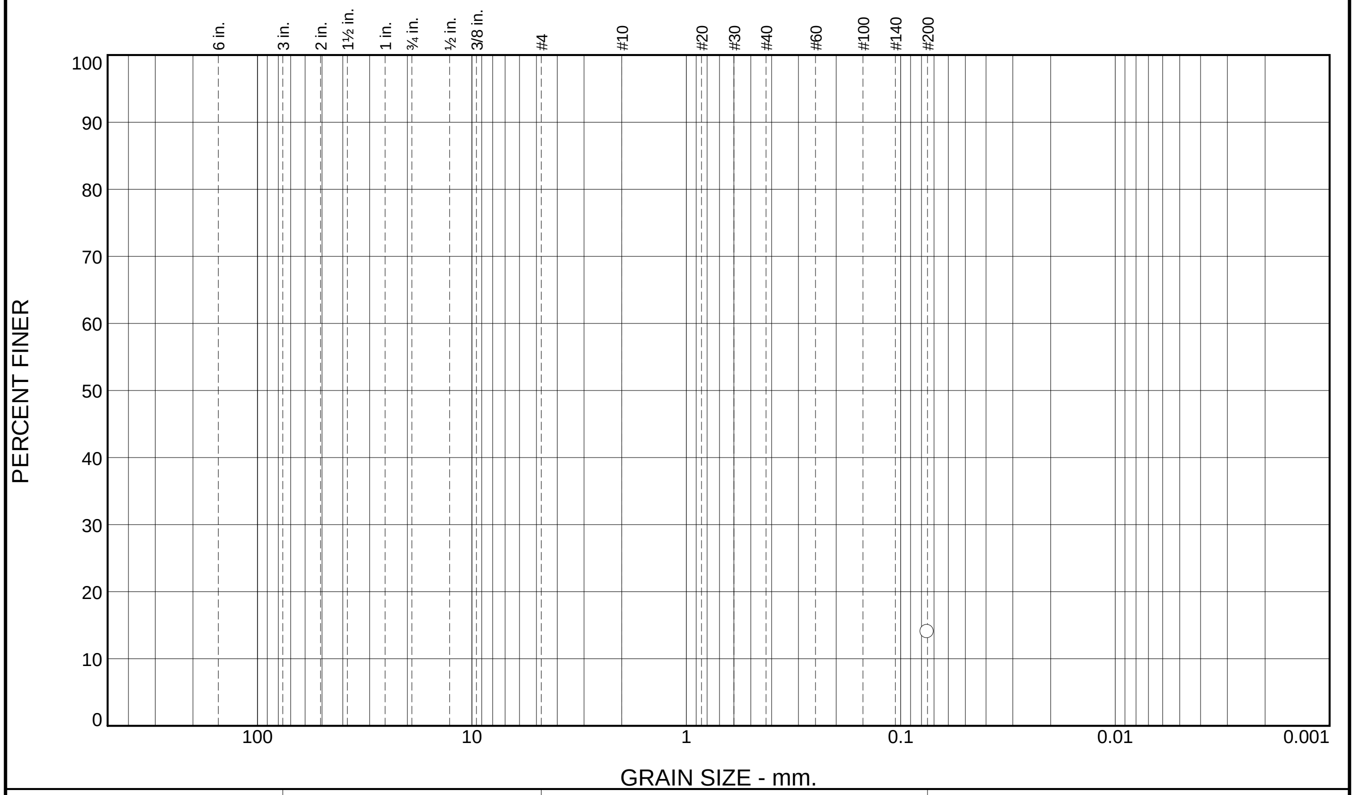
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						14.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	14.0		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 182.95; Soak Time = 4 hrs

Sample Number: 1-B1 @ 38

Date: 11/5/2018

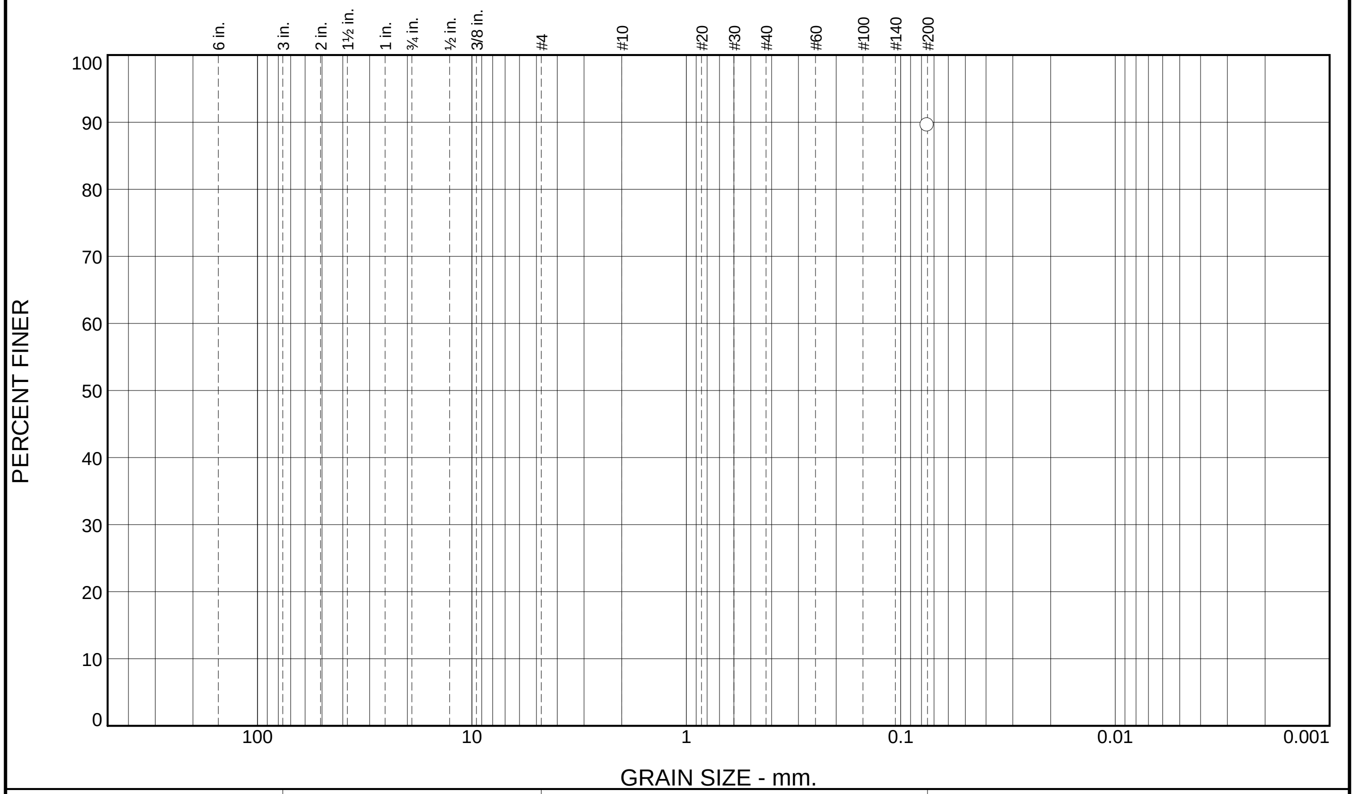
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						89.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	89.5		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140, Method B
Dry Sample Weight = 110.02; Soak Time = 4 hrs
PI: ASTM D4318, Wet method

Sample Number: 1-B1 @ 43

Date: 11/5/2018

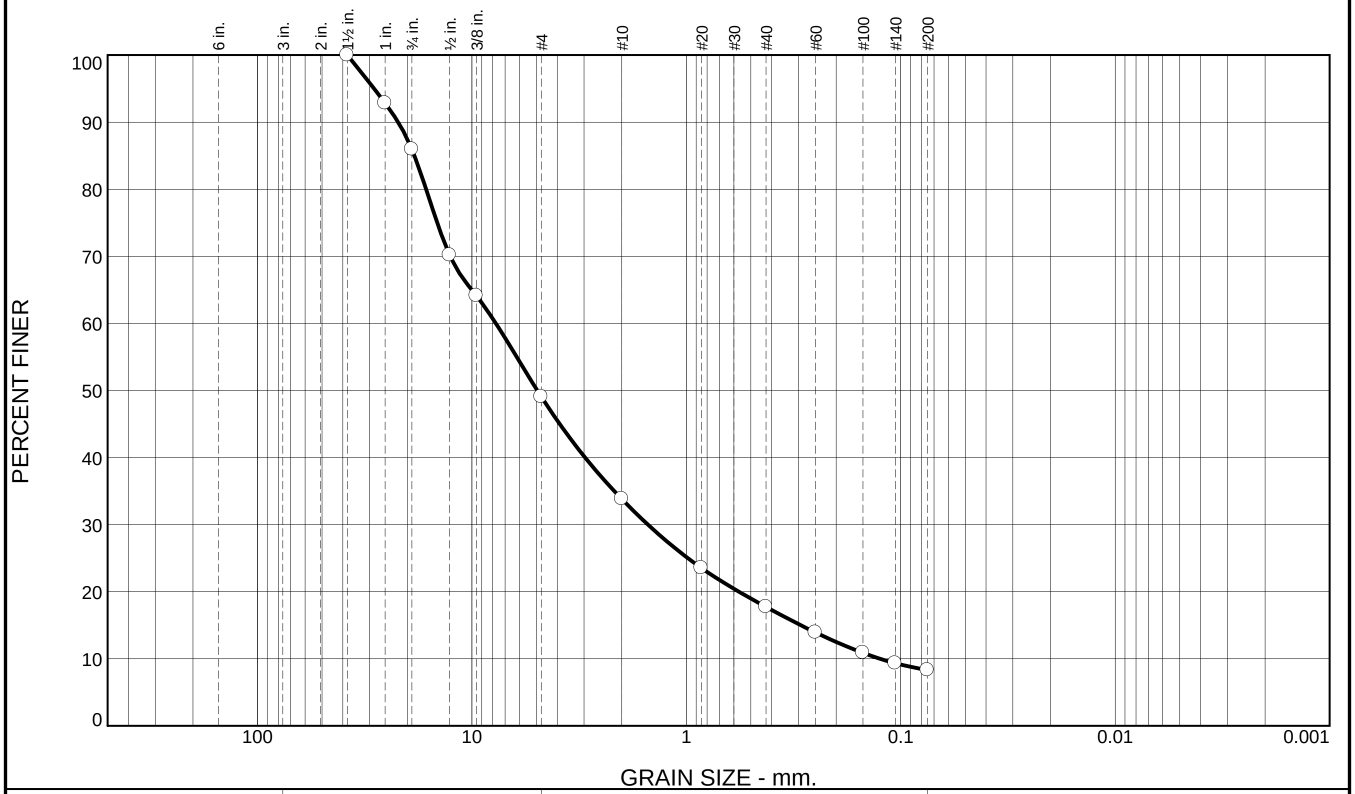
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.1	36.8	15.3	16.1	9.4	8.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1-1/2	100.0		
1	92.8		
3/4	85.9		
1/2	70.2		
3/8	64.1		
#4	49.1		
#10	33.8		
#20	23.5		
#40	17.7		
#60	13.9		
#100	10.9		
#140	9.3		
#200	8.3		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 22.0699 D_{85}= 18.5381 D_{60}= 7.7306
D_{50}= 4.9557 D_{30}= 1.5106 D_{15}= 0.2928
D_{10}= 0.1251 C_u= 61.79 C_c= 2.36

Classification

USCS= AASHTO=

Remarks

ASTM D6913

Sample Number: 1-B2 @ 11.5

Date: 11/6/18

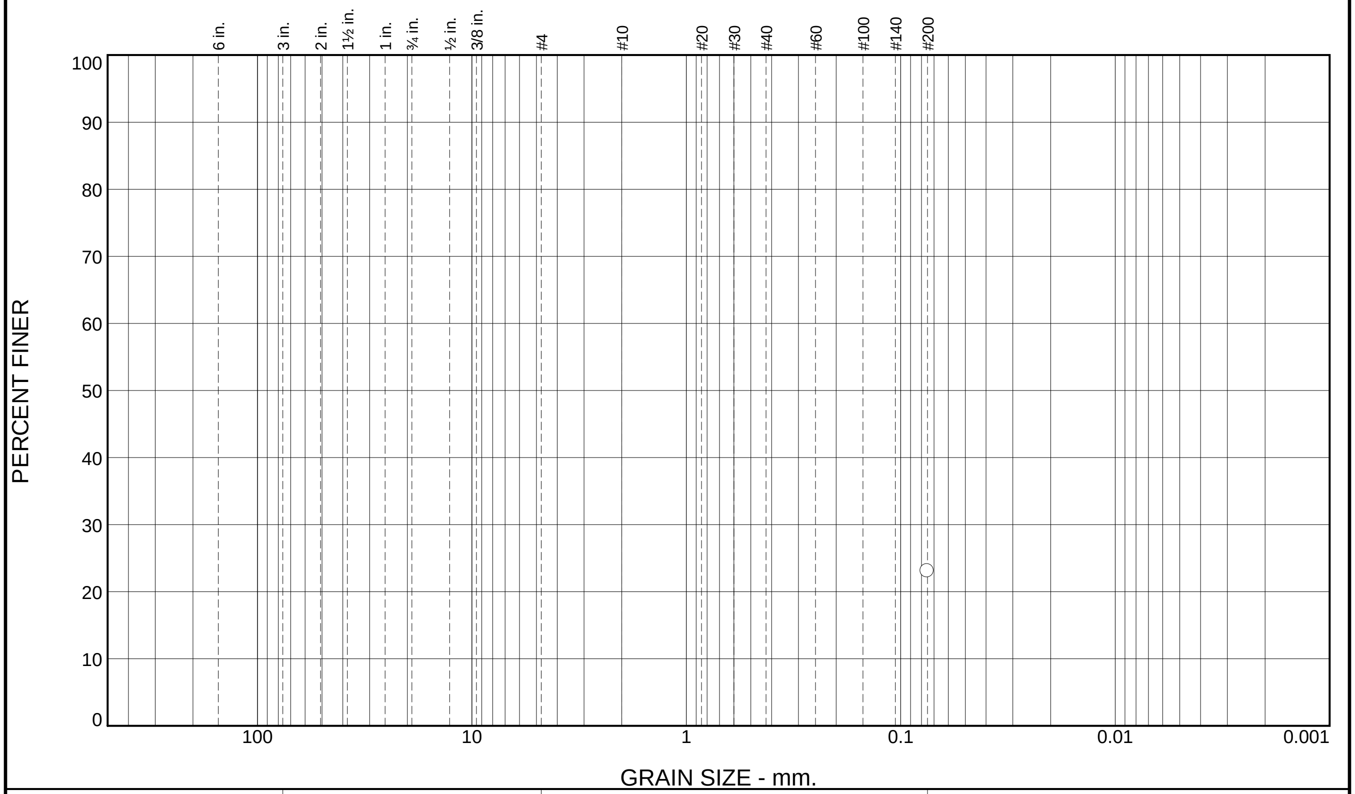
ENGEO
INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Quasem **Checked By:** M. Bromfield

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						23.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	23.0		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= 20 LL= 22 PI= 2

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140
PI: ASTM D4318, Wet method

Sample Number: 1-B2 @ 16.5

Date: 11/6/18

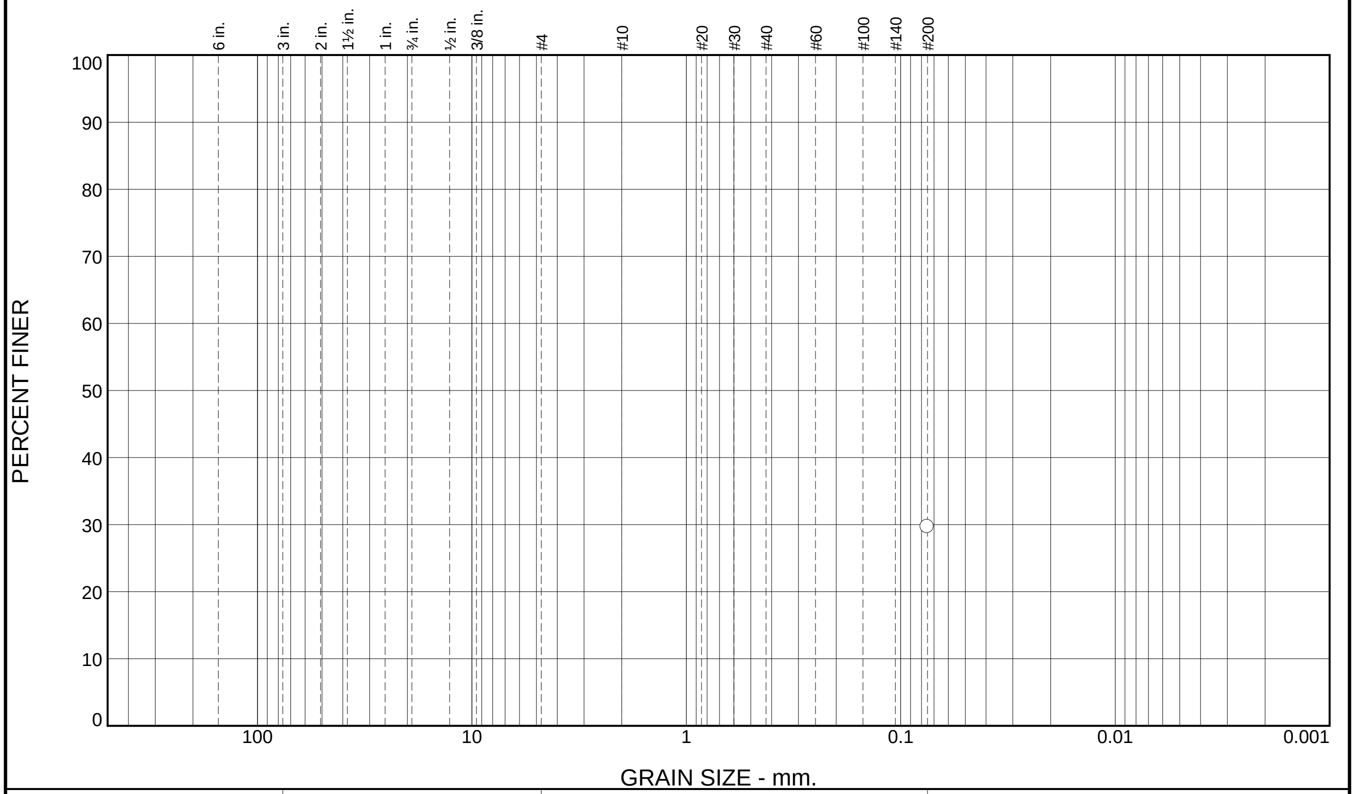
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Quasem **Checked By:** M. Bromfield

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						29.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	29.6		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 164.64; Soak Time = 4 hrs

Sample Number: 1-B2 @ 20

Date: 11/5/2018

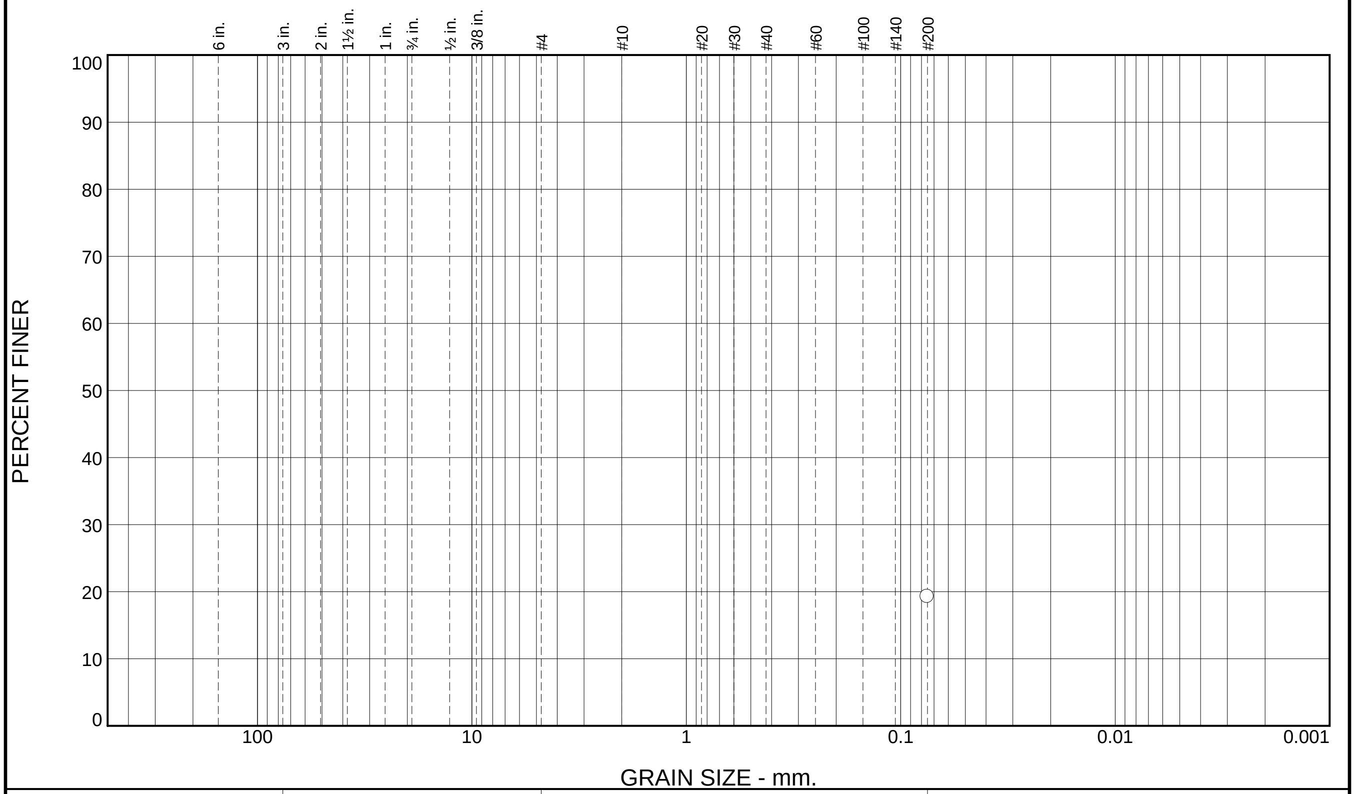
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						19.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	19.2		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= 17 LL= 35 PI= 18

Coefficients

D_{90}= D_{85}= D_{60}=

D_{50}= D_{30}= D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140, Method B

Dry Sample Weight = 283.86; Soak Time = 4 hrs

PI: ASTM D4318, Wet method

Sample Number: 1-B3 @ 16

Date: 11/5/2018

ENGEO INCORPORATED

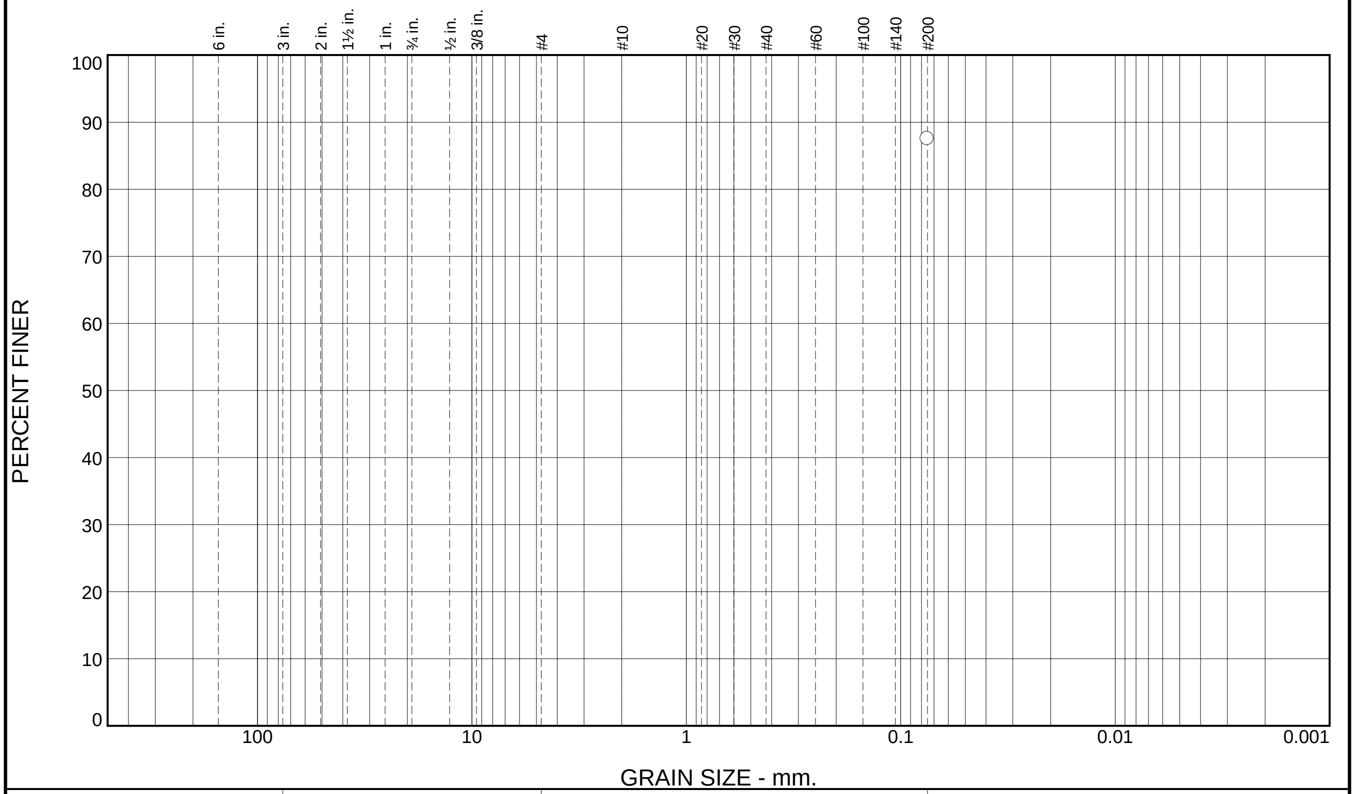
Client: Monte Vista Memorial Investment Group, LLC

Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						87.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	87.5		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 118.31; Soak Time = 4 hrs

Sample Number: 1-B4 @ 33.5

Date: 11/26/2018

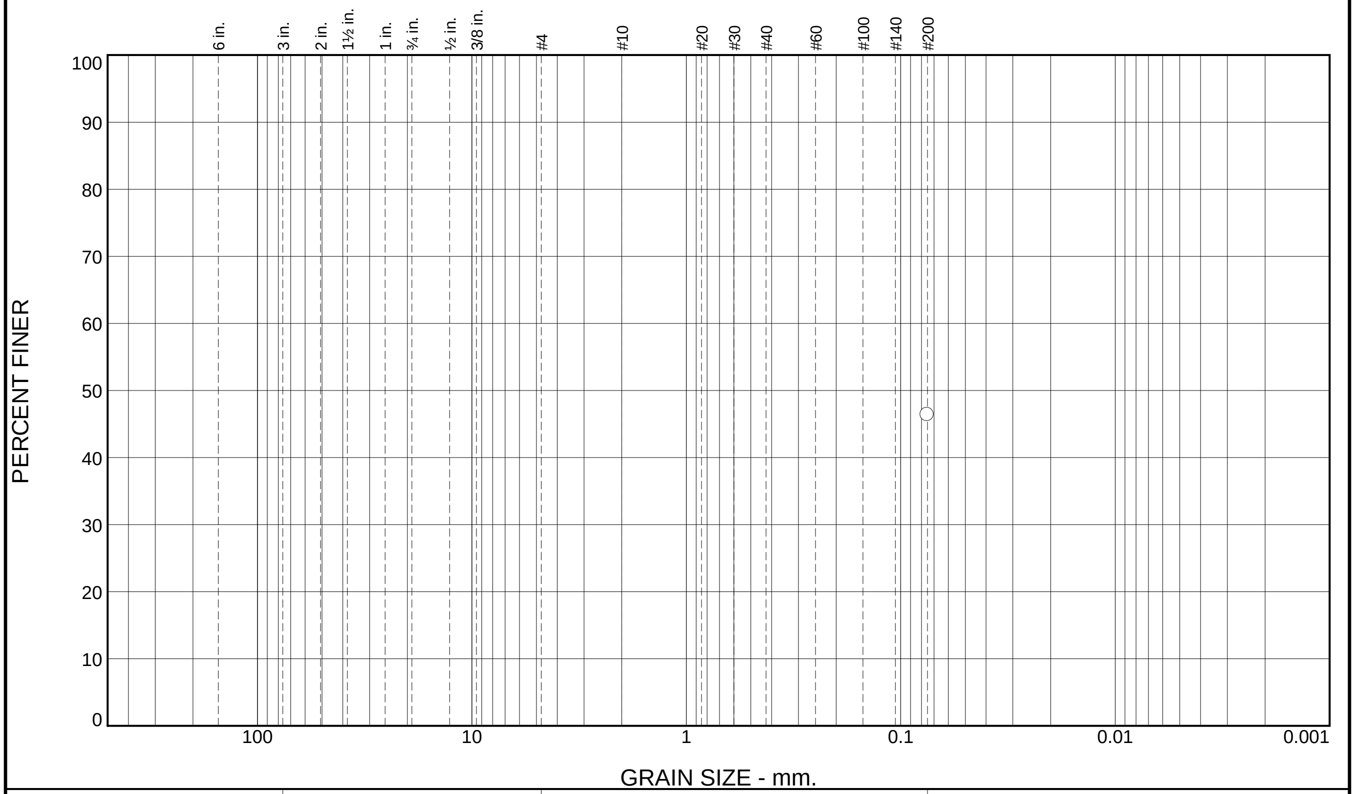
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						46.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	46.3		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 145.69; Soak Time = 4 hrs

Sample Number: 1-B4 @ 43

Date: 11/26/2018

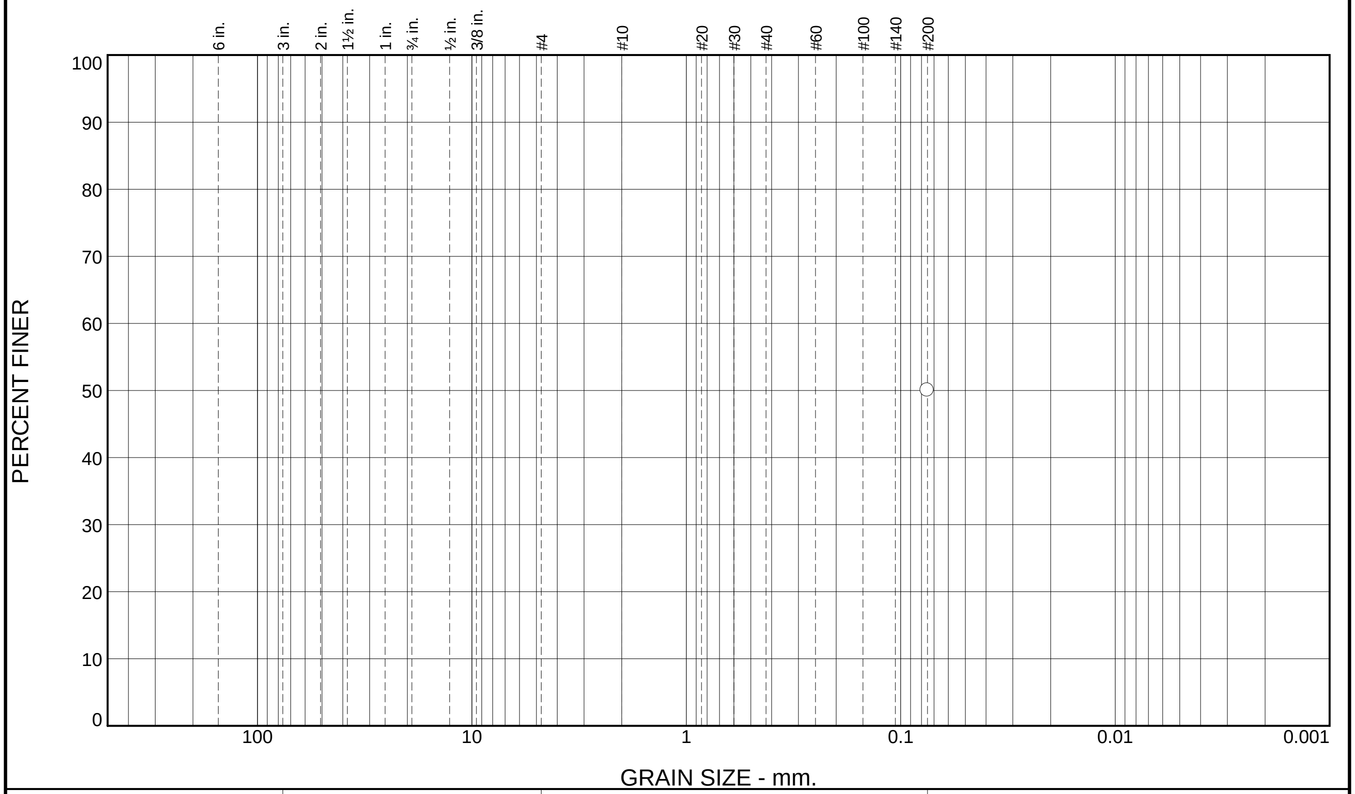
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						50.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	50.0		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 207.55; Soak Time = 4 hrs

Sample Number: 1-B4 @ 6

Date: 11/26/2018

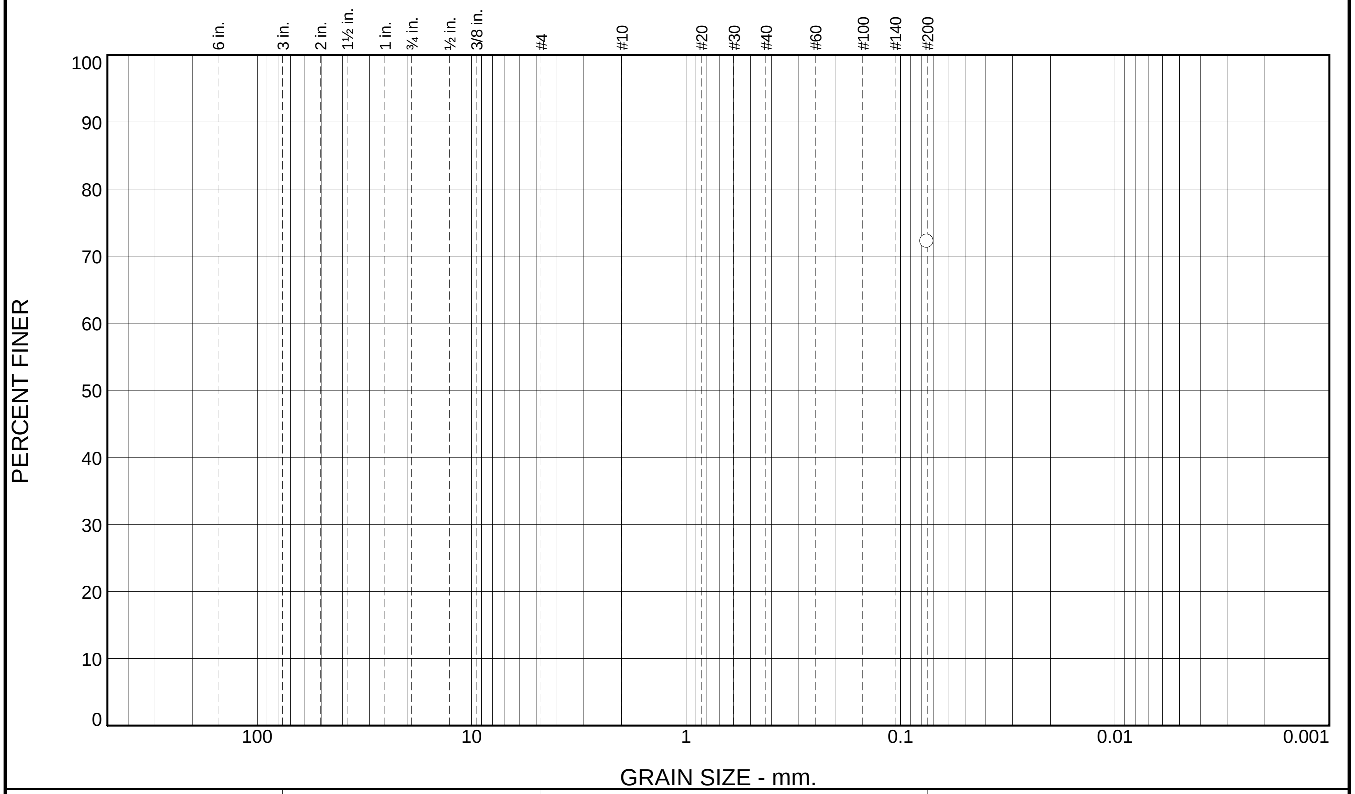
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						72.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	72.2		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 109.94; Soak Time = 4 hrs

Sample Number: 1-B5 @ 16

Date: 11/26/2018

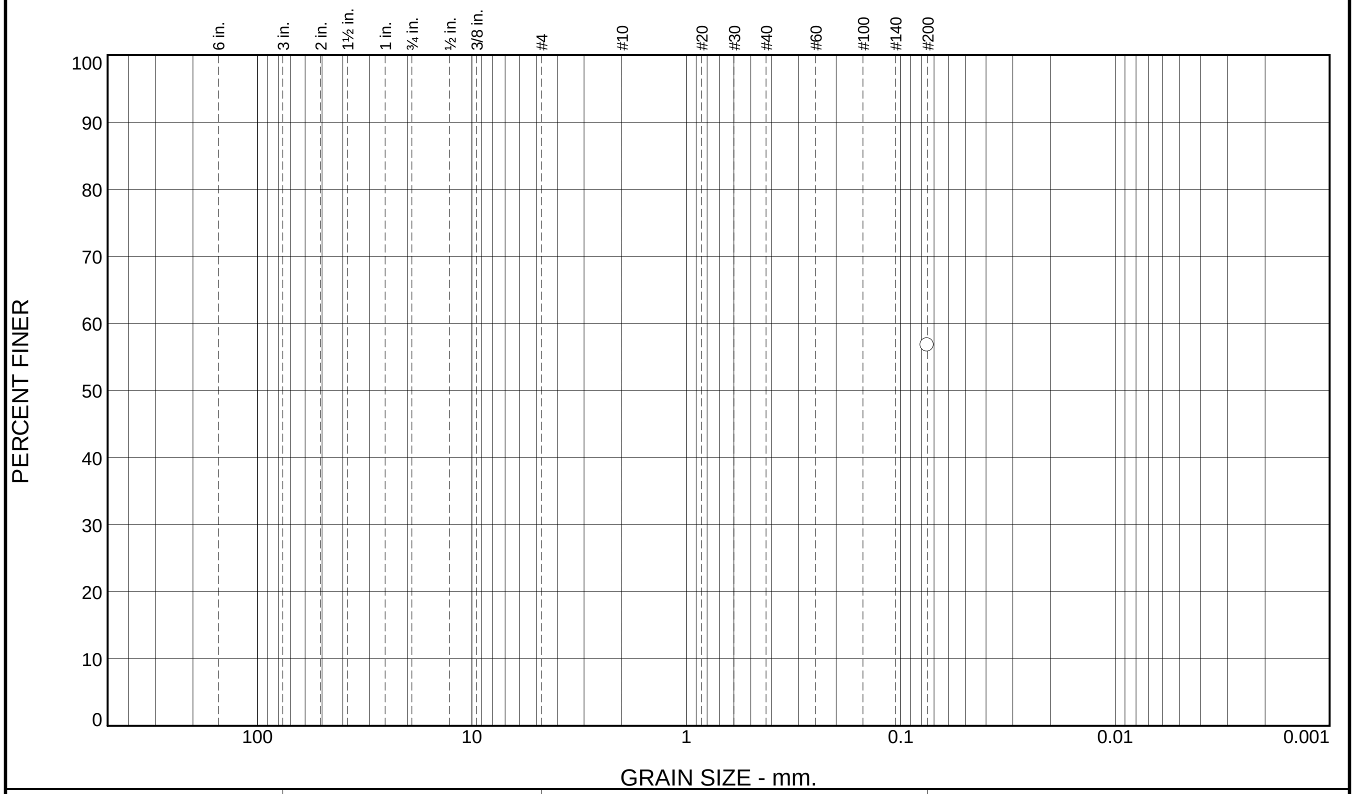
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						56.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	56.7		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 238.5; Soak Time = 4 hrs

Sample Number: 1-B5 @ 33

Date: 11/28/2018

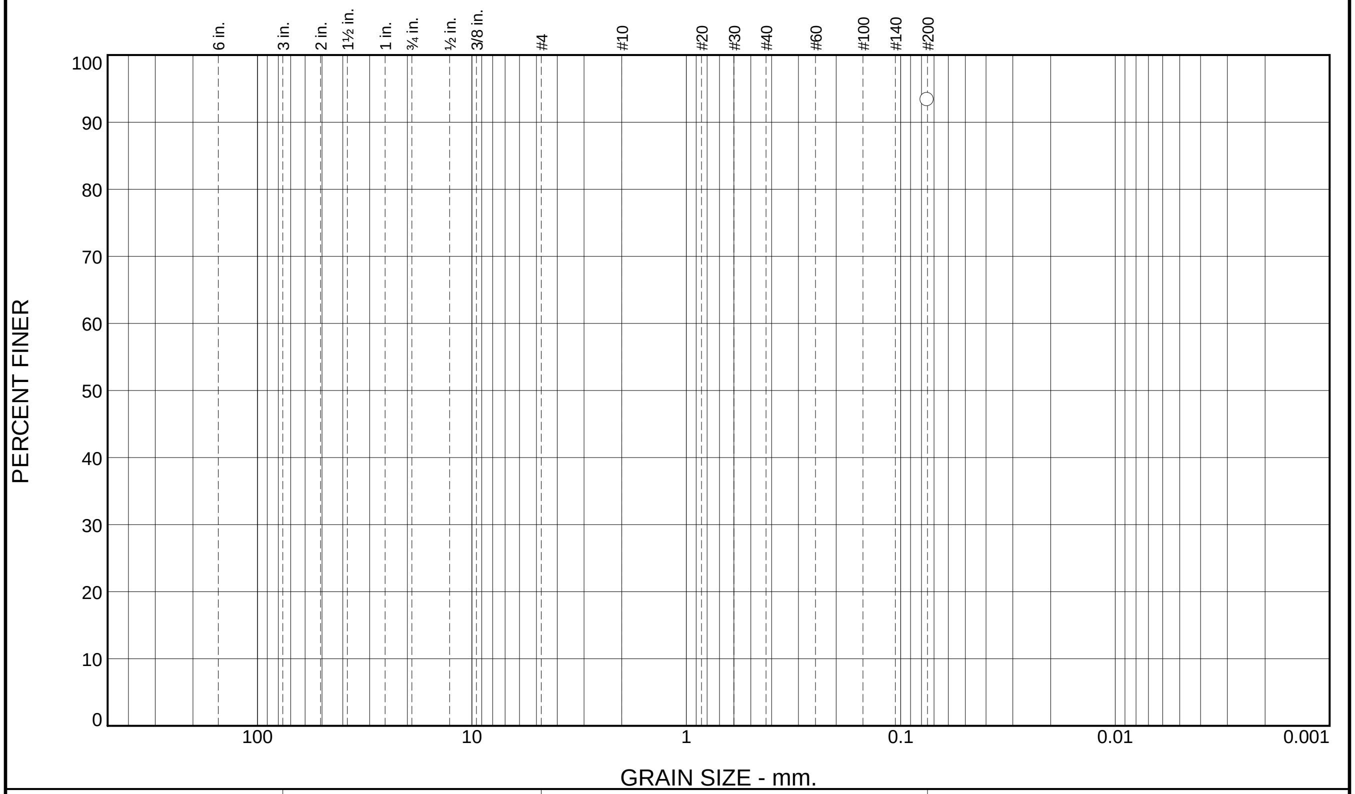
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						93.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	93.3		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 20 LL= 40 PI= 20

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140, Method B
Dry Sample Weight = 55.33, Soak Time = 4 hrs
PI: ASTM D4318, Wet method

Sample Number: 1-B5 @ 38

Date: 11/28/2018

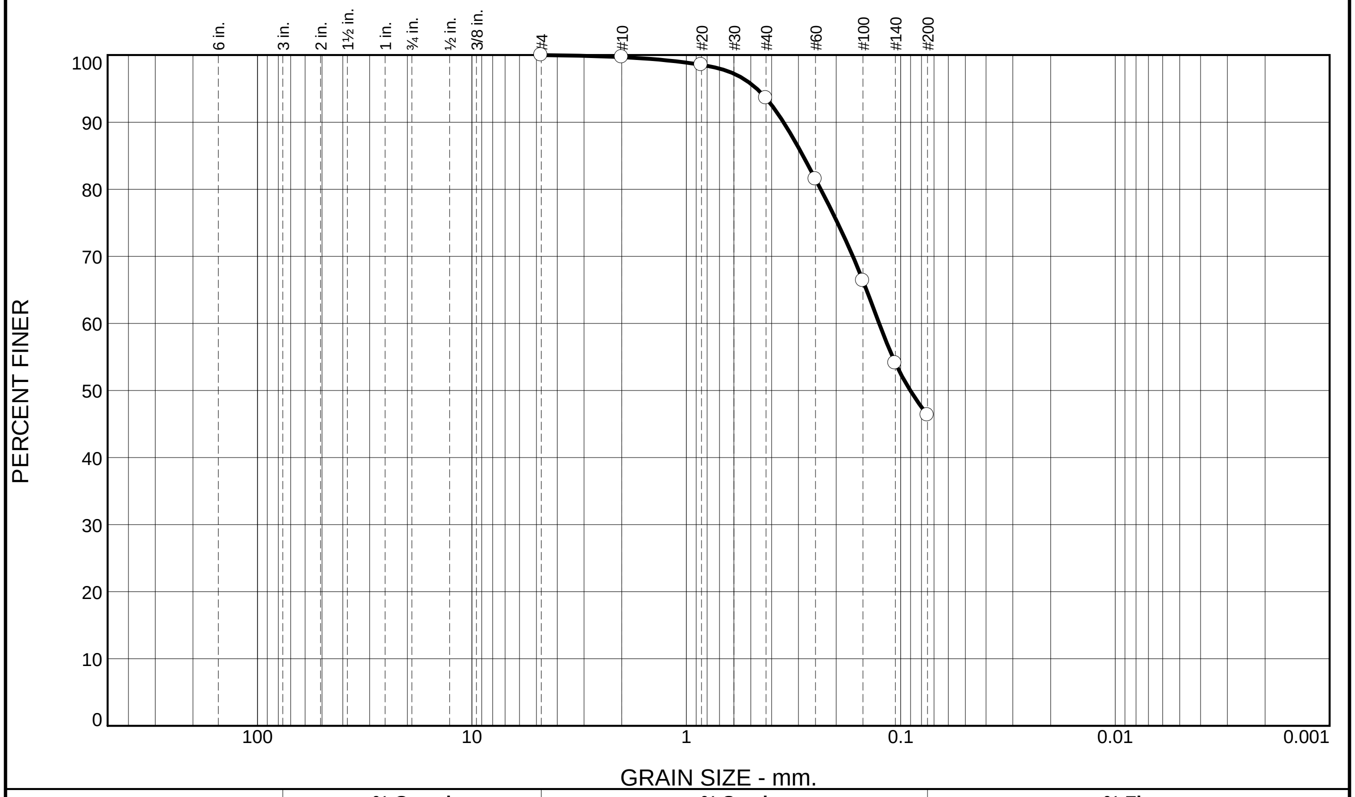
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	6.1	47.3	46.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	98.5		
#40	93.6		
#60	81.5		
#100	66.4		
#140	54.1		
#200	46.3		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3525 D_{85}= 0.2860 D_{60}= 0.1261
D_{50}= 0.0903 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D6913, Method A

Sample Number: 1-B5 @ 5.5

Date: 11/26/2018

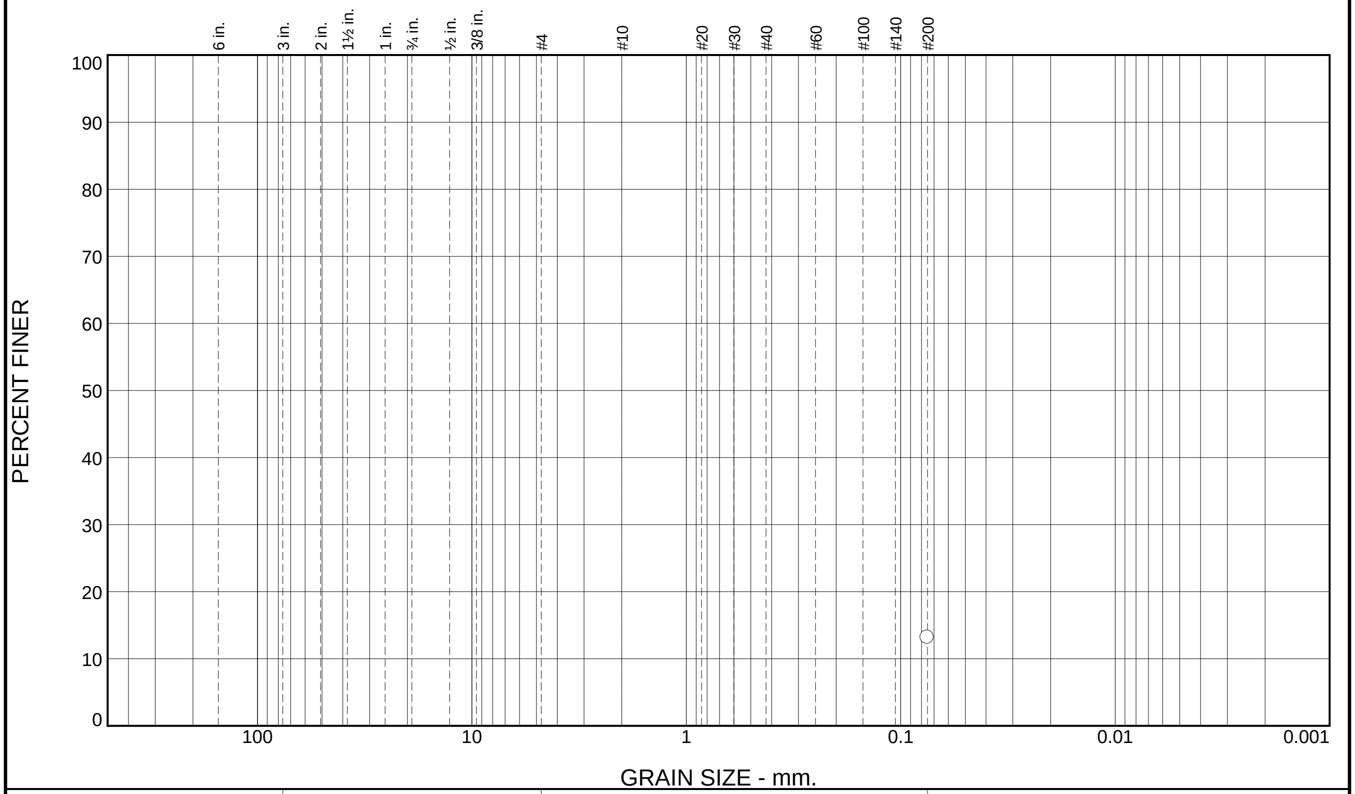
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						13.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	13.2		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 334.5; Soak Time = 4 hrs

Sample Number: 1-B6 @ 17

Date: 11/5/2018

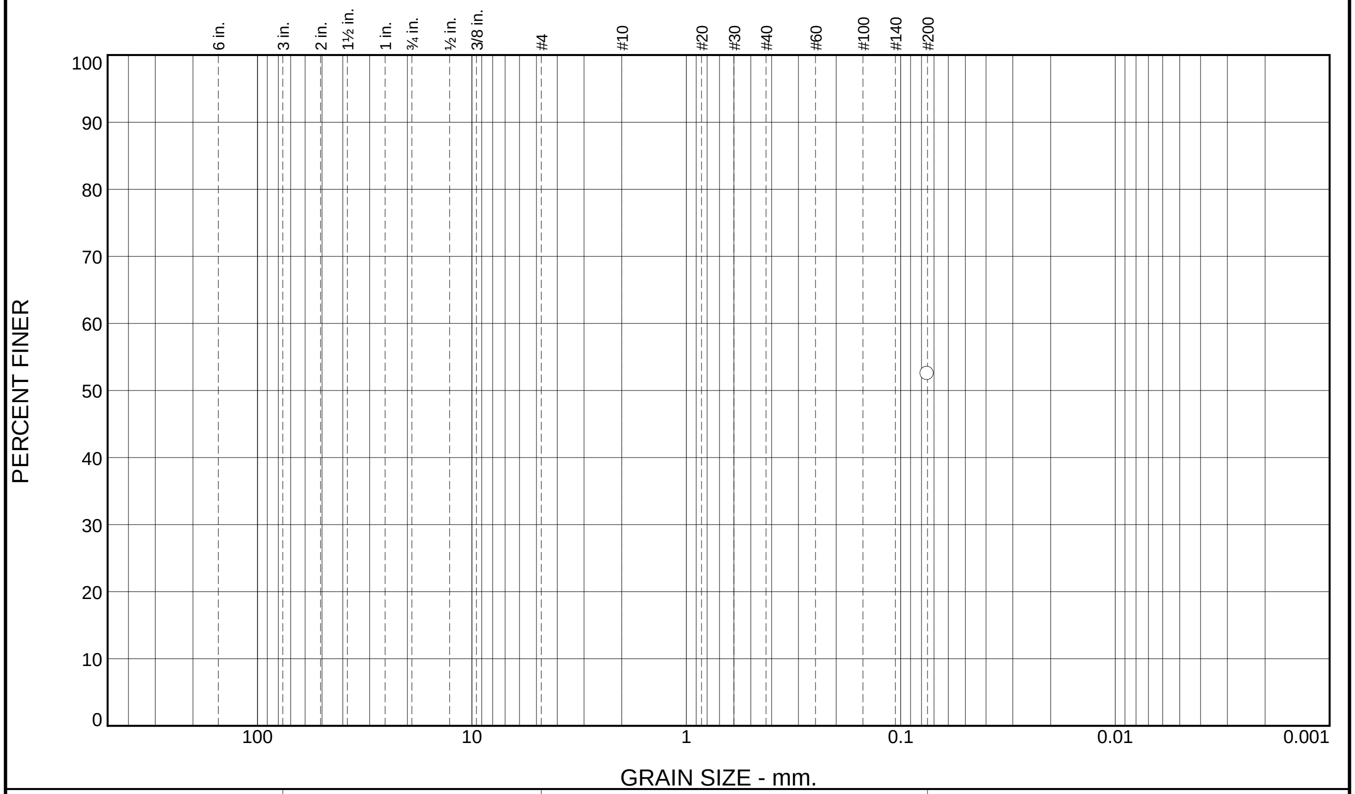
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						52.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	52.5		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D1140, Method B
Dry Sample Weight = 143.8; Soak Time = 68.33

Sample Number: 1-B6 @ 25

Date: 11/5/2018

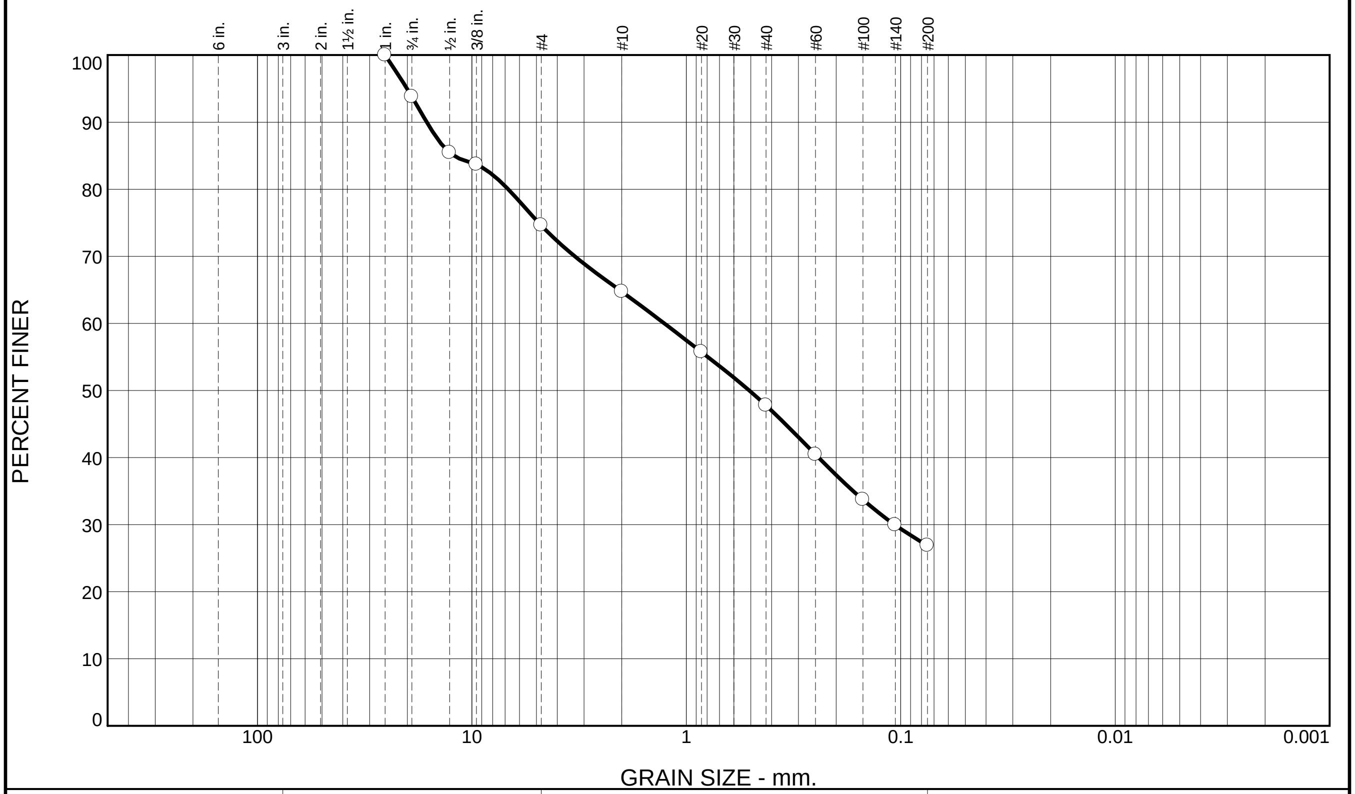
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.2	19.2	9.9	16.9	20.9	26.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	93.8		
1/2	85.4		
3/8	83.7		
#4	74.6		
#10	64.7		
#20	55.7		
#40	47.8		
#60	40.4		
#100	33.7		
#140	29.9		
#200	26.9		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 16.2311 D_{85}= 12.1555 D_{60}= 1.2673
D_{50}= 0.5088 D_{30}= 0.1069 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D6913

Sample Number: 1-B7 @ 10

Date: 11/6/18

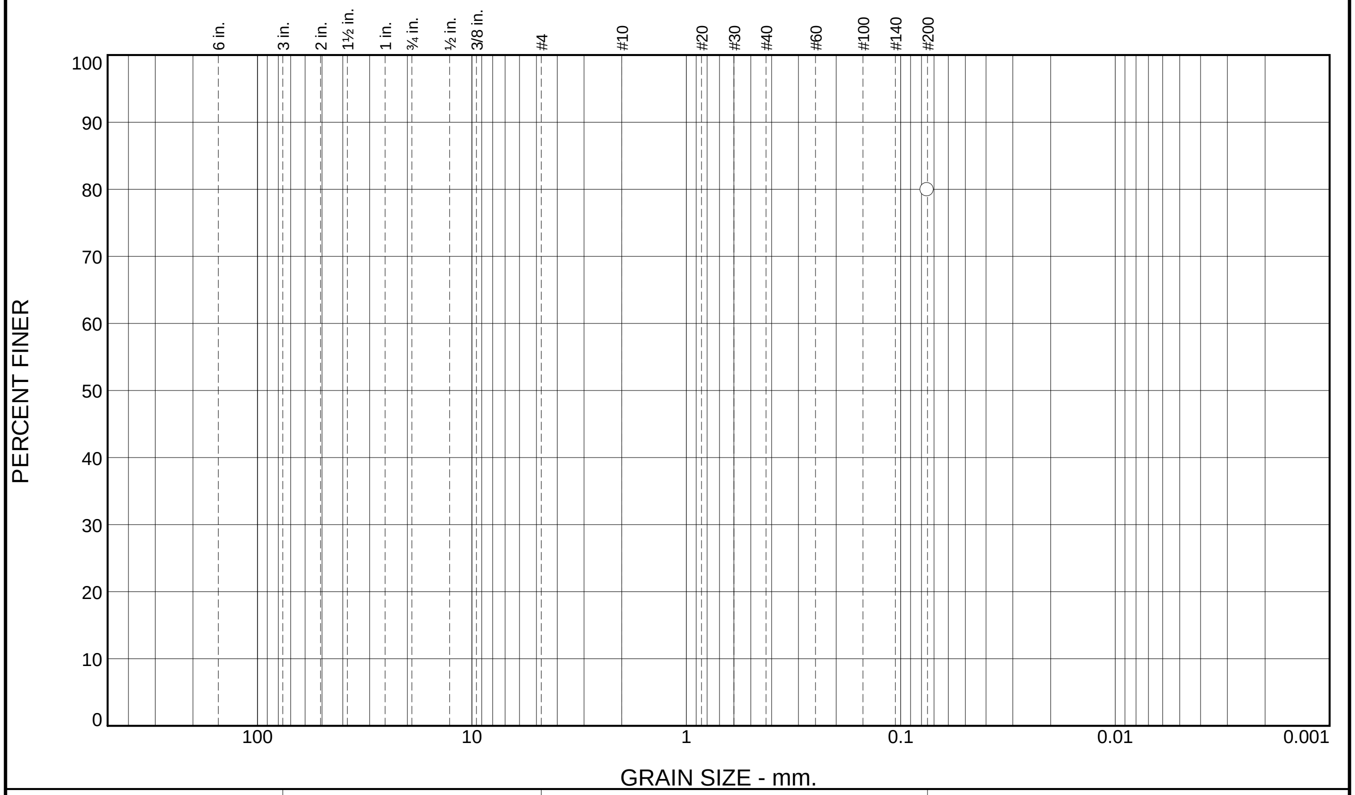
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Quasem **Checked By:** M. Bromfiled

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						79.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	79.9		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 21 LL= 41 PI= 20

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D1140, Method B
Dry Sample Weight = 176.83; Soak Time = 4 hrs
PI: ASTM D4318, Wet method

Sample Number: 1-TP4 @ 11-12

Date: 11/28/2018

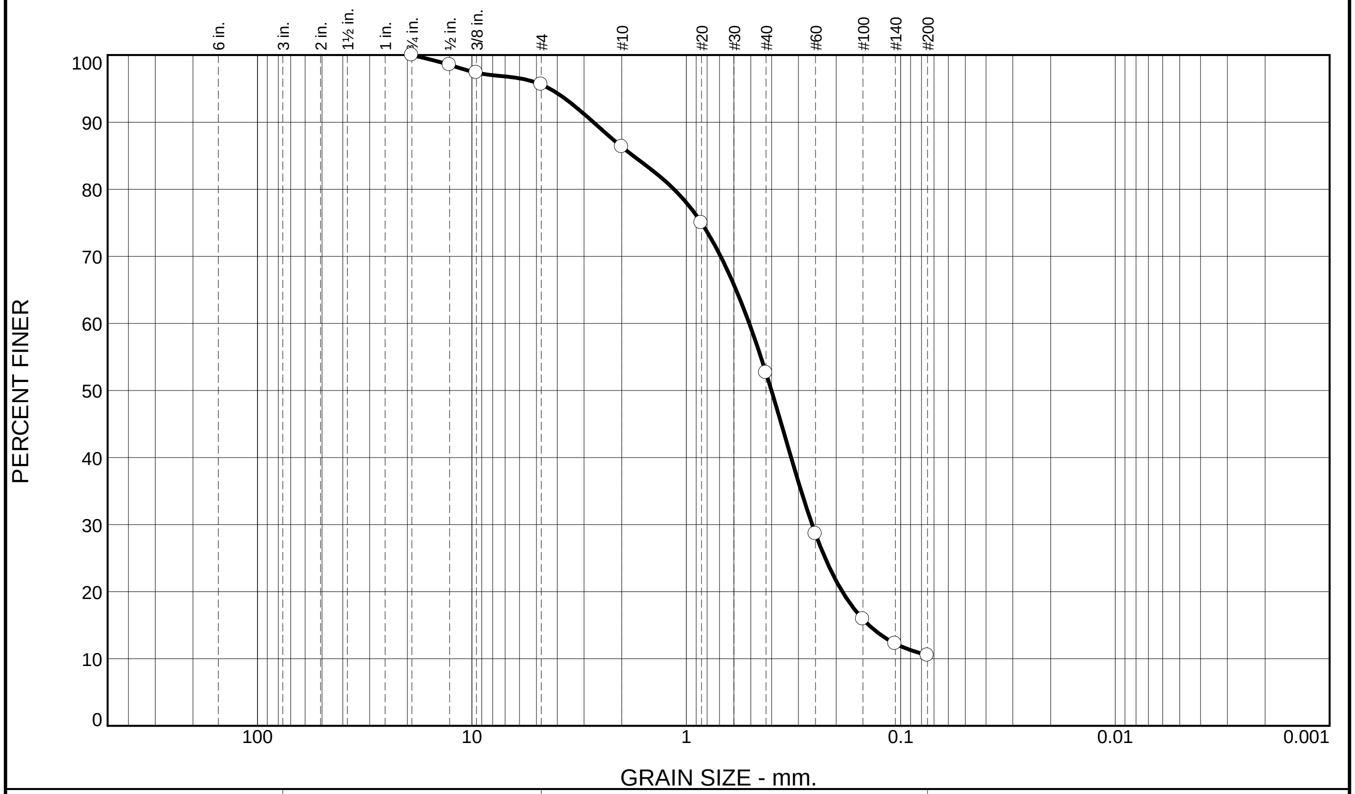
ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	9.3	33.7	42.1	10.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	98.5		
3/8	97.4		
#4	95.6		
#10	86.3		
#20	75.0		
#40	52.6		
#60	28.6		
#100	15.9		
#140	12.2		
#200	10.5		

* (no specification provided)

Material Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.7117 D_{85}= 1.7699 D_{60}= 0.5087
D_{50}= 0.4010 D_{30}= 0.2591 D_{15}= 0.1406
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

GS: ASTM D422; Specific gravity = 2.706, ASTM D854
Silt/clay division of 0.002 was used

Sample Number: 1-B1 @ 10

Date: 11/6/18

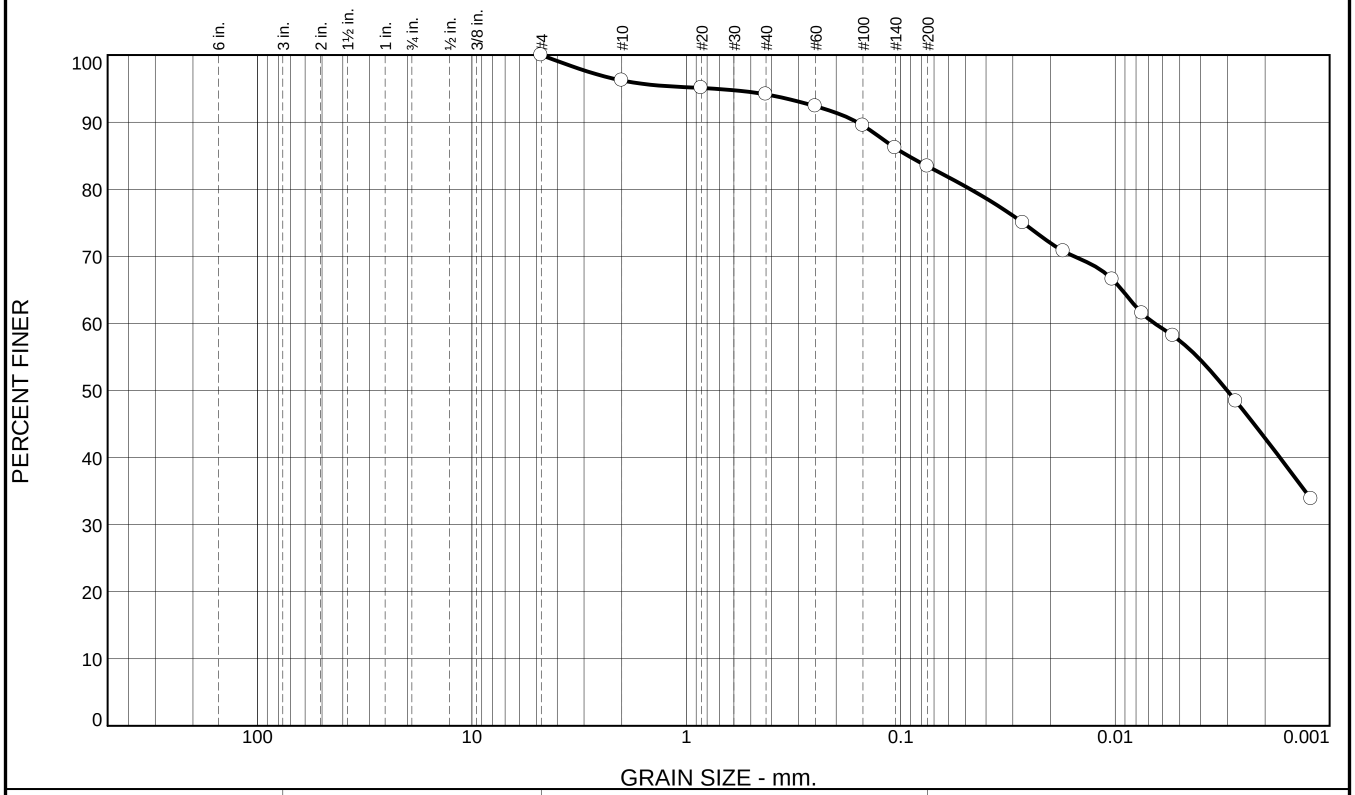
ENGEO
INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Quasem **Checked By:** M. Bromfield

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.8	2.1	10.7	40.5	42.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	96.2		
#20	95.1		
#40	94.1		
#60	92.4		
#100	89.5		
#140	86.1		
#200	83.4		
0.0269 mm.	75.0		
0.0174 mm.	70.8		
0.0103 mm.	66.6		
0.0075 mm.	61.5		
0.0054 mm.	58.2		
0.0027 mm.	48.4		
0.0012 mm.	33.8		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 21 LL= 46 PI= 25

Coefficients

D_{90}= 0.1597 D_{85}= 0.0927 D_{60}= 0.0066
D_{50}= 0.0030 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(21)

Remarks

GS: ASTM D422, Specific Gravity = 2.715, ASTM D854
PI: ASTM D4318, Wet method; USCS: ASTM D2487
Silt/clay division of .002 mm was used.

Sample Number: 1-B5 @ 28

Date: 11/28/2018

ENGEO INCORPORATED

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road

Project No: 15426.000.000

Tested By: M. Bromfield **Checked By:** M. Quasem

MOISTURE CONTENT DETERMINATION

ASTM D2216

BORING/SAMPLE ID	**1-B3@11.5**							
DEPTH (ft)	**11.5**							
Method A or B	B							
%MOISTURE	**27.6**							

BORING/SAMPLE ID								
DEPTH (ft)								
Method A or B								
%MOISTURE								

BORING/SAMPLE ID								
DEPTH (ft)								
Method A or B								
%MOISTURE								

BORING/SAMPLE ID								
DEPTH (ft)								
Method A or B								
%MOISTURE								

BORING/SAMPLE ID								
DEPTH (ft)								
Method A or B								
%MOISTURE								

PROJECT NAME: 3656 Las Colinas Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial investment Group, LLC
PHASE NUMBER: 001

DATE: 11/15/18

ENGEO
INCORPORATED

Tested by: R. Montalvo Reviewed by: M. Gilbert

MOISTURE-DENSITY DETERMINATION

ASTM D7263

BORING ID:	1-B1	1-B1	1-B1	1-B2	1-B2	1-B2	1-B3	1-B3
DEPTH (ft.):	28.0	38.0	43.0	16.5	20.0	44.0	16.0	26.5
MOISTURE CONTENT (%):	21.2	19.7	23.3	20.1	16.9	20.1	15.9	13.2
DRY DENSITY (lbs/ft^3):	107.1		103.5	106.8		106.5	118.0	

BORING ID:	1-B3	1-B6	1-B6	1-B6	1-B7	1-B7	1-B8	1-B9
DEPTH (ft.):	50.0	6.0	17.0	31.0	4.0	10.0	5.5	8.0
MOISTURE CONTENT (%):	25.0	23.3	18.0	21.2	22.2	20.1	33.9	24.1
DRY DENSITY (lbs/ft^3):	101.3	101.9		108.8			86.6	97.8

BORING ID:	1-B10	1-B11	1-B12	1-B13	1-B13	1-B14	1-B15	
DEPTH (ft.):	4.0	4.0	10.0	10.0	20.0	4.0	5.5	
MOISTURE CONTENT (%):	25.3	17.8	18.5	19.1	25.3	45.1	30.6	
DRY DENSITY (lbs/ft^3):	83.3	80.8	109.3	106.1	99.9	74.0		

Testing remarks: For moisture content only, ASTM D2216

PROJECT NAME: 3656 Las Colinas Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
PHASE NUMBER: 001

DATE: 11/05/18

ENGEO
Expect Excellence

Tested by: M. Quasem　　Reviewed by: W. Miller

MOISTURE-DENSITY DETERMINATION

ASTM D7263

BORING ID:	1-B4	1-B4	1-B4	1-B5	1-B5	1-B5	1-B5	1-B5
DEPTH (ft.):	6.0	33.5	43.0	11.5	21.0	28.0	33.0	43.0
MOISTURE CONTENT (%):	14.8	26.7	20.1	23.1	21.3	25.1	18.3	26.0
DRY DENSITY (lbs/ft^3):	102.6	96.1	107.9		106.0	99.5	111.1	97.4

Testing remarks: For moisture content only, ASTM D2216

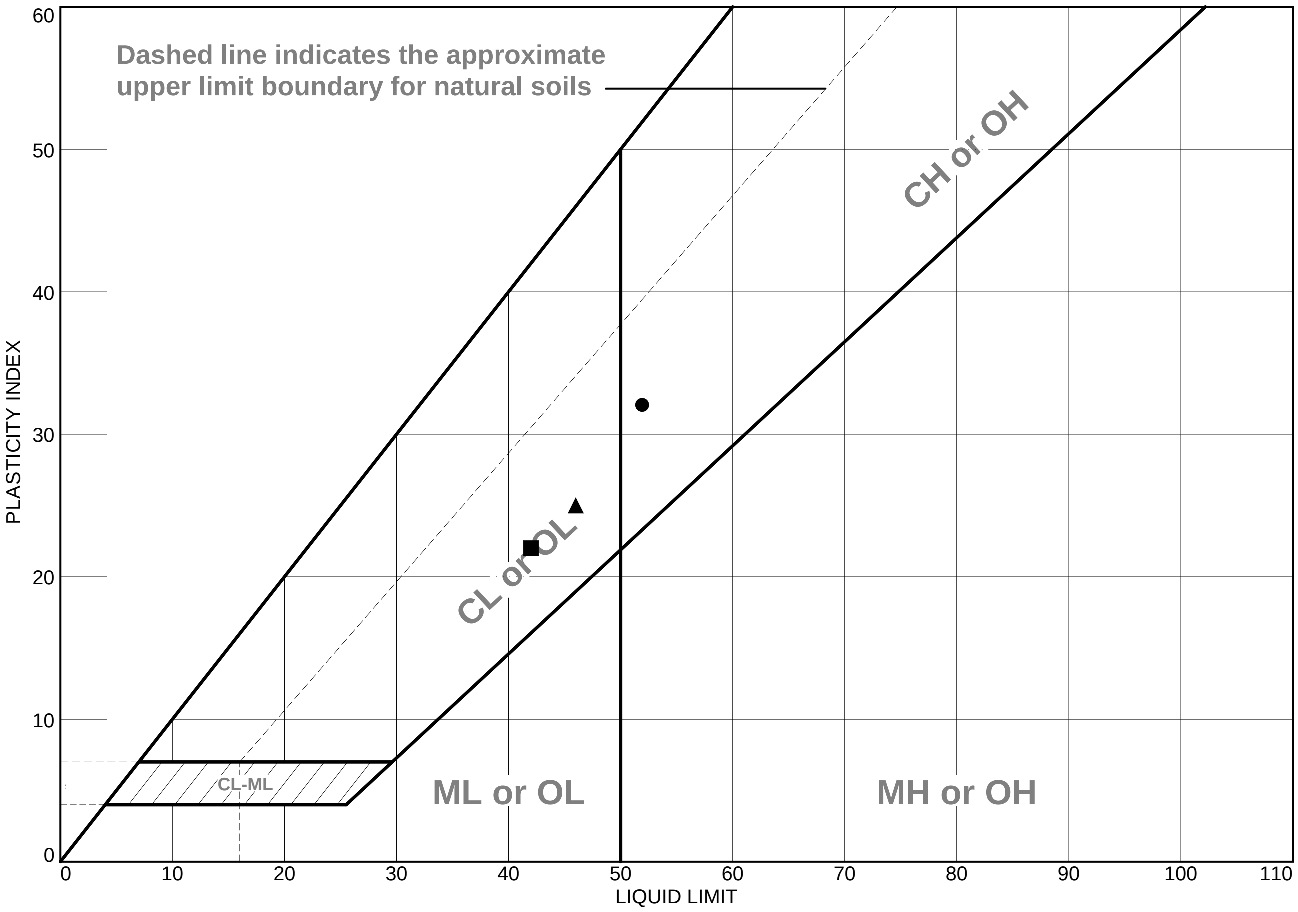
PROJECT NAME: **3656 Las Colinas Road**
PROJECT NUMBER: **15426.000.000**
CLIENT: **Monte Vista Memorial Investment Group, LLC**
PHASE NUMBER: **001**

DATE: **11/22/18**

ENGEO
Expect Excellence

Tested by: M. Bromfeild
Reviewed by: M. Quasem

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	52	20	32			
■	See exploration logs	42	20	22			
▲	See exploration logs	46	21	25			

Project No. 15426.000.000 **Client:** Monte Vista Memorial Investment Group, LLC

Project: 3656 Las Colinas Road

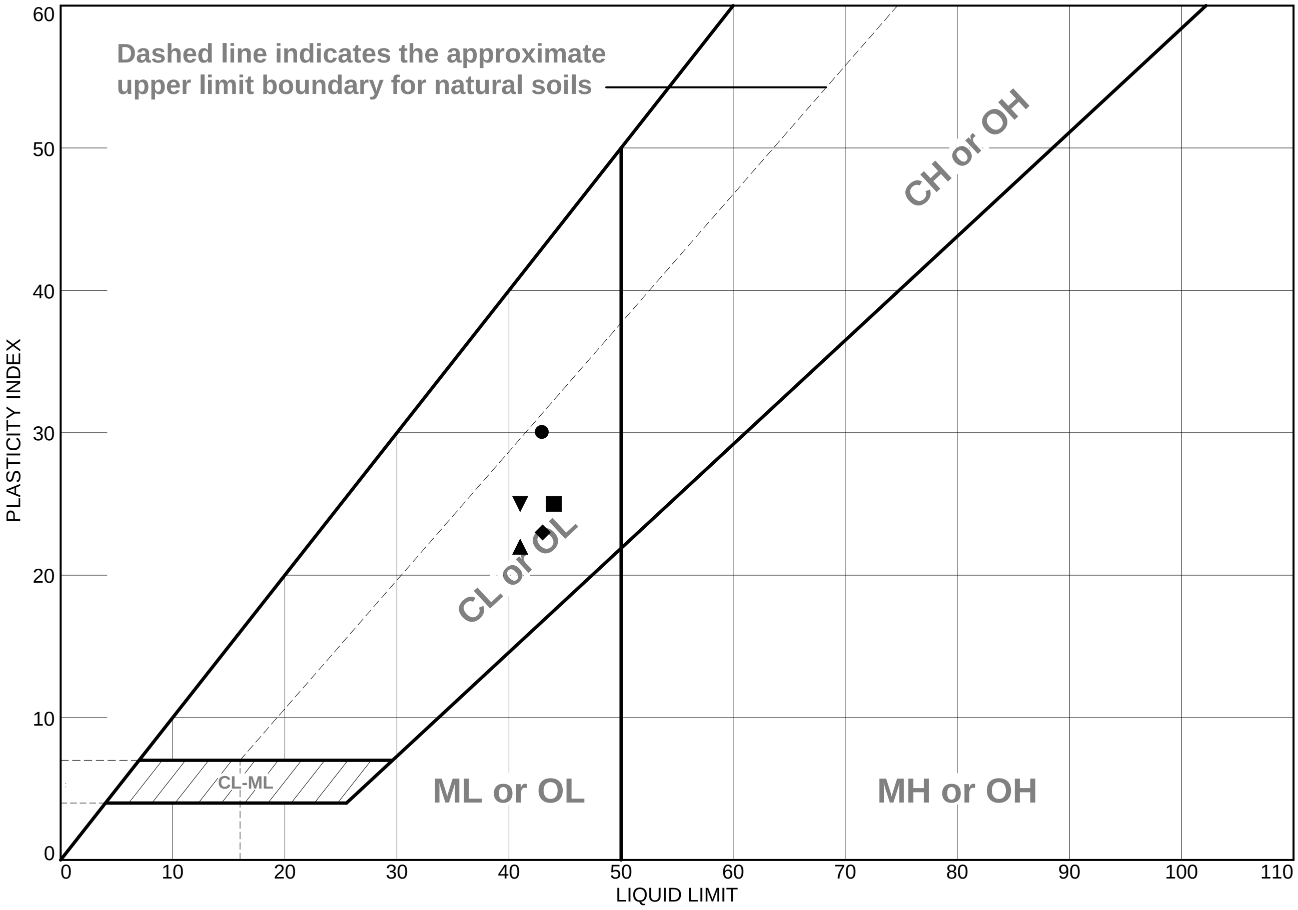
●**Sample Number:** 1-B4 @ 16
■**Sample Number:** 1-B5 @ 11.5
▲**Sample Number:** 1-B5 @ 28

Remarks:
●ASTM D4318, Wet method
■ASTM D4318, Wet method
▲PI: ASTM D4318, Wet method
GS: ASTM D422

ENGEO INCORPORATED

Tested By: M. Bromfield **Checked By:** M. Quasem

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	43	13	30			
■	See exploration logs	44	19	25		70.1	
▲	See exploration logs	41	19	22		86.8	
◆	See exploration logs	43	20	23		89.5	
▼	See exploration logs	41	16	25			

Project No. 15426.000.000 **Client:** Monte Vista Memorial Investment Group, LLC

Project: 3656 Las Colinas Road

●**Sample Number:** 1-B1 @ 6
■**Sample Number:** 1-B1 @ 21
▲**Sample Number:** 1-B1 @ 28
◆**Sample Number:** 1-B1 @ 43
▼**Sample Number:** 1-B2 @ 6

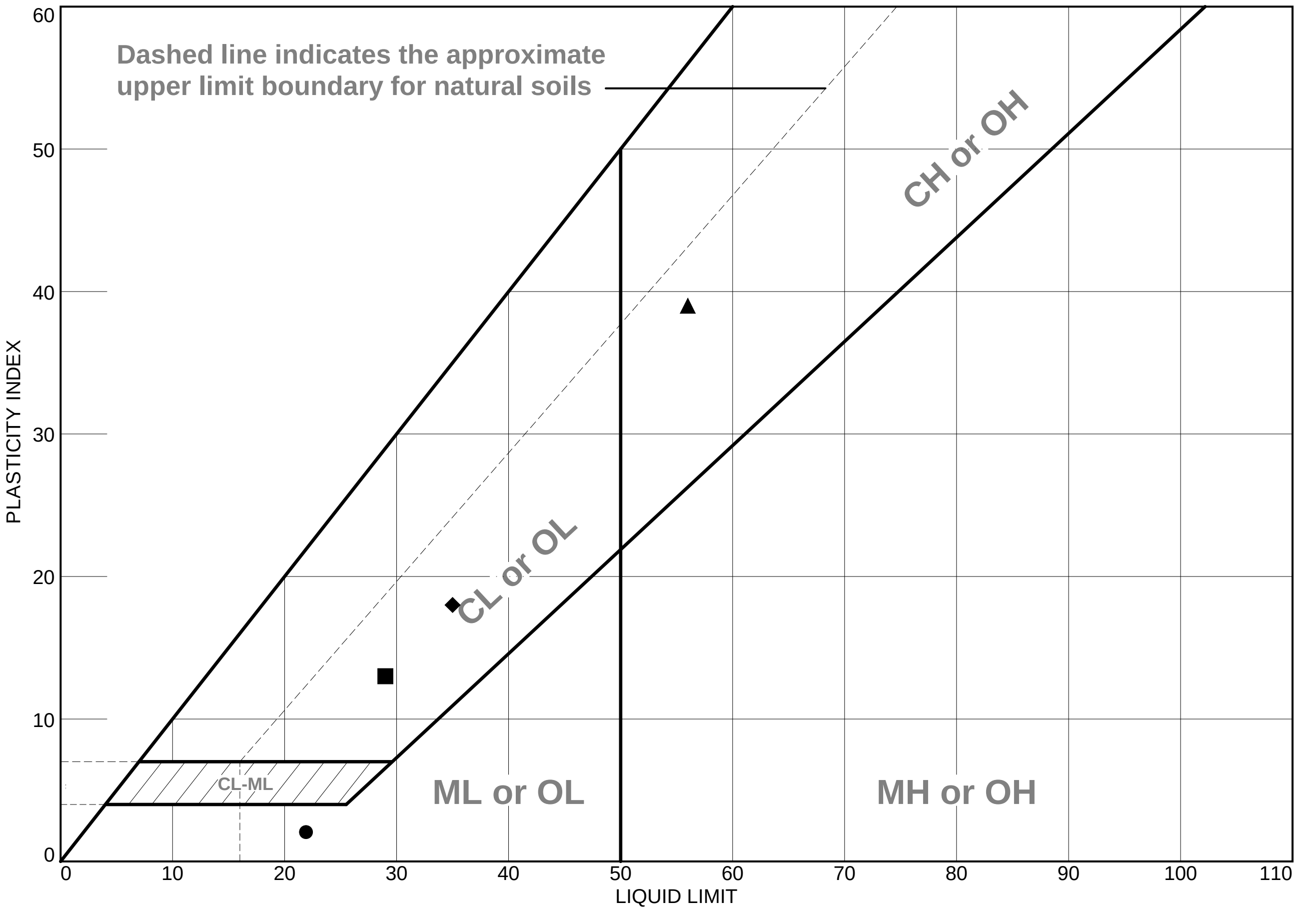
ENGEO
INCORPORATED

Remarks:

●ASTM D4318, Wet method
■PI: ASTM D4318, Wet method
GS: ASTM D1140
▲PI: ASTM D4318, Wet method
GS: ASTM D1140, Method B
◆PI: ASTM D4318, Wet method
GS: ASTM D1140
▼ASTM D4318, Wet method

Tested By: ○ M. Quasem □ M. Quasem △ M. Bromfield ◇ M. Quasem ▽ M. Quasem **Checked By:** M. Bromfield

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	22	20	2		23.0	
■	See exploration logs	29	16	13			
▲	See exploration logs	56	17	39			
◆	See exploration logs	35	17	18		19.2	

Project No. 15426.000.000 **Client:** Monte Vista Memorial Investment Group, LLC

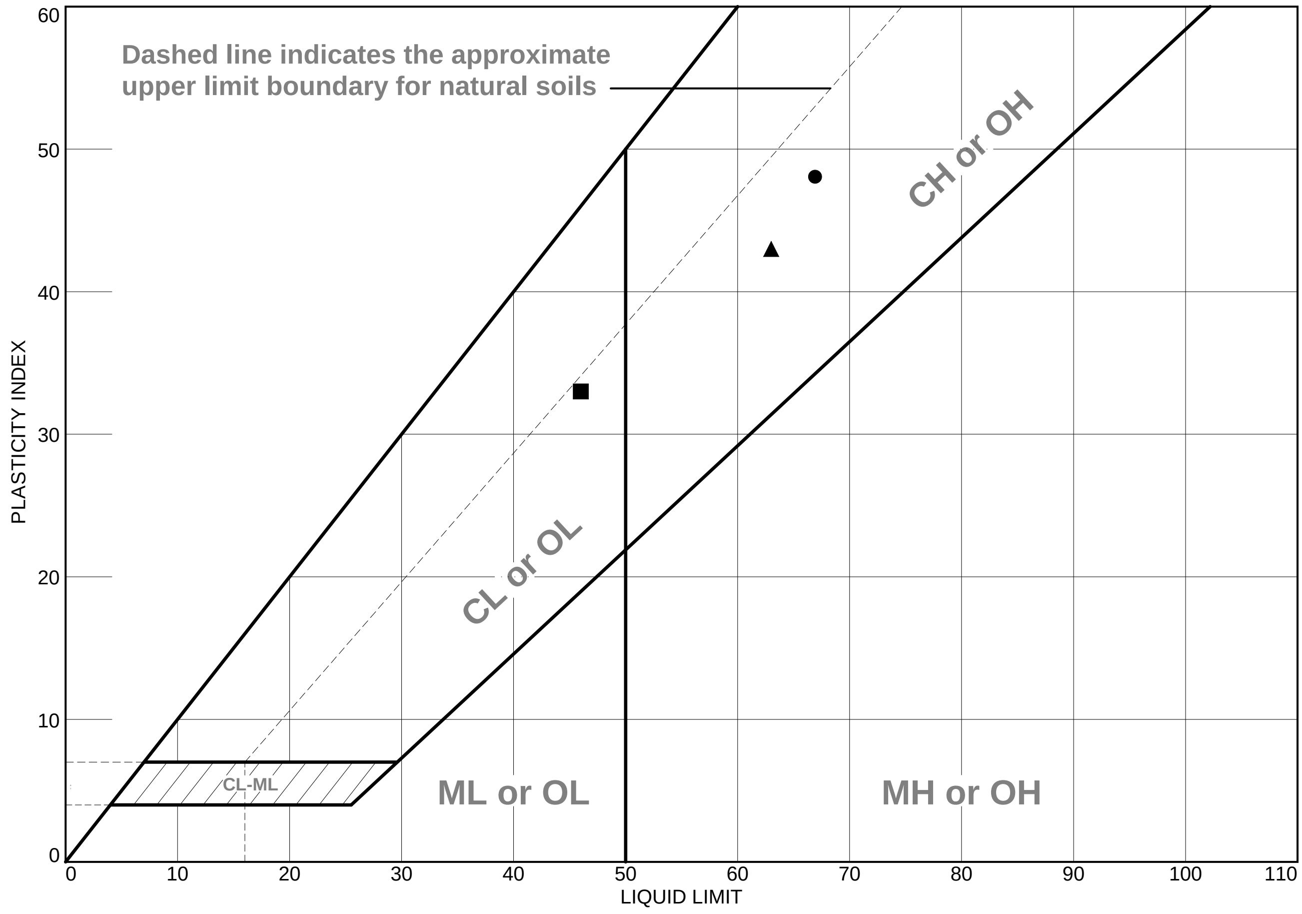
Project: 3656 Las Colinas Road

●**Sample Number:** 1-B2 @ 16.5
■**Sample Number:** 1-B2 @ 28
▲**Sample Number:** 1-B3 @ 6
◆**Sample Number:** 1-B3 @ 16

Remarks:
●PI: ASTM D4318, Wet method
GS: ASTM D1140, Method B
■ASTM D4318, Wet method
▲ASTM D4318, Wet method
◆PI: ASTM D4318, Wet method
GS: ASTM D1140, Method B

Tested By: ○ M. Bromfield □ M. Quasem △ M. Quasem ◇ M. Bromfield **Checked By:** M. Quasem

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	67	19	48			
■	See exploration logs	46	13	33			
▲	See exploration logs	63	20	43			

Project No. 15426.000.000 **Client:** Monte Vista Memorial Investment Group, LLC

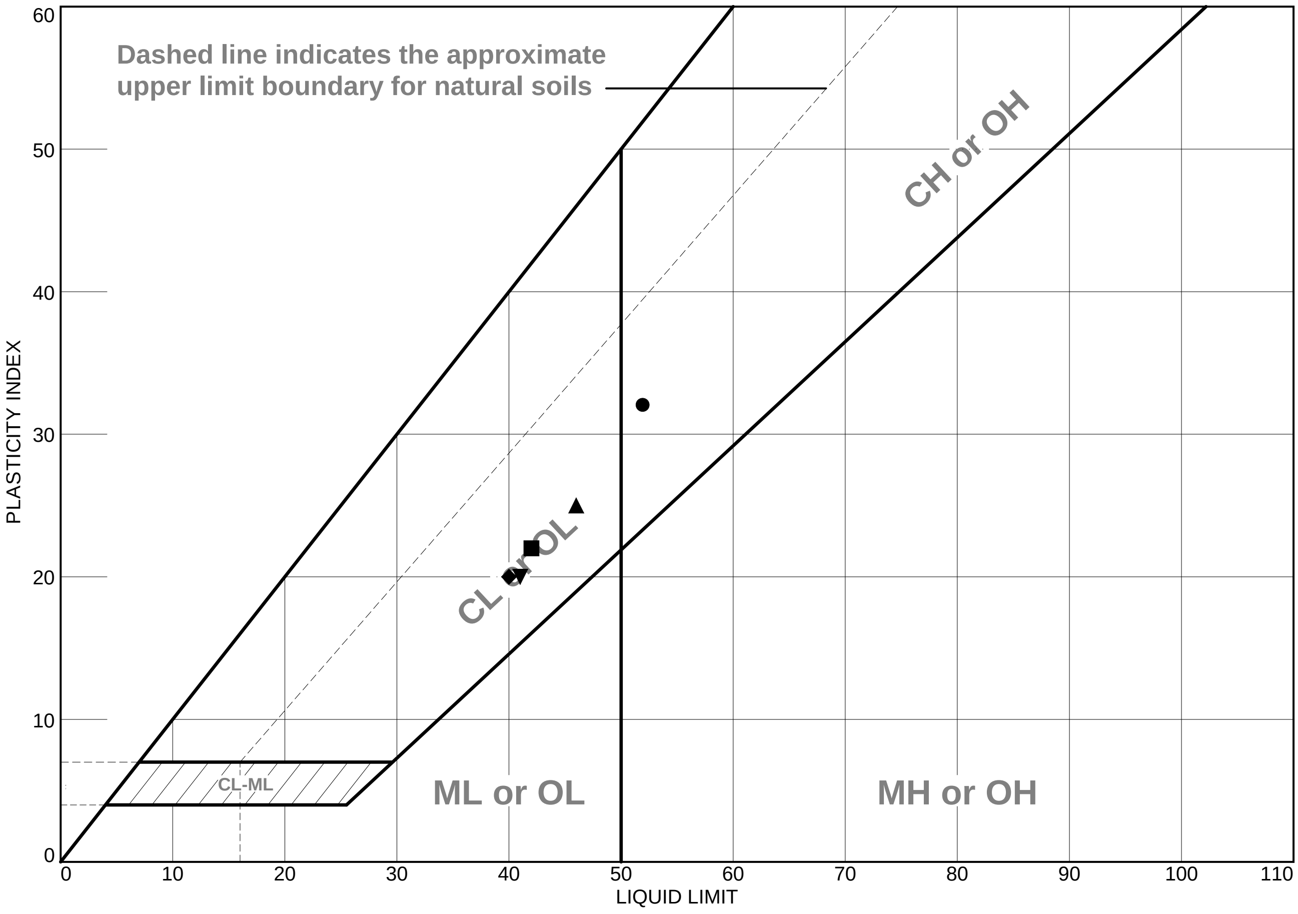
Project: 3656 Las Colinas Road

●**Sample Number:** 1-B6 @ 6
■**Sample Number:** 1-B11 @ 4
▲**Sample Number:** 1-B15 @ 5.5

Remarks:
●ASTM D4318, Wet method
■ASTM D4318, Wet method
▲ASTM D4318, Wet method

Tested By: ○ M. Bromfield ☐ M. Quasem △ M. Quasem **Checked By:** M. Quasem

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	52	20	32			
■	See exploration logs	42	20	22			
▲	See exploration logs	46	21	25			
◆	See exploration logs	40	20	20		93.3	
▼	See exploration logs	41	21	20		79.9	

Project No. 15426.000.000 **Client:** Monte Vista Memorial Investment Group, LLC

Project: 3656 Las Colinas Road

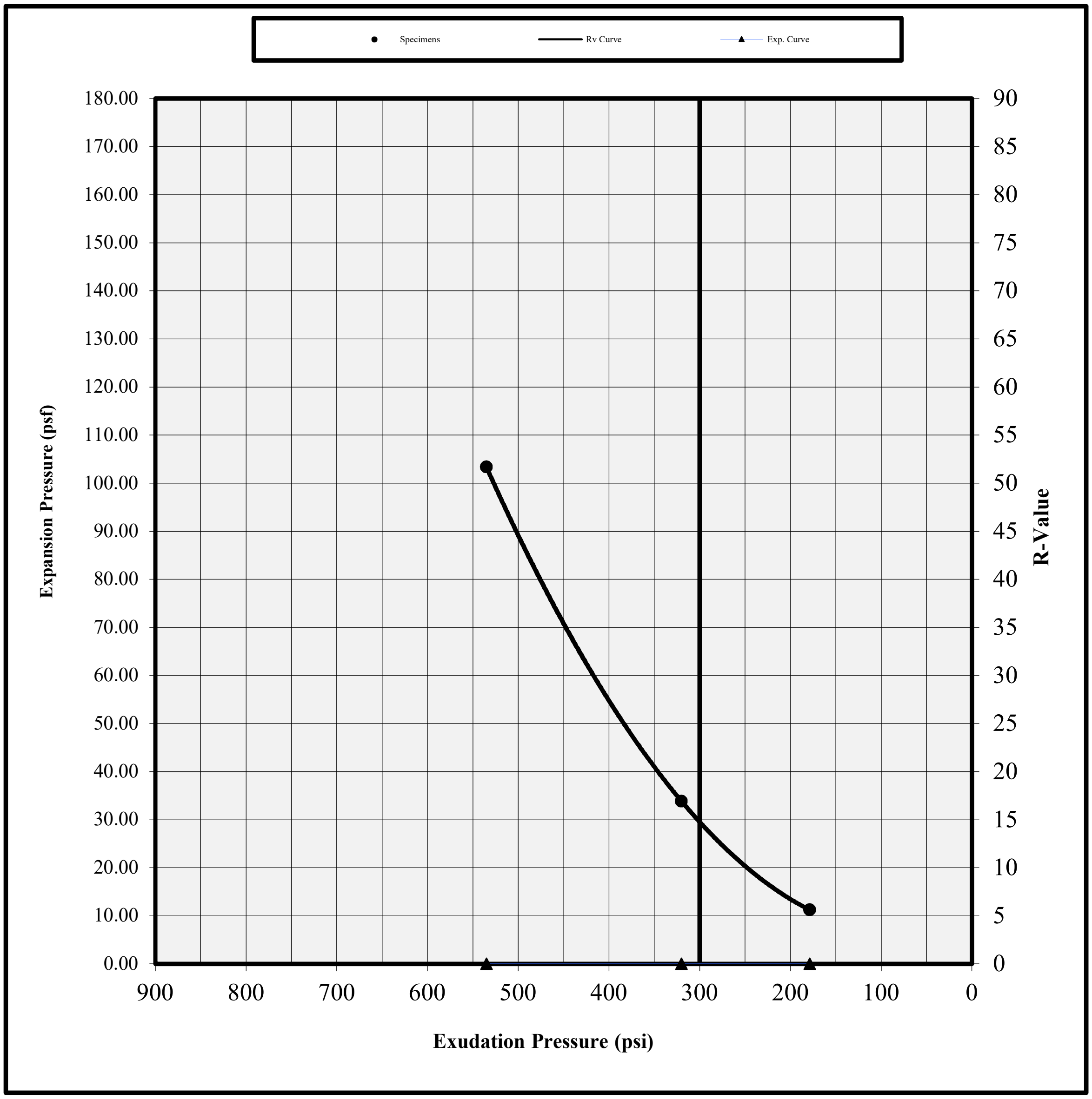
●**Sample Number:** 1-B4 @ 16
■**Sample Number:** 1-B5 @ 11.5
▲**Sample Number:** 1-B5 @ 28
◆**Sample Number:** 1-B5 @ 38
▼**Sample Number:** 1-TP4 @ 11-12

ENGEO
INCORPORATED

Remarks:
●ASTM D4318, Wet method
■ASTM D4318, Wet method
▲PI: ASTM D4318, Wet method
GS: ASTM D422
◆PI: ASTM D4318, Wet method
GS: ASTM D1140, Method B
▼PI: ASTM D4318, Wet method
GS: ASTM D1140, Method B

Tested By: M. Bromfield **Checked By:** M. Quasem

R VALUE TEST REPORT
ASTM D2844



Sample ID/Location: 1-TP2@4.5
Description: See exploration logs

Specimen	**Specimen 1**	**Specimen 2**	**Specimen 3**
Exudation Pressure (p.s.i.)	**535**	**320**	**179**
Expansion dial (0.0001")	**0**	**0**	**0**
Expansion Pressure (p.s.f.)	**0**	**0**	**0**
Resistance Value, "R"	**52**	**17**	**6**
% Moisture at Test	**11.8**	**14.4**	**16.1**
Dry Density at Test, p.c.f.	**117.5**	**117.1**	**113.4**
Minimum Design R-Value	**NA**		
"R" Value at Exudation Pressure of 300 psi.	**15**		
Expansion Pressure (psf) at Exudation Pressure of 300 psi.	**0**		

PROJECT NAME: 3656 Las Colina Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
PHASE NUMBER: 1

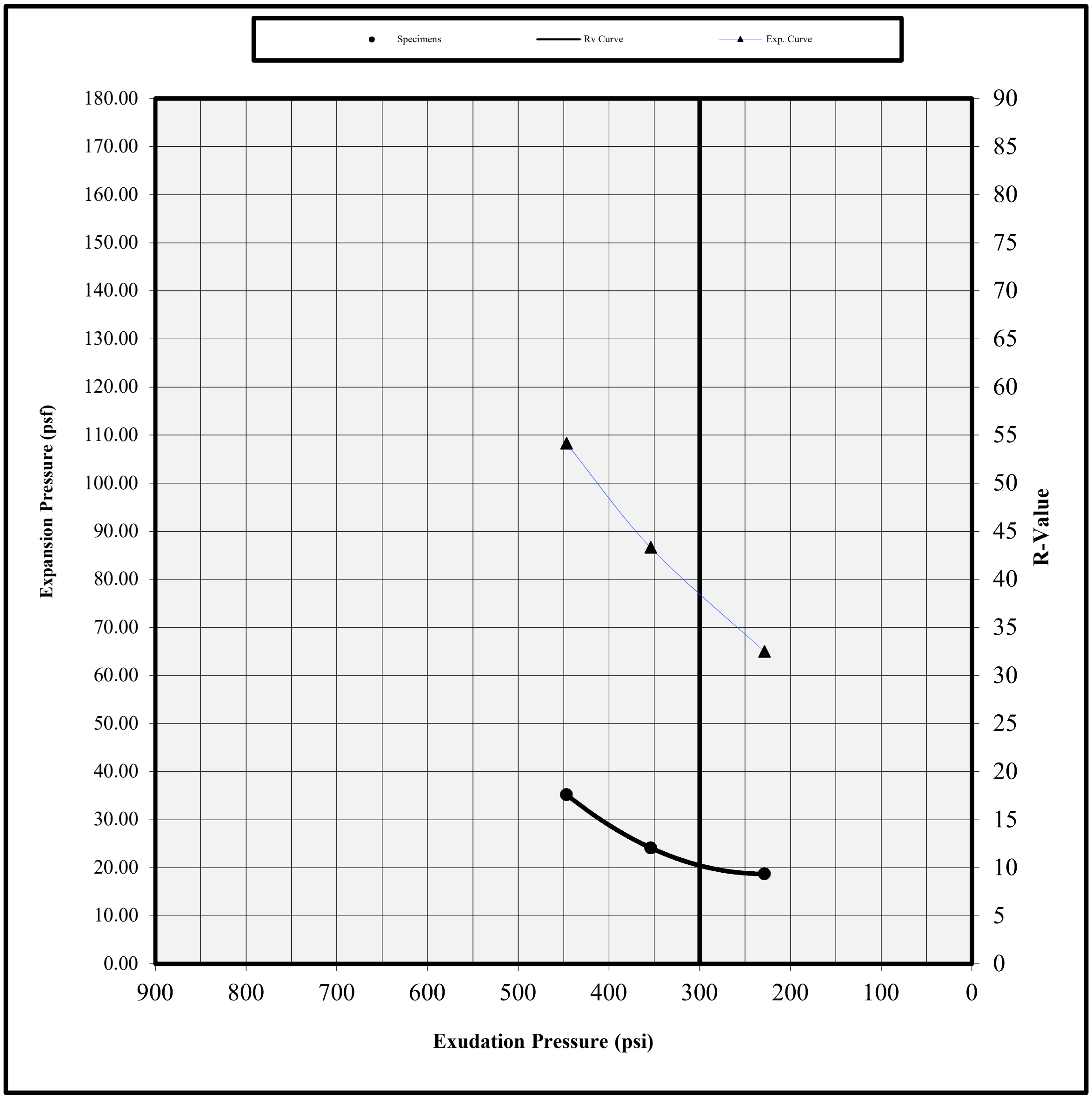
DATE: 11/19/18

ENGEO
Expect Excellence

Tested by: R. Montalvo
Reviewed by: M. Gilbert

Lab Address: 2213 Plaza Drive, Rocklin, CA 95765

R VALUE TEST REPORT
ASTM D2844



Sample ID/Location: Bulk 1 ft. to 1.5 ft.
Description: See exploration logs

Specimen	Specimen 1	Specimen 2	Specimen 3
Exudation Pressure (p.s.i.)	447	354	229
Expansion dial (0.0001")	25	20	15
Expansion Pressure (p.s.f.)	108	87	65
Resistance Value, "R"	18	12	9
% Moisture at Test	23.8	25.2	27.0
Dry Density at Test, p.c.f.	98.4	96.2	93.0
Minimum Design R-Value	NA		
"R" Value at Exudation Pressure of 300 psi.	11		
Expansion Pressure (psf) at Exudation Pressure of 300 psi.	78		

PROJECT NAME: 3656 Las Colina Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
PHASE NUMBER: 1

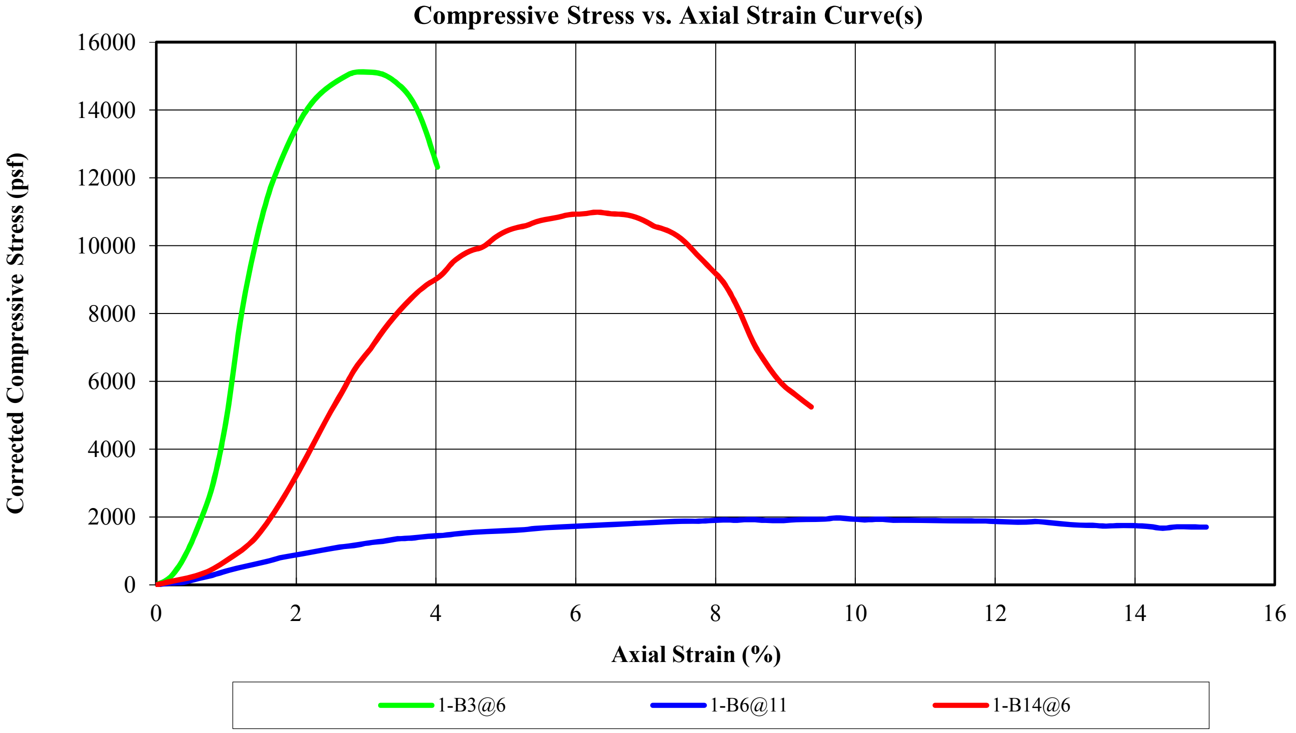
DATE: 11/19/18

ENGEO
Expect Excellence

Tested by: R. Montalvo
Reviewed by: M. Gilbert

Lab Address: 2213 Plaza Drive, Rocklin, CA 95765

UNCONFINED COMPRESSION TEST REPORT
(ASTM D2166)



	SPECIMEN		
BEFORE TEST	**1-B3@6**	**1-B6@11**	**1-B14@6**
Moisture Content (%)	17.6	26.0	25.0
Dry Density (pcf)	110.2	103.2	96.2
Saturation (%)	93.2	100.0	92.0
Void Ratio	0.50	0.60	0.72
Diameter (in)	2.412	2.410	2.419
Height (in)	5.11	5.06	5.05
Height-To-Diameter Ratio	2.12	2.10	2.09
TEST DATA			
Unconfined Compressive Strength (psf)	15117	1973	10988
Undrained Shear Strength (psf)	7558	987	5494
Strain Rate (in./min.)	0.05	0.05	0.05
Specific Gravity (Assumed)	2.650	2.650	2.650
Strain at Failure (%)	3.03	9.73	6.30
Liquid Limit	-	-	-
Plastic Limit	-	-	-
Test Remarks			

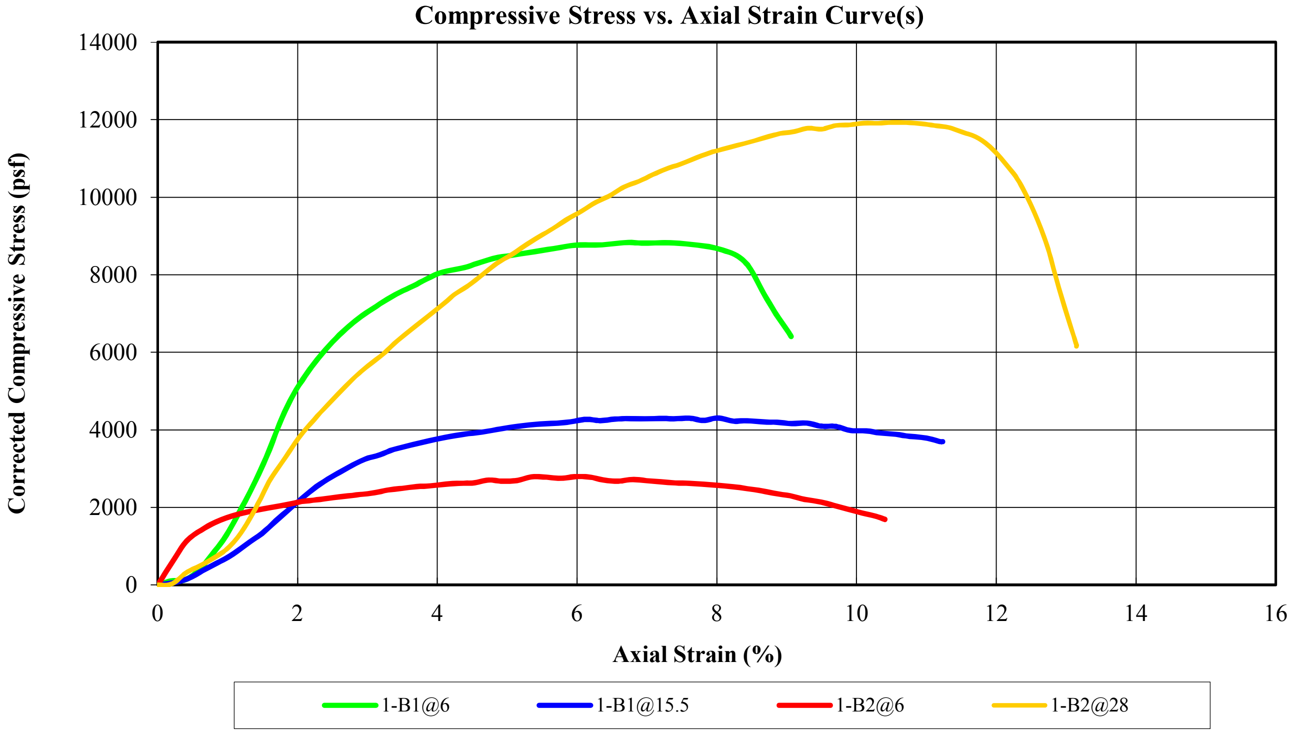
SPECIMEN	DESCRIPTION
1-B3@6	See exploration logs
1-B6@11	See exploration logs
1-B14@6	See exploration logs

PROJECT NAME: 3656 Las Colinas Road
PROJECT NO: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
LOCATION: Livermore, CA
PHASE NO: 001

Test Date: 11/05/18
Tested By: M. Quasem
Reviewed By: M. Bromfield

ENGEO
Expect Excellence

UNCONFINED COMPRESSION TEST REPORT
(ASTM D2166)


Compressive Stress vs. Axial Strain Curve(s)

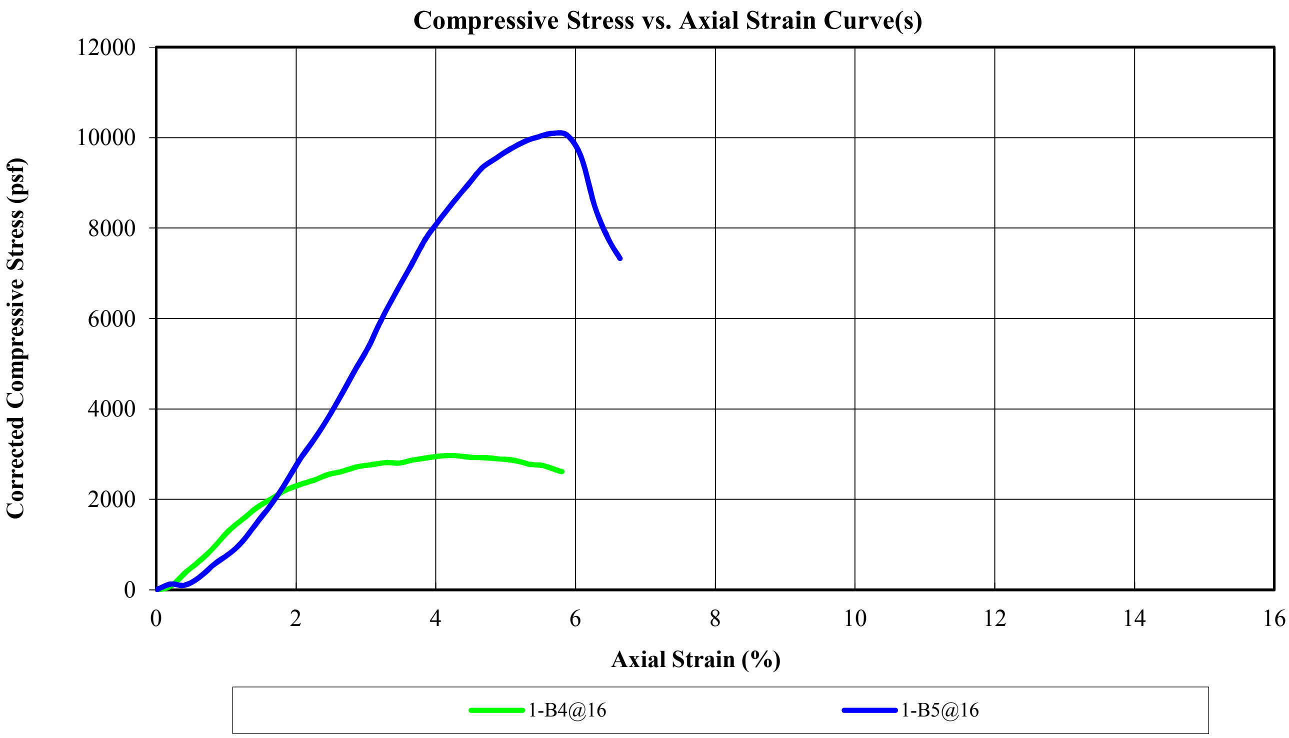
	SPECIMEN			
BEFORE TEST	**1-B1@6**	**1-B1@15.5**	**1-B2@6**	**1-B2@28**
Moisture Content (%)	15.7	16.6	17.7	15.8
Dry Density (pcf)	114.3	107.4	103.5	115.2
Saturation (%)	93.0	81.4	78.3	96.2
Void Ratio	0.45	0.54	0.60	0.44
Diameter (in)	2.420	2.418	2.420	2.400
Height (in)	5.34	4.87	4.99	5.09
Height-To-Diameter Ratio	2.21	2.01	2.06	2.12
TEST DATA				
Unconfined Compressive Strength (psf)	8834	4304	2791	11930
Undrained Shear Strength (psf)	4417	2152	1396	5965
Strain Rate (in./min.)	0.05	0.05	0.05	0.05
Specific Gravity (Assumed)	2.650	2.650	2.650	2.650
Strain at Failure (%)	6.73	8.02	5.97	10.51
Liquid Limit	-	-	-	-
Plastic Limit	-	-	-	-
Test Remarks				

SPECIMEN	**DESCRIPTION**
1-B1@6	See exploration logs
1-B1@15.5	See exploration logs
1-B2@6	See exploration logs
1-B2@28	See exploration logs

PROJECT NAME: 3656 Las Colinas Road
PROJECT NO: 15426.000.00
CLIENT: Monte Vista Memorial Investment Group, LLC
LOCATION: Livermore, CA
PHASE NO: 001

Test Date: 11/05/18
Tested By: M. Quasem
Reviewed By: M. Bromfield

UNCONFINED COMPRESSION TEST REPORT
(ASTM D2166)



	SPECIMEN	
BEFORE TEST	**1-B4@16**	**1-B5@16**
Moisture Content (%)	27.8	21.5
Dry Density (pcf)	91.3	117.0
Saturation (%)	90.7	100.0
Void Ratio	0.81	0.41
Diameter (in)	2.380	2.427
Height (in)	5.01	5.07
Height-To-Diameter Ratio	2.11	2.09
TEST DATA		
Unconfined Compressive Strength (psf)	2968	10094
Undrained Shear Strength (psf)	1484	5047
Strain Rate (in./min.)	0.05	0.05
Specific Gravity (Assumed)	2.650	2.650
Strain at Failure (%)	4.11	5.67
Liquid Limit	-	-
Plastic Limit	-	-
Test Remarks		

SPECIMEN	DESCRIPTION
1-B4@16	See exploration logs
1-B5@16	See exploration logs

ENGEO
Expect Excellence

PROJECT NAME: 3656 Las Colinas Road
PROJECT NO: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
LOCATION: Livermore, CA
PHASE NO: 001

Test Date: 11/21/18
Tested By: M. Quasem
Reviewed By: M. Bromfield

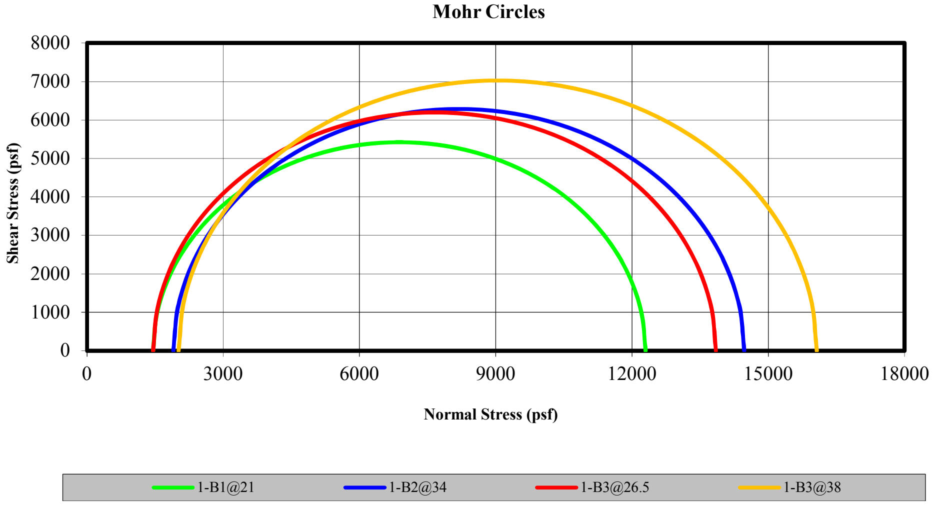
Isotropic Unconsolidated Undrained Triaxial Test

(ASTM D2850)

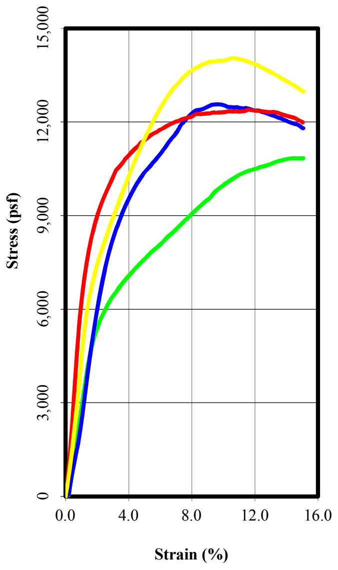
Tested By: M. Quasem Date: 11/5/2018

Checked By: M. Bromfield Date: 11/05/18

Mohr Circles



Stress-Strain Curve



	Specimen			
Before Test	**1-B1@21**	**1-B2@34**	**1-B3@26.5**	**1-B3@38**
Water Content (%)	23.27	26.39	24.29	25.31
Dry Density (pcf)	100.80	99.33	101.53	100.52
Saturation (%)	96.16	100.00	99.34	100.00
Void Ratio	0.64	0.72	0.66	0.68
Diameter (in)	2.430	2.399	2.418	2.420
Height (in)	5.060	5.100	5.051	5.030
Height-to-Diameter Ratio	2.082	2.126	2.089	2.079
ASTM D4318 - Wet Method				
Liquid Limit	-	-	-	-
Plastic Limit	-	-	-	-
ASTM D854 - Measured				
Specific Gravity (Assumed)	2.650	2.740	2.700	2.700
After Test	**1-B1@21**	**1-B2@34**	**1-B3@26.5**	**1-B3@38**
Water Content (%)	23.27	26.39	24.29	25.31
Saturation (%)	96.16	100.00	99.34	100.00
Strain Rate (in/min)	0.05	0.05	0.05	0.05
Peak Deviator Stress (psf)	10842.6	12568.7	12391.9	14050.1
Axial Strain @ Failure (%)	14.524	9.672	11.560	10.607
	Cell Pressure			
Cell (psf)	1454.4	1900.8	1454.4	2016.0
Back (psf)	n/a	n/a	n/a	n/a
	Principle Stresses at Failure			
σ1 (psf)	12297.0	14469.5	13846.3	16066.1
σ3 (psf)	1454.4	1900.8	1454.4	2016.0
Corrected Peak Deviator Stress				

Mohr-Coulomb Parameters with a Non-zero Friction Angle (Ø≠0)			**Cohesion at Failure with a Zero Friction Angle (Ø=0)**			
Cohesion, c (psf)	0.0		5421.3	6284.3	6195.9	7025.1
Friction Angle Ø	0.00		n/a	n/a	n/a	n/a

Project Information	
Project Name:	3656 Las Colinas Road
Project Number:	15426.000.000
Project Location:	Livermore, CA
Client:	Monte Vista Memorial Investment Group, LLC
Description:	See exploration logs
Test Remarks:	

ENGEO
Expect Excellence

PERMEABILITY TEST REPORT

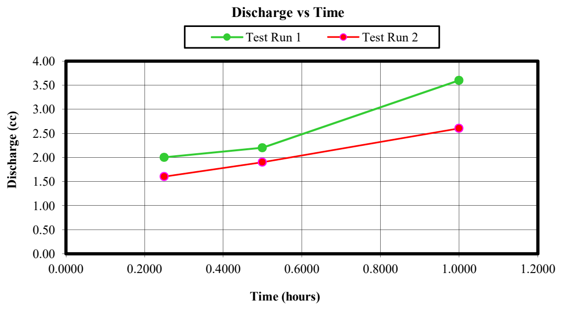
ASTM D5084, Method C

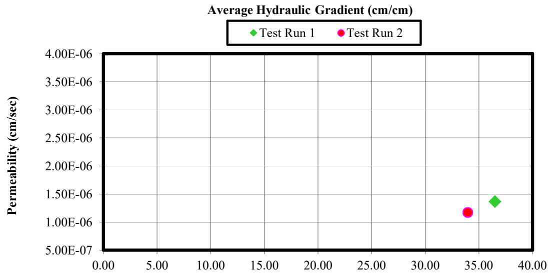
TEST DATA

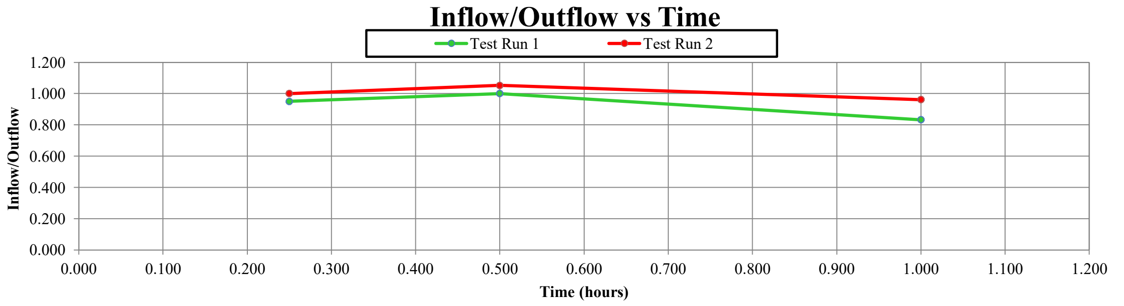
	Run 1	Run 2
Specimen Diameter (in.):	2.400	2.400
Specimen Height (in.):	2.055	2.055
Dry Density Before Test (pcf):	98.6	98.6
Moisture Content Before Test (%):	26.0%	26.0%
Moisture Content After Test (%):	24.4%	24.4%
Cell Pressure During Test (psi):	36.1	36.1
Back Pressure During Test (psi):	25.0	25.0
Effective Stress (σ_3) (psf):	1598.4	1598.4
Flow Rate (cc/sec):	1.48E-03	1.19E-03
Permeability (cm/sec):	1.37E-06	1.17E-06
B-Value:	0.99	0.99
Permeant Fluid:	Tap Water	

SPECIMEN DATA

Sample Identification:	1-B5@38			
Sample Type:	undisturbed			
%Gravel:	0.0	%Sand:	%Silt/Clay:	
Atterberg Limits:	LL: 40	PL: 20	PI: 20	USCS:
Post Test Length Change(in.):	0.0181			
Maximum Dry Density (pcf):	n/a			
Optimum Moisture Content (%):	n/a			
Compaction (%):	n/a			
Compaction Method:	Tamping a known mass to a known volume			
Permeameter Type:	**Flexible Wall**			
Type of Test:	**Falling Head--Rising Tailwater Pressure**			
Remarks:	Test results have been corrected to reflect a temperature of 20° Celsius.			







	Before Test	After test
Specimen Data	Initial	Final
Diameter, in	2.422	2.400
Height, in	2.073	2.055
Area, in^2	4.606	4.524
Volume, ft^3	0.0055	0.0054
Specific Gravity of Sample (measured)	2.689	2.689
Weight of Sample, g	311.1	307.1
Total Volume (cc)	156.46	152.33
Vol. of Solids (cc)	93.02	90.56
Vol. of Voids (cc)	63.45	61.77
Porosity	41.3306	39.7381
Void Ratio, e	0.7017	0.6568
Saturation %	99.75%	100.00%
Tare Weight, g	158.9	0.0
Gross Wet Soil Weight, g	191.33	313.82
Gross Dry Soil Weight, g	184.64	252.18
Water Content, %	26.0%	24.4%
Wet Unit Weight, pcf	124.3	126.0
Dry Unit Weight, pcf	98.6	101.3
Hydraulic Gradient, Test Run 1		36.48
Hydraulic Gradient, Test Run 2		33.95
Δ[Hydraulic Gradient] (Run 1 - Run 2)		2.53

Project Name: 3656 Las Colinas Road
Project Location: Livermore, California
Project Number: 15426.000.000
Phase Number: 001
Tested By: G. Criste **Reviewed by:** D. Seibold
Date: 12/05/18

Remolding Specifications for Permeability

PROJECT NAME: 3656 Las Colinas Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
PHASE NUMBER: 001 **DATE: 11/28/18**

SAMPLE ID: 1-TP4@11-12
Curve Maximum Density: **107.8** pcf **Height (in) : 2.000**
Curve Optimum Moisture: **15.8** % **Diam (in) : 2.421**

Moisture Content of sample to be remolded:

Tare name:
Wet soil + tare: 442.10
Dry soil + tare: 418.49
Tare weight: 256.21
14.55 % **Vol (ft^3) :** 0.0053

Compact To: **95** % at **2** % over optimum moisture

Desired moisture content at remolding/compaction:
15.8 + 2.0 = 17.8 %
17.8 - 14.55 = 3.2511 g
*Water to be added (g): **3.25** to **114.55** g soil

Weight of remolding material (g): **300.00**
Water to be added to remolding material (g): **8.51**

WET DENSITY CALCULATION:

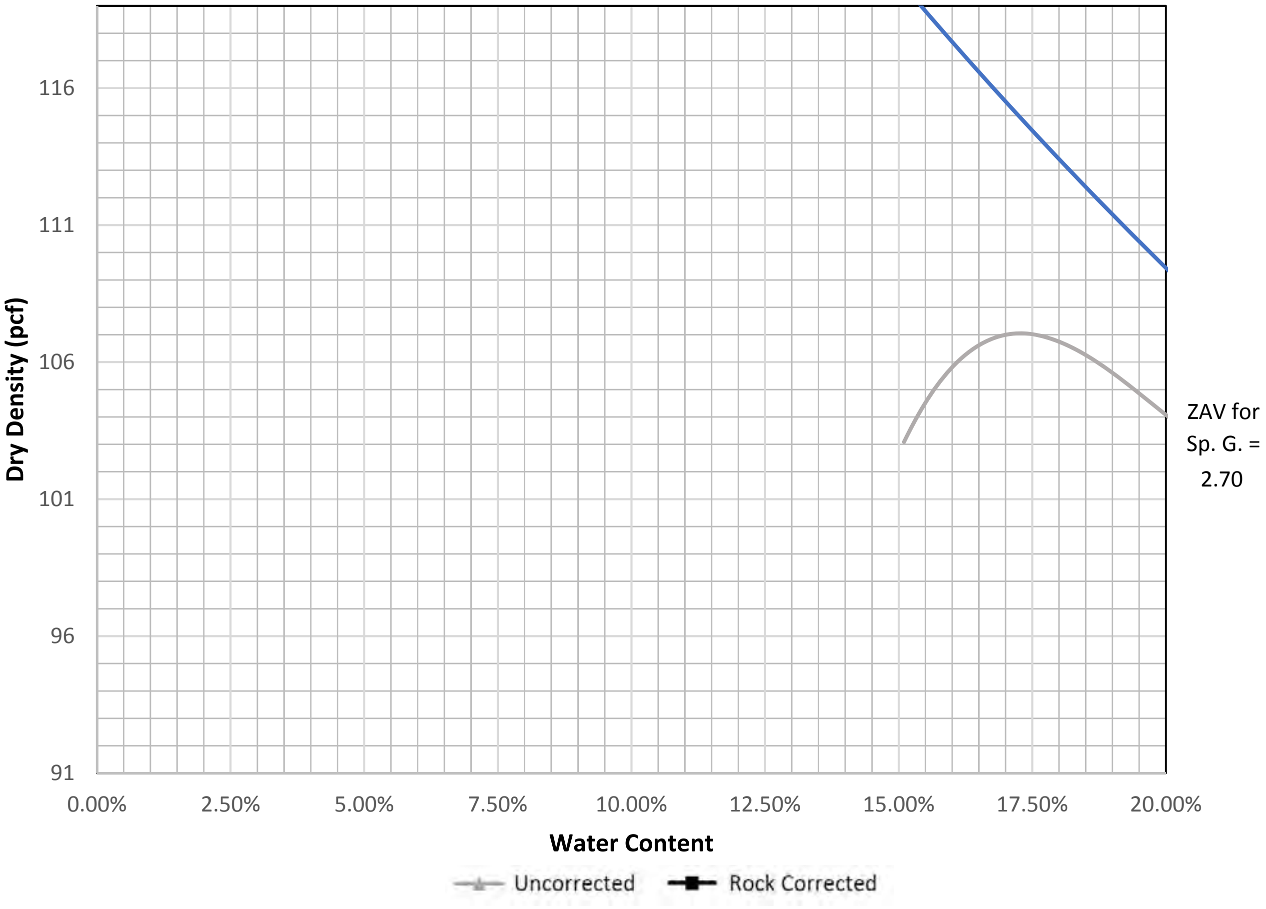
Dry Density (remold): 0.95 * 107.8 = 102.4 lb/ft^3
Wet density (lb/ft^3): 120.64 [dry density * (1+(MC/100))]

Multiply wet density (pcf) w/ volume (cf) and by 453.6 grams per lb. to get sample size for remolding:

120.6 lb/ft^3 * 0.0053 ft^3 * 453.6 = 291.6 g

291.56 grams of soil needed for remolding
145.78 g per lift (2 lifts)

COMPACTION TEST RESULT for Curve No. N/A



Test specification: Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% > No.200
	USCS	AASHTO						
				2.7				

ROCK CORRECTED RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 0 pcf	107.1 pcf	Yellowish brown sandy CLAY
Optimum moisture = 0%	17.3%	

ASTM METHODS USED:

ASTM C127
ASTM D4318
ASTM D6913

Client: Monte Vista Memorial Investment Group, LLC
Project: 3656 Las Colinas Road
Project No. 15426.000.000 **Date:**
Location: 1-TP4 @ 11-12 **Curve No.** N/A

Remarks:

ENGEO
Expect Excellence

Tested By: G. Criste **Checked By:** M. Bromfield

PERMEABILITY TEST REPORT

ASTM D5084, Method C

TEST DATA

	Run 1	Run 2
Specimen Diameter (in.):	2.424	2.424
Specimen Height (in.):	1.998	1.998
Dry Density Before Test (pcf):	101.7	101.7
Moisture Content Before Test (%):	17.8%	17.8%
Moisture Content After Test (%):	24.5%	24.5%
Cell Pressure During Test (psi):	24.7	24.7
Back Pressure During Test (psi):	15.0	15.0
Effective Stress (σ_3) (psf):	1396.8	1396.8
Flow Rate (cc/sec):	1.43E-02	1.37E-02
Permeability (cm/sec):	2.09E-05	2.09E-05
B-Value:	0.99	0.99
Permeant Fluid:	Tap Water	

SPECIMEN DATA

Sample Identification: 1-TP4@11-12

Sample Type: Remolded

%Gravel: 0.0 | %Sand: 20.1 | %Silt/Clay: 79.9

Atterberg Limits: LL: 41 | PL: 21 | PI: 20 | USCS: CL

Post Test Length Change(in.): 0.0048

Maximum Dry Density (pcf): 107.8

Optimum Moisture Content (%): 15.8

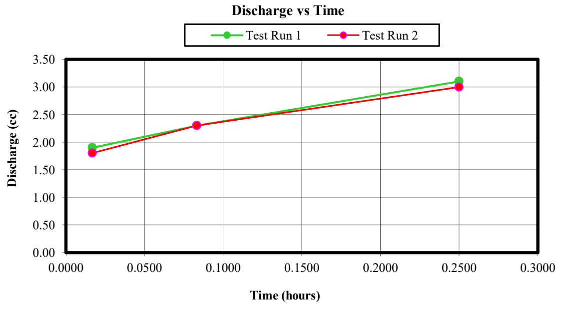
Compaction (%): 95%

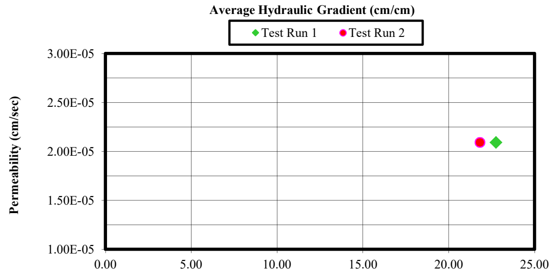
Compaction Method: Tamping a known mass to a known volume

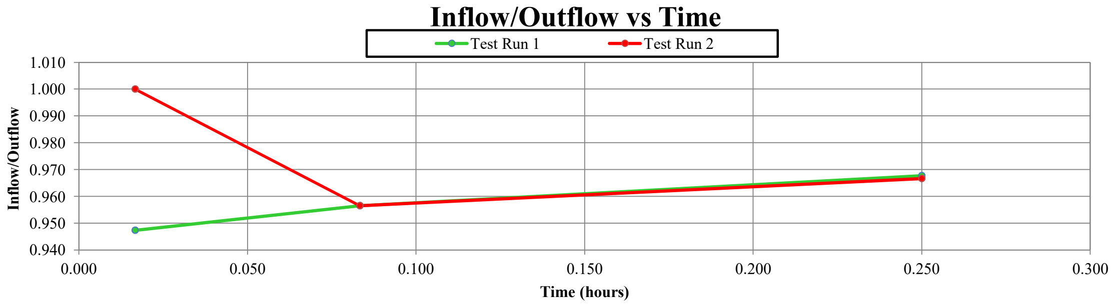
Permeameter Type: **Flexible Wall**

Type of Test: **Falling Head--Rising Tailwater Pressure**

Remarks: Test results have been corrected to reflect a temperature of 20° Celsius. Specimen remolded to 95%RC of 107.8pcf at 17.8%MC (+2% over opt)







	Before Test	After test
Specimen Data	Initial	Final
Diameter, in	2.431	2.424
Height, in	2.003	1.998
Area, in^2	4.641	4.616
Volume, ft^3	0.0054	0.0053
Specific Gravity of Sample (measured)	2.743	2.743
Weight of Sample, g	291.8	308.4
Total Volume (cc)	152.32	151.16
Vol. of Solids (cc)	90.63	89.94
Vol. of Voids (cc)	61.69	61.22
Porosity	40.7024	40.2488
Void Ratio, e	0.6837	0.6709
Saturation %	71.35%	100.00%
Tare Weight, g	0.0	85.5
Gross Wet Soil Weight, g	100.00	396.22
Gross Dry Soil Weight, g	84.90	335.12
Water Content, %	17.8%	24.5%
Wet Unit Weight, pcf	119.7	127.5
Dry Unit Weight, pcf	101.7	102.4
Hydraulic Gradient, Test Run 1		22.75
Hydraulic Gradient, Test Run 2		21.83
Δ[Hydraulic Gradient] (Run 1 - Run 2)		0.92

Project Name: 3656 Las Colinas Road
Project Location: Livermore, California
Project Number: 15426.000.000
Phase Number: 001
Tested By: G. Criste **Reviewed by:** D. Seibold
Date: 12/12/18

ENGEO
Expect Excellence

WATER SOLUBLE SULFATES IN SOILS

ASTM C1580

Sample number	Sample Location / ID	Matrix	Water Soluble Sulfate % by mass
1	1-B1@5.5	soil	ND
2	1-B2@25	soil	ND
3	1-B3@11.5	soil	ND

Remarks: Results are reported to the nearest 100mg/kg. Anything less than 50mg/kg will be reported as 'ND' for Not-Detectable.

PROJECT NAME: 3656 Las Colinas Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
PHASE NUMBER: 001

DATE: 11/15/18

ENGEO
Expect Excellence

Lab Address: 2213 Plaza Drive, Rocklin, CA 95765. Phone No. (916) 279-2698

WATER SOLUBLE SULFATES IN SOILS

ASTM C1580

Sample number	Sample Location / ID	Matrix	Water Soluble Sulfate % by mass
1	1-B4 @ 21	soil	ND

Remarks: Results are reported to the nearest 100mg/kg. Anything less than 50mg/kg will be reported as 'ND' for Not-Detectable.

PROJECT NAME: 3656 Las Colinas Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
PHASE NUMBER: 001

DATE: 11/26/18

ENGEO
Expect Excellence

Tested by: M. Quasem

Reviewed by: M. Bromfield

WATER SOLUBLE SULFATES IN SOILS

ASTM C1580

Sample number	Sample Location / ID	Matrix	Water Soluble Sulfate % by mass
1	1-B6 @ 5.5	soil	0.01

Remarks: Results are reported to the nearest 100mg/kg. Anything less than 50mg/kg will be reported as 'ND' for Not-Detectable.

PROJECT NAME: 3656 Las Colinas Road
PROJECT NUMBER: 15426.000.000
CLIENT: Monte Vista Memorial Investment Group, LLC
PHASE NUMBER: 001

DATE: 11/02/18

ENGEO
Expect Excellence

Tested by: M. Quasem

Reviewed by: M. Bromfield

California State Certified Laboratory No. 2153

CERCO
analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 **462 2771** Fax. 925 **462 2775**
www.cercoanalytical.com

15 November, 2018

Job No. 1811013
Cust. No. 10169

Mr. Eric Keifer
ENGEO Inc.
2010 Crow Canyon Place, Suite 250
San Ramon, CA 94583

Subject: Project No.: 15426.000.000
Project Name: 3656 Las Colinas Road
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Keifer:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on November 05, 2018. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, both sample is classified as "corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations were 61 mg/kg & 62 mg/kg and are determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentration were 40 mg/kg & 120 mg/kg and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of the soils were 7.38 & 8.67, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials were 230-mV & 330-mV and are indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

Cheryl McMillan for

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client:	ENGEO Incorporated
Client's Project No.:	15426.000.000
Client's Project Name:	3656 Las Colinas Road
Date Sampled:	8-Oct-18
Date Received:	5-Nov-18
Matrix:	Soil
Authorization:	Signed Chain of Custody

Date of Report: 15-Nov-2018

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
1811013-001	1-B2 @ 11.5'	230	7.38	-	1,700	-	62	120
1811013-002	1-B3 @ 32'	330	8.67	-	1,200	-	61	40

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
	14-Nov-2018	13-Nov-2018	-	15-Nov-2018	-	13-Nov-2018	13-Nov-2018

* Results Reported on "As Received" Basis

Cheryl McMillen
Laboratory Director

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

1811013

CU#10869

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: 15426.000.000

PROJECT NAME: 3656 Las Colinas Road

SAMPLED BY: (SIGNATURE/PRINT) Spencer Wagnaar

PROJECT MANAGER: Eric Keifer

ROUTING: E-MAIL swaganaar@engeo.com; EKiefer@engeo.com

	SAMPLE NUMBER	DATE	TIME	MATRIX	NUMBER OF CONTAINERS	CONTAINER SIZE	PRESERVATIVE	Redox, pH, sulfate, resistivity (100% sat.) chloride	REMARKS REQUIRED DETECTION LIMITS
001	1-B2 @ 11.5 ft.	10/08/18	9:00 AM	soil	1	bag	none	X	Sample with brief evaluation
002	1-B3 @ 32 ft.	10/08/18	11:00 AM	soil	1	bag	none	X	Sample with brief evaluation

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Kris Bur	11/5/18 1:17pm			11/5/18 1350	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME

ENGEO INCORPORATED

2010 CROW CANYON PLACE, SUITE 250
SAN RAMON, CALIFORNIA 94583
(925) 837-2973 FAX (888) 279-2698
WWW.ENGEO.COM

Standard 10- day turnaround

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO PROJECT FIELD FILES

APPENDIX C

TEST PIT LOGS

ENGEO
Expect Excellence

Test Pit Log

Test Pit Number
1-TP1

Project Name: **Las Colinas**			Lat.: **37.70641**
Project Location: **Livermore, California**			Long.: **-121.76015**
Project No.: **15426.000.000**	Logged By: **Eric M Kiefer**	Contractor: **Shryock Grading**	Equipment: **CAT 313L**
Date Started: **10/3/18**	Date Completed: **10/3/18**	Total Depth: **11 ft**	Groundwater: **N/A**

Depth (ft)	Soil/Rock Descriptions
0 – 3.5	**Sandy fat CLAY (CH)** – Dark gray, very stiff to hard (PP = 3.5 to >4.5 tsf), dry to slightly moist (well drained), some partings developed, carbonate streamers very common. [COLLUVIUM/TOPSOIL]
3.5 – 8	**Gravelly lean CLAY (CL)** – Yellowish brown to dark yellowish brown, hard (PP = >4.5 tsf), partings well developed, well rounded gravels up to approximately 1.5 inches, carbonate streamers and blebs, some gravels may be completely replaced. [LIVERMORE GRAVELS]
8 – 11	**Gravelly lean CLAY (CL)** – Yellowish brown, hard (operator commented “got much harder” around 8 feet), well rounded gravels up to approximately 1 inch, gravels appear more common, gravels appear to be highly or completely weathered. [LIVERMORE GRAVELS]

*Bottom of test pit at 11 feet. No groundwater encountered. No Caving. Excavator started having trouble excavating at approximately 11 feet.

ENGEO
Expect Excellence

Test Pit Log

Test Pit Number
1-TP2

Project Name: **Las Colinas**
Lat.: **37.70635**
Project Location: **Livermore, California**
Long.: **-121.76067**
Project No.: **15426.000.000**
Logged By: **Eric M Kiefer**
Contractor: **Shryock Grading**
Equipment: **CAT 313L**
Date Started: **10/3/18**
Date Completed: **10/3/18**
Total Depth: **Approx. 13.5 ft**
Groundwater: **N/A**

Depth (ft)	Soil/Rock Descriptions
0 – 3.5	**Sandy fat CLAY (CH)** – Dark gray, hard (PP = >4.5 tsf), dry to slightly moist (well drained), some partings, some carbonate streamers. [COLLUVIUM/TOPSOIL]
3.5 – 5	**Sandy lean CLAY/Clayey SAND (CL/SC)** – Yellowish brown, hard (PP = >4.5 tsf), slightly moist to dry, some partings, massive. [LIVERMORE GRAVELS]
5 – 7.5	**Silty SAND (SM)** – Light yellowish brown, very dense (PP = >4.5 tsf), dry to slightly moist, medium to fine grained sand, poorly graded (well sorted), very faint evidence of rock structure, massive. [LIVERMORE GRAVELS]
7.5 – ~12	**Gravelly SAND (SP)** – Light yellowish brown to pale olive, very dense (PP = >4.5 tsf), slightly moist, well rounded gravels up to approximately 1 inch, thinly bedded (gravels showing some imbrication), strike and dip 265°, 31° (?) bedding. Gravel size increased to up to 3 inches at approximately 11 feet. [LIVERMORE GRAVELS]
~12 – ~13.5	**Silty clayey SAND (SM/SC)** – Light yellowish brown to pale olive, very dense, slightly moist, clay cemented, some trace rock structure visible, massive. [LIVERMORE GRAVELS]

*Bottom of test pit at approximately 13.5 feet. No groundwater encountered. No Caving.

Expect Excellence	# Test Pit Log	Test Pit Number **1-TP3**
Project Name: **Las Colinas**		Lat.: **37.70569**
Project Location: **Livermore, California**		Long.: **-121.76163**

Project No.: **15426.000.000**	Logged By: **Eric M Kiefer**	Contractor: **Shryock Grading**	Equipment: **CAT 313L**
Date Started: **10/3/18**	Date Completed: **10/3/18**	Total Depth: **11.5 feet**	Groundwater: **N/A**

Depth (ft)	**Soil/Rock Descriptions**
0 – 6	**Sandy fat CLAY (CH)** – Dark gray, very stiff to hard (PP = 3.5 to >4.5 tsf), dry to slightly moist, some partings, some carbonate streamers and blebs. [COLLUVIUM/TOPSOIL]
6 – 8.5	**Sandy CLAY with gravels (CL)** – Yellowish brown, hard (PP = >4.5 tsf), dry to slightly moist, medium to fine grained sand, well rounded to rounded gravels up to approximately 3 inches, gravels highly to completely weathered. [LIVERMORE GRAVELS]
8.5 – 11.5	**Silty CLAY with gravels (CL)** – Yellowish brown to pale olive or olive brown, hard (PP= >4.5 tsf), rounded to well rounded gravels up to approximately 1 inch, gravels highly to completely weathered (some gravels weathered to white clay), carbonate blebs and streamers common, partings well developed, some rock structure. [LIVERMORE GRAVELS]

*Bottom of test pit at 11.5 feet. No groundwater encountered. No Caving.

ENGEO
Expect Excellence

Test Pit Log

Test Pit Number
1-TP4

Project Name: **Las Colinas**
Lat.: **37.70643**
Project Location: **Livermore, California**
Long.: **-121.75849**
Project No.: **15426.000.000**
Logged By: **Eric M Kiefer**
Contractor: **Shryock Grading**
Equipment: **CAT 313L**
Date Started: **10/3/18**
Date Completed: **10/3/18**
Total Depth: **Approx. 13 ft**
Groundwater: **N/A**

Depth (ft)	Soil/Rock Descriptions
0 – 3	**Sandy fat CLAY (CH)** – Dark gray, Hard (PP = >4.5 tsf), dry to slightly moist, some partings developed, no visible carbonate streamers. [COLLUVIUM/TOPSOIL]
3 – 8	**Gravelly SAND with clay (SP)** – Yellowish red to dark yellowish brown, dense to very dense (PP = 2.5 to >4.5 tsf), moist, sand medium to coarse grained, rounded to well rounded gravels up to approximately 4 inches, well developed imbrication in gravels. [LIVERMORE GRAVELS]
8 – ~13	**Sandy lean CLAY (CL)** – Olive brown to yellowish brown, hard (PP = >4.5 tsf), slightly moist to moist, partings well developed, some rock structure, carbonate streamers and blebs common. [LIVERMORE GRAVELS] **Lab Results** (Sampled at approximately 11-12 feet) • Particle Size Distribution – Passing #200 Sieve = 79.9% • Atterberg Limits – PL = 21; LL = 41; PI = 20

*Bottom of test pit at approximately 13 feet. No groundwater encountered. No Caving.

Test Pit Log

Test Pit Number

1-TP5

Project Name: **Las Colinas**	Lat.: **37.70539**
Project Location: **Livermore, California**	Long.: **-121.75784**

Project No.: **15426.000.000**	Logged By: **Eric M Kiefer**	Contractor: **Shryock Grading**	Equipment: **CAT 313L**
Date Started: **10/3/18**	Date Completed: **10/3/18**	Total Depth: **Approx. 14 ft**	Groundwater: **N/A**

Depth (ft)	Soil/Rock Descriptions
0 – 2	**Silty SAND (SM)** – Light gray, very dense (PP = >4.5 tsf), dry (well drained), fine to very fine grained sand, some carbonate streamers and partings. [ALLUVIUM/OVERBANK DEPOSIT]
2 – 3	**Sandy fat CLAY (CH)** – Olive brown to dark yellowish brown, hard (PP = >4.5 tsf), moist, some partings. [COLLUVIUM/TOPSOIL]
3 – 8	**Sandy lean CLAY with some gravels (CL)** –Dark yellowish brown to yellowish brown, dense to very dense (PP = 4.0 to >4.5 tsf), moist, well graded, some well rounded gravels up to ½ inch, sand fine to coarse grained. [LIVERMORE GRAVELS]
8 – ~13	**Clayey SAND with gravels (SC)** – Yellowish red to dark yellowish brown, dense to very dense (PP = 4.0 to >4.5 tsf), moist, well graded, some well rounded gravels up to ½ inch, sand fine to coarse grained. [LIVERMORE GRAVELS]
~13 – ~14	**Gravelly SAND (SP)** – Dark reddish brown to yellowish brown, dense to very dense, moist, well rounded gravels up to 6+ inches. [LIVERMORE GRAVELS]

*Bottom of test pit at approximately 14 feet. No groundwater encountered. No Caving.

Test Pit Log

Test Pit Number

1-TP6

Project Name: **Las Colinas**			Lat.: **37.70450**
Project Location: **Livermore, California**			Long.: **-121.76003**
Project No.: **15426.000.000**	Logged By: **Eric M Kiefer**	Contractor: **Shryock Grading**	Equipment: **CAT 313L**
Date Started: **10/3/18**	Date Completed: **10/3/18**	Total Depth: **Approx. 12.5 ft**	Groundwater: **N/A**

Depth (ft)	Soil/Rock Descriptions
0 – 4	**Sandy fat CLAY (CH)** – Dark gray, hard (PP = >4.5 tsf), dry to slightly moist, some partings, some carbonate streamers. [COLLUVIUM/TOPSOIL]
4 – ~12.5	**Sandy CLAY with some gravels (CL)** – Dark yellowish brown to dark brown, hard (PP = >4.5 tsf), moist, some partings, some carbonate streamers, some rock structure. Sandy gravel lens at approximately 5.5 feet, rounded to well rounded gravels up to 1.5 inches. Carbonate streamers and blebs more common starting at approximately 6 feet. Moisture increasing at approximately 12.5 feet. [LIVERMORE GRAVELS]

*Bottom of test pit at approximately 12.5 feet. No groundwater encountered. No Caving.

Test Pit Log

Test Pit Number

1-TP7

Project Name: **Las Colinas**			Lat.: **37.70547**
Project Location: **Livermore, California**			Long.: **-121.76330**
Project No.: **15426.000.000**	Logged By: **Eric M Kiefer**	Contractor: **Shryock Grading**	Equipment: **CAT 313L**
Date Started: **10/3/18**	Date Completed: **10/3/18**	Total Depth: **Approx. 14 ft**	Groundwater: **N/A**

Depth (ft)	Soil/Rock Descriptions
0 – 4	**Sandy fat CLAY (CH)** – Dark gray, hard (PP = >4.5 tsf), dry to slightly moist, some partings. [COLLUVIUM/TOPSOIL]
4 – ~14	**Clayey SAND/Sandy lean CLAY (SC/CL)** – Light yellowish brown to pale olive, hard (PP = >4.5 tsf), slightly moist to moist, partings well developed, some rock structure, massive, carbonate blebs and streamers common (less common below approximately 5.5 feet), trace gravels up to approximately 0.5 inches. Got harder around 12 feet – continued to get harder with depth. [LIVERMORE GRAVELS]

*Bottom of test pit at approximately 14 feet. No groundwater encountered. No Caving.

ENGEO
Expect Excellence

Test Pit Log

Test Pit Number
1-TP8

Project Name: **Las Colinas**			Lat.: **37.70410**
Project Location: **Livermore, California**			Long.: **-121.76206**
Project No.: **15426.000.000**	Logged By: **Eric M Kiefer**	Contractor: **Shryock Grading**	Equipment: **CAT 313L**
Date Started: **10/3/18**	Date Completed: **10/3/18**	Total Depth: **Approx. 14 ft**	Groundwater: **N/A**

Depth (ft)	Soil/Rock Descriptions
0 – 3	**Sandy fat CLAY (CH)** – Dark gray, hard (PP = >4.5 tsf), dry to slightly moist, some partings, trace carbonate blebs and streamers. [COLLUVIUM/TOPSOIL]
3 – 6	**Sandy lean CLAY (CL)** – Pale olive to dark yellowish brown, hard (PP = >4.5 tsf), slightly moist to moist, fine grained sand, carbonate blebs and streamers common from approximately 3-4 feet. [LIVERMORE GRAVELS]
6 – 6.25	**Sandy GRAVEL (GP)** – Dark gray mottled with dark yellowish brown, very dense (PP = >4.5 tsf), moist, well rounded gravels up to 0.5 inches, gravels imbricated. [LIVERMORE GRAVELS]
6.25 – ~14	**Sandy lean CLAY (CL)** – Dark yellowish brown to olive brown, hard (PP = >4.5 tsf), moist, trace gravels – well rounded, carbonate streamers and blebs, well developed partings and some rock structure – becomes more well developed below approximately 9 feet. [LIVERMORE GRAVELS]

*Bottom of test pit at approximately 14 feet. No groundwater encountered. No Caving.

APPENDIX D

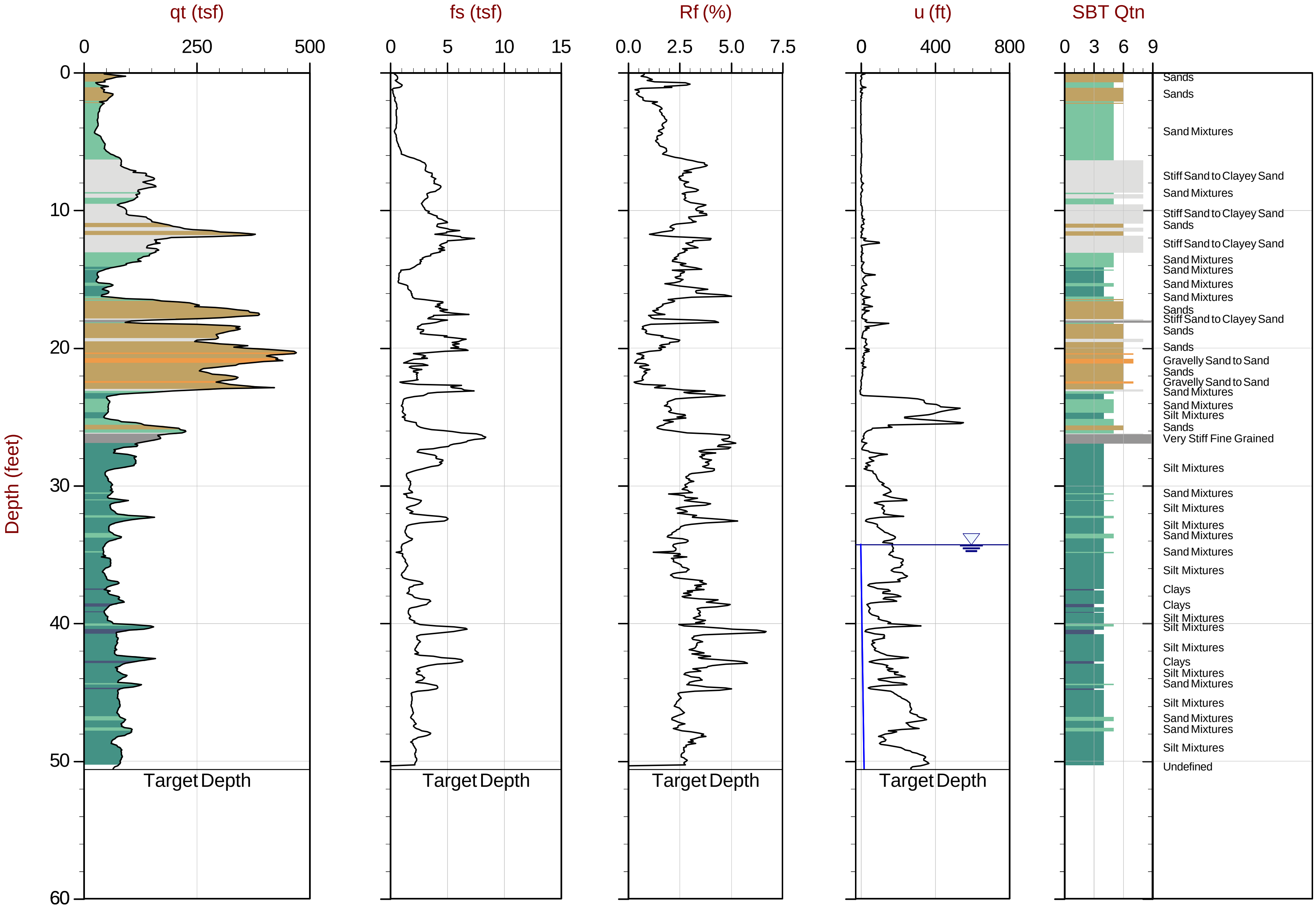
CONE PENETRATION TEST LOGS

CONETEC

ENGEO

Job No: 18-56165
Date: 2018-10-03 09:39
Site: Las Colinas

Sounding: 1-CPT1
Cone: 383:T1500F15U500



Max Depth: 15.425 m / 50.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56165_1CP1.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173832m E: 609296m
Sheet No: 1 of 1

● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved — Hydrostatic Line

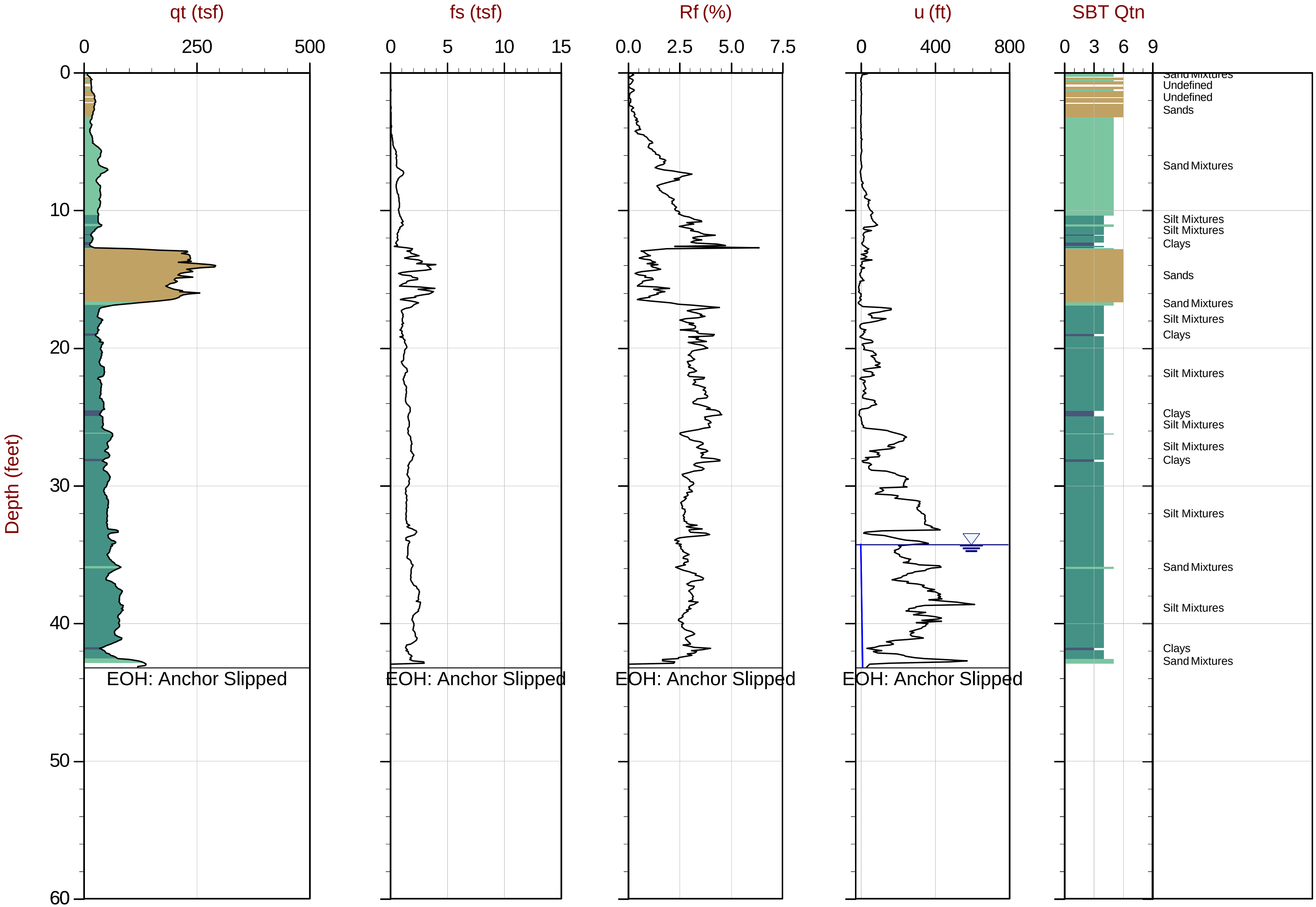
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

ENGEO

Job No: 18-56165
Date: 2018-10-03 14:27
Site: Las Colinas

Sounding: 1-CPT2
Cone: 383:T1500F15U500



Max Depth: 13.175 m / 43.22 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56165_1CP2.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173772m E: 609526m
Sheet No: 1 of 1

● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved — Hydrostatic Line

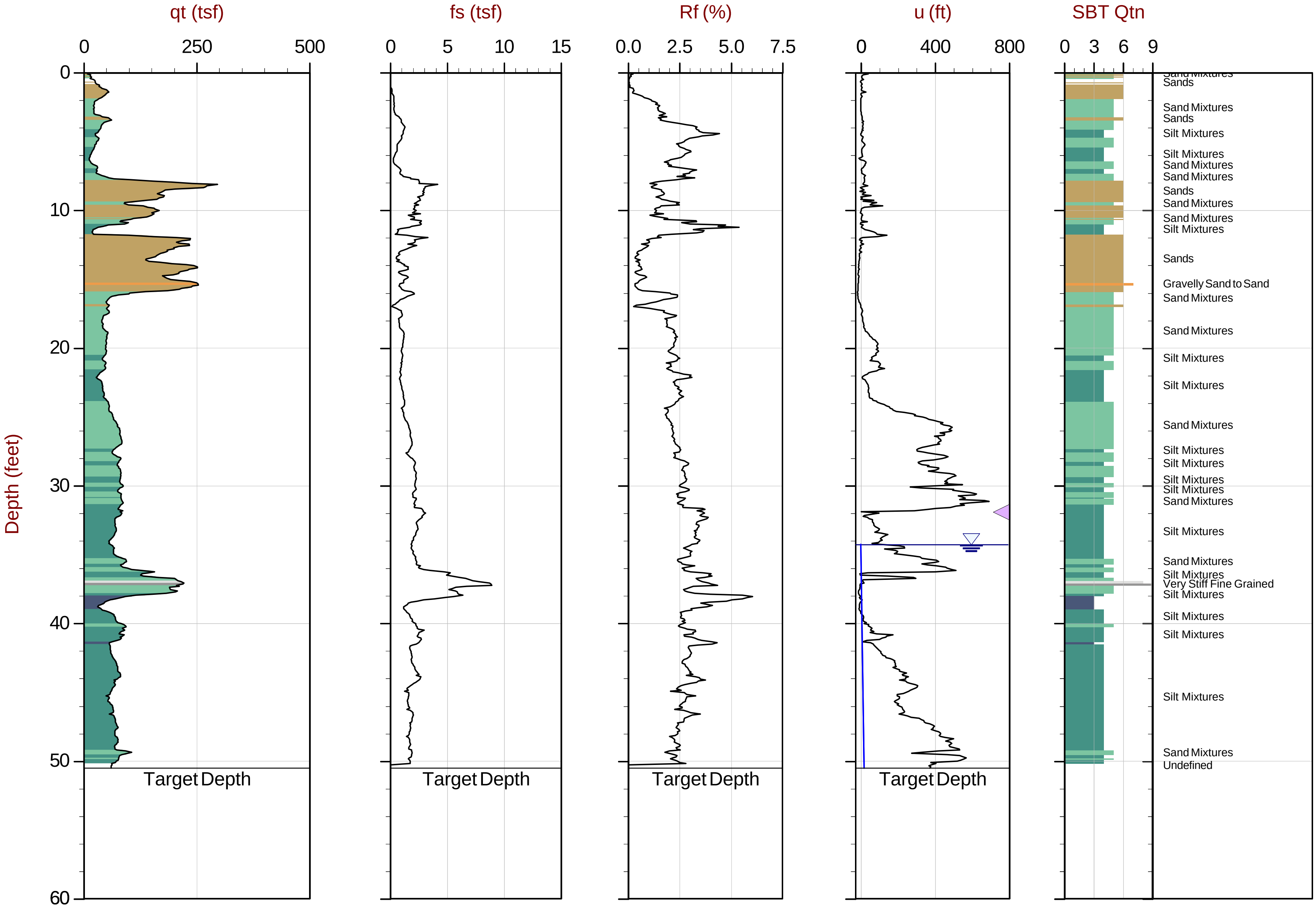
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

ENGEO

Job No: 18-56165
Date: 2018-10-03 10:42
Site: Las Colinas

Sounding: 1-CPT3
Cone: 383:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56165_1CP3.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173665m E: 609327m
Sheet No: 1 of 1

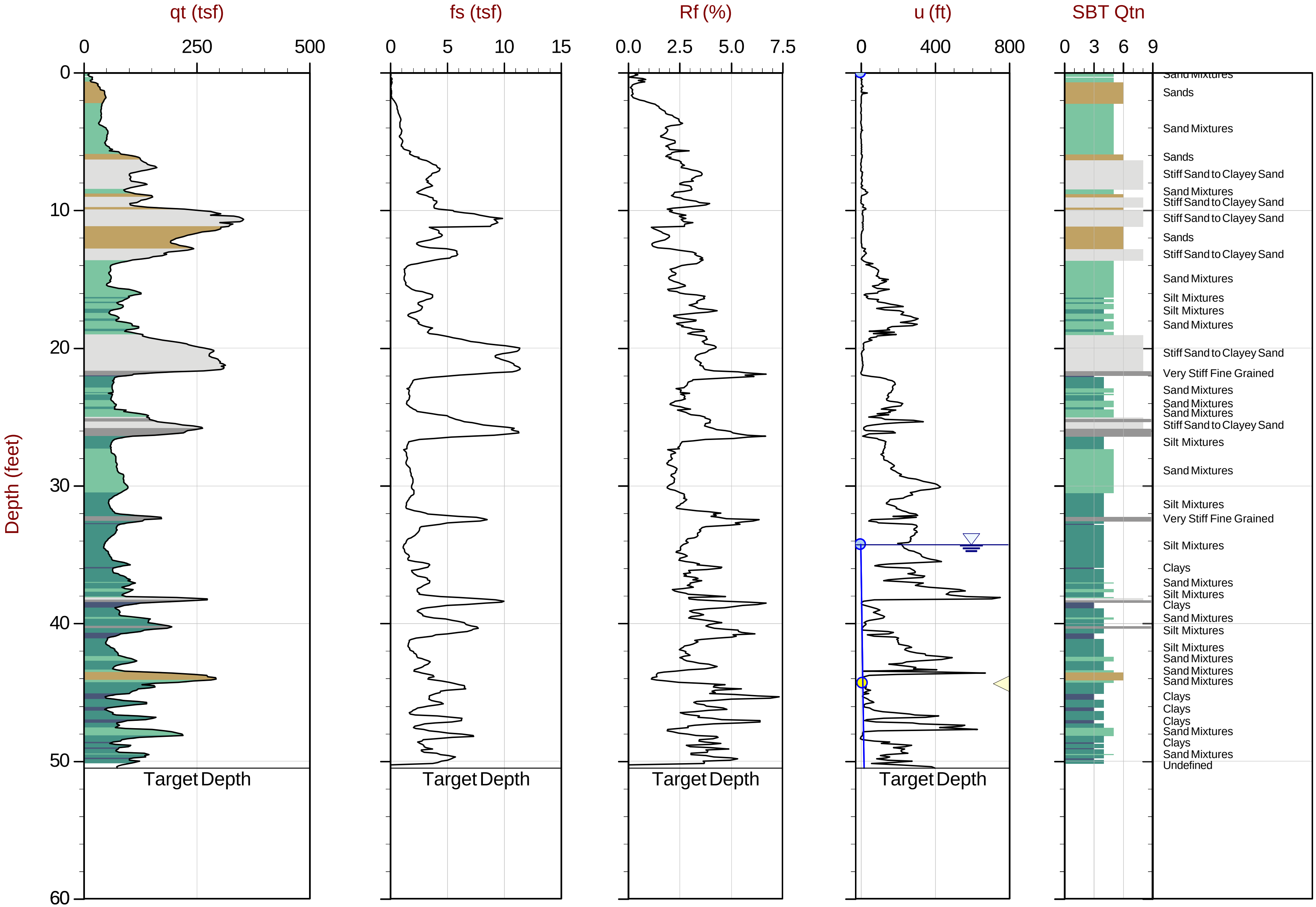
● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ENGEO

Job No: 18-56165
Date: 2018-10-03 11:42
Site: Las Colinas

Sounding: 1-CPT4
Cone: 383:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56165_1CP4.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173726m E: 609001m
Sheet No: 1 of 1

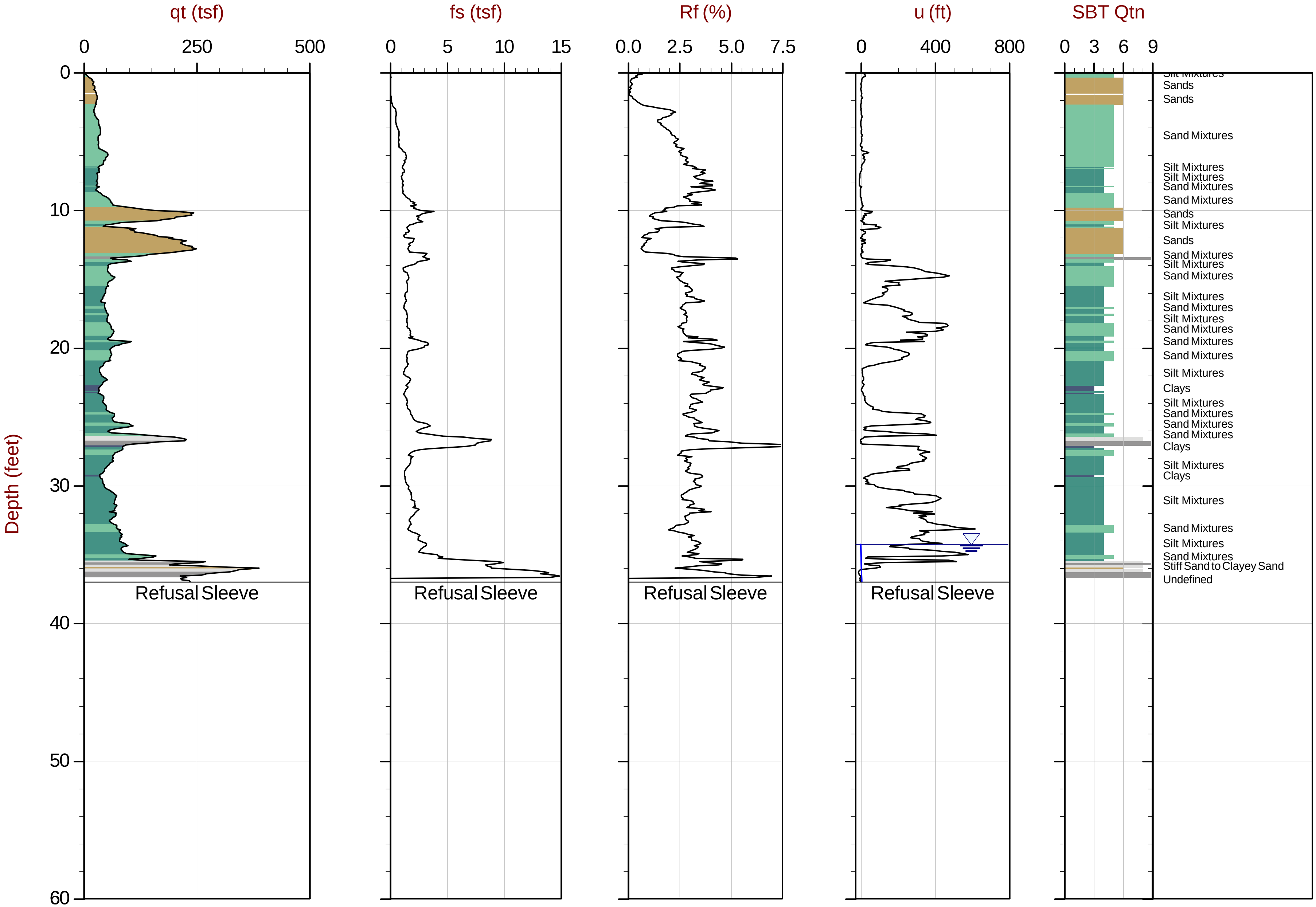
● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ENGEO

Job No: 18-56165
Date: 2018-10-03 15:31
Site: Las Colinas

Sounding: 1-SCPT5
Cone: 383:T1500F15U500



Max Depth: 11.275 m / 36.99 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56165_1SCP5.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173695m E: 609406m
Sheet No: 1 of 1

● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved — Hydrostatic Line

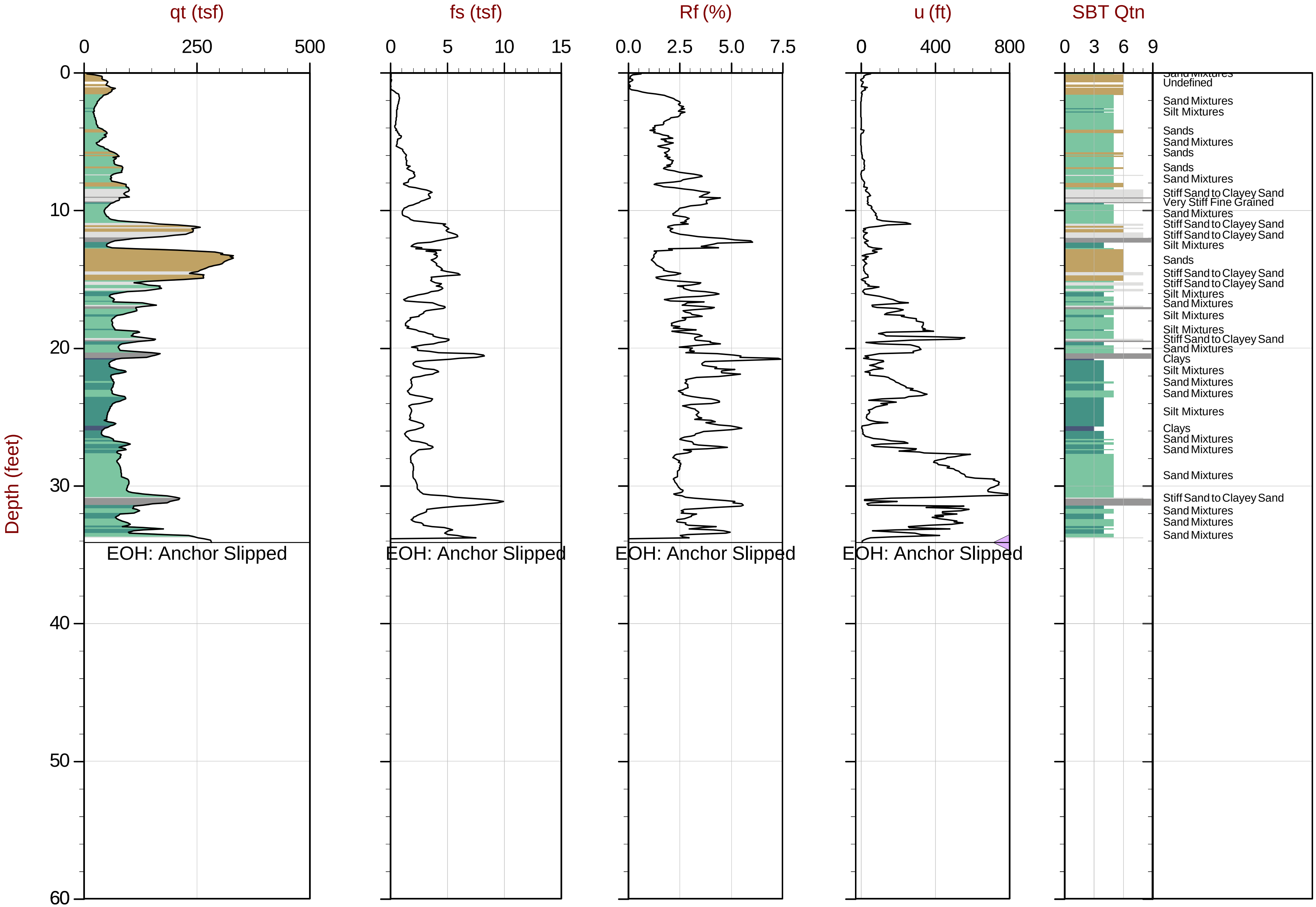
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

ENGEO

Job No: 18-56165
Date: 2018-10-03 12:58
Site: Las Colinas

Sounding: 1-CPT6
Cone: 383:T1500F15U500



Max Depth: 10.400 m / 34.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56165_1CP6.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N N: 4173838m E: 609072m
Sheet No: 1 of 1

● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq ◁ Dissipation, Ueq achieved ◀ Dissipation, Ueq not achieved — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ENGEO

Expect Excellence

APPENDIX G

HYDROLOGIC ANALYSIS

This page intentionally left blank

MONTE VISTA MEMORIAL GARDENS DEVELOPMENT
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

HYDROLOGIC ANALYSIS

SUBMITTED TO
Mr. Michael Kliment
Monte Vista Memorial Investment Group, LLC
189 Contractors Avenue
Livermore, CA 94551

PREPARED BY
ENGEO Incorporated

October 22, 2019
Revised November 18, 2019

PROJECT NO.
15426.000.000

ENGEO
Expect Excellence

GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES
CONSTRUCTION SERVICES

Project No.
15426.000.000

October 22, 2019
Revised November 18, 2019

Mr. Michael Kliment
Monte Vista Memorial Investment Group, LLC
189 Contractors Avenue
Livermore, CA 94551

Subject: Monte Vista Memorial Gardens Development
3656 Las Colinas Road
Livermore, California

HYDROLOGIC ANALYSIS

Dear Mr. Kliment:

We are pleased to present this Hydrologic Analysis for the subject site, located at 3656 Las Colinas Road in Livermore, California (Site). The objectives of this study are to evaluate the effect of development of the project on peak flows within the Arroyo Las Positas watershed and to estimate water usage for the proposed project.

If you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated

Brooke Spruit

Brooke Spruit

Sean Cleary, PE

SEAN CLEARY
No. 73795

JONATHAN BUCK
No. 2958

Jonathan D. Buck, GE

ms/bs/jb/sc/reviewed by jaf/cjn

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION

The proposed site is located in unincorporated Alameda County near the City of Livermore just north of Interstate 580, between the North Livermore Avenue and the North First Street exits. The proposed project would have a funeral home, an extensive cemetery grounds area, as well as a number of associated services, as further described below.

The site is approximately 66 acres and is bisected by Arroyo Las Positas in the southeast. The site generally consists of a relatively flat lowland valley area in the southeast, with gently sloping hills and valleys to the north and west. The localized ridges and valleys are oriented roughly north-south in the northern portion of the property, and roughly east-west in the western portion of the property, with valleys draining toward Arroyo Las Positas. Site slope gradients range from 2.5:1 to 10:1 (horizontal:vertical) in the surrounding hills (with the steepest slopes in the southwest), and the lowland valley area has a slope gradient shallower than 25:1 (horizontal:vertical). Furthermore, the site is bordered by an existing residence to the east and private undeveloped grazing land to the west and north. Currently, the portion of the site to the east of Arroyo Las Positas contains several paved roadways while the area on the west side of the Arroyo is undeveloped and used for grazing and dry farming.

The project proposes to develop 5.8 acres of the southwestern portion of the site into a funeral home, with parking facilities and an associated mortuary, crematorium and other services related to the burial grounds. The proposed project would include two bridges spanning over Arroyo Las Positas to connect the funeral home area to the cemetery grounds in the northwesterly portion of the site. The proposed cemetery grounds also would include several lake features, wetlands, lawn areas, and other landscape elements requiring the installation and maintenance of onsite water irrigation and management systems.

2.0 SITE GEOLOGY

Based on our geologic mapping and subsurface explorations from our 2018 Geotechnical Exploration Report (ENGEO, 2018), the site is underlain by young colluvial and alluvial deposits, as well as older Livermore Gravel deposits. Barlock (1988, 1989) describes the soil onsite as Holocene alluvium, and late-Miocene to early-Pleistocene Livermore Gravels. Furthermore, Dibblee (1980) confirms both the unit geology, and presence of regional folding onsite. We observed these units onsite, as well as Holocene colluvium and residual soil, during our 2018 exploration.

Soil at the site generally consists of interbedded layers of fine- and coarse-grained material associated with alluvial deposits and the Livermore Gravel formation. In general, the upper approximately 2 to 10 feet of soil we encountered in our explorations consisted predominantly of clay. Below the surficial clay layer, we encountered an approximately 5- to 10-foot-thick layer of generally medium dense to very dense coarse-grained material consisting of clayey sand, clayey gravel, silty sand, sand, and gravel. Below this granular layer, we encountered hard lean clay and silty clay with varying amounts of sand and gravel representative of the Livermore Gravel Formation.

Soil mapping of the watershed prepared by the National Resource Conservation Service (NRCS) for the Monte Vista Memorial Project (NRCS, 2019) indicates that surficial soil materials are primarily comprised of Altamont Clay (AaC) and Linee clay loam (LaD) with respective hydrologic group ratings of ‘C’ and ‘D’ among other soil groups of Group ‘C’ and ‘D’ rating.

Group ‘C’ soil is defined as having low infiltration rates or moderately high runoff potential when thoroughly wet. Group ‘D’ soil is defined as having a very slow infiltration rate or high runoff potential when thoroughly saturated. As a result, the watershed is characterized by moderate to rapid run-off characteristics after saturation has occurred.

3.0 HYDROLOGIC CALCULATIONS

For the Monte Vista Memorial project, we evaluated the use of the two proposed lakes to attenuate peak flows from the project before discharging into the Arroyo Las Positas Creek. We conducted our hydrologic calculations in accordance with methodologies set forth by Alameda County Flood Control and & Water Conservation Districts (Alameda County).

3.1 HYDROLOGIC METHODS

We used the Synthetic Unit Hydrograph Method as described in the Alameda County Hydrology and Hydraulic Manual (Alameda County, 2018) to develop peak flow hydrographs within the Site tributary watersheds of Arroyo Las Positas Creek. The Synthetic Unit Hydrograph Method is used for drainage areas greater than 0.5 square miles, for evaluation of detention basin design, or for situations where a hydrograph is required. The Synthetic Unit Hydrograph Method transforms a hypothetical rainfall distribution and rainfall depth into a design runoff hydrograph. The intent of this document is to use the Alameda County Synthetic Unit Hydrograph methodology input files within the framework of the Hydrologic Engineer Center-Hydrologic Modeling System program (HEC HMS). The Synthetic Unit Hydrograph method is dependent on the following parameters for each sub-basin.

1. Size of subwatershed.
2. Subwatershed infiltration rate.
3. Current/Proposed Land Use.
4. Overall watershed slope.
5. Lag Time – which is a function of longest channel length within the subwatershed as well as the subwatershed geometry.
6. Basin Peaking Factor.

We based the delineation of sub-basins for the study of the site contributing drainage areas on input from ACS Consulting Engineers tentative site development files (ACS, 2018) as well as Lidar topography provided by U.S. Geological Survey (USGS). Figures depicting the watershed in terms of infiltration rates and proposed development are included as Figures 2 and 3. Infiltration calculations weighted specifically for each hydrologic subwatershed as well as excerpts from the Alameda County Hydrology and Hydraulics Manual are included in Appendix A.

3.2 REOCCURRENCE INTERVAL

For this report, we analyzed the 24-hour, 10-year and 24-hour, 100-year recurrence interval storm events in conformance with Alameda County Flood Control methods.

These flows represent maximum flows in the pre-project condition and provide a baseline for designing post-construction flow control features for the developed scenario.

3.3 RAINFALL DATA

Published precipitation data provided on the National Oceanic and Atmospheric (NOAA) Atlas 14 Point Precipitation Frequency Estimates database provides precipitation frequency estimates with 90-percent confidence intervals for varied durations and average recurrence intervals. A 24-hour duration is most appropriate for use in evaluating a detention basin design per Alameda County standards.

TABLE 3.3-1: 24-hour Rainfall Depth for Selected Reoccurrence Intervals

	10-YEAR	100-YEAR
Rainfall Depth (inches)	2.91	4.90

Actual rainfall depths used in the hydrologic modeling are summarized in Appendix A for the 24-Hour Design Storm and are based on the Alameda County method of converting the estimated rainfall depth to a rainfall temporal distribution. The total watershed area draining into the local creek segments upstream of the box culvert at Interstate 580 is approximately 0.31 square miles.

3.4 PRE-DEVELOPMENT ASSESSMENT PARAMETERS

As shown in Figure 4, three drainage areas to the Site were subdivided into three Sub-Basins (A-1 through C-1).

TABLE 3.4-1: Pre-Development Basin Characteristics

SUB-BASIN	A-1	B-1	C-1
Area (Square Miles)	0.125	0.174	0.006
Longest Flow Path (feet)	3194	4553	655
Lc (Feet)	1273	2268	365
Initial Infiltration Loss (inches)	1.0	1.0	1.0
Uniform Infiltration Loss (inches/r)	0.067	0.111	0.058
Average Stream Slope (feet/mile)	192.4	123.9	12.7
Weighted Roughness Factor	0.07	0.07	0.07
% Impervious	0.0	0.0	20.9
Distance Factor	21.79	24.58	16.57
Basin Lag Time (hours)	0.27	0.47	0.12
Basin Peaking Factor	0.6	0.6	0.6

Specific lag time calculations are furnished in Appendix A of this document.

3.5 POST-DEVELOPMENT ASSESSMENT PARAMETERS

We modified the existing watersheds in our model to reflect the post-development conditions. As shown in Figure 5, contributing drainage areas to the site were subdivided into six Sub-Basins (A-2 through F-2). In general, the project is characterized by existing rural conditions, new landscaping, and low-density buildings (Sub-Basin E-2).

TABLE 3.5-1: Post-Development Basin Characteristics

SUB-BASIN	A-2	B-2	C-2	D-2	E-2	F-2
Area (Square Miles)	0.005	0.080	0.121	0.023	0.006	0.041
Longest Flow Path (feet)	470	2547	3730	1911	655	1245
Lc (Feet)	540	1079	1978	1087	365	788
Initial Infiltration Loss (inches)	1.0	1.0	1.0	1.0	1.0	1.0
Uniform Infiltration Loss (inches/r)	0.101	0.115	0.115	0.091	0.070	0.082
Average Stream Slope (feet/mile)	655.5	197.3	112.5	548.0	12.7	119.0
Weighted Roughness Factor	0.07	0.07	0.07	0.07	0.43	0.07
% Impervious	6.2	2.3	0.1	12.0	40.0	17.5
Distance Factor	16.19	20.46	22.89	19.15	16.57	17.78
Basin Lag Time (hours)	0.061[1]	0.22	0.39	0.15	0.72[2]	0.14
Basin Peaking Factor	0.69	0.60	0.60	0.68	0.60	0.60

[1] Modeled with basin lag time of 0.1 hours as this is the minimum criteria to run hydrologic model.
[2] Modeled with basin lab time of 0.1 hours to represent directly connected impervious areas within Sub-Basin E-2.

We used a basin lag time of 0.1 hours for Sub-Basin E-2 to demonstrate use of proposed directly connected impervious areas within the majority of the Sub-Basin. It is our experience that this assumption is typical for the type of proposed building use and drainage characteristics of this area. We assumed 40 percent imperviousness for the proposed Site use of Sub-Basin E-2 based on the proposed buildings, pervious pavers, and landscaping within the footprint.

3.5.1 Post Development Hydrologic Routing

A proposed creek will route discharge from the upper lake (Lake 2 on Figure 5) to the lower lake (Lake 1 on Figure 5). To maintain static or desired lake water levels as well as an equilibrium creek flow during the dry season, water from the lower lake will be re-circulated to the upper lake by use of a pump. This will help minimize water demand from groundwater or municipal sources to the maximum extent practicable. We used the Muskingum Cunge method as the routing method for this hydrologic model. The Muskingum Cunge is a widely accepted approach that uses reach length, channel slope and cross-sectional geometry to attenuate the flood hydrograph as it moves through each reach. We assumed a typical trapezoidal channel with the parameters shown in Table 3.5.1-1. We selected these parameters based upon our understanding of the proposed topography and creek routing.

TABLE 3.5.1-1: Muskingum-Cunge Routing Coefficients – Reach from Upper to Lower Lake

REACH	1	2
Length (ft)	543	635
Slope (ft/ft)	0.01	0.01
Manning’s n	0.035	0.035
Index Flow (cfs)	75	75
Bottom Width (ft)	5	5
Side Slope (H:V)	3:1	3:1

We selected roughness coefficients based on Manning's method. We used a Manning's 'n' value of 0.035 to represent open channel roughness for a clean, windy creek with no pools or major rifts (Chow, 1959). We selected an index flow of 75 cfs based upon the average values of the respective hydrograph.

We understand sub-drains will capture and re-direct runoff surrounding proposed crypts. In our hydrologic model, we assumed runoff would be directed from Node 2 to the lower lake by a pump with an insignificant lag time associated with such.

3.6 POST-DEVELOPMENT PEAK DISCHARGE COMPARISON TO EXISTING CONDITIONS

We understand there will be two proposed discharge points from the site to Arroyo Las Positas. These locations are at the base of the proposed wetland and bio-filter (Figure 5). We modeled these two discharge points as Node 1 and Node 3, respectively. Below is a summary of the pre-and post- development discharges and volumes for the discharge points modeled. As discussed earlier, Node 2 is re-directed to the lower lake to capture additional runoff from crypt sub-drains within Sub-Basin F-2 as well as Sub-Basins D-2 runoff for the purpose of maintaining lake volume. The lower lake is to be directed to Node 3 in the event of overflow from the lower lake. Node 2 therefore is reflected within Node 1 in the post-development model.

TABLE 3.6-1: 10-Year Peak Flow Comparison of Pre- and Post- Development

NODE	1	2	3
Pre-Development Discharge (cfs)	56.2	62.5	2.9
Post-Development Discharge (cfs)	48.8	N/A	2.9
Pre-Development Volume Runoff (ac-ft)	7.2	7.7	0.5
Post-Development Volume Runoff (ac-ft)	18.4	N/A (0)	0.6

The above table demonstrates that the lakes will require additional storage of 3.5 acre-feet (ac-ft) to match pre-development flow during the 10-year rain event (Nodes 1 and 2). An additional 0.1 ac-ft detainment is required for Node 3.

TABLE 3.6-2: 100-Year Peak Flow Comparison of Pre- and Post- Development

NODE	1	2	3
Pre-Development Discharge (cfs)	98.5	114.6	5.0
Post-Development Discharge (cfs)	222.9	N/A	5.0
Pre-Development Volume Runoff (ac-ft)	18.8	20.9	1.1
Post-Development Volume Runoff (ac-ft)	45.0	N/A (0)	1.2

The above table demonstrates that the lakes will require additional storage of 5.3 ac-ft to match pre-development flow during the 100-year rain event (Nodes 1 and 2). An additional 0.1 ac-ft detainment is required for Node 3.

4.0 DETENTION SIZING

The project intends to decrease post-project peak flows by detaining water in the proposed lake features, which would offset increases in peak flow created by addition of impervious surfaces and modifications to existing surface drainage paths.

Node 3 accepts runoff from Sub-Basin C-1 in the pre- development model and Sub-Basin E-2 in the post- development model. Node 3 shows an additional 0.1 ac-ft discharge for the post-development conditions as compared to existing for the 100-year rain event. Additional runoff will be mitigated by use of a proposed bio-filter (approximate location shown on Figure 5). This bio-filter will accept drainage from the Site through drainage inlets or pervious pavers, treat this runoff, and ultimately discharge to Arroyo Las Positas Creek (Node 3).

As previously mentioned, the post-development model routes Node 2's discharge to the lower lake along with crypt sub-drain runoff from Sub-Basin F-2 to maintain lake water levels. We estimated approximately 5.3 ac-ft capacity required from the proposed lakes to detain the 100-year storm event. We estimated this volume from the ultimate discharge to Node 1 in the post- development model as compared to the discharge to Nodes 1 and 2 in the pre-development model. The lakes would be designed to provide adequate storage to collect excess stormwater and to meter the detained water through an engineered outfall structure. We understand an approximately 2.6-acre wetland mitigation area, as shown in Figure 5, will be implemented to handle discharge from the lakes during high flow events. This wetland mitigation area would discharge at the study 10-year and 100-year pre-development flow rates into the Arroyo Las Positas Creek.

It is our opinion that this estimate is considered conservative as the infiltration potential for soil within the burial areas and new landscaping will increase due to the disturbance of soil.

5.0 WATER BALANCE – PROPOSED WATER FEATURES

The proposed lakes and creeks will be operated as a water feature on the Monte Vista Memorial project. We conducted a water balance analysis on the proposed system to determine the availability of water for the system and the amount of additional water that would be needed, if any, to support the lakes and creek. The water budget defines and quantifies the important input and output parameters, such as precipitation, evapotranspiration, and flow into or out of a given body of water. We analyzed each of these parameters individually to develop expected numerical value flux estimates, and the sum of the parts provides an estimate of available water at a given time step. For this project, this summation analysis approximates the volumes of available surface water expected to flow through, or be retained in, the lakes and creek each month.

The proposed system includes two separate lakes with a creek connecting them. The upper lake consists of two different pools, an upper and lower pool. The upper pool flows into the lower pool via a waterfall feature as detailed in the provided Landscaping plan. The lower pool of the upper lake drains into the creek, which flows into the lower lake. The upper lake's water supply can be supplemented by an onsite groundwater well. A pump powered by solar panels recirculates water from the lower lake to the upper pool of the upper lake. The lower lake will act as a reservoir for irrigation water needed for the landscaping on the site.

The lower lake consist of a steeper portion in the deepest parts of the lake that level out to form a shelf. This shelf portion of the lake is sized to retain storm events but will not typically hold water throughout the year.

5.1 TOPOGRAPHY, WATERSHEDS, AND PROPOSED LAKES AND CREEK

All proposed lakes are located in the Arroyo Las Positas Watershed. We used the same sub-basins used for the study of the hydrologic study for the water balance study. We based the locations and initial sizes of the proposed ponds and creek on the input from ACS Consulting Engineers tentative site development files (ACS, 2018).

5.2 HYDROLOGIC INPUTS

5.2.1 Precipitation and Water Year Types

We used data from The National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA) which records daily precipitation for Livermore, California (NCDC,2019) Station GHCND : USC00044997 and extends from 1903 through 2018. However, in order to maintain consistency between different water budget data sets, we performed our analyses utilizing data from Water Year 2 (WY) 1969 through 2017 (October 1968 through September 2017), as this time period correlates with the available pan evaporation data, discussed later. The long-term (WY1969-2017) average annual rainfall estimate from these data is 14.06 inches. The value agrees well with the USGS estimate for mean annual rainfall of 15.0-inches for this site location (Rantz, 1971).

The USGS defines a water year as the 12-month period from October 1, for any given year, through September 30, of the following year. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1999, is called the "1999" water year and includes 9 of the 12 months.

We used the monthly data set to determine the rainfall-runoff year-type probability analysis, described below.

We summed and ranked monthly average rainfall values for WY 1969 – 2017 (NCDC, 2019) by water year. The exceedance probability ranking of the annual rainfall values suggests the long-term (1969-2017) average value of 14.06 inches has about a 40 percent probability of occurring any given year. Thus, the statistical average value does not equal the median value. The median year in the data set, or that with a 50 percent probability of occurring within any given year, is WY 2004, and we used data for this year for the median year-type analysis. WY2004 generated 13.07 inches of rainfall annually. We selected a water year-type with an 85 percent probability of occurring within any given year was selected as the representative dry year-type. The Water Year exhibiting the 85 percent probability range is WY 1990; we used this water year for the dry year-type analysis. WY1990 generated 9.35 inches of rainfall annually. Average, median, and dry year-type monthly rainfall totals are presented in Tables 5.2.3-1, 5.2.3-2 and 5.2.3-3, respectively.

5.2.2 Runoff

We could not identify a suitable local area stream flow gauges to estimate surface water runoff from the site. Therefore, we calculated runoff contributing to the Monte Vista Memorial project using the Natural Resource Conservation Service (NRCS) Runoff Curve Number (CN) Method (NRCS, 1986). The CN method approximates volume of direct surface runoff as a function of daily (24-hour) rainfall (P), the potential maximum retention after runoff begins (S), the initial abstraction (Ia), and the curve number (CN). Estimated as 20 percent of the value for S, Ia accounts for the total water losses before runoff begins and includes depression storage, interception, evaporation, and infiltration. S is directly related to CN, a function of hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition.

Soil data (NRCS, 1966, 1977, 2007, 2010) overlaid onto contributing watersheds resulted in HSG coverage of type C and type D. Both HSG C and HSG D soil has high runoff potential and low infiltration rates when thoroughly wetted (Figure 4). To calculate the composite CN for the site, a weighted average of the soil types is calculated. Assuming cover type is pasture, grassland, or range, with 50 to 75 percent ground cover and not heavily grazed (fair condition), with approximately 43 percent HSG C and 57 percent HSG D, the universal CN calculated from Table 2-2c (NRCS, 1986) was 79 for HSG C and 84 for HSG D. The composite CN is 81.85.

Based on a CN value of 81.85, we estimated the parameters to the runoff equations as:

$S = (1000 / CN) – 10 = 2.2$ inches
$Ia = 0.2 * S = 0.44$ inches

These data indicate that within a 24-hour period, the initial 0.44 inch of rainfall goes towards depression storage, interception, evaporation, and infiltration. Below this initial rainfall total, no runoff occurs. Rainfall in excess of 0.44 inch generates surface water runoff (Q) by the equation:

$$Q = ((P – 0.2S)^2) / (P +0.8S)$$

Using the daily rainfall total data and runoff equation discussed above, daily runoff totals for the entire analysis period (WY1969-2017) were calculated. The average monthly values over the entire analysis period were used in the average water year type water budget analysis and are presented in Table 5.2.3-1. The long-term (WY1969-2017) average annual rainfall estimate of 14.16 inches generates an average annual runoff value of nearly 4.81 inches per year.

We calculated median and dry year type runoff totals using the runoff equation and daily rainfall totals for WY2004 (median year type) and WY1990 (dry year type). The resulting annual runoff totals for WY2004 and WY1990 were 5.99 and 2.64 inches, respectively (Tables 5.2.3-2 and 5.2.3-3).

5.2.3 Evaporation

We performed this analysis considering monthly pan evaporation using data at Lake Del Valle in Livermore for Water Year 1969 - 2017 obtained from Zone 7 Water Agency (Zone 7 Water Agency, 2018). We converted pan evaporation data to an open-water evaporation rate by multiplying by a coefficient of 0.6402 (Zone 7 Water Agency, 2018). Average, median, and dry year-type monthly evapotranspiration values are presented in Tables 5.2.3-1, 5.2.3-2 and 5.2.3-3, respectively.

TABLE 5.2.3-1: Average Year-Type Annual Input Values WY 1969-2017

MONTH	PRECIP. (INCHES)	RUNOFF (INCHES)	ETO (INCHES)
October	0.81	0.05	3.28
November	1.62	0.41	1.55
December	2.51	1.00	0.96
January	2.83	1.24	0.92
February	2.55	1.03	1.25

MONTH	PRECIP. (INCHES)	RUNOFF (INCHES)	ETO (INCHES)
March	2.06	0.68	2.32
April	1.04	0.13	3.50
May	0.38	0.00	5.01
June	0.10	0.06	6.02
July	0.02	0.10	6.85
August	0.06	0.08	6.23
September	0.19	0.03	5.04
Annual	**14.16**	**4.81**	**42.92**

TABLE 5.2.3-2: Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969-2017 is WY 2004

MONTH	PRECIP. (INCHES)	RUNOFF (INCHES)	ETO (INCHES)
October	0.02	0.10	4.30
November	2.02	0.66	1.10
December	3.57	1.83	0.72
January	2.19	0.77	0.69
February	4.01	2.20	1.42
March	0.39	0.00	3.19
April	0.18	0.04	4.72
May	0.11	0.06	5.54
June	0	0.11	6.06
July	0	0.11	6.50
August	0	0.11	6.33
September	0.58	0.01	5.61
Annual	**13.07**	**5.99**	**46.18**

TABLE 5.2.3-3: Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969-2017 is WY 1990

MONTH	PRECIP. (INCHES)	RUNOFF (INCHES)	ETO (INCHES)
October	1.13	0.16	3.11
November	1.02	0.12	1.89
December	0.1	0.06	1.12
January	1.54	0.36	1.01
February	2.46	0.96	1.17
March	0.87	0.07	2.33
April	0.37	0.00	3.67
May	1.78	0.50	5.03
June	0	0.11	5.88
July	0.02	0.10	6.52
August	0	0.11	5.90
September	0.06	0.08	4.54
Annual	**9.35**	**2.64**	**42.17**

5.3 INFILTRATION

The site consists of HSG C and HSG D, which indicates extremely low rates of vertical infiltration. Thus, for this analysis, we considered the infiltration to be negligible.

5.4 LANDSCAPING DEMANDS

The provided landscaping plan detailed a variety of plantings that would be used for the landscaping. This included different cover grasses as well as shrubs and trees. In this analysis, the landscaping water demand was split into planting demand and lawn maintenance demand.

We estimated the cover area of plantings using the provided Landscaping Plan (Camp & Camp, 2018). We based the water requirements for the plantings on the Water Use Classification of Landscape Species (WUCOLS), which determines the plant water requirements based on a percentage of the reference evapotranspiration in the area, shown in Table 5.4.1 along with the coverage area of the plantings. The water requirement for the plantings are calculated based on these classifications and the reference evapotranspiration (ETo) for Livermore taken from the Model Water Efficient Landscape Ordinance (Table 5.4.2). The resulting plant water demand on the site is shown in Table 5.4-3

TABLE 5.4-1: Planting Water Requirements

PLANT NAME	WUCOLS CLASSIFICATION	PERCENTAGE OF EVAPOTRANSPIRATION	COVERAGE AREA, ACRES
Aesculus californica	Very Low	10	0.193
Lagerstroemia ‘Muskogee’	Low	30	0.270
Laurus nobilis ‘Saratoga’	Low	30	0.533
Platanus racemose	Moderate	60	1.174
Quercus agrifolia	Very Low	10	1.336
Quercus lobata	Low	30	2.268
Arcstostaphylos ‘Howard McMinn’	Low	30	0.103
Ceanothus ‘Dark Star’	Low	30	0.093
Cercis occidentalis	Low	30	0.047
Olea europaea ‘Arbequina’	Low	30	0.296

TABLE 5.4-2: Reference Evapotranspiration for Livermore

MONTH	REFERENCE EVAPOTRANSPIRATION, IN/MONTH
October	3.2
November	1.5
December	0.9
January	1.2
February	1.5
March	2.9
April	4.4
May	5.9
June	6.6

MONTH	REFERENCE EVAPOTRANSPIRATION, IN/MONTH
July	7.4
August	6.4
September	5.3
Annual	**47.2**

We calculated the lawn maintenance demand based off of a crop coefficient given by a publication by the University of California Division of Agriculture and Natural Resources of 0.8 (Harivandi et al., 2009) and the reference evapotranspiration value shown in Table 5.4-2. We converted these values to a lawn maintenance demand by multiplying by the lawn coverage area.

The results of the landscaping water requirements are shown below in Table5.4-3.

TABLE 5.4-3: Landscaping Water Demand

MONTH	PLANTING DEMAND, AF	LAWN MAINTENANCE DEMAND, AF
October	0.20	1.62
November	0.25	2.03
December	0.48	3.92
January	0.73	5.94
February	0.98	7.97
March	1.10	8.91
April	1.23	9.99
May	1.07	8.64
June	0.88	7.16
July	0.53	4.32
August	0.25	2.03
September	0.15	1.22
Annual	**7.86**	**63.75**

The irrigation system for the project site will draw water from the lower lake. The lawn areas are underlain by a French drain system that will capture water that has infiltrated the soil and return it back to the lower lake for reuse. We estimated the landscaping return value as 20 percent of the applied water, the larger of the direct precipitation or landscaping demands., based on the CN method's initial abstraction, discussed above. The initial abstraction is the amount of rainfall that goes towards depression storage, interception, evaporation, and infiltration.

5.5 WELL PRODUCTION

The project site has a groundwater well that can be used to supplement the water supply to the upper lake. Based on a 24-hour flow test conducted by Pacific Coast Well & Pump Inc. in July 2012, the well has an average production capacity of 200 gallons per minute. This is approximately equal to 0.88 AF of water per day.

The well draws from the Livermore Valley Groundwater Basin. The Livermore Valley Groundwater Basin spans approximately 69,600 acres (109 square miles) and has an approximate capacity of 500,000 AF. The Alameda County Flood Control and Water Conservation District, Zone 7 manages groundwater in the basin. Zone 7 has maintained an annual hydrologic budget. Under average conditions, the groundwater budget has remained in balance with the demands balancing the inflows. The estimated groundwater storage in 1999 was 219,000 AF. Due to higher than usual rainfall in 2017 WY, the groundwater storage increased to 246,000 AF.

The groundwater-bearing materials in the basin include valley-fill materials, the Livermore Formation, and the Tassajara Formation. The valley-fill materials are composed of unconsolidated sand, gravel, silt, and clay. The valley-fill materials yield significant quantities of water to wells in the central and southern portions of the valley. The Livermore Formation is primarily exposed over the south and southwest regions of the Livermore Valley groundwater basin. The Livermore Formation consists of unconsolidated to semi-consolidated beds of gravel, silt, and clay. Limey concretions are common in its lower portion and tuffaceous beds are present at its base. The Livermore Formation supplies water to deep wells in the eastern half of the basin. The Tassajara Formation is exposed in the uplands to the north of the Livermore Valley. The Tassajara Formation consists of beds composed of sandstone, siltstone, shale, conglomerate, and limestone. Wells tapping into the Tassajara Formation yield only sufficient water for domestic or stock purposes.

For management purposes, the Livermore Valley groundwater basin is also split based on varying geologic, hydrogeologic, and groundwater conditions. These are the Main Basin, Fringe Subareas, and Upland Areas. The project site is located within the Upland and is underlain by the Livermore Formation.

For the purpose of sustainable groundwater management, the groundwater well draw was limited to 150 gpm, or approximately 0.66 AF of water per day.

5.6 RECIRCULATION PUMP

A pump will be used to recirculate water from the lower lake to the upper lake to reduce the demand of well water to sustain the system. The pump will be powered by solar panels on site. We modeled the pump with a six-hour operational time each day to account for the amount of time the solar panels would be receiving sunlight. A pump with a capacity of around 1850 gpm would be needed to recirculate enough water within the allotted operational time. The pump would be able to move approximately 60 AF of water per month. If solar power is not sufficient for the operation of the pump, the power supply will be supplemented by another electrical source.

5.7 BUILDING DEMAND

The building area including the main funeral home and the reflecting pool will be supplied by a municipal water connection and the demands from this area were not included in the overall water budget.

5.8 MODELING APPROACH

We applied the following performance criteria to the analysis. First, a constant flow of 1 cubic foot per second was to be maintained through the creek at all times to ensure adequate flow in the creek. The second objective was to design the lakes to be at full depth for the entirety of the year.

5.9 WATER BUDGET ANALYSES

Our water budget analysis consisted of processing monthly inflow, outflow, and storage volume changes for both lakes and the creek that connects them.

A typical water budget for a lake system accounts for the monthly inflows, outflows and changes in lake storage as described below:

- Monthly direct rainfall inflow is converted from inches to volume (acre-feet) by multiplying monthly rainfall by the “total” lake surface area[1].
- Monthly surface water runoff is converted from inches to volume (acre-feet) by multiplying monthly runoff from the contributing watershed area, excluding lake (net drainage area). Sub-catchment C flows into the upper lake, Sub-catchment B flows into the creek, and Sub-catchments A, D, and F flows into the lower lake, shown in Figure 5.
- Monthly evapotranspiration outflow is converted from inches to volume (acre-feet) by multiplying the previous end of month lake surface area by the evapotranspiration.
- Accounting for the rainfall, runoff, evapotranspiration, landscaping demands, and landscaping return volumes for each month produces the monthly lakes-creek inflow balance. The monthly inflow balance is positive if the sum of rainfall, runoff, and landscaping return exceed evapotranspiration and landscaping demand losses. Or, the monthly inflow balance may be zero when evapotranspiration and landscaping demand volume is greater than contributing rainfall, runoff, and landscaping return volumes. Monthly inflow is added cumulatively, month by month, with any negative monthly values converted to zero to account for dry months.
- End-of-month lake storage is calculated during filling and draining sequence based on the stage-area-volume relationships derived for each lake. Outflow or spillage from the lake is quantified should inflows exceed total lake capacity and converting any negative monthly values to zero, accounting for the months where the pond dries out. End of month stage (lake water depth) and lake surface areas are calculated from the lake volume using the stage-area-volume relationships. The end of month lake surface area is used in the water budget to calculate the amount of evaporation occurring in the following month.
- Should spillage from the upper lake occur once capacity is exceeded, the monthly spillage volume is accounted for as an additional inflow volume to receiving creek and lower lake. Should spillage from the lower lake occur once capacity is exceeded, additional spillage would be routed to the proposed wetland area discussed later in this report.

5.10 RESULTS-PROPOSED LAKES AND CREEK SYSTEM

There is sufficient water supply to sustain the proposed lakes and creek system. Results of the water budget analyses indicate that the water inflow into the lakes and creek and the supplemental water from the onsite groundwater well are sufficient in achieving target lake

---

[1] All direct rainfall enters the lake area even if it falls on the side slopes of the empty lake shelf, as it is assumed to runoff and pool at the bottom of the lake.

water depths and creek flow throughout the year for the average, median, and dry years. These lakes are also large enough to retain the 100-year storm detailed in Section 3. Table 5.10-1 below shows the proposed lake sizing based on the input from ACS Consulting Engineers tentative site development files (ACS, 2018). The table shows the full lake depth, volume and surface area, along with the additional depth, additional volume, and total surface area created by the shelf. This lake sizing is subject to change upon further analysis.

TABLE 5.10-1: Summary of Lake Sizing

LAKE	"FULL" LAKE DEPTH (FEET)	"FULL" LAKE VOLUME (AF)	"FULL" LAKE SURFACE AREA (ACRES)	ADDITIONAL SHELF DEPTH (FT)	ADDITIONAL SHELF VOLUME (AF)	TOTAL LAKE SURFACE AREA WITH SHELF (ACRES)
Upper Lake, Upper Pool	16	7.06	0.47	N/A	N/A	N/A
Upper Lake, Lower Pool	38	16.86	0.49	N/A	N/A	N/A
Lower Lake	16	19.21	1.36	1	10.04	2.09

For this analysis, we maximized the recirculated water amount based on the amount of water in the lower lake up to a maximum value of 60 AF per month. We assumed the remaining water needs of the system will be supplemented by the well water. The lakes-creek system well-water demand, the recirculation volume, and overflow volume from the lower lake for the average, median, and dry year are shown below in Tables 5.10-2, 5.10-3 and 5.10-4, respectively.

TABLE 5.10-2: Water demand, Recirculation, and Overflow Amount of Lake-Creek System for Average Year

MONTH	WELL-WATER SUPPLY (AF)	RECIRCULATION WATER (AF)	OVERFLOW VOLUME FROM LOWER LAKE (AF)
October	1.55	59.58	0.0000
November	0.00	60	0.0000
December	0.00	60	4.7594
January	0.00	60	8.0859
February	0.00	60	5.1671
March	0.00	60	0.0000
April	1.45	57.45	0.0000
May	6.14	58.86	0.0000
June	6.68	52.91	0.0000
July	7.27	54.14	0.0000
August	6.26	55.21	0.0000
September	5.36	56.39	0.0000
Annual	**34.71**	**694.54**	**18.012**

TABLE 5.10-3: Water demand, Recirculation, and Overflow Amount of Lake-Creek System for Median Year

MONTH	WELL-WATER SUPPLY (AF)	RECIRCULATION WATER (AF)	OVERFLOW VOLUME FROM LOWER LAKE (AF)
October	2.44	58.52	0.0000
November	0.00	60	0.0000
December	0.00	60	16.2164
January	0.00	60	1.3607
February	0.00	60	21.2563
March	3.30	58.45	0.0000
April	5.34	54.66	0.0000
May	7.14	54.51	0.0000
June	7.81	60	0.0000
July	8.65	52.76	0.0000
August	7.41	54.55	0.0000
September	6.17	53.7	0.0000
Annual	**48.26**	**687.15**	**38.833**

TABLE 5.10-4: Water demand, Recirculation, and Overflow Amount of Lake-Creek System for Dry Year

MONTH	WELL-WATER SUPPLY (AF)	RECIRCULATION WATER (AF)	OVERFLOW VOLUME FROM LOWER LAKE (AF)
October	0.5	58.52	0.0000
November	0.00	60	0.0000
December	1.18	60	16.2164
January	0.00	60	1.3607
February	0.00	60	21.2563
March	1.31	58.45	0.0000
April	5.22	54.66	0.0000
May	7.14	54.51	0.0000
June	7.57	60	0.0000
July	8.76	52.76	0.0000
August	7.33	54.55	0.0000
September	6.05	53.7	0.0000
Annual	**37.92**	**685.96**	**3.919**

Tables 5.10-3 and 5.10-4 show that the overall well-water supply to the lakes is greater in a median year than in a dry year. This is due to the distribution of rainfall during the selected years of WY 1990 and WY 2004. Although there is less overall rainfall in the statistically dry year, WY 1990, the rainfall is distributed throughout the year in such a way that the water demands of the site are better met than using the distribution from the statistically median year, WY 2004.

Based on the overflow results, a drawdown schedule would need to be established to reduce the chance of overflow events leading up to the months of December, January, and February.

6.0 WATER BALANCE – PROPOSED WETLAND

We conducted an additional water balance analysis on the proposed direct precipitation wetlands located on the southern part of the project site to determine the surface water supply available to the wetland. These wetlands are approximately 2.6 acres and will be implemented to discharge from the lakes during high flow events.

6.1 HYDROLOGIC INPUTS

6.1.1 Precipitation

We also used the precipitation inputs used in the proposed lakes and creek system analyses in the analyses for the proposed wetland.

6.1.2 Runoff

Based on the final grading of the site, the wetland area will not receive significant runoff. Therefore, we set the runoff inputs for the wetland to zero for all months.

6.1.3 Evapotranspiration

To determine the evapotranspiration of the wetland area, we used the landscape coefficient method per the University of California Cooperative extension California Department of Water Resources (2000). We based the coefficient on the species of plant and the classification under the WUCOLS, the density of the plantings, and the microclimate in which the landscape is located. Each component generates a related coefficient and the landscaping coefficient is the product of the generated component coefficients. The resulting coefficients for the wetland area are shown in the table below.

TABLE 6.1.3-1: Calculation of the Landscape Coefficient

COEFFICIENT TYPE	VALUE
Species	0.2
Density	0.7
Microclimate	1.0
Landscape	0.14

To determine the predicted evapotranspiration for each month, we multiplied the landscape coefficient by the reference evapotranspiration for Livermore shown in Table 5.4-2.

6.2 MODELING APPROACH

The intent of the model was to determine periods of saturation that are likely to occur in the proposed wetlands. Wetlands are considered saturated if hydrologic inputs exceed outputs for any given month.

6.3 WATER BUDGET ANALYSES

The water budget analysis consisted of processing monthly inflow values and outflow values for the proposed wetland area.

The wetland water budget accounts for the monthly inflows and demands as described below:

- Monthly direct rainfall inflow is converted from inches to volume (acre-feet) by multiplying monthly rainfall by the wetland area.
- Monthly evapotranspiration outflow is converted from inches to volume (acre-feet) by multiplying the landscape coefficient by the by the wetland area.
- Accounting for the rainfall and evapotranspiration volumes for each month produces the monthly wetland inflow balance. The monthly inflow balance is positive if the sum of rainfall and runoff exceed evapotranspiration losses; or, the monthly inflow balance may be zero when evapotranspiration volume is greater than contributing rainfall and runoff volumes. Monthly inflow is added cumulatively, month by month, with any negative monthly values converted to zero to account for dry months.

6.4 RESULTS – PROPOSED WETLANDS

Results of the analysis are provided in table 6.4.1 below. In general, there is sufficient water supply to achieve creation of the proposed wetland. The wetland area will be expected to be saturated for an average of 6 months every year.

TABLE 6.4-1: Predicted Wetland Saturation

YEAR TYPE	MONTHS
Average	7
Median	4
Dry	6

Table 6.4-1 shows the wetlands being saturated for a longer period of time during a dry year than in a median year. This is due to the difference in the distribution of rainfall for WY 1990 and WY 2004. Although there is less precipitation during the dry year, it is distributed to better meet the water demands of the site.

7.0 CONCLUSION

Based on the results of our modeling, the Monte Vista Memorial Garden project will not increase peak flows in the Arroyo Las Positas watershed downstream of the project if built in accordance with recommendations made herein. We expect this hydrologic model will need to be updated prior to approval of the final map of the project in order to assess any future modifications to the land plan.

In addition, based on the water balance analyses, there is an adequate water supply to sustain the Monte Vista Memorial Garden Project’s proposed water features and proposed wetland.

If you have any questions on any portion of this report, please call and we will be glad to discuss them with you.

SELECTED REFERENCES

ACS Consulting Engineers; Monte Vista Memorial Gardens Plan Set; APN 090-0015-016-03; 3656 Las Colinas Road, Livermore, California; November 28, 2018.

Alameda County Flood Control & Water Conservation District; Hydrology and Hydraulics Manual; 2018.

Barlock, V.E., 1988, Geologic map of the Livermore gravels, Alameda County, California; U.S. Geologic Survey, Open-File Report OF-88-516, scale 1:24,000.

Barlock, V.E., 1989, Sedimentology of the Livermore gravels (Miocene-Pleistocene), southern Livermore Valley, California: U.S. Geological Survey, Open-File Report OF-89-131, scale 1:48,000.

Camp & Camp Associates; Monte Vista Memorial Gardens, Overall Master Plan, Livermore, California; Sheet L-1; May 2018, Job No. 10-017

Chow, V.T., 1959, Open-Channel Hydraulics: New York, McGraw-Hill, 680 p.

Department of Water Resources; Model Water Efficient Landscape Ordinance; September 10, 2009.

Dibblee, T.W., 1980, Preliminary geologic map of the Livermore quadrangle, Alameda and Contra Costa Counties, California: U.S. Geological Survey, Open-File Report OF-80-533-B, scale1:24,000.

Dibblee, T.W., and Minch, J.A., 2006, Geologic map of the Livermore quadrangle, Contra Costa & Alameda Counties, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-196, scale 1:24,000.

ENGEO: Geotechnical Exploration Report; 3656 Las Colinas Road, Livermore, California; December 21, 2018.

Harivandi et al.; Managing Turfgrasses during Drought. University of California Division of Agriculture and Natural Resources Publication 8395; August 2009.

National Resources Conservation Service (NRCS); Urban Hydrology for Small Watersheds, Technical Release 55; 1986.

NRCS; Custom Soil Resource Report for Alameda Area, California; Monte Vista Memorial Project; October 9, 2019.

NOAA; Hydrometeorological Design Studies Center; Precipitation Frequency Data Server (PFDS); Atlas 14 Point Precipitation Frequency Estimates: KS. https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html.

University of California Cooperative Extension California Department of Water Resources; A Guide to Estimating Irrigation Water Needs of landscape Plantings in California; 2000

U.S. Army Corp. of Engineers; Hydrologic Modeling System (HEC-HMS); Version 4.3. September 2018.

U.S. Department of Agriculture, Natural Resources Conservation Service; 2007, Soil Survey Geographic (SSURGO) database for Contra Costa County, California, ca013, http://SoilDataMart.nrcs.usda.gov/.

Zone 7 Water Agency; Annual Report for the Ground Water Management Program, Table 4-G; 2008.

FIGURES

FILE PATH: G:\Drafting\DRAFTING2_Dwg_13000 Plus\15426\000\100919-Hydro\15426000000-1-VicMap-1019.dwg SAVE DATE: 10/15/2019 8:36:14 AM SAVED BY: jvergara

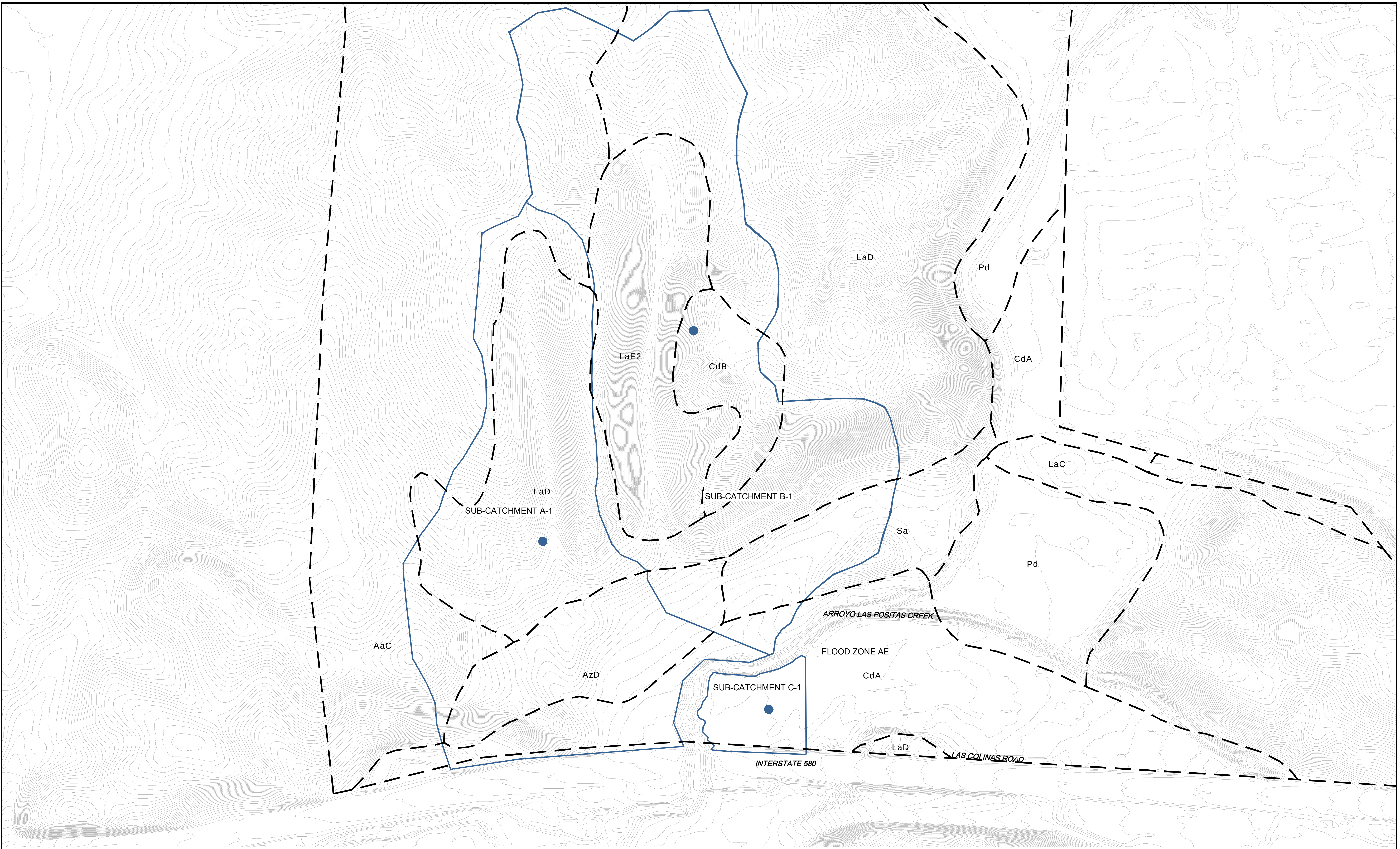
BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO
Expect Excellence

VICINITY MAP
MONTE VISTA MEMORIAL GARDENS DEVELOPMENT
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO.: 15426.000.000
SCALE: AS SHOWN
DRAWN BY: JV
CHECKED BY: SPC
FIGURE NO. 1

ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

—	WATERSHED BOUNDARY
– –	SOIL LINE

SOIL TYPES

AaC	ALTAMONT CLAY, 3-15% SLOPES, CLASS C SOIL	LaD	LINNE CLAY LOAM, 15-30% SLOPES, MLRA 15. CLASS D SOIL
AzD	AZULE CLAY LOAM, 3-30% SLOPES, MLRA 15, CLASS D SOIL	LaE2	LINNE CLAY LOAM, 30-15% SLOPES, ERODED, CLASS C SOIL
CdA	CLEAR LAKE CLAY, DRAINED, 0-2% SLOPES, MLRA 14, CLASS D SOIL	Pd	PESCADERO CLAY LOAM, 0-6% SLOPES, MLRA 14, CLASS C/D SOIL
CdB	CLEAR LAKE CLAY, DRAINED, 3-7% SLOPES, CLASS C SOIL	Sa	SAN YSIDRO LOAM, 0-2%, MLRA 14, CLASS C SOIL
LaC	LINNE CLAY LOAM, 3-15% SLOPES, CLASS C SOIL		

BASE MAP SOURCE: ACS CONSULTING ENGINEERS AND USDA

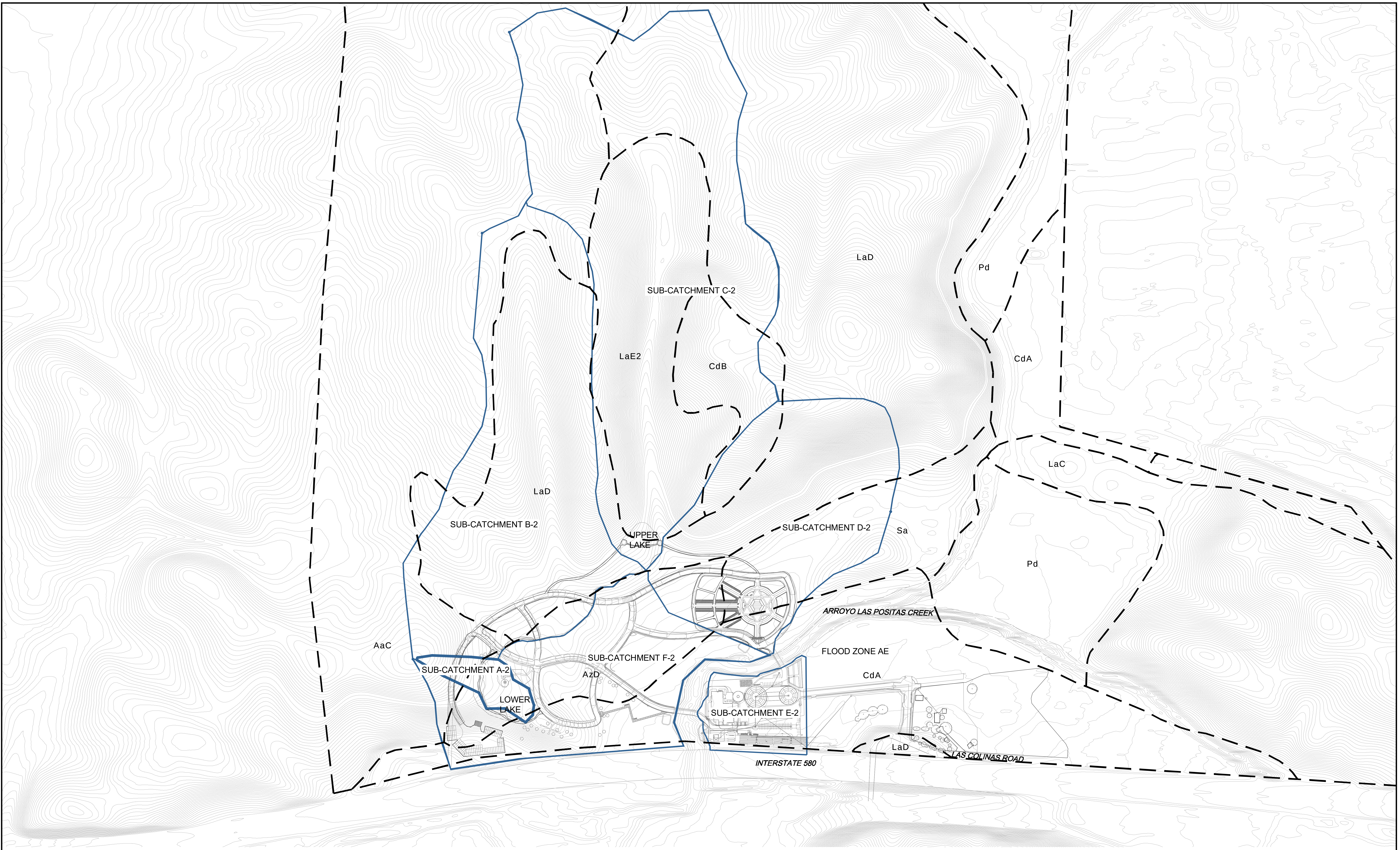
ENGEO
Expect Excellence

PRE-DEVELOPMENT WATERSHEDS - SOIL MAP
MONTE VISTA MEMORIAL GARDENS DEVELOPMENT
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO.: 15426.000.000
SCALE: AS SHOWN
DRAWN BY: JV
CHECKED BY: SPC
FIGURE NO. 2

ORIGINAL FIGURE PRINTED IN COLOR

FILE PATH: G:\Drafting\DRAFTING2_Dwg_13000 Plus\15426\000\100919-Hydro\15426000000-2_4-PreDevelop-1019.dwg SAVE DATE: 10/15/2019 8:45:28 AM SAVED BY: jvergara



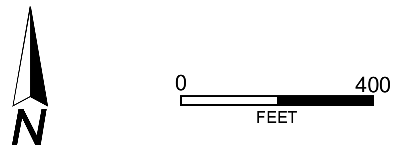
EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

▬	WATERSHED BOUNDARY
– –	SOIL LINE

SOIL TYPES

AaC	ALTAMONT CLAY, 3-15% SLOPES, CLASS C SOIL
AzD	AZULE CLAY LOAM, 3-30% SLOPES, MLRA 15, CLASS D SOIL
CdA	CLEAR LAKE CLAY, DRAINED, 0-2% SLOPES, MLRA 14, CLASS D SOIL
CdB	CLEAR LAKE CLAY, DRAINED, 3-7% SLOPES, CLASS C SOIL
LaC	LINNE CLAY LOAM, 3-15% SLOPES, CLASS C SOIL
LaD	LINNE CLAY LOAM, 15-30% SLOPES, MLRA 15. CLASS D SOIL
LaE2	LINNE CLAY LOAM, 30-15% SLOPES, ERODED, CLASS C SOIL
Pd	PESCADERO CLAY LOAM, 0-6% SLOPES, MLRA 14, CLASS C/D SOIL
Sa	SAN YSIDRO LOAM, 0-2%, MLRA 14, CLASS C SOIL



BASE MAP SOURCE: ACS CONSULTING ENGINEERS AND USDA

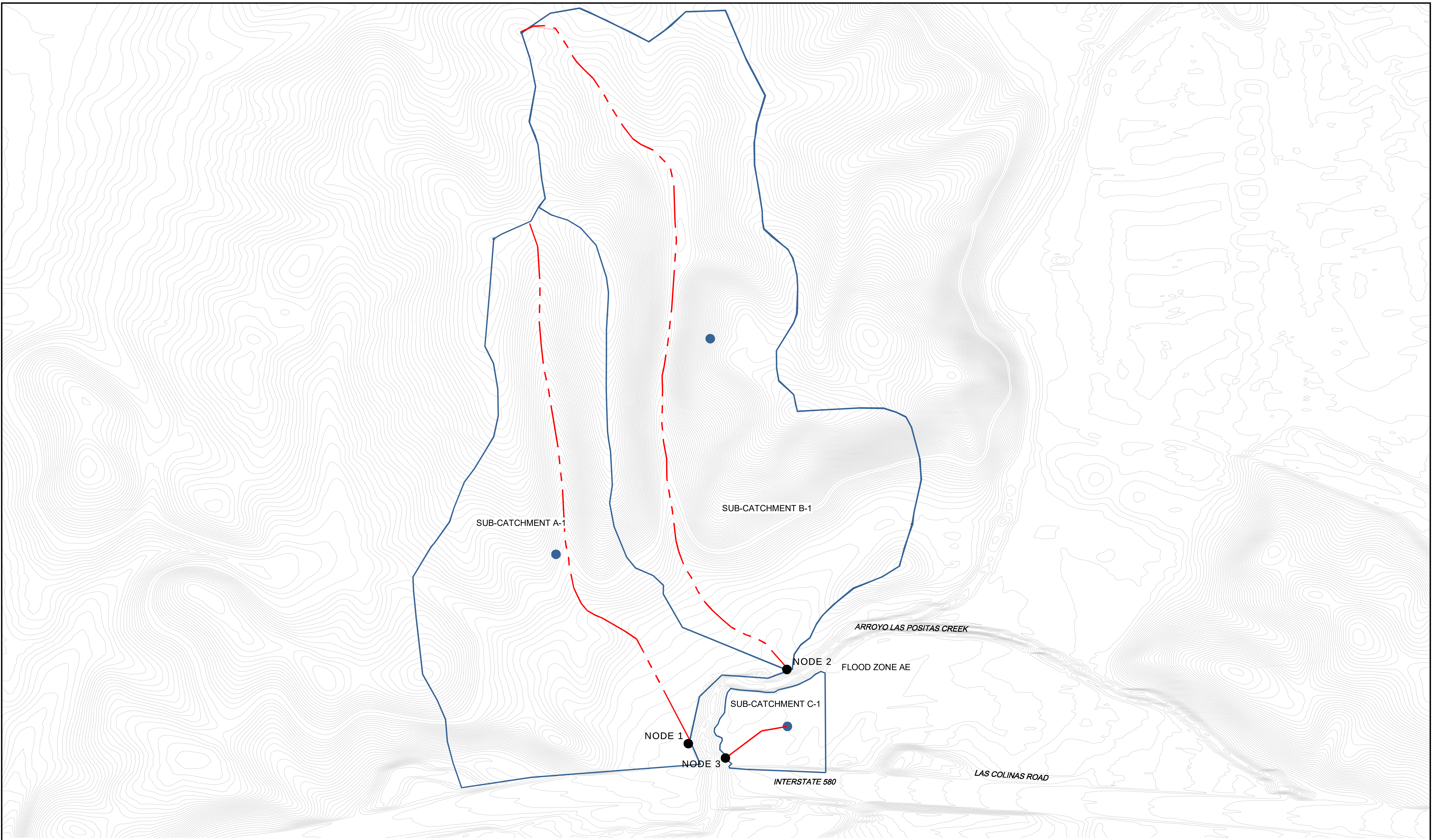
ENGEO
Expect Excellence

POST-DEVELOPMENT WATERSHEDS - SOIL MAP
MONTE VISTA MEMORIAL GARDENS DEVELOPMENT
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO.: 15426.000.000
SCALE: AS SHOWN
DRAWN BY: JV
CHECKED BY: SPC
FIGURE NO. 3

ORIGINAL FIGURE PRINTED IN COLOR

FILE PATH: G:\Drafting\DRAFTING2_Dwg_13000 Plus\15426\000\100919-Hydro\15426000000-3_5-POSTDevelop-Soil-1019.dwg SAVE DATE: 10/16/2019 10:36:31 AM SAVED BY: jvergara



FOR PRE-DEVELOPMENT CONDITIONS

Subcatchment	Area (Square Miles)	Initial Loss (inches)	Uniform Loss Rate (inches)	Longest Flow Path (ft)	Channel Length from Centroid (ft)	Average Stream Slope (ft/mile)	Weighted Roughness Factor (N)	% Impervious	Distance Factor	Basin Lag Time (hr)	Basin Peaking Factor
A-1	0.125	1	0.140	3194	1273	192	0.07	0	21.79	0.27	0.6
B-1	0.174	1	0.050	4553	2268	124	0.07	0	24.58	0.47	0.6
C-1	0.006	1	0.058	655	365	13	0.07	21	16.57	0.12	0.6

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

▬	WATERSHED BOUNDARY
●	CENTROID
— - - —	LONGEST DRAINAGE PATH
●	NODE

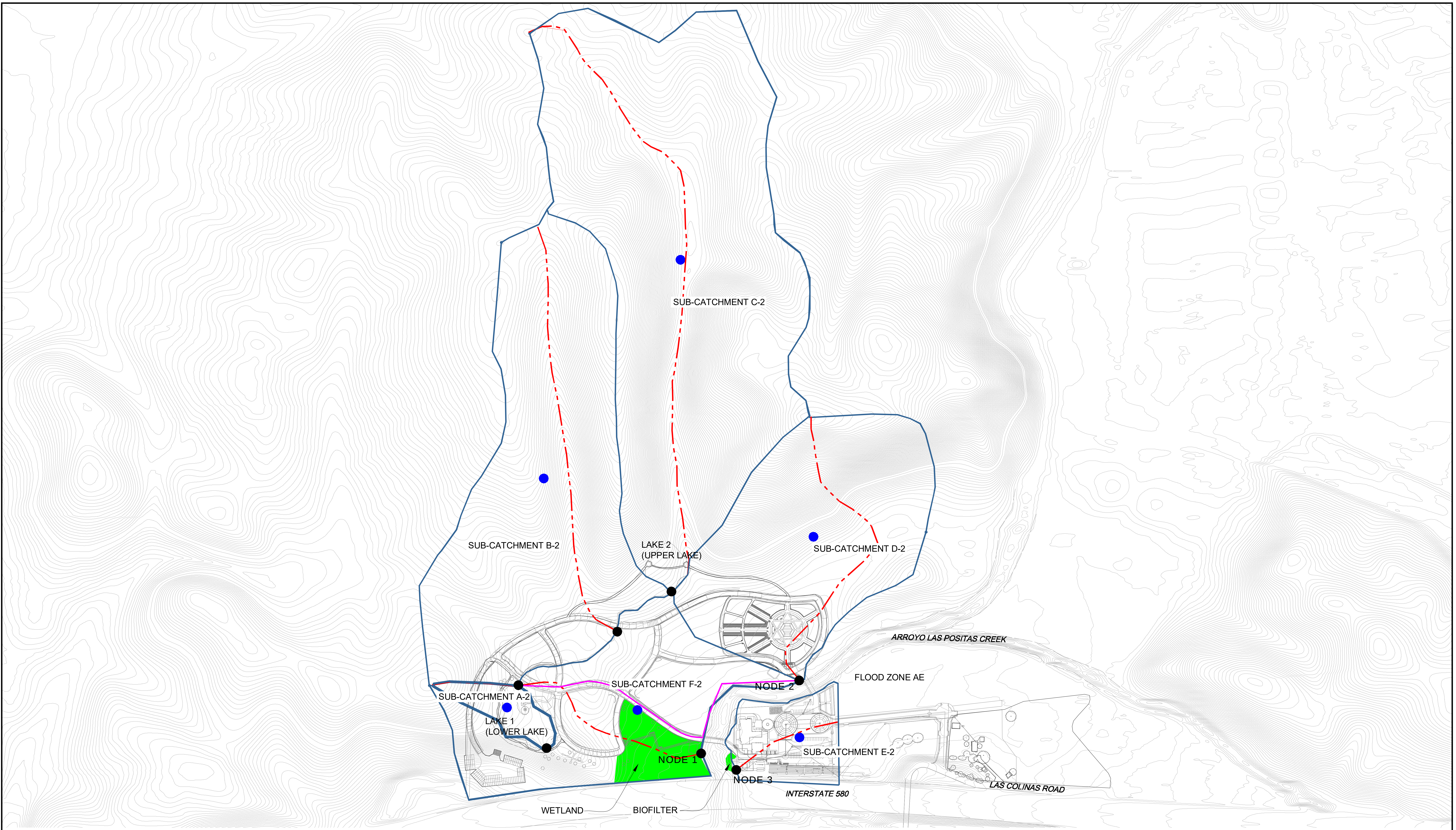
BASE MAP SOURCE: ACS CONSULTING ENGINEERS

ENGEO
Expect Excellence

PRE-DEVELOPMENT WATERSHEDS
MONTE VISTA MEMORIAL GARDENS DEVELOPMENT
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

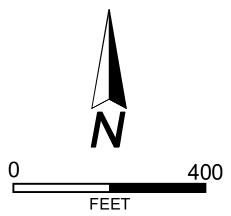
PROJECT NO.: 15426.000.000
SCALE: AS SHOWN
DRAWN BY: JV
CHECKED BY: SPC
FIGURE NO. 4

ORIGINAL FIGURE PRINTED IN COLOR



FOR POST-DEVELOPMENT CONDITIONS

Subcatchment	Area (Square Miles)	Initial Loss (inches)	Uniform Loss Rate (inches)	Longest Flow Path (ft)	Channel Length from Centroid (ft)	Average Stream Slope (ft/mile)	Weighted Roughness Factor (N)	% Impervious	Distance Factor	Basin Lag Time (hr)	Basin Peaking Factor
A-2	0.005	1	0.052	470	540	655	0.05	6.20	16	0.040	0.696
B-2	0.076	1	0.051	2547	1079	197	0.05	2.34	20	0.155	0.600
C-2	0.121	1	0.050	3730	1978	112	0.05	0.10	23	0.282	0.600
D-2	0.053	1	0.055	1911	1087	548	0.05	11.95	19	0.108	0.680
E-2	0.012	1	0.070	1355	937	13	0.04	85.00	18	0.154	0.600
F-2	0.045	1	0.056	1245	788	119	0.05	15.97	18	0.101	0.600
G-2	0.008	1	0.053	620	362	84	0.05	8.12	16	0.056	0.600



10-YEAR PEAK FLOW COMPARISON OF PRE- AND POST- DEVELOPMENT

Node	1	2	3
Pre-Development Discharge (cfs)	56.2	62.5	2.9
Post-Development Discharge (cfs)	48.8	N/A	2.9
Pre-Development Volume Runoff (ac-ft)	7.2	7.7	0.5
Post-Development Volume Runoff (ac-	18.4	N/A (0)	0.6

100-YEAR PEAK FLOW COMPARISON OF PRE- AND POST- DEVELOPMENT

Node	1	2	3
Pre-Development Discharge (cfs)	98.5	114.6	5
Post-Development Discharge (cfs)	222.9	N/A	5
Pre-Development Volume Runoff (ac-ft)	18.8	20.9	1.1
Post-Development Volume Runoff (ac-	45	N/A (0)	1.2

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

▬	WATERSHED BOUNDARY	●	CENTROID	🟩	WETLANDS/WATERQUALITY BMP
— - - —	LONGEST DRAINAGE PATH	●	NODE	▬	SUB-DRAIN DISCHARGE PUMP TO LOWER LAKE

BASE MAP SOURCE: ACS CONSULTING ENGINEERS

ENGEO
Expect Excellence

POST-DEVELOPMENT WATERSHEDS
MONTE VISTA MEMORIAL GARDENS DEVELOPMENT
3656 LAS COLINAS ROAD
LIVERMORE, CALIFORNIA

PROJECT NO.: 15426.000.000
SCALE: AS SHOWN
DRAWN BY: JV
CHECKED BY: SPC
FIGURE NO. 5

ORIGINAL FIGURE PRINTED IN COLOR

FILE PATH: G:\Drafting\DRAFTING2_Dwg_13000 Plus\15426\000\100919-Hydro\15426000000-3_5-POSTDevelop-Soil-1019.dwg SAVE DATE: 10/16/2019 10:36:31 AM SAVED BY: jvergara

APPENDIX A

HYDROLOGIC CALCULATIONS

TABLE A.1 – Temporal Rainfall Distribution (24-hour, 10-year)

TIME (HR)	RAINFALL FRACTION	CUMULATIVE RAINFALL (INCHES)	TIME (HR)	RAINFALL FRACTION	CUMULATIVE RAINFALL (INCHES)
0.25	0.00	0.01	12.25	0.49	1.42
0.50	0.01	0.03	12.50	0.56	1.63
0.75	0.01	0.04	12.75	0.62	1.80
1.00	0.02	0.05	13.00	0.65	1.90
1.25	0.02	0.07	13.25	0.68	1.97
1.50	0.03	0.09	13.50	0.69	2.01
1.75	0.04	0.11	13.75	0.71	2.06
2.00	0.04	0.11	14.00	0.72	2.10
2.25	0.04	0.12	14.25	0.73	2.13
2.50	0.05	0.13	14.50	0.74	2.17
2.75	0.05	0.16	14.75	0.75	2.20
3.00	0.06	0.17	15.00	0.77	2.23
3.25	0.07	0.19	15.25	0.78	2.26
3.50	0.07	0.19	15.50	0.79	2.29
3.75	0.07	0.21	15.75	0.80	2.32
4.00	0.07	0.21	16.00	0.80	2.34
4.25	0.08	0.24	16.25	0.81	2.37
4.50	0.09	0.26	16.50	0.82	2.39
4.75	0.10	0.28	16.75	0.83	2.42
5.00	0.10	0.30	17.00	0.84	2.44
5.25	0.11	0.31	17.25	0.85	2.46
5.50	0.11	0.33	17.50	0.85	2.48
5.75	0.12	0.35	17.75	0.86	2.50
6.00	0.13	0.37	18.00	0.87	2.53
6.25	0.13	0.38	18.25	0.88	2.55
6.50	0.14	0.40	18.50	0.88	2.57
6.75	0.15	0.42	18.75	0.89	2.58
7.00	0.15	0.44	19.00	0.89	2.60
7.25	0.16	0.47	19.25	0.90	2.62
7.50	0.17	0.49	19.50	0.91	2.64
7.75	0.18	0.51	19.75	0.91	2.65
8.00	0.18	0.53	20.00	0.92	2.67
8.25	0.19	0.55	20.25	0.92	2.69
8.50	0.20	0.58	20.50	0.93	2.71
8.75	0.21	0.61	20.75	0.94	2.73
9.00	0.22	0.63	21.00	0.94	2.74
9.25	0.23	0.66	21.25	0.95	2.76
9.50	0.24	0.69	21.50	0.95	2.78
9.75	0.25	0.72	21.75	0.96	2.79
10.00	0.26	0.75	22.00	0.96	2.80
10.25	0.27	0.79	22.25	0.97	2.82
10.50	0.28	0.82	22.50	0.98	2.85
10.75	0.30	0.86	22.75	0.98	2.84
11.00	0.31	0.90	23.00	0.98	2.86
11.25	0.33	0.95	23.25	0.99	2.87
11.50	0.35	1.01	23.50	0.99	2.88
11.75	0.37	1.09	23.75	1.00	2.90
12.00	0.42	1.23	24.00	1.00	2.91

TABLE A.2 – Temporal Rainfall Distribution (24-hour, 100-year)

TIME (HR)	RAINFALL FRACTION	CUMULATIVE RAINFALL (INCHES)	TIME (HR)	RAINFALL FRACTION	CUMULATIVE RAINFALL (INCHES)
0.25	0.00	0.02	12.25	0.49	2.39
0.50	0.01	0.04	12.50	0.56	2.74
0.75	0.01	0.07	12.75	0.62	3.04
1.00	0.02	0.09	13.00	0.65	3.20
1.25	0.02	0.11	13.25	0.68	3.31
1.50	0.03	0.16	13.50	0.69	3.39
1.75	0.04	0.18	13.75	0.71	3.47
2.00	0.04	0.18	14.00	0.72	3.53
2.25	0.04	0.20	14.25	0.73	3.59
2.50	0.05	0.22	14.50	0.74	3.65
2.75	0.05	0.27	14.75	0.75	3.70
3.00	0.06	0.29	15.00	0.77	3.75
3.25	0.07	0.32	15.25	0.78	3.80
3.50	0.07	0.32	15.50	0.79	3.85
3.75	0.07	0.35	15.75	0.80	3.90
4.00	0.07	0.35	16.00	0.80	3.94
4.25	0.08	0.41	16.25	0.81	3.99
4.50	0.09	0.44	16.50	0.82	4.03
4.75	0.10	0.47	16.75	0.83	4.07
5.00	0.10	0.50	17.00	0.84	4.11
5.25	0.11	0.53	17.25	0.85	4.14
5.50	0.11	0.56	17.50	0.85	4.18
5.75	0.12	0.59	17.75	0.86	4.22
6.00	0.13	0.62	18.00	0.87	4.26
6.25	0.13	0.64	18.25	0.88	4.29
6.50	0.14	0.67	18.50	0.88	4.32
6.75	0.15	0.71	18.75	0.89	4.35
7.00	0.15	0.75	19.00	0.89	4.38
7.25	0.16	0.79	19.25	0.90	4.41
7.50	0.17	0.82	19.50	0.91	4.44
7.75	0.18	0.86	19.75	0.91	4.47
8.00	0.18	0.90	20.00	0.92	4.50
8.25	0.19	0.93	20.25	0.92	4.53
8.50	0.20	0.98	20.50	0.93	4.56
8.75	0.21	1.02	20.75	0.94	4.59
9.00	0.22	1.07	21.00	0.94	4.62
9.25	0.23	1.11	21.25	0.95	4.65
9.50	0.24	1.16	21.50	0.95	4.68
9.75	0.25	1.22	21.75	0.96	4.70

TIME (HR)	RAINFALL FRACTION	CUMULATIVE RAINFALL (INCHES)	TIME (HR)	RAINFALL FRACTION	CUMULATIVE RAINFALL (INCHES)
10.00	0.26	1.27	22.00	0.96	4.72
10.25	0.27	1.32	22.25	0.97	4.74
10.50	0.28	1.38	22.50	0.98	4.79
10.75	0.30	1.45	22.75	0.98	4.79
11.00	0.31	1.52	23.00	0.98	4.81
11.25	0.33	1.60	23.25	0.99	4.83
11.50	0.35	1.70	23.50	0.99	4.86
11.75	0.37	1.83	23.75	1.00	4.88
12.00	0.42	2.06	24.00	1.00	4.90

TABLE A.3 –Initial Losses (Alameda County Hydrology and Hydraulic Manual)

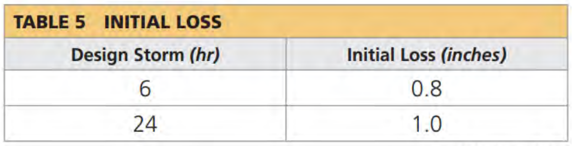


TABLE 5 INITIAL LOSS

Design Storm *(hr)*	Initial Loss *(inches)*
6	0.8
24	1.0

(District 1994)

TABLE A.4 –Uniform Loss Rates by Soil Group Type (Alameda County Hydrology and Hydraulic Manual)

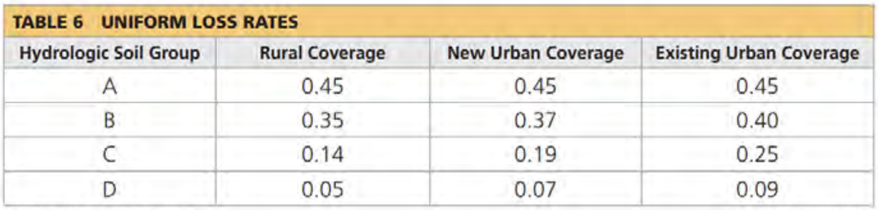


TABLE 6 UNIFORM LOSS RATES

Hydrologic Soil Group	Rural Coverage	New Urban Coverage	Existing Urban Coverage
A	0.45	0.45	0.45
B	0.35	0.37	0.40
C	0.14	0.19	0.25
D	0.05	0.07	0.09

All loss rates in inches/hour.

(District 1994)

TABLE A.5 –Basin Roughness Factors (Alameda County Hydrology and Hydraulic Manual)

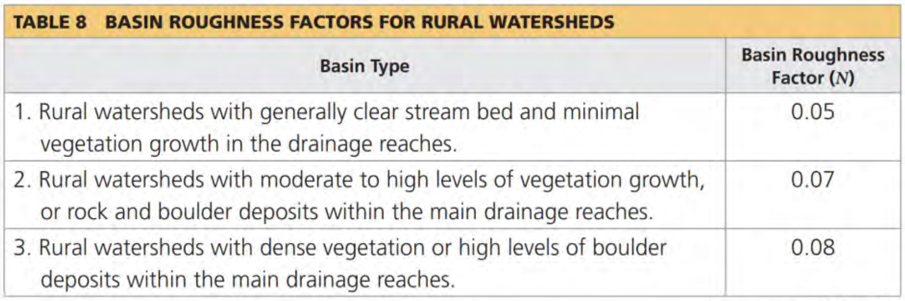


TABLE 8 BASIN ROUGHNESS FACTORS FOR RURAL WATERSHEDS

Basin Type	Basin Roughness Factor (*N*)
1. Rural watersheds with generally clear stream bed and minimal vegetation growth in the drainage reaches.	0.05
2. Rural watersheds with moderate to high levels of vegetation growth, or rock and boulder deposits within the main drainage reaches.	0.07
3. Rural watersheds with dense vegetation or high levels of boulder deposits within the main drainage reaches.	0.08

(District 2015)

TABLE A.6 – Pre-Development Soil Type Uniform Loss Rate Assumptions – Groups C and D

	Uniform Loss Rate for Soil Group D	Uniform Loss Rate for Soil Group C	% of Sub-Basin A-1 Group C	% of Sub-Basin A-1 Group D	% of Sub-Basin B-1 Group C	% of Sub-Basin B-1 Group D	% of Sub-Basin C-1 Group C	% of Sub-Basin C-1 Group D
Rural	0.05	0.14	18.88481249	81.11518751	67.91367389	32.08632611	0	79.073
New Urban	0.07	0.19	0	0	0	0	0	0
Existing Urban Coverage	0.09	0.25	0	0	0	0	0	20.927
Soil Group Reference	(Attachment 9, 2018 ACFCD HH Manual)							

TABLE A.7 – Pre-Development Infiltration Conditions

	Initial Loss (inches)	Uniform Loss Rate (inches) (Ref. Table 6 AC Manual)	Weighted Roughness Factor (N)	N Assumption
Subcatchment				
A-1	1	0.066996331	0.07	>80% is Rural; Use 0.07 Per manual
B-1	1	0.111122307	0.07	>80% is Rural; Use 0.07 Per manual
C-1	1	0.0583708	0.07	>80% is Rural; Use 0.07 Per manual
Reference	Table 5, ACWD Manual (24-hr storm)		Assumed Rural Watershed	

TABLE A.8 – Post-Development Uniform Soil Loss Rate Assumptions – Group D Soils

	Uniform Loss Rate for Soil Group D	% of Sub-Basin A-2	% of Sub-Basin B-2	% of Sub-Basin C-2	% of Sub-Basin D-2	% of Sub-Basin E-2	% of Sub-Basin F-2
Rural	0.05	0	67.83839434	26.19769675	48.79010035	0	0
New Urban	0.07	75.03470886	9.150625749	1.753437604	16.31011207	60	90.046747
Existing Urban Coverage	0.09	0	0	0		0	0
Soil Group Reference	(Attachment 9, 2018 ACFCD HH Manual)						

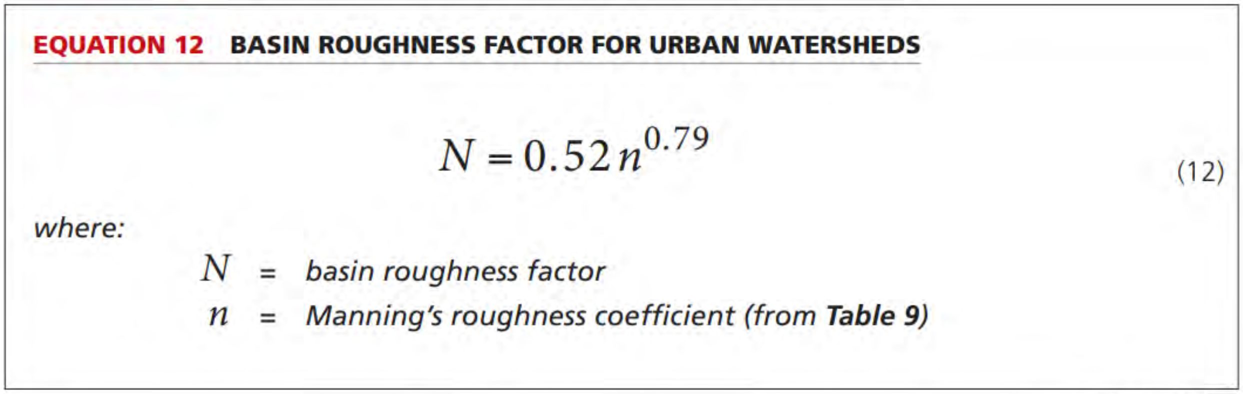
TABLE A.9 – Post-Development Uniform Soil Loss Rate Assumptions – Group C Soils

	Uniform Loss Rate for Soil Group C	% of Sub-Basin A-2	% of Sub-Basin B-2	% of Sub-Basin C-2	% of Sub-Basin D-2	% of Sub-Basin E-2	% of Sub-Basin F-2
Rural	0.14	0	21.20405984	72.04886565	21.83889359	0	0
New Urban	0.19	25.41692454	1.806920065	0	13.06089399	0	9.9532527
Existing Urban Coverage	0.25	0	0	0		0	0
Soil Group Reference	(Attachment 9, 2018 ACFCD HH Manual)						

TABLE A.10 – Post-Development Infiltration Conditions

	Initial Loss (inches)	Uniform Loss Rate (inches/hr)	Weighted Roughness Factor (N)	N Assumption
Subcatchment				
A-2	1	0.100816453	0.07	>80% is Rural; Use 0.07 Per manual
B-2	1	0.115194667	0.07	>80% is Rural; Use 0.07 Per manual
C-2	1	0.115194667	0.07	>80% is Rural; Use 0.07 Per manual
D-2	1	0.091202278	0.07	>80% is Rural; Use 0.07 Per manual
E-2	1	0.07	0.427136816	Mixed Rural/Urban, weight N obtained from Table 8 and Eqn. 12 of ACWD Manual , Assumed
F-2	1	0.081943903	0.07	>80% is Rural; Use 0.07 Per manual
Reference	Table 5, ACWD Manual (24-hr storm)			

TABLE A.11 – Basin Roughness Factor for Urban Watersheds (Alameda County Hydrology and Hydraulic Manual)



EQUATION 12 BASIN ROUGHNESS FACTOR FOR URBAN WATERSHEDS

$$N = 0.52 n^{0.79} \quad (12)$$

where:

N = *basin roughness factor*

n = *Manning's roughness coefficient (from **Table 9**)*

(District 2015)

Sub-Basin E-2 is classified as urban given more than 80% of the sub-basin is not classified as rural. The equation above was used to calculate the basin roughness factor, N, using Manning's roughness coefficient. We assumed a Manning's 'n' of 0.014 for a reinforced concrete pipe less than 36 inches in diameter.

TABLE A.12 – Manning's Roughness Coefficient (Alameda County Hydrology and Hydraulic Manual)

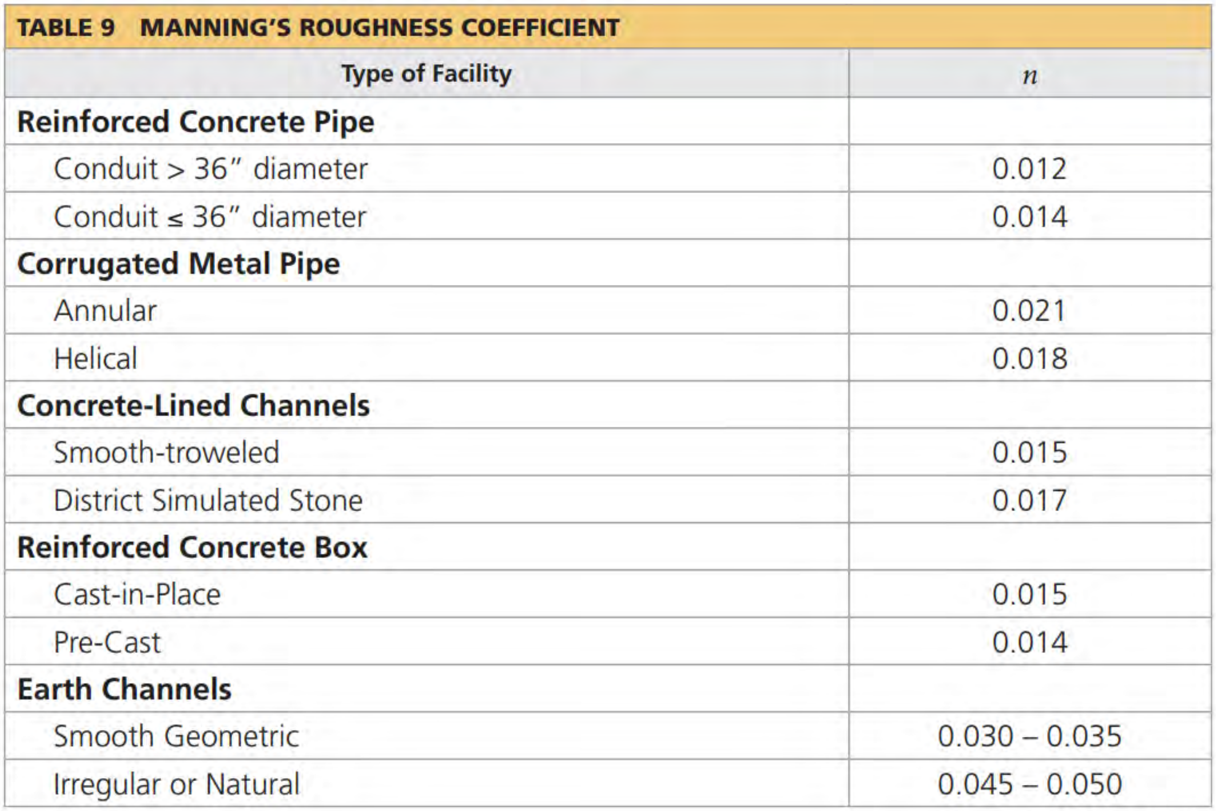


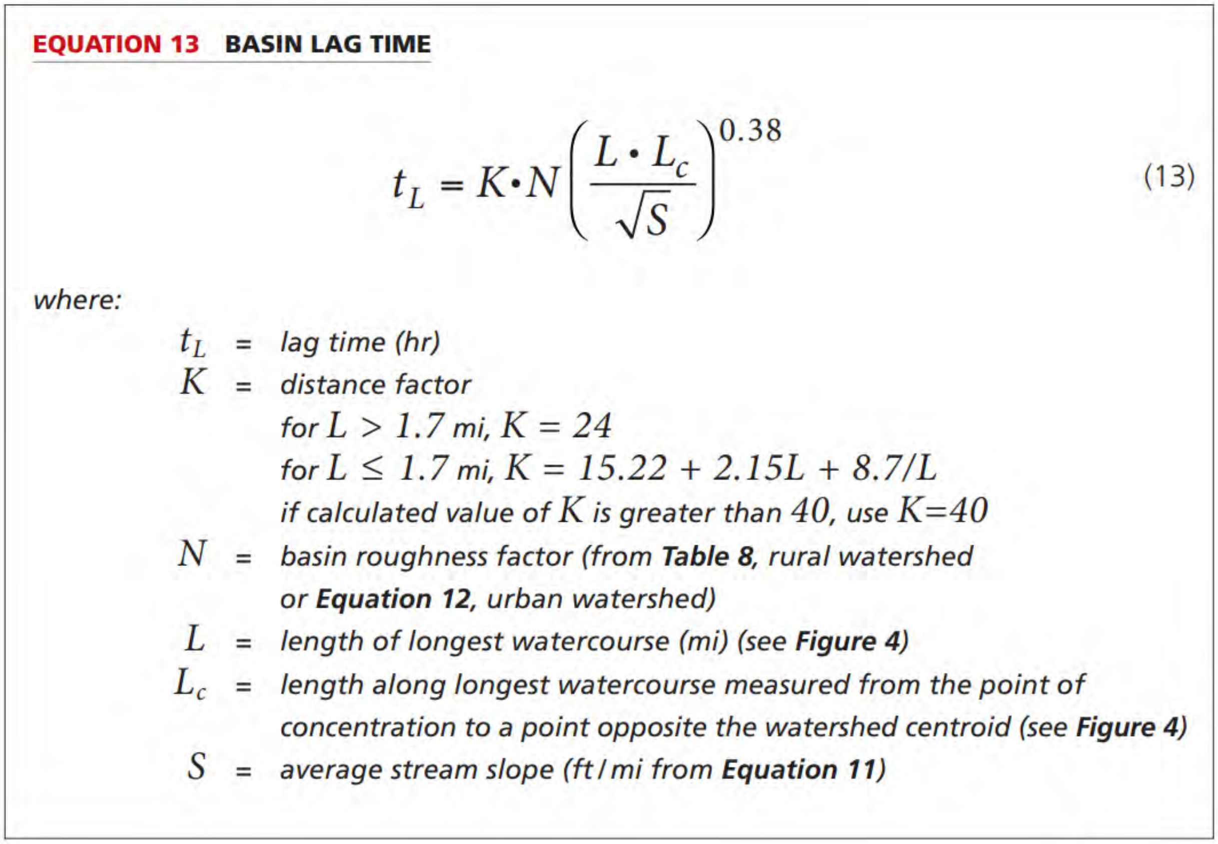
TABLE 9 MANNING'S ROUGHNESS COEFFICIENT

Type of Facility	n
Reinforced Concrete Pipe	
Conduit > 36″ diameter	0.012
Conduit ≤ 36″ diameter	0.014
Corrugated Metal Pipe	
Annular	0.021
Helical	0.018
Concrete-Lined Channels	
Smooth-troweled	0.015
District Simulated Stone	0.017
Reinforced Concrete Box	
Cast-in-Place	0.015
Pre-Cast	0.014
Earth Channels	
Smooth Geometric	0.030 – 0.035
Irregular or Natural	0.045 – 0.050

(Chow 1959, District 1989)

This was averaged with the basin roughness factor for the pervious portions of the sub-basin to determine a weighted average N. In accordance with the Alameda County Hydrology and Hydraulic Manual, a weighted N is used for a mixed rural and urban sub-basin when less than 80% rural.

TABLE A.13– Basin Roughness Factor for Urban Watersheds (Alameda County Hydrology and Hydraulic Manual)



EQUATION 13 BASIN LAG TIME

$$t_L = K \bullet N \left(\frac{L \bullet L_c}{\sqrt{S}} \right)^{0.38} \qquad (13)$$

where:

t_L = *lag time (hr)*

K = *distance factor*
for $L > 1.7$ *mi,* $K = 24$
for $L \leq 1.7$ *mi,* $K = 15.22 + 2.15L + 8.7/L$
if calculated value of K *is greater than* 40*, use* K=40

N = *basin roughness factor (from* ***Table 8****, rural watershed or* ***Equation 12****, urban watershed)*

L = *length of longest watercourse (mi) (see* ***Figure 4****)*

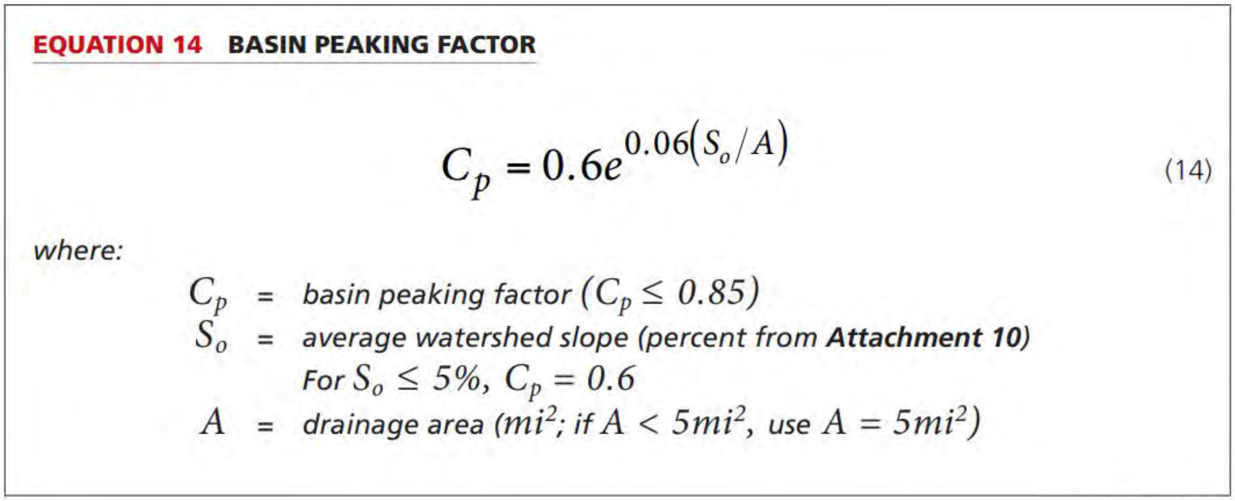
L_c = *length along longest watercourse measured from the point of concentration to a point opposite the watershed centroid (see* ***Figure 4****)*

S = *average stream slope (ft/mi from* ***Equation 11****)*

(District 1994)

As shown above, the basin lag time for each sub-basin in the pre- and post- development model was calculated using the parameters shown in Sections 3.4 and 3.5 of the report.

TABLE A.14– Basin Peaking Factor (Alameda County Hydrology and Hydraulic Manual)



EQUATION 14 BASIN PEAKING FACTOR

$$C_p = 0.6e^{0.06(S_o/A)} \qquad (14)$$

where:

C_p = *basin peaking factor* $(C_p \leq 0.85)$
S_o = *average watershed slope (percent from* ***Attachment 10****)*
For $S_o \leq 5\%,\ C_p = 0.6$
A = *drainage area* $(mi^2$*; if* $A < 5mi^2$*, use* $A = 5mi^2)$

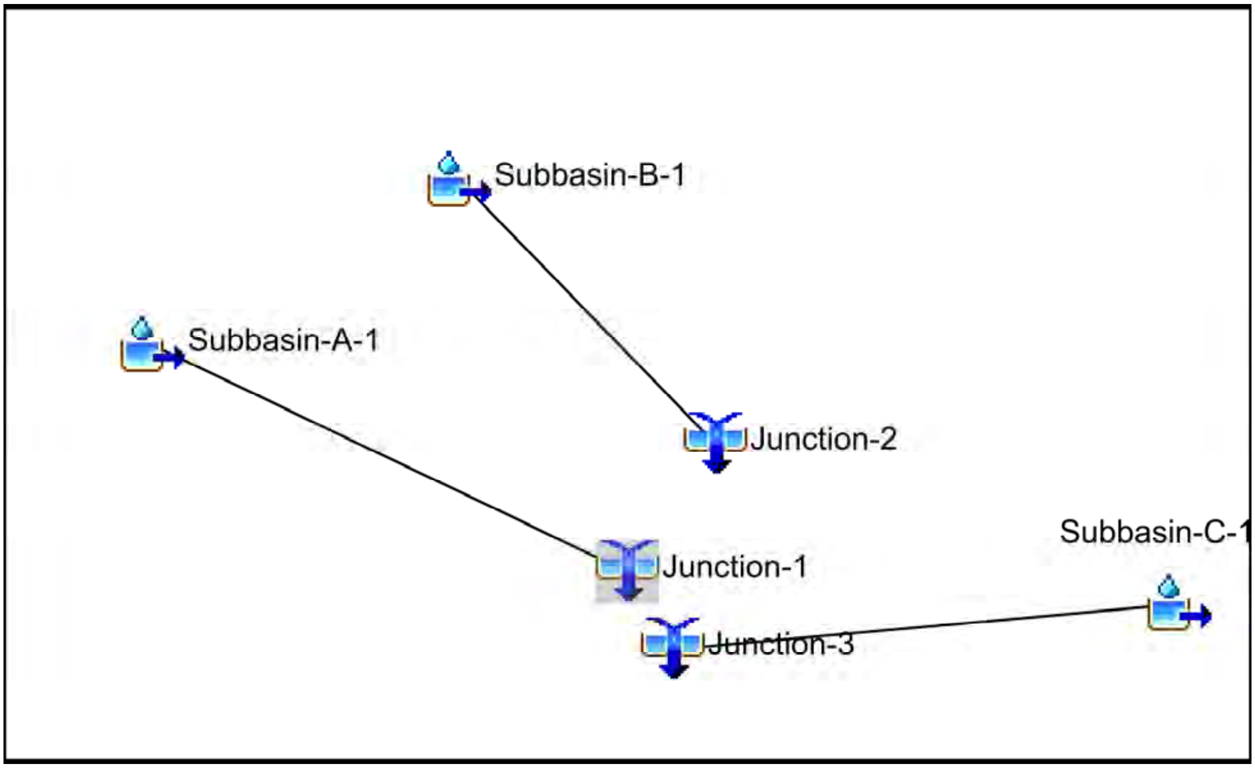
(District 1994)

The above equation was used to determine the basin peaking factor for each sub-basin of the pre- and post- development model.

APPENDIX B

HEC-HMS Output Tables

Pre-Development Basin Model


Subbasin-B-1
Subbasin-A-1
Junction-2
Subbasin-C-1
Junction-1
Junction-3

Pre-Development Model 10-Year Results

Project: Monte Vista Simulation Run: Run 1

Start of Run: 01Jan2000, 00:00 Basin Model

End of Run: 02Jan2000, 00:00 Meteorologi

Compute Time: 22Oct2019, 09:31:01 Control Spe

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Subbasin-A-1	0.12	56.2	01Jan2000, 12:45	7.2
Subbasin-B-1	0.17	62.5	01Jan2000, 13:00	7.7
Junction-2	0.17	62.5	01Jan2000, 13:00	7.7
Junction-1	0.12	56.2	01Jan2000, 12:45	7.2
Subbasin-C-1	0.01	2.9	01Jan2000, 12:30	0.5
Junction-3	0.01	2.9	01Jan2000, 12:30	0.5

Pre-Development Model 100-Year Results

Project: Monte Vista Simulation Run: Run 1

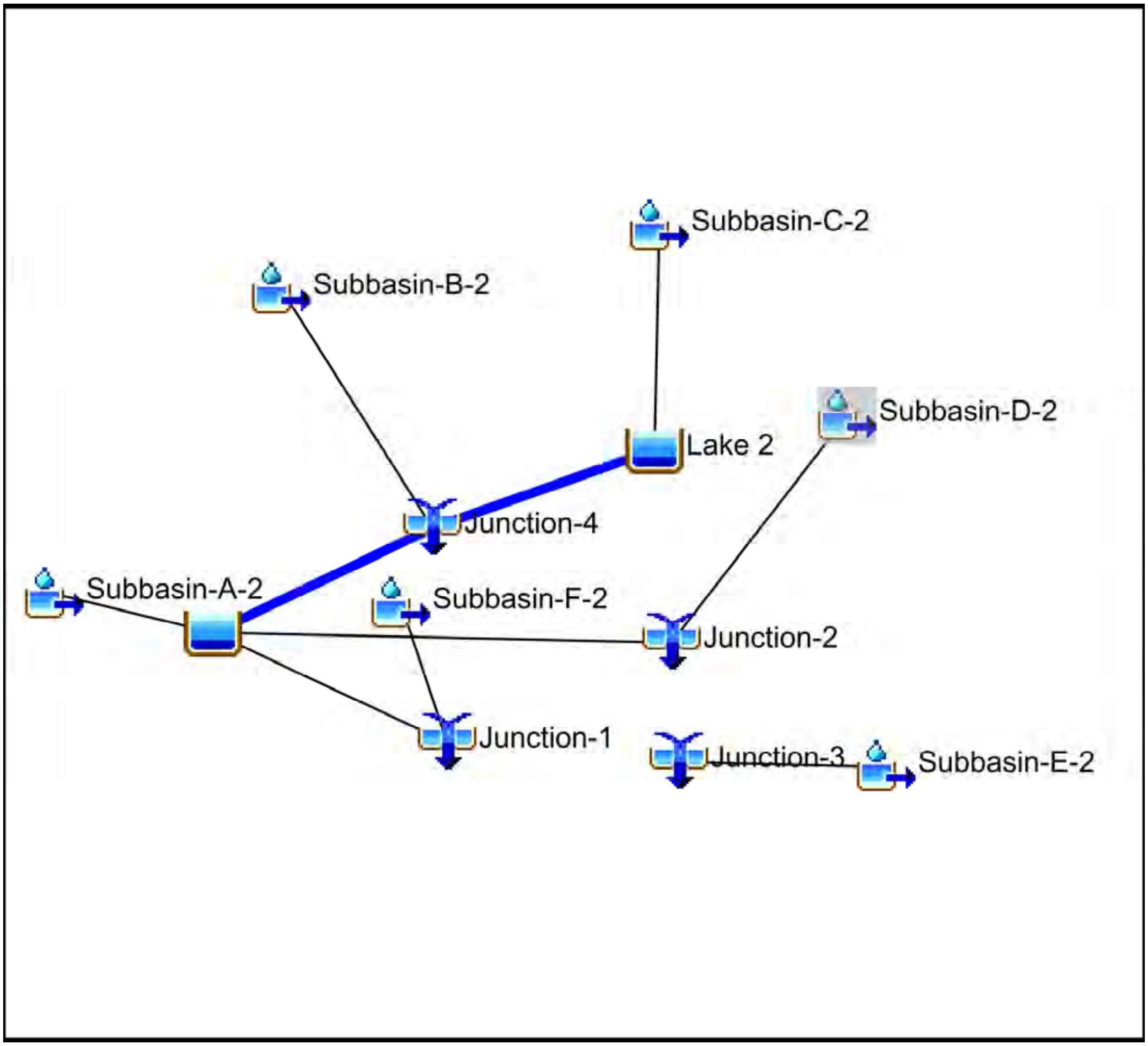
Start of Run: 01Jan2000, 00:00 Basin Model

End of Run: 02Jan2000, 00:00 Meteorologi

Compute Time: 22Oct2019, 09:44:54 Control Spe

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Subbasin-A-1	0.1247600	98.5	01Jan2000, 12:45	18.9
Subbasin-B-1	0.1737700	114.6	01Jan2000, 13:00	21.0
Junction-2	0.1737700	114.6	01Jan2000, 13:00	21.0
Junction-1	0.1247600	98.5	01Jan2000, 12:45	18.9
Subbasin-C-1	0.0059155	5.0	01Jan2000, 12:30	1.1
Junction-3	0.0059155	5.0	01Jan2000, 12:30	1.1

Post-Development Basin Model


Subbasin-C-2
Subbasin-B-2
Subbasin-D-2
Lake 2
Junction-4
Subbasin-A-2
Subbasin-F-2
Junction-2
Junction-1
Junction-3
Subbasin-E-2

Post-Development Model 10-Year Results

Project: Monte Vista Simulation Run: Run 1

Start of Run: 01Jan2000, 00:00 Basin Model

End of Run: 02Jan2000, 00:00 Meteorologi

Compute Time: 22Oct2019, 09:49:45 Control Spe

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Junction-2	0.05	24.6	01Jan2000, 12:30	3.3
Junction-4	0.20	82.5	01Jan2000, 12:45	11.9
Reach-2	0.20	81.6	01Jan2000, 12:45	11.9
Lake 2	0.12	49.6	01Jan2000, 12:45	8.3
Subbasin-D-2	0.05	24.6	01Jan2000, 12:30	3.3
Subbasin-C-2	0.12	49.6	01Jan2000, 12:45	8.3
Reach-1	0.12	48.8	01Jan2000, 12:45	8.3
Subbasin-B-2	0.08	34.4	01Jan2000, 12:30	3.7
Subbasin-A-2	0.00	2.1	01Jan2000, 12:30	0.2
Lake 1	0.26	107.0	01Jan2000, 12:45	15.5
Subbasin-F-2	0.04	19.4	01Jan2000, 12:30	2.9
Junction-1	0.30	125.4	01Jan2000, 12:45	18.4
Subbasin-E-2	0.01	2.9	01Jan2000, 12:30	0.6
Junction-3	0.01	2.9	01Jan2000, 12:30	0.6

Post-Development Model 100-Year Results

Project: Monte Vista Simulation Run: Run 1

Start of Run: 01Jan2000, 00:00 Basin Model

End of Run: 02Jan2000, 00:00 Meteorologic

Compute Time: 22Oct2019, 09:24:39 Control Spe

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Junction-2	0.0528344	43.3	01Jan2000, 12:30	7.9
Junction-4	0.2000452	147.1	01Jan2000, 12:45	29.8
Reach-2	0.2000452	145.9	01Jan2000, 12:45	29.8
Lake 2	0.1205300	87.4	01Jan2000, 12:45	20.1
Subbasin-D-2	0.0528344	43.3	01Jan2000, 12:30	7.9
Subbasin-C-2	0.1205300	87.4	01Jan2000, 12:45	20.1
Reach-1	0.1205300	86.2	01Jan2000, 12:45	20.1
Subbasin-B-2	0.0795152	61.8	01Jan2000, 12:30	9.7
Subbasin-A-2	0.0045724	3.7	01Jan2000, 12:30	0.6
Lake 1	0.2574520	190.7	01Jan2000, 12:45	38.3
Subbasin-F-2	0.0408717	33.8	01Jan2000, 12:30	6.7
Junction-1	0.2983237	222.9	01Jan2000, 12:45	45.0
Subbasin-E-2	0.0059155	5.0	01Jan2000, 12:30	1.2
Junction-3	0.0059155	5.0	01Jan2000, 12:30	1.2

ENGEO

Expect Excellence

www.engeo.com

APPENDIX H

NOISE

Noise Appendix

Long Term Noise Measurement Graphs for Site 1

Thursday (5/6/2021) is on the first two graphs.

Note: The 1st graph presents Leq, Lmax, L2 , and L8. The 2nd graph presents Leq and Lmax (again for reference) and L25 and L50.

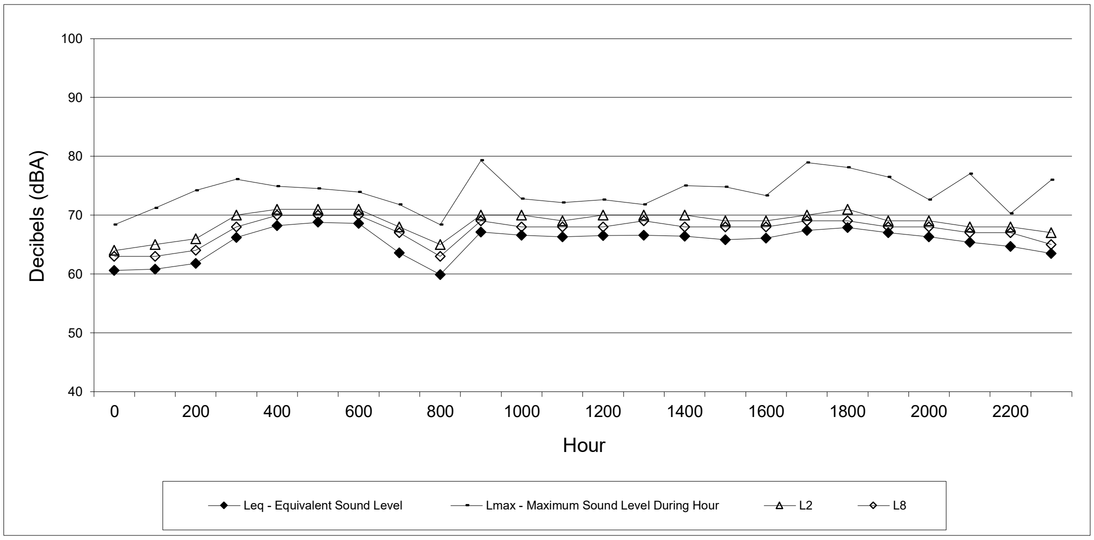
Friday (5/7/2021) is on the second two graphs

Note: The 1st graph presents Leq, Lmax, L2 , and L8. The 2nd graph presents Leq and Lmax (again for reference) and L25 and L50.

Saturday (5/8/2021) is on the last two graphs

Note: The 1st graph presents Leq, Lmax, L2 , and L8. The 2nd graph presents Leq and Lmax (again for reference) and L25 and L50.

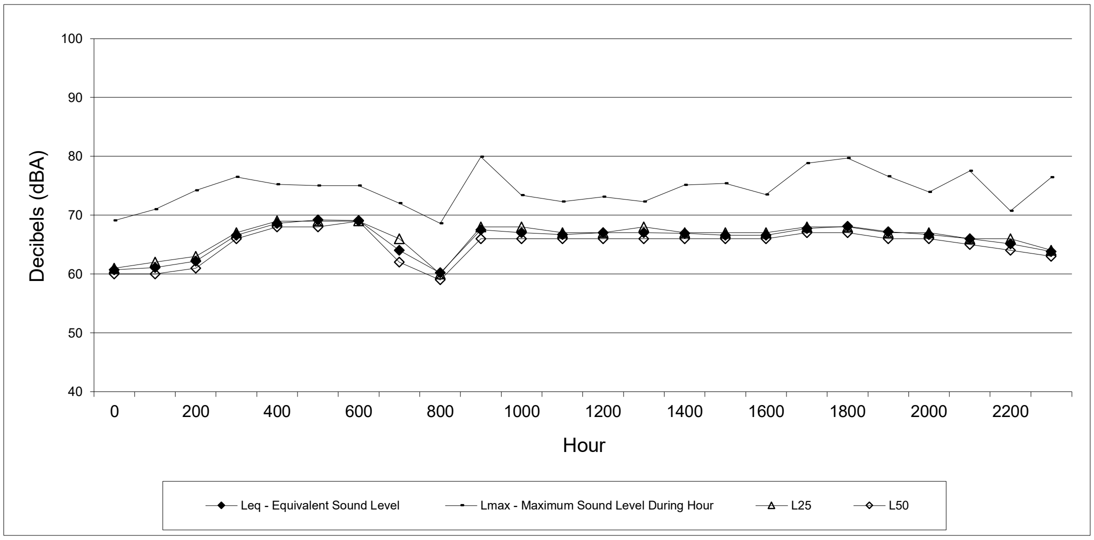
RCHGROUP
planning & environmental consulting



Site 1: (1/2) West area of Project site, approximately 350 feet north of Interstate 580.
Thursday May 6, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L2	L8
0	61	68	64	63
100	61	71	65	63
200	62	74	66	64
300	66	76	70	68
400	68	75	71	70
500	69	75	71	70
600	69	74	71	70
700	64	72	68	67
800	60	68	65	63
900	67	79	70	69
1000	67	73	70	68
1100	66	72	69	68
1200	67	73	70	68
1300	67	72	70	69
1400	66	75	70	68
1500	66	75	69	68
1600	66	73	69	68
1700	67	79	70	69
1800	68	78	71	69
1900	67	77	69	68
2000	66	73	69	68
2100	65	77	68	67
2200	65	70	68	67
2300	64	76	67	65

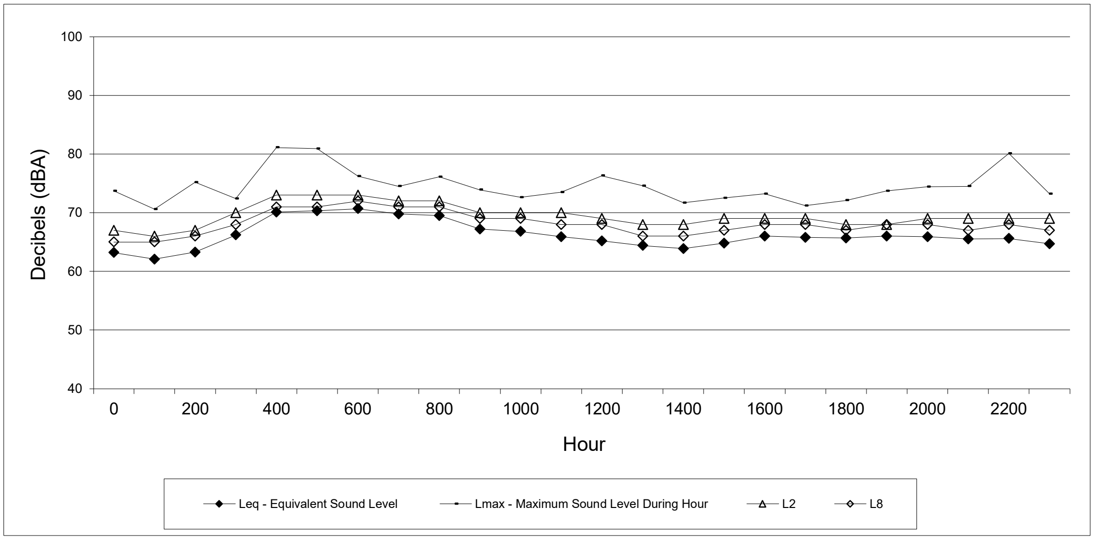
CNEL 73



Site 1: (2/2) West area of Project site, approximately 350 feet north of Interstate 580. Thursday May 6, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L25	L50
0	61	69	61	60
100	61	71	62	60
200	62	74	63	61
300	67	77	67	66
400	69	75	69	68
500	69	75	69	68
600	69	75	69	69
700	64	72	66	62
800	60	69	60	59
900	68	80	68	66
1000	67	73	68	66
1100	67	72	67	66
1200	67	73	67	66
1300	67	72	68	66
1400	67	75	67	66
1500	67	75	67	66
1600	67	74	67	66
1700	68	79	68	67
1800	68	80	68	67
1900	67	77	67	66
2000	67	74	67	66
2100	66	78	66	65
2200	65	71	66	64
2300	64	76	64	63

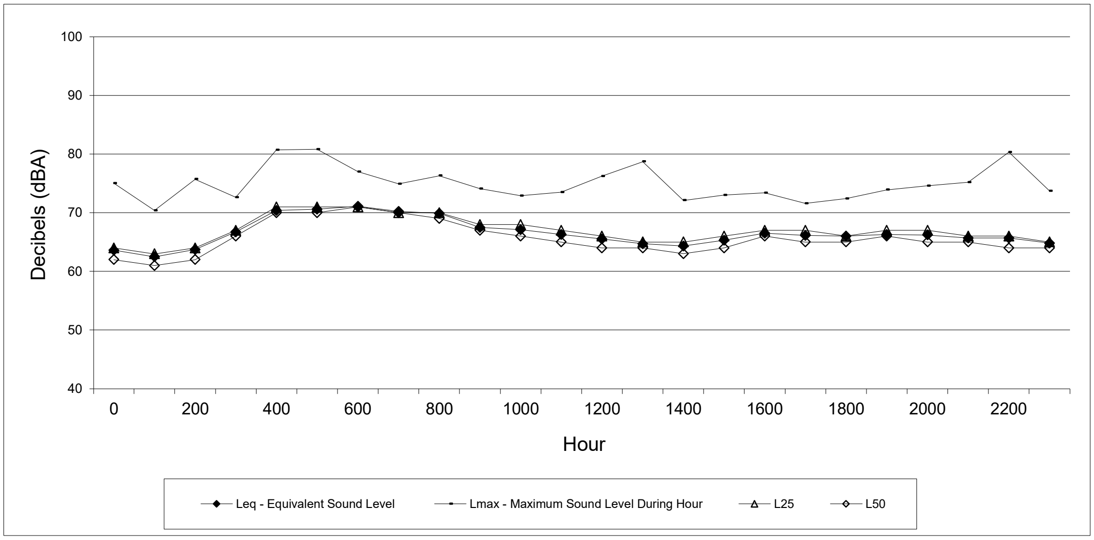
CNEL 73



Site 1: (1/2) West area of Project site, approximately 350 feet north of Interstate 580. Friday May 7, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L2	L8
0	63	74	67	65
100	62	71	66	65
200	63	75	67	66
300	66	72	70	68
400	70	81	73	71
500	70	81	73	71
600	71	76	73	72
700	70	75	72	71
800	70	76	72	71
900	67	74	70	69
1000	67	73	70	69
1100	66	74	70	68
1200	65	76	69	68
1300	64	75	68	66
1400	64	72	68	66
1500	65	73	69	67
1600	66	73	69	68
1700	66	71	69	68
1800	66	72	68	67
1900	66	74	68	68
2000	66	74	69	68
2100	66	75	69	67
2200	66	80	69	68
2300	65	73	69	67

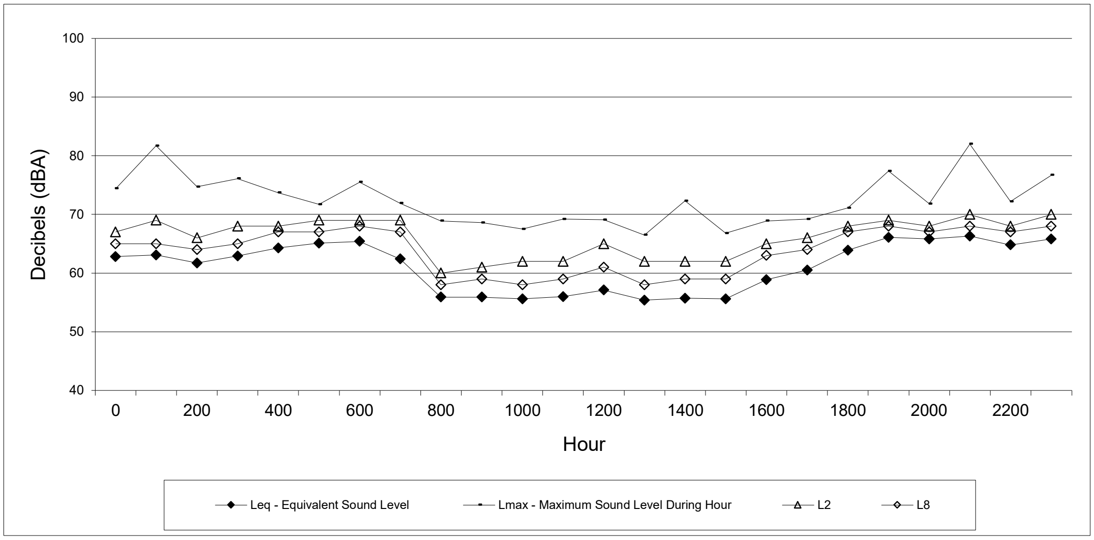
CNEL: 74



Site 1: (2/2) West area of Project site, approximately 350 feet north of Interstate 580. Friday May 7, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L25	L50
0	64	75	64	62
100	63	70	63	61
200	64	76	64	62
300	67	73	67	66
400	70	81	71	70
500	71	81	71	70
600	71	77	71	71
700	70	75	70	70
800	70	76	70	69
900	68	74	68	67
1000	67	73	68	66
1100	66	74	67	65
1200	66	76	66	64
1300	65	79	65	64
1400	64	72	65	63
1500	65	73	66	64
1600	67	73	67	66
1700	66	72	67	65
1800	66	72	66	65
1900	66	74	67	66
2000	66	75	67	65
2100	66	75	66	65
2200	66	80	66	64
2300	65	74	65	64

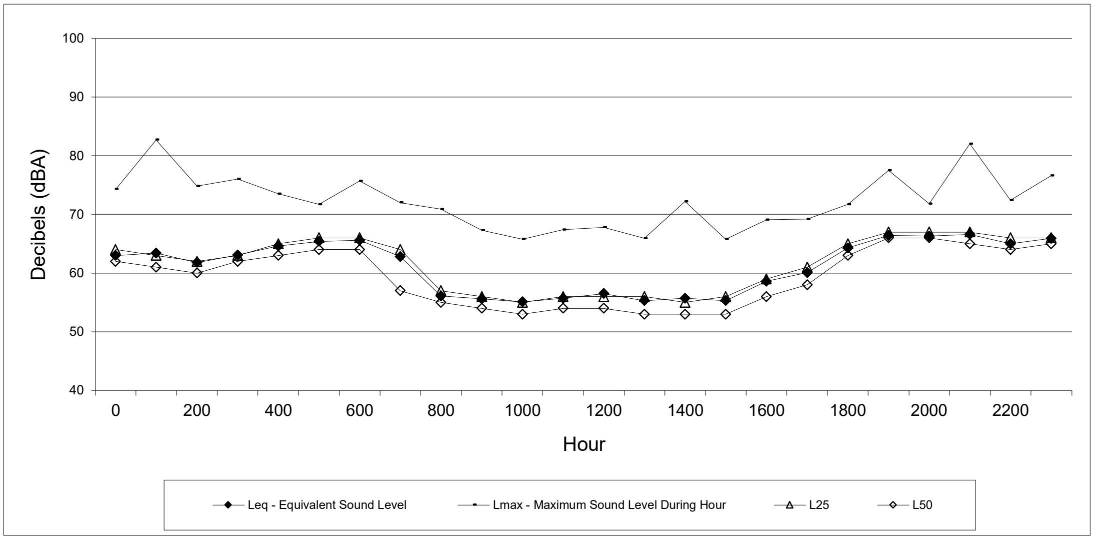
CNEL: 74



Site 1: (1/2) West area of Project site, approximately 350 feet north of Interstate 580. Saturday May 8, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L2	L8
0	63	74	67	65
100	63	82	69	65
200	62	75	66	64
300	63	76	68	65
400	64	74	68	67
500	65	72	69	67
600	65	76	69	68
700	62	72	69	67
800	56	69	60	58
900	56	69	61	59
1000	56	68	62	58
1100	56	69	62	59
1200	57	69	65	61
1300	55	67	62	58
1400	56	72	62	59
1500	56	67	62	59
1600	59	69	65	63
1700	61	69	66	64
1800	64	71	68	67
1900	66	77	69	68
2000	66	72	68	67
2100	66	82	70	68
2200	65	72	68	67
2300	66	77	70	68

CNEL: 71



Site 1: (2/2) West area of Project site, approximately 350 feet north of Interstate 580. Saturday May 8, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L25	L50
0	63	74	64	62
100	63	83	63	61
200	62	75	62	60
300	63	76	63	62
400	65	74	65	63
500	65	72	66	64
600	66	76	66	64
700	63	72	64	57
800	56	71	57	55
900	56	67	56	54
1000	55	66	55	53
1100	56	67	56	54
1200	57	68	56	54
1300	55	66	56	53
1400	56	72	55	53
1500	55	66	56	53
1600	59	69	59	56
1700	60	69	61	58
1800	64	72	65	63
1900	66	78	67	66
2000	66	72	67	66
2100	67	82	67	65
2200	65	72	66	64
2300	66	77	66	65

CNEL: 71

APPENDIX I

TRANSPORTATION – MONTE VISTA MEMORIAL GARDENS FOCUSED TRAFFIC STUDY

Monte Vista Memorial Gardens

Focused Traffic Study

Alameda County
May 20, 2021

Revised

PHA Transportation Consultants
2711 Stuart Street Berkeley, CA 94705
(510) 848-9233

Project Description

PHA Transportation Consultants has prepared this focused traffic analysis to evaluate the potential traffic impact for the proposed Monte Vista Memorial Gardens Project "Project". The site of the Project is in the unincorporated Alameda County at 3656 Las Colinas Road, Livermore. The proposed Project is a multi-cultural cemetery in the Tri-Valley Area. The Project would consist of a funeral home, interment areas, and associated services, including a crematory and mortuary. The cemetery ground consists of approximately 47-acre of land, about 24 acres of which would be used for various memorial monuments and burial gardens.

According to the Project proponent, the Project will include two buildings A and B on the site. Building a (two stories) will house the morgue, crematorium, sales offices, staff offices, garage, a receiving area, reception area, guest lounge, and a chapel with a capacity for 120-140 guests. Building B (one story) would have kitchens, storages, sanitary facilities, and table seating for 120-130 guests. The project is expected to employ up to 10 professional staff members working on the site daily. The Project is scheduled to open between 9:00 a.m. and 4:00 p.m. Mondays through Fridays during the initial stage. Once fully operational, the Project will open 7 days a week. Weekend funerals and burials will be available upon request with special arrangements. The Project will provide 92 parking spaces on the site (75 at the main parking lot, 17 in the secondary lot by the Jewish cemetery internment area, and 3 hearse spaces at the garage at Building A). Figure 1 shows the location of the Project site and its environs.

Adjacent Area Land Use

The Project site is currently vacant. The land use in the adjacent area of the site is mostly grazing land to the north and west. There are several residences and barn structures to the east of the Project site. There are also several horse barns located further east near the terminus of Las Colinas Road. South of the Project site is the freeway Interstate 580.

According to the City of Livermore development data, a Catholic High School was once proposed to be built to the northeast of the Project site. Access to the school will be via Las Colinas Road in conjunction with Las Positas Road south of I-580. Las Colinas Road was planned to be widened and improved as part of the school project mitigation. The school project was approved in mid-2000 and later received a five-year extension to build in 2015. So far, there are no activities with the project. Figure 1 on page 2 shows the approximate location of the proposed high school and the proposed widening and extension of Las Colinas Road. Should the high school project eventually materialize, Las Colinas Road will be widened and extend further north and would likely improve the access for the area and would have a positive impact on the Monte Vista Memorial Gardens.

Figure 1 Proposed Monte Vista Memorial Gardens Site and Environs

Project Site Access and Area Traffic Circulation

Direct access to the Project site will be via an unnamed road off Las Colinas Road in conjunction with Las Positas Road. Regional access to the site is provided via I-580 in conjunction with North Livermore Avenue in the west and First Street in the east. The unnamed access road off Las Colinas Road is not paved and is currently blocked off.

Las Colinas Road is a two-way local street providing access to several residences and barns east of the project site and the horse stables at the eastern terminus of the road. The entire length of the road is about 1,500 feet long measuring from the eastern terminus to its connection at Las Positas Road over the freeway. The Road measures about 26 feet wide with one travel lane in each direction. The road is marked with solid double yellow lines indicating no passing. The Current (February 2021) daily traffic volume is 68 vehicles per day (VPD) on weekdays. The Peak-hour volumes are less than 15 VPD for both AM and PM. There are no posted speed limit signs observed.

Las Positas Road is a collector road with a varying width between two and four-lane connecting North Livermore Avenue in the west and Frist Street in the east. It has two travel lanes in each direction west of North Mines Road but transitions to a two-lane road with one lane in each direction in the east near the Las Colinas Road Bridge over I-580. It then transitions back to four-lane as it approaches the shopping area near Frist Street. The current daily traffic volume on a weekday is 12,899 vehicles per day east of North Livermore Avenue and 8,534 west of First Street. The peak-hour volume on Las Positas Road near Las Colinas Road was about 290 in morning and 520 in the afternoon. The posted speed limit on Las Positas Road is 40 mph based on the City of Livermore speed limit map.

North Livermore Avenue is a four-lane arterial road south of I-580. It runs in a north-south orientation providing access to and from the freeway. There are additional turn lanes provided at major intersections along its length. The daily traffic volume is about 30,975 vehicle trips per day south of the interchange based on a 2016 City of Livermore traffic count. The speed limit for North Livermore Avenue is 40 mph per the City of Livermore speed limit classification map.

First Street is a six-lane north-south arterial road south of I-580 near the Project site. It provides access to and from the freeway. There are also additional turn lanes provided at intersections along its length. The daily volume is about 36,590 vehicles daily south of the I-580 interchange. The speed limit for Frist Street is 40 mph based on the City's speed limit classification.

Interstate -580 is a freeway running in an east-west orientation. There are four travel lanes in each direction with additional HOV lanes in the vicinity of the proposed Project site. It has interchanges at N. Livermore Avenue and First Street. The segment near the project site vicinity carries about 193,000 vehicles per day near North First Street according to a 2019 traffic count conducted by Caltrans.

Study Area Traffic Safety Review

Traffic control devices on Las Colinas Road consist of a stop sign at the approach to Las Positas Road from Las Colinas Road, a speed advisory sign 15 mph near the curve, and a double yellow line marking at the center of the road. Traffic control devices on Las Positas Road consist of traffic signals at North Livermore Avenue, North Mines Road, and Frist Street. Traffic signals are also provided at major accesses to shopping areas along the road with turn lanes. The posted speed limit on Las Positas Road is 45 mph. Several segments of the Las Positas Road near North Livermore Avenue in the west and First Street in the east are divided with a raised landscaped median. There is a left-turn pocket at the eastbound Las Positas Road to northbound Las Colinas Road, accommodating left-turn traffic from Las Positas Road onto Las Colinas Road.

According to data obtained from Traffic Injuries and Mapping System (TIMS), a traffic collision records center located at UC Berkeley indicated there were 6 reported collisions along the segment of Las Positas Road between North Livermore Avenue and First Street between 2017 and 2019 (2000 data was not yet available). This represents an average of 2 collisions a year during the three years. There are no reported collisions on Las Colinas Road during the same three-year period. As such, Las Colinas Road and Las Positas Road do not appear to be collision hot spots. TIMS obtained traffic collision records from SWITRS, a Statewide Integrated Traffic Records System database that contains all collisions that were reported to CHP from local and government agencies.

Project Trip Generation Estimates

The Project has a burial ground about 24 acres and is expected to employ 10 professional staff members. Based on acreage -base trip generation rates published in the ITE Trip Generation Manual, the site is expected to generate 108 daily trips (one-way trips). ITE Trip Generation Manual is published by the Institute of Transportation Engineers and has a database containing trip generation rates and characteristics at various land-use categories and sites nationwide. Trip generation surveys were conducted frequently to update the manual's database.

As discussed previously, the Project will operate from 9 a.m. to 4 p.m. Mondays through Fridays during the initial stage but would open 7 days a week eventually. Since the facility operates between 9 a.m. and 4 p.m., the traffic related to the Project would mostly employee trips traveling to and from the site and is not expected to have significant impacts on peak hour traffic operations in the area.

Table 1 shows the summary of the trip generation estimates based on the number of employees and the size of the burial ground, plus estimated visitors and deliveries.

Table 1 "Project" Trip Generation Estimates
Monte Vista Memorial Gardens – Alameda County

Monte Vista Memorial Gardens	**Units**	**AM Peak- Hour Trips (7-9 a.m.)**			**PM Peak-Hour Trips (4-6 p.m.)**			**Average Daily Trips (24- hour)**		
		In	Out	Total	In	Out	Total	In	Out	Total
Acres (ITE 566)	24	3	1	4	7	14	21	54	54	108
Employees	10	10	0	10	0	10	10	10	10	20
Visitors	30	2	1	3	1	2	3	30	30	60
Deliveries	10	0	0	0	0	0	0	10	10	20
Total		**12**	**1**	**13**	**1**	**12**	**13**	**50**	**50**	**100**

ITE Trip Generation Manual (9th Edition) Rates for the cemetery (ITE land-use code 566):
Employee Based (PHA Estimates)
Daily Rate 2/employee, 50% in, 50% out,
AM Peak Hour Rate 1/employee, 100% in,0% out,
PM Peak Hour Rate, 1/employee, 0% in, 100% out
Acreage Based (ITE)
Daily Rate 4.73/acre, 50% in, 50% out.
AM Peak Hour Rate 0.17/acre, 70% in, 30% out.
PM Peak Hour Rates 0.84/acre, 33% in, 67% out.
Deliveries, Visitors (PHA Estimates)
UPS, FedEx, Amazon, USPS, Newspaper, assumed each generates two one-way trips.

According to data provided by the Memorial Gardens official, when the cemetery is fully operational (by the 10th year), the cemetery will likely have 2.8 burials and memorial services per day. The average daily round trip is 44 or 88 one-way trips. This assumes the average of 2.8 burials per day attended by an average of 40 persons each at a 2.5 person vehicle occupancy rate. The trip estimates shown in Table 1 are based entirely on the number of employees, visitors, and deliveries. The ITE trip generation estimates are provided for comparison purposes.

Potential Project Traffic Impact

As indicated in the above trip generation analysis, the proposed Monte Vista Memorial Gardens will add about 100 one-way trips daily, including 4 a.m. peak and 21 p.m. peak hour trips respectively to the area. These are estimates were made based on the size (acreage) of the number of employees working at the site. Table 2 summarizes Project added traffic on the adjacent streets. The proposed project would not warrant signalization at the Las Colinas and Las Positas Road intersection based on the "Peak Hour Volume Signal Warrant" base on traffic volumes and intersection configuration. A graphic showing the "Peak Hour Volume" warrant analysis is attached.

Table 2 "Project" Traffic Impact
Monte Vista Memorial Gardens

	Las Colinas Rd		Las Positas Rd (West of Las Colinas Rd)		Las Positas Rd (East of Las Colinas Rd)	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
Current Daily Vol.	68	48	12,899	10,110	8534	6795
Project Added Trips	100	100.	60	60	40	40
Project Impact (%)	147%	208%.	0.47%	0.59%.	0.47%	0.59%.

Current Volumes represent traffic counts conducted in the field in early February 2021 amid COVID 19.
Weekday volume represents the average of Thursday and Friday counts
Weekend volume represents the average of Saturday and Sunday counts
Site traffic directional distribution assumption: 60% travel to and from the west direction, 40% to and from the east.
Burial and funeral services occur Mondays thru Fridays. Weekend services can be arranged upon request with added fees. For the purpose of the study. Weekend trips are assumed to be the same as weekday trips.

Project Site Plan Review

The site currently is vacant and the access road to the site is blocked off at Las Colinas Road. The access road is not paved and is fenced on both sides of the road. According to the preliminary site plan, there will be two buildings A and B on the site. Building A (two-story) will house the morgue, crematorium, sales offices, staff offices, garage, a receiving area, reception area, guest lounge, and a chapel with a capacity for 120-140 guests. Building B (one-story) would have kitchens, storages, sanitary facilities, and table seating for 120-130 guests. The site plan also shows two parking lots, the main lot at the southeast corner of the site has 75 stalls, and a small lot at the northeastern corner of the site has 17 parking stalls. The project proponent also indicated there is a parking garage with 3 spaces for limos at building A.

The preliminary site plan does not show parking stall dimensions, the dedicated number of handicapped parking spaces, and the drive aisle widths. These dimensions should be labeled when finalizing the site plan following the design standards of the County. Figure 2 shows the preliminary project site plan.

Parking Requirements and Needs

The Alameda County Zoning Code does not have a specific parking requirement for cemeteries. However, it does have parking requirements (1 space for every 4 fixed seats) for the auditorium, church, mortuary, chapel, and theaters. Assuming a 140-seat chapel and a 130-seat table seating for guests at Building B the total parking required for the Project is 68+/- spaces (140 seats +130 seats/4). With a total of 75 spaces at the main lot and 72 spaces at the secondary lot, the Project would satisfy the County's parking requirement.

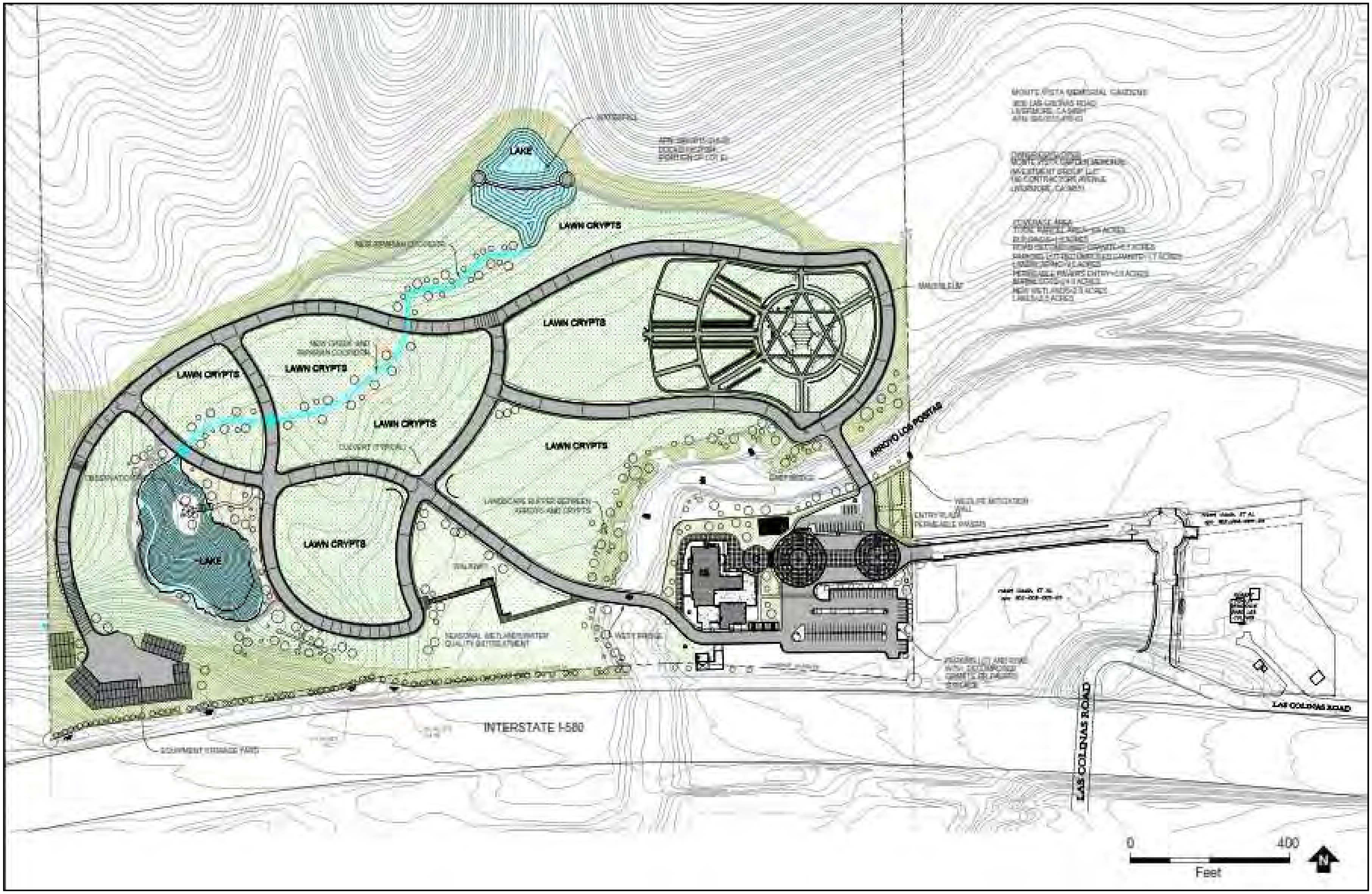


Figure 2 Preliminary Project Site Plan- Source: RCH Group (ENGEO 2020)

Internal Circulation

The preliminary site plan appears to provide adequate internal circulation. The access road to the Project site is not paved and is more than 30 feet wide based on measurements from aerials. Minimum width of 24 feet or wider should be considered to provide for two-way vehicle travel. The turning radius at the approach/departure at Las Colinas Road should be designed to accommodate hearses and other service and delivery trucks.

No dimensions are showing on the internal circulation roads that provided access to burial grounds. A 24-foot wide for the internal circulation roads is desired. These dimensions would provide for funeral possessions and visitors who drive and must park parallel along the roadside and at the same time accommodate other vehicles passing through.

The internal circulation road should be designed to provide one-way forward travel with directional signs and arrows to direct visitors.

Access Driveway Sight Distance

The access driveway to the Project site is located along a curve at Las Colinas Road. Assuming a 25 mph speed limit for Las Colinas Road, the minimum sight distance requirement is 120 feet according to roadway design guidelines. Measurements conducted based on aerials indicated the stopping distance is 200 feet and 125 feet from the east and the south (from the bridge) respectively and would satisfy the minimum sight distance requirement. Sight distance (stopping sight distance) is the length of the roadway ahead that is visible to the driver. The available sight distance on a roadway should be sufficiently long to enable a vehicle traveling at or near the speed limit to stop before reaching a stationary object in its path.

Conclusion

The project is expected to generate 100 trips (Table 1) daily and is not expected to create significant impacts on the peak-hour traffic operation on adjacent streets since the Project would open between 9 a.m. and 4.pm. The Project would provide 92 parking spaces on the site and will satisfy County parking requirements. The site access road at Las Colinas Road will have adequate stopping sight distances in both directions. Based on the review of the collision records, Las Positas Road and Las Colinas Road do not appear to be collision hot spots. The proposed project would not warrant signalization at the Las Colinas and Las Positas Road intersection based on the "Peak Hour Volume Signal Warrant" base on traffic volumes and intersection configuration. While there are no activities taking place currently with the approved high school project to the northeast of the Project site, it is worthwhile to monitor development activities in the vicinity since the area is mostly vacant and development may occur that could lead to realignment, widening, and extending of Las Colinas Road, and could have an impact on the proposed cemetery access and operation.

Peak Hour Volume Warrant Analysis

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

● AM volume Major Street 289 (Las Positas), Minor Street 20 (Las Colinas)
○ PM volume Major Street 518 (Las Positas), Minor Street 20 (Las Colinas)