Appendix A

Notice of Preparation

ALAMEDA COUNTY
Community Development Agency

NOTICE OF PREPARATION FOR AN ENVIRONMENTAL IMPACT REPORT

PROJECT NAME:	**THE OUTDOOR PROJECT CAMP, PLN2020-00093**
PROJECT LOCATION:	**17015 CULL CANYON ROAD, CASTRO VALLEY CA APN 85-1200-1-16**
PROJECT APPLICANT:	**THE MOSAIC PROJECT, 478 Santa Clara Avenue, Suite 200, Oakland, CA 94610**

The County of Alameda, Planning Department, (County), as lead agency, is issuing this Notice of Preparation (NOP) to advise other agencies and the public that the County will be preparing an Environmental Impact Report (EIR) for the Outdoor Project Camp (herein referred to as the "proposed project") within 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 NOP 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.

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 studied, the impacts to be evaluated and the evaluation methods to be used. Comments pertaining to alternatives 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.

All materials related to this project can be found on the Alameda County Planning Website: **www.acgov.org/cda/planning/landuseprojects/currentprojects.htm.** Written comments on the scope of the Outdoor Project Camp 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 December 19, 2021. Comments on the project scope should be sent via email with the subject line "The Outdoor Project Camp EIR" to: sonia.urzua@acgov.org or by regular mail to:

Alameda County Planning Department
ATTN: Sonia Urzua, Senior Planner
224 W. Winton Avenue, Suite 111
Hayward, CA 94544

In addition, comments can be made during a Scoping Meeting to be held on Tuesday, November 30 at 10:30am. Due to the COVID-19 pandemic, the scoping meeting will be held via Zoom Webinar will be The Webinar information is below:

https://us06web.zoom.us/j/89938939951

Or by Phone **[1 (669) 900 9128 or 1 (346) 248 7799]** Webinar ID: **[899 3893 9951]**

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.

PROJECT LOCATION AND EXISTING USES:

The proposed project is located on an approximately 37-acre site at 17015 Cull Canyon Road near the unincorporated community of Castro Valley, in Alameda County, California, approximately three miles north of Interstate 580 (I- 580). The site is identified by the Alameda County Assessor's Office as Assessor's Parcel Number (APN) 85-1200-1-16. The site is bounded by Cull Canyon Road to the east, Twining Vine Winery to the north, Cull Canyon Regional Recreational Area to the west, and residential property to the south. The project site is accessible via Cull Canyon Road from the east by Interstate-680 at the Crow Canyon Road exit and from the west by Interstate 580 at the Grove Way exit.

The project site is currently developed and heavily vegetated. On the eastern portion of the site, Cull Creek runs north to south through the property, generally parallel and west of Cull Canyon Road. Existing structures on the property include a 1,200-square-foot mobile home, a 970-square-foot barn, and a paved parking area located adjacent to Cull Canyon Road. An existing 14-foot-wide bridge spans Cull Canyon Creek and leads to a developed area that includes a large 7,500-square-foot garage building, a paved patio, and driveways with drainage swales. There are large, semi-flat, open areas adjacent to the garage. The remainder of the site consists of steep bay and oak woodlands on an east-facing slope, with minor drainages.

PROPOSED PROJECT:

This proposed project would provide a camping facility for The Mosaic Project's primary program, its Outdoor Project. The Mosaic Project's mission with The Outdoor Project Camp is to work toward a peaceful future by uniting children of diverse backgrounds, providing them with community building skills, and empowering them to become peacemakers through a multi-day nature-oriented experience. The proposed project would consist of demolishing an existing 7,500-square-foot garage, improving trails and miscellaneous dirt or gravel roads, and constructing components critical to the proposed project's mission. These components include twelve 400-square-foot camping cabins; a two-story, 40-foot-high, 8,500-square-foot central meeting and dining hall; a 1,025-square-foot restroom/shower building; a two-story 2,600-square-foot staff housing building; use of an existing 1,200-square-foot caretaker's unit; and sewer infrastructure that includes an on-site septic tank with a leach field dispersal system.

The proposed project, including all recreational facilities and caretaker residences, would encompass an area totaling 2 acres. Water for the proposed project would be pumped from on-site groundwater wells to an above ground treatment system for contaminant removal. A detailed Project Description is included as Attachment A.

KEY ENVIRONMENTAL ISSUES:

Key issues that will be evaluated in the EIR include:

- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Public Services (Fire Protection and Police Services)
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

Other CEQA topics scoped out of the EIR include:

- Aesthetics
- Energy
- Mineral Resources
- Population and Housing
- Recreation

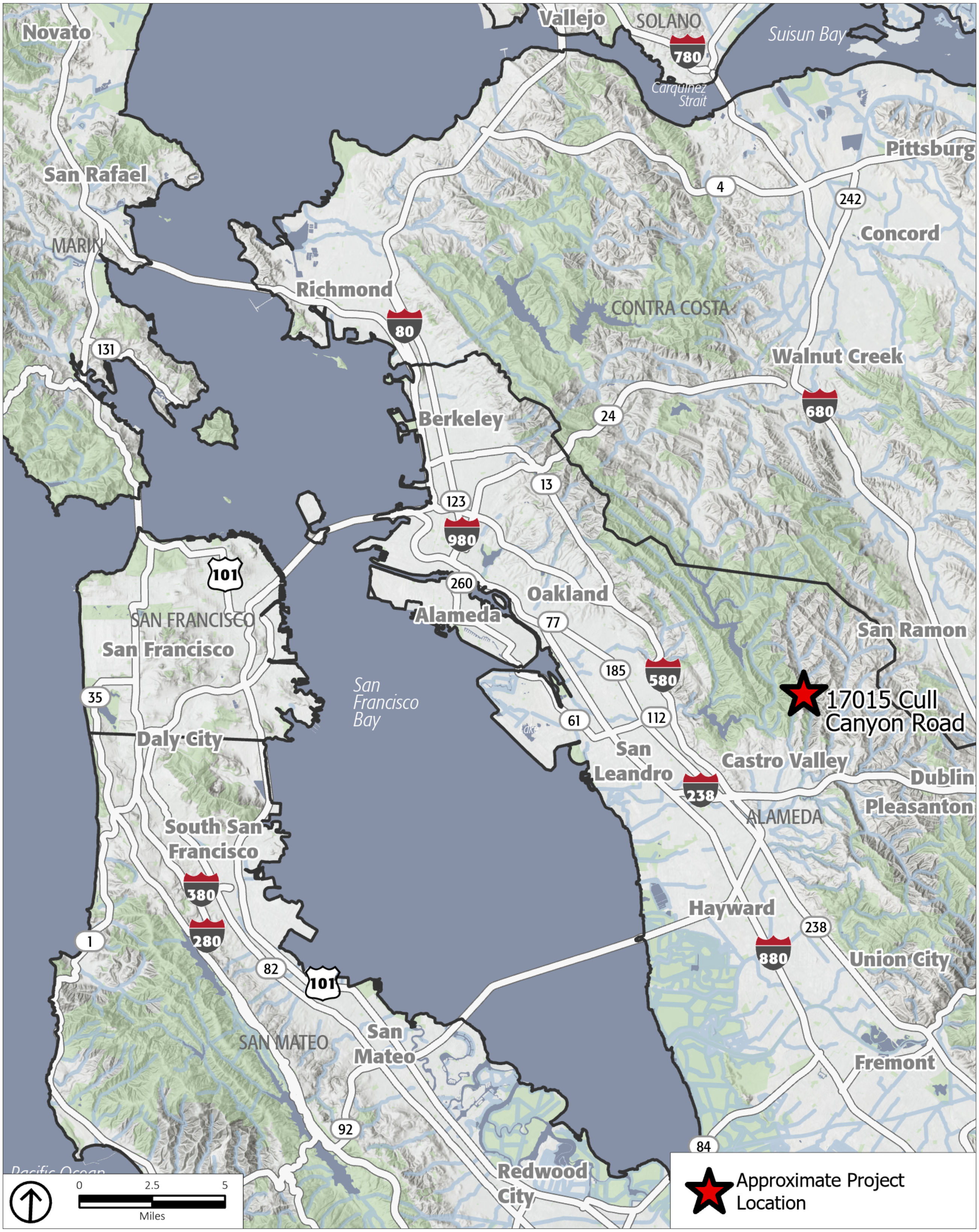
These topics were addressed separately in an Initial Study Document, included as Attachment B.

ATTACHMENTS:

Figure 1 Regional Location
Figure 2 Project Site Plan

Attachment A: Project Description
Attachment B: Initial Study

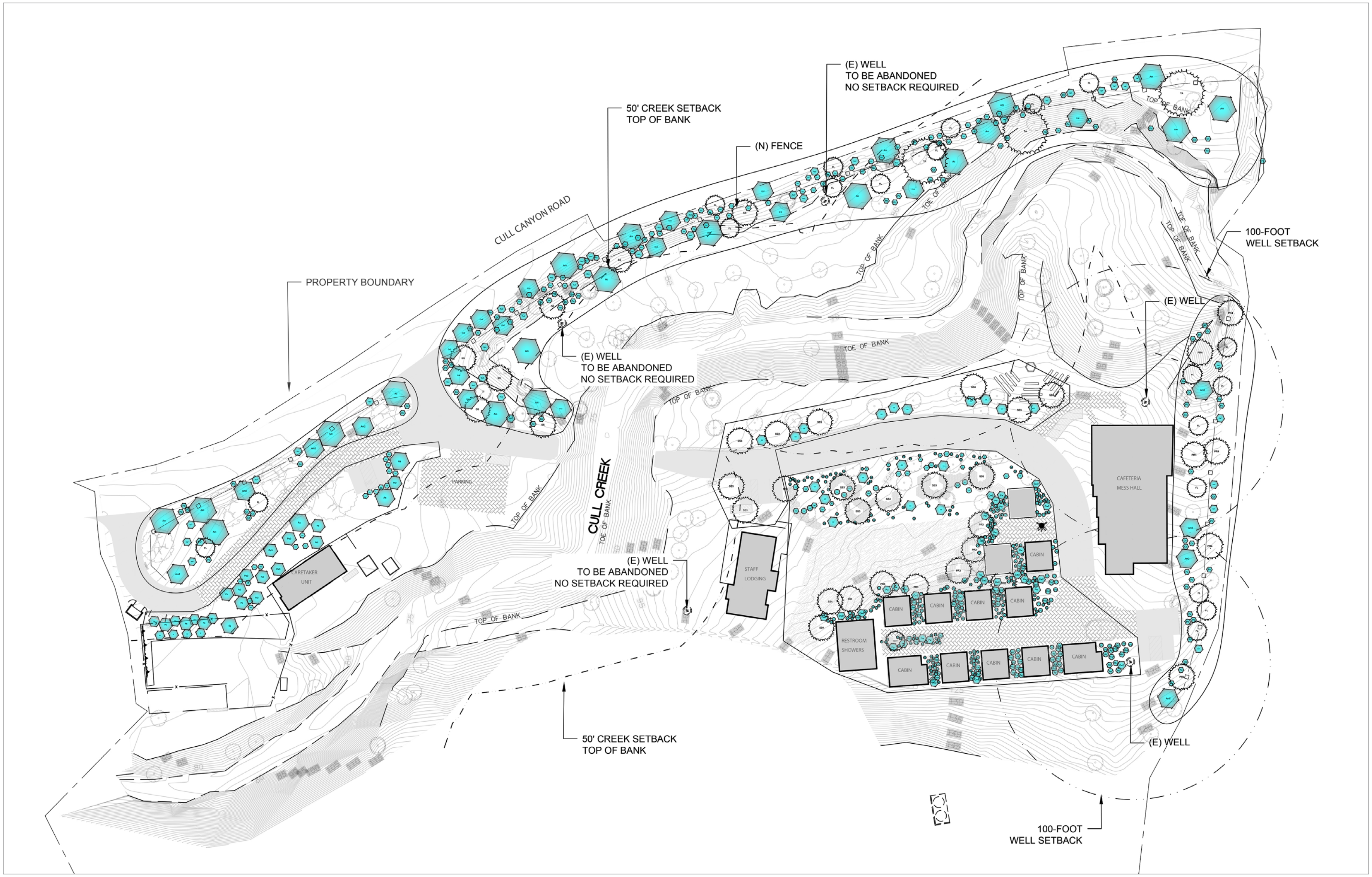
NOTICE OF PREPARATION



Source: Esri, 2021; PlaceWorks, 2021.

Figure 1
Regional Location

NOTICE OF PREPARATION



Source: Watershed Progressive, 2020.

Figure 2
Proposed Project Site Plan

Attachment A: Project Description

The Mosaic Project, the project applicant, proposes The Outdoor Project Camp (referred to herein as the "proposed project"), a camping facility in unincorporated Alameda County. This facility would provide a site in the San Francisco Bay Area for The Mosaic Project's primary program, its Outdoor Project. The Mosaic Project's mission with The Outdoor Project Camp is to work toward a peaceful future by uniting children of diverse backgrounds, providing them with community building skills, and empowering them to become peacemakers through a multi-day nature-oriented experience. The proposed project would consist of demolishing an existing 7,500-square-foot garage, improving an existing bridge to meet fire code access requirements, improving trails and miscellaneous dirt or gravel roads, and constructing components critical to the proposed project's mission. These components include twelve 400-square-foot camping cabins; a two-story, 40-foot-high, 8,500-square-foot central meeting and dining hall; a 1,025-square-foot restroom/shower building; a two-story 2,600-square-foot staff housing building; a 1,200-square-foot caretaker's unit; and sewer infrastructure that includes an on-site septic tank with a leach field dispersal system. The proposed project, including all recreational facilities and caretaker residences, would encompass an area totaling 2 acres. Water for the proposed project would be pumped from on-site groundwater wells to an above ground treatment system for contaminant removal. Two on-site wells would remain in use: one as the primary water well, and the other as the backup well. These two wells would be located nearby the cabins and kitchen, as shown on Figure 3-6, Site Plan.

This chapter provides a detailed description of the proposed project, including the location, setting, site characteristics, project objectives, principal features, and approximate construction phasing, as well as required permits and approvals. These activities and approvals collectively constitute a "project" under the California Environmental Quality Act (CEQA).

3.1 PROJECT SITE LOCATION AND CHARACTERISTICS

The proposed project is located on a 37-acre site at 17015 Cull Canyon Road near the unincorporated community of Castro Valley, in Alameda County, California, approximately three miles north of Interstate 580 (I- 580). The site is identified by the Alameda County Assessor's Office as Assessor's Parcel Number (APN) 085-1200-01-16.[1] The site is bounded by Cull Canyon Road to the east, Twining Vine Winery to the north, Cull Canyon Regional Recreational Area to the west, and residential property to the south. Figure 3-1, Regional Location, shows the location of the project site.

Views from Cull Canyon Road towards the project site are generally obstructed by vegetation and existing trees along the roadway. The property line extends to the edge of the two-lane roadway comprising Cull Canyon Road with minimal shoulder or bike and pedestrian path between the roadway and property. The

[1] Alameda County, 2020, Assessor's Parcel Number, available online at http://gis.acgov.org/Html5Viewer/index.html?viewer=parcel_viewer, accessed January 20, 2021.

area of the site with existing structures is mostly flat and generally bisected by a bridge over Cull Canyon Creek. Medium to large trees, ranging from 30 to 100 years old, are scattered throughout the property, interspersed with areas dominated by grasses or bare ground. Tree species in this area include Sycamore, black walnut, various Oak species, and English walnut, among others. In addition, several redwoods are located near the proposed location of proposed leach fields. An existing internal concrete roadway is located on the project site, leading from the entrance of the property, over the bridge, and to the existing concrete building. Trees line the roadway on the Cull Canyon side. The internal roadway meanders at a slight upward slope after the bridge until it reaches the concrete building. Behind the concrete building, the property begins a sharp inclined slope estimated at 20 to 30 percent. This area includes a proposed multi-use trail that will ultimately connect to Juan Bautista De Anza Trail.

Existing structures on the 37-acre parcel include a residential home, a barn, a bridge, several wells, a septic system, an outdoor barbeque and spit, and a large concrete building with a slab foundation. Cull Creek runs through the eastern portion of the parcel. Buildable land on the parcel consists of approximately 7.8 acres.

3.1.1 REGIONAL LOCATION AND ACCESS

As shown on Figure 3-1, Regional Location, the proposed project is located in unincorporated Alameda County. The project site is accessible via Cull Canyon Road from the east by Interstate-680 at the Crow Canyon Road exit and from the west by Interstate 580 at the Grove Way exit. The site is not served by public transportation.

3.1.2 SURROUNDING LAND USES

Figure 3-2, Local Context, shows the immediate vicinity of the project site. As shown in this figure the project site is within a largely undeveloped area. Residential land uses are located east, south, and west of the project site; the Twining Vine Winery and Event Center is located to the north; and East Bay Regional Parkland is adjacent to the residential properties located along the western boundary. Within the East Bay Regional Parkland, and bordering the project site to the west, is the Juan Bautista de Anza Historic Trail that stretches from the San Francisco Bay Area to Nogales, Arizona.[2]

3.1.3 EXISTING SITE CONDITIONS

Elevation of the project site ranges from 500 to 900 feet above mean sea level, and slopes gradually down to the east towards Cull Creek.

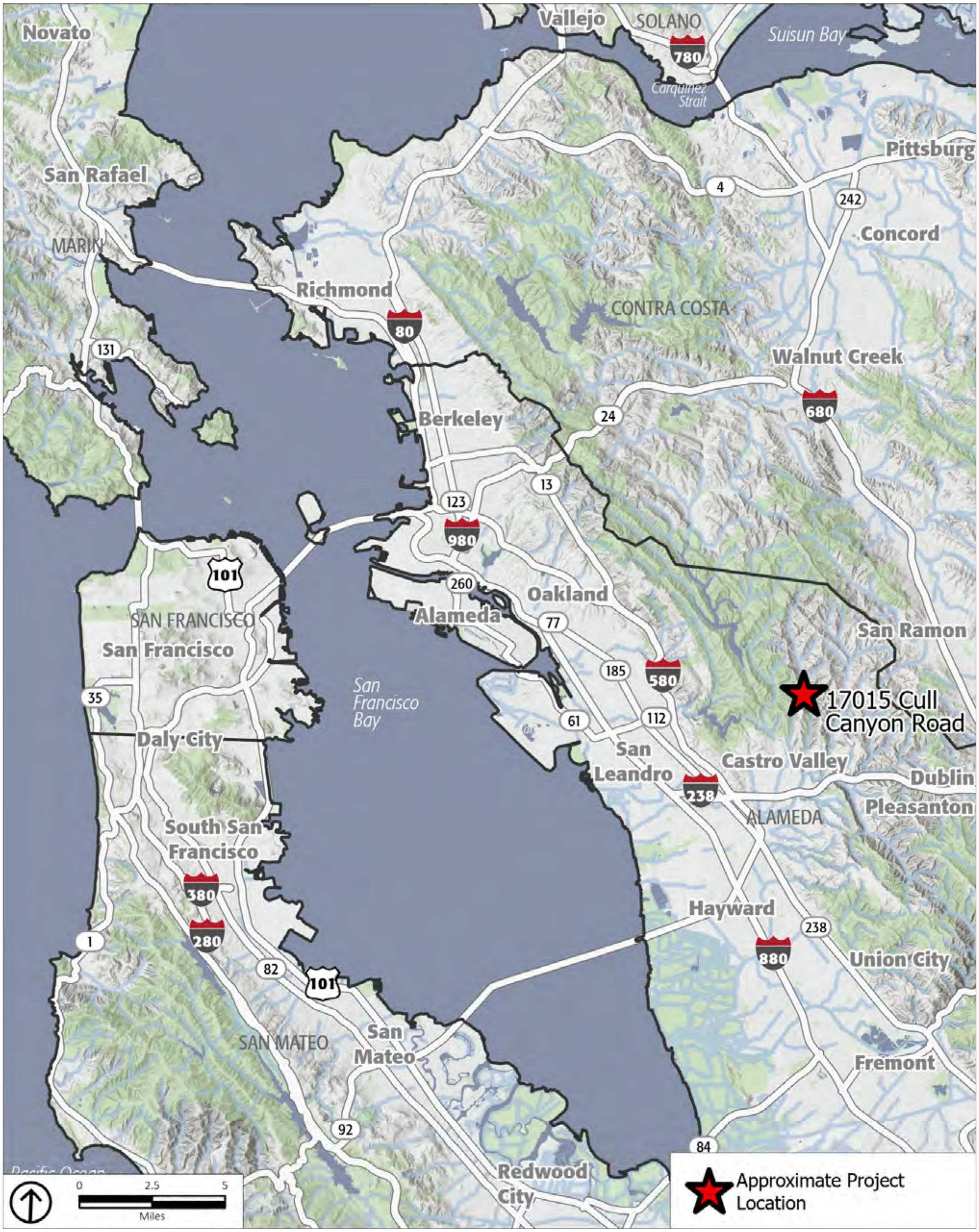
The project site is developed and heavily vegetated. On the eastern portion of the site, Cull Creek runs north to south through the property, generally parallel and west of Cull Canyon Road. Existing structures on the property include a 1,200-square-foot mobile home, a 970-square-foot barn, and a paved parking area located adjacent to Cull Canyon Road. An existing 14-foot-wide bridge spans Cull Canyon Creek and

[2] National Park Service, 2020, Juan Bautista De Anza Trail, available online at https://www.nps.gov/juba/index.htm, accessed January 20, 2021.

leads to a developed area that includes a large 7,500-square-foot garage building, a paved patio, and driveways with drainage swales. There are large, semi-flat, open areas adjacent to the garage. The remainder of the site consists of steep bay and oak woodlands on an east-facing slope, with minor drainages.

Prior County approvals involving the site include the following:

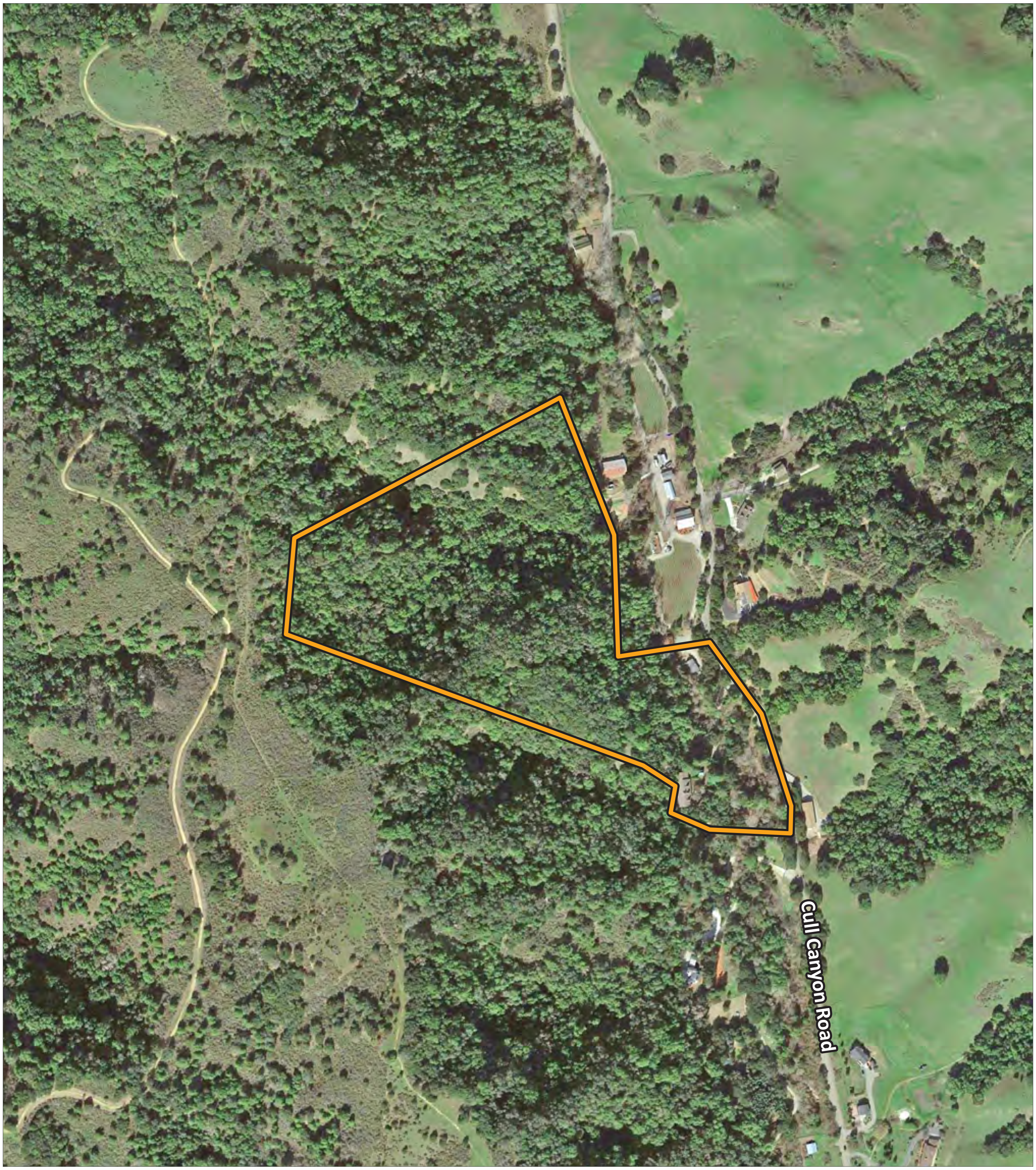
- February 17, 1993: Variance V-10452, that approved a boundary adjustment resulting in a property containing 37 acres where 100 acres is normally the minimum required.
- December 18, 1996: Conditional Use Permit C-6930 and Variance V-10880, that approved occupancy of a mobile home by an agricultural caretaker on a property containing 37 acres where 100 acres is the minimum in an "A" (Agricultural) District.
- January 26, 2000: Conditional Use Permit C-7540, and Variance V-11293, to allow continued occupancy of a mobile home by an agricultural caretaker on a property containing 37 acres in area where 100 acres is the minimum building site area required in an "A" (Agricultural) District.



Source: Esri, 2021; PlaceWorks, 2021.

Figure 3-1
Regional Location

PROJECT DESCRIPTION



Source: Google Earth, 2021. PlaceWorks, 2021.

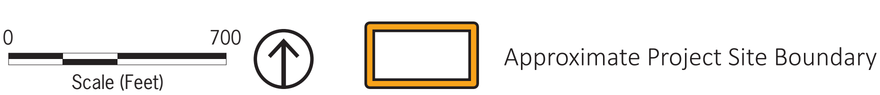


Figure 3-2
Local Context

3.1.4 GENERAL PLAN LAND USE DESIGNATION AND ZONING

The project site is in the unincorporated portion of Alameda County and within the Castro Valley General Plan 2012 area. The project site is designated Resource Management in the Castro Valley General Plan. The Resource Management designation permits agricultural uses, recreational uses, habitat protection, watershed management, public and quasi-public uses, areas typically unsuitable for human occupation due to public health and safety hazards such as earthquake faults, floodways, unstable soils, or areas containing wildlife habitat and other environmentally sensitive features, secondary residential units, active sand and gravel and other quarries, reclaimed quarry lakes, and similar and compatible uses.[3] The property is also subject to the provisions of Measure D of the East County Area Plan which established the Urban Growth Boundary that also applies to the Castro Valley Canyonlands.

The project site is located in the Agriculture (A) zoning district of Alameda County. This zoning district is established for agricultural and other nonurban uses, to conserve and protect existing agricultural uses, and to provide space for and encourage such uses in places where more intensive development is not desirable or necessary for the general welfare.[4] Permitted uses include crop, vine, or tree farm, plant nursery, apiary, raising or keeping of poultry or other similar animals, winery microbrewery or olive mill with visitor center, public or private riding or hiking trails, boarding stables and riding academics. Other uses, such as outdoor recreation facility, animal hospital, kennels, public or private hunting of wildlife or fishing, and public or private hunting clubs and accessory structures, radio and television transmission facilities, and administrative support and service facilities of a public recreation district are allowed with a Conditional Use Permit.

[3] Alameda County, 2012, *Castro Valley General Plan*, Appendix A Measure D Excerpts Pertaining to the Castro Valley Canyonlands, page A-2.

[4] Alameda County, 2020, Municipal Code, Section 17.06.010 – Agricultural districts – Intent, https://library.municode.com/ca/alameda_county/codes/code_of_ordinances?nodeId=TIT17ZO_CH17.06ADI_17.06.030PEUS, accessed February 1, 2020.

3.2 PROJECT OBJECTIVES

The project applicant has developed the following project objectives:

- Provide state-of-the-art experiential educational programs.
- Develop a project focused site within 30 miles of the majority of the partner elementary schools. After two years of due diligence, it was determined that this is the unique property that can meet this need.
- Provide chickens and goats as a learning experience for the youth in the program as well as natural maintenance of the property.
- Provide an organic garden for the site and program. Produce from the garden would be used in student meals and sold to the community. Students would learn about the history of cultivation in the area and the growing of produce.
- Provide improved pedestrian trail and site maintenance. Dirt roads and trails exist on the property and extend within the bay/oak woodland habitat that covers the slopes on the western side of the project site. These existing roads/trails would be repurposed to serve as a recreational pedestrian trail system, with undergrowth maintained by the goats housed on the property.
- Provide a caretaker's residence to watch over the facilities and animals when not in session.
- Meet the development standards of the Alameda County Castro Valley Jurisdiction, including fire access, storm water management, and site development restrictions.
- Provide parking to meet Alameda County's standards.
- Replace existing utilities to accommodate the proposed project including a small public water system and expanded wastewater system.
- Provide a greywater irrigation system that can be used as a test project for Alameda County Environmental Health.

3.3 PROPOSED PROJECT

The Outdoor Project Camp would facilitate several classes of 4th- or 5th-grade students, approximately 75-95 students total (not to exceed 95), who will be transported by bus to the project site from their schools for a five-day, four-night camp program in nature. Students would typically arrive on Monday morning and depart on Friday afternoon. The Outdoor Project Camp would initially operate seasonally during the school year with six camp sessions in the fall (September to October) and six camp sessions in the spring (April to May). The programs would be spaced out so that there would never be more than two consecutive five-day, four-night programs. The goal would be to eventually operate year-round, including summer sessions and occasional weekend programs. Under the year-round schedule, weekend programs would also never fall next to a weekday program. This would allow for the following:

- 18 five-day/four-night sessions (10 in the winter/spring and 8 in the fall)
- Five (5) five-day/four-night summer sessions
- 12 weekend programs

3.3.1 PROPOSED SITE IMPROVEMENTS

The proposed project would include the construction and operation of an outdoor camping facility consisting of cabins, a meeting and dining hall, a restroom and shower building, a family building, a caretaker's unit, agricultural activities, a garden, and trails, with associated infrastructure, amenities, septic and leach field areas, parking, and vehicular circulation. Figure 3-3 shows the existing conditions on the site and identifies features to be demolished or removed. Figure 3-4 shows the conceptual site plan for the proposed project. The buildout projections for the proposed new buildings are summarized in Table 3-1, Proposed Project Buildout by Land Use, and are described below. In total, the proposed project would involve approximately 18,173 square feet of building area, a net 8,274 square foot increase over existing conditions. Figures 3-8 through 3-13 include the building layouts and elevation drawings.

Demolition of Garage

The existing 7,500-square-foot garage building on the southwestern portion of the project site was determined to be out of compliance with current code regulations after review by a structural engineer. Due to the high cost to bring the building up to code it was decided to remove the existing structure and redesign the project within its footprint. Demolition of the existing garage will require a Demolition Permit from Alameda County. As much as possible, materials from the demolition will be reused on site.

Camping Cabins

Twelve 400-square-foot non-permanent camping cabins are proposed to be placed within the footprint of the existing garage building on the southwestern portion of the site. These cabins, shown on Figure 3-5, would be simple, light-footprint construction with access from a 20-foot-wide fire road in compliance with the cabin code section of the California Code of Regulations (CCR) Title 25, Div 1, Chapter 2.2.[5]

Central Meeting and Dining Hall

The proposed central meeting and dining hall (Figure 3-6) would consist of an 8,500 square foot multi-purpose building and would be constructed southeast of the cabins on the southern portion of the project site. It would be used for camp indoor activities and would contain a medic room, kitchen, pantry, dining area, meeting space, laundry room, as well as restrooms, showers, and offices.

Counsel Ring

A gathering space with benches and a large outdoor natural gas/propane fire pit would be located within close proximity to the multi-use building. The camps meet at this space as a gathering spot, for group presentations, and singing. The Counsel Ring is shared for one hour three nights a week and occasionally to start the day.

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[5] West Law, 2021, California Code of Regulations, available online at https://govt.westlaw.com/calregs/Document/IA1D5D8C082C911E2BD79AA7206D382EB?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default), accessed January 20, 2021.

Restroom and Shower Building

A 1,025-square-foot restroom and shower building would be constructed just north of the camping cabins on the western portion of the project site.

Family Dwelling

A 2,600-square-foot staff "family" dwelling (Figure 3-7) would be constructed to the north of the cabins on the western portion of the project site to serve as the project staff's permanent home.

Caretakers Unit

The existing 1,200-square-foot residence on the northern portion of the project site adjacent to Cull Canyon Road would remain as a caretaker's dwelling.

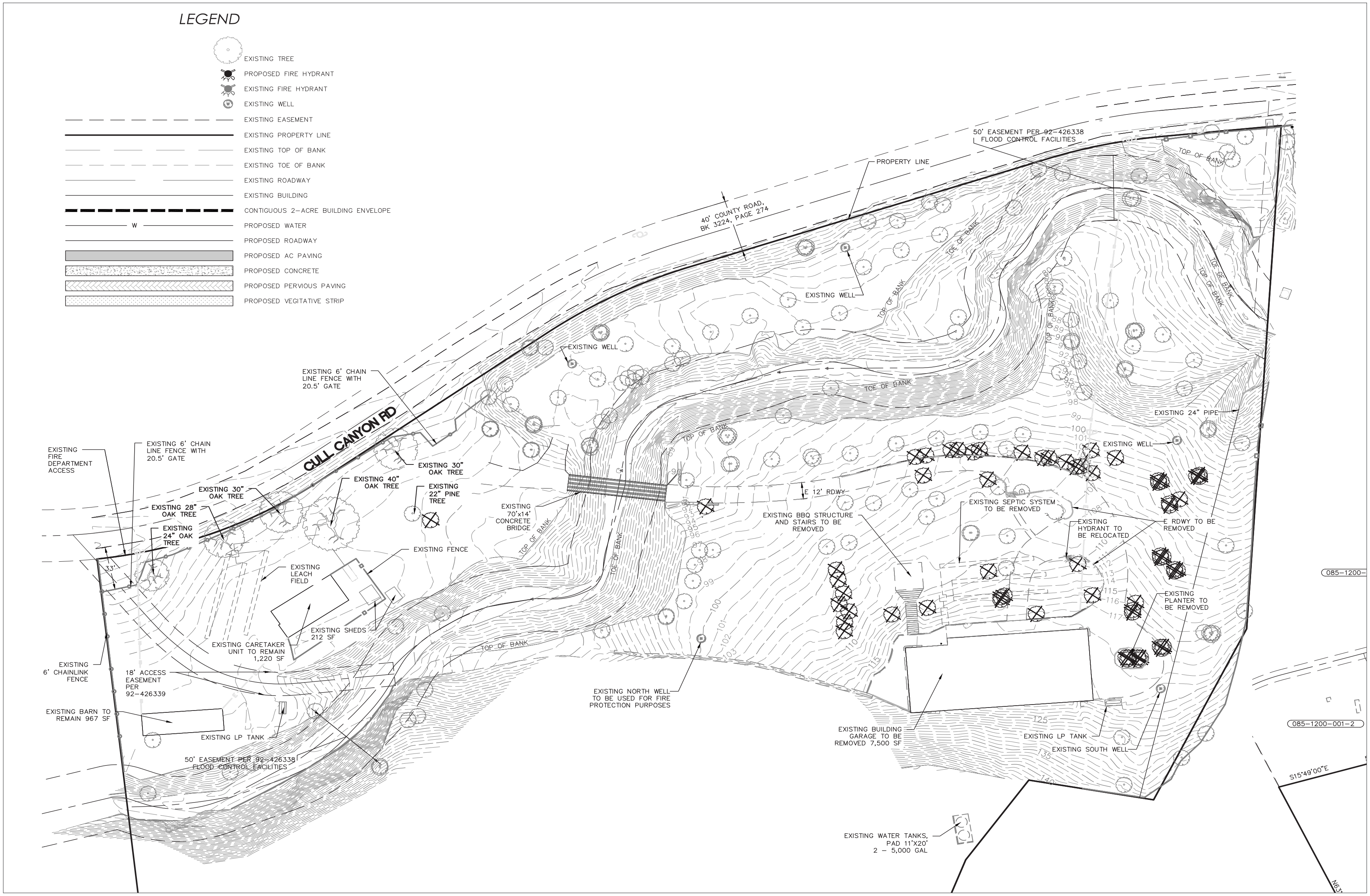
Bridge Improvements

The Alameda County Fire Department has noted that the existing bridge may remain at its current width as a single land access per Title 14. Fire Department regulations would be maintained without construction within Cull Canyon Creek as discussed with the Alameda County Fire Department. Improvements to the Bridge may be proposed to ensure that it is up to code.

Agricultural and Farming Activities

Farm animals consisting of up to five pigmy goats and forty chickens, would be kept on-site with a proposed yard on the northern portion of the project site adjacent to Cull Canyon Road. The animals would be used for natural property maintenance, food, and as an educational experience for the campers. The animals would graze on the property with the main purpose of understory vegetation maintenance. An additional goal of the agricultural and farming activities is for The Mosaic Project to earn income to support its activities from selling goat's milk and eggs as well as from renting out the goats for grazing for fuel reduction and fire abatement.

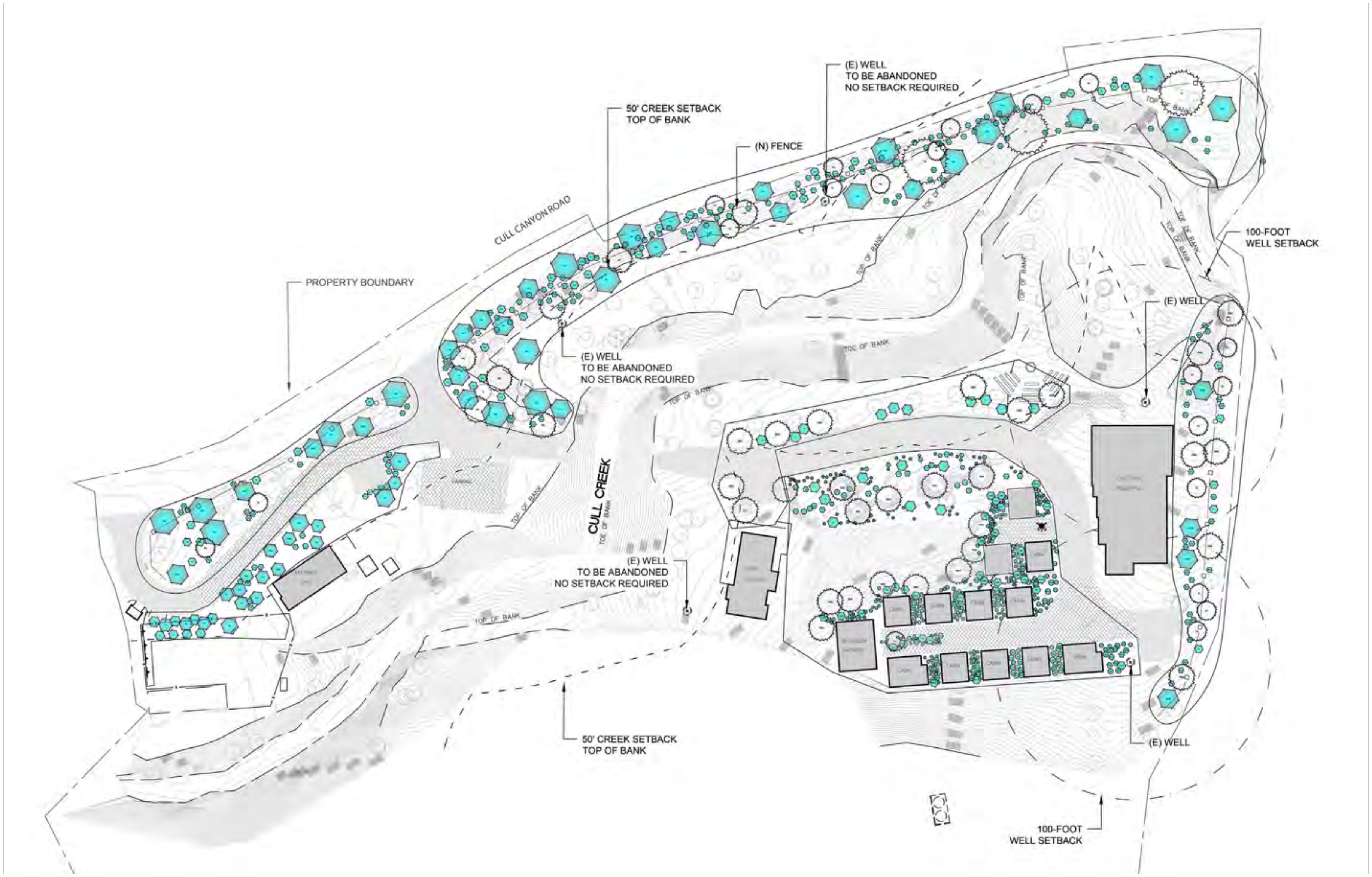
The proposed project would incorporate an organic garden site. Produce grown from the garden would be used in student meals and sold to the community. Through gardening activities, students would learn about the growing of produce. Operational agricultural and farming equipment proposed for use on-site include tractors, loaders, and off-road vehicles.



Source: NorthStar, 2021.

Figure 3-3
Existing Site Plan

NOTICE OF PREPARATION



Source: Watershed Progressive, 2020.

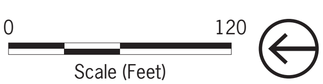


Figure 3-4
Proposed Project Site Plan

Source: NorthStar, 2021.

Figure 3-5
Camping Cabins

Source: NorthStar, 2021.

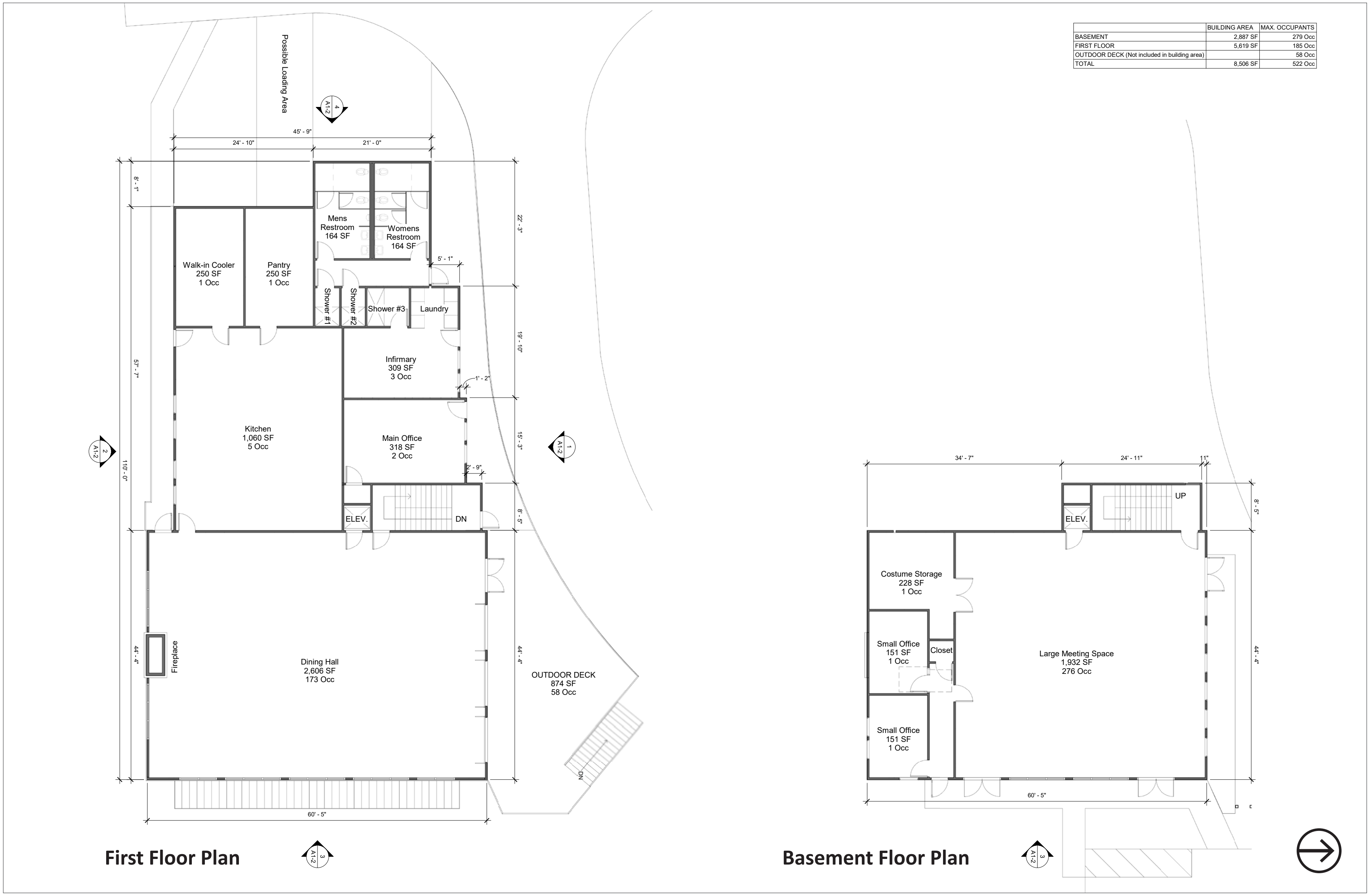
Figure 3-6

Central Meeting & Dining Hall

Source: NorthStar Engineers, 2021.

Figure 3-7
Staff Family Building

	BUILDING AREA	MAX. OCCUPANTS
BASEMENT	2,887 SF	279 Occ
FIRST FLOOR	5,619 SF	185 Occ
OUTDOOR DECK (Not included in building area)		58 Occ
TOTAL	8,506 SF	522 Occ

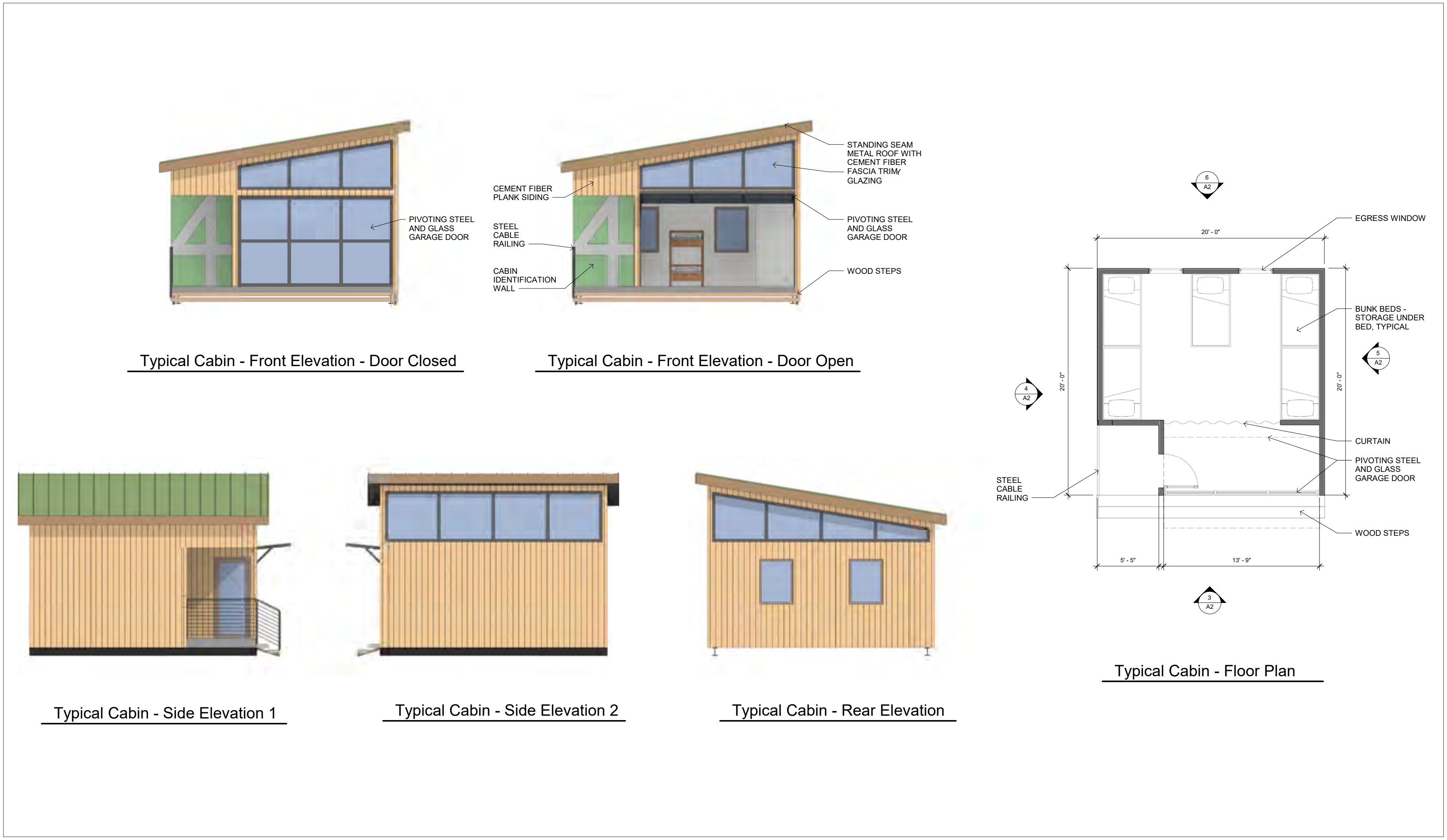


Source: NorthStar, 2021.

Figure 3-8
Main Building - Floor Plans

Source: NorthStar, 2021.

Figure 3-9
Main Building - Elevations



Source: NorthStar, 2021.

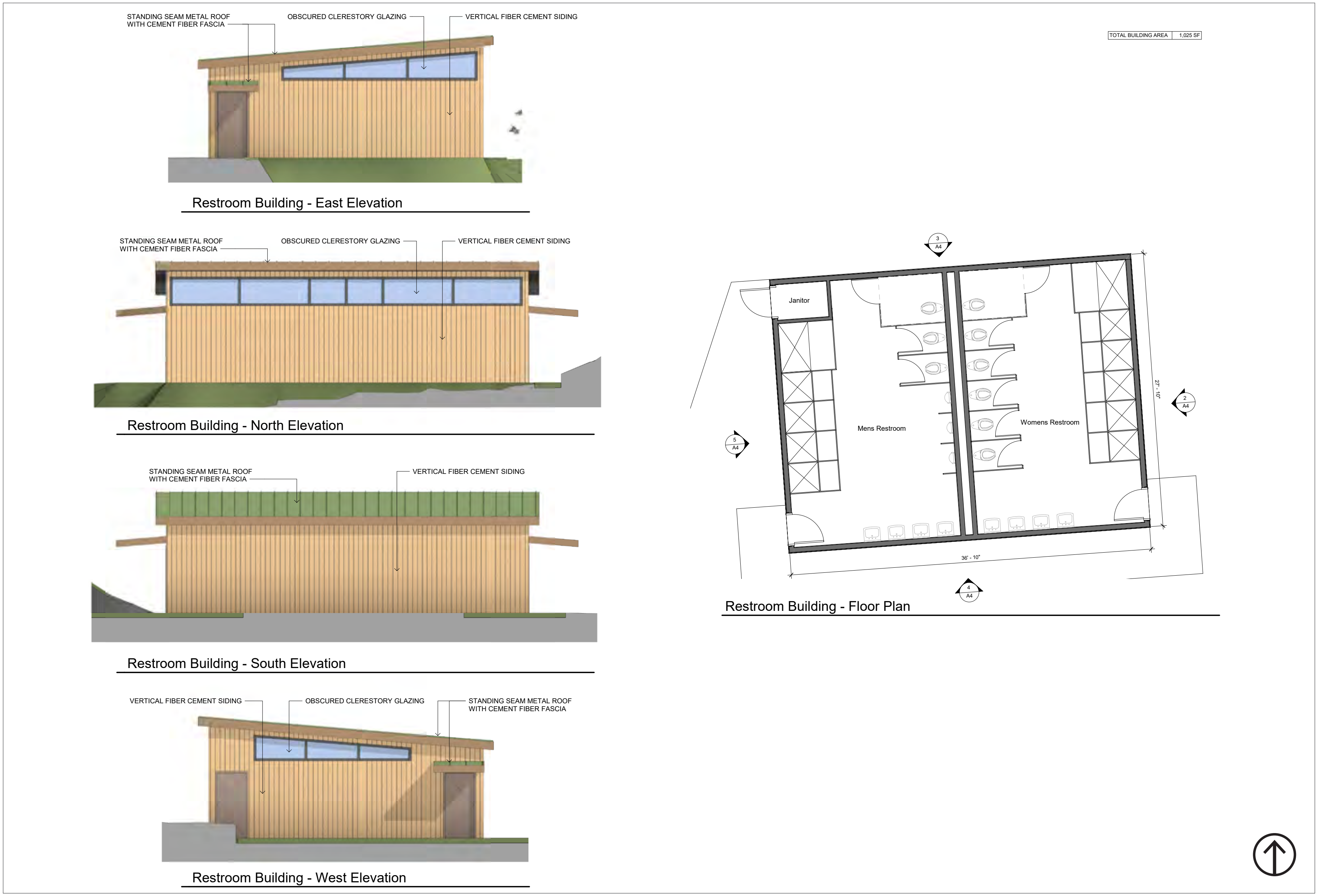
Figure 3-10

Typical Cabin - Floor Plan and Elevations

Source: NorthStar, 2021.

Figure 3-11

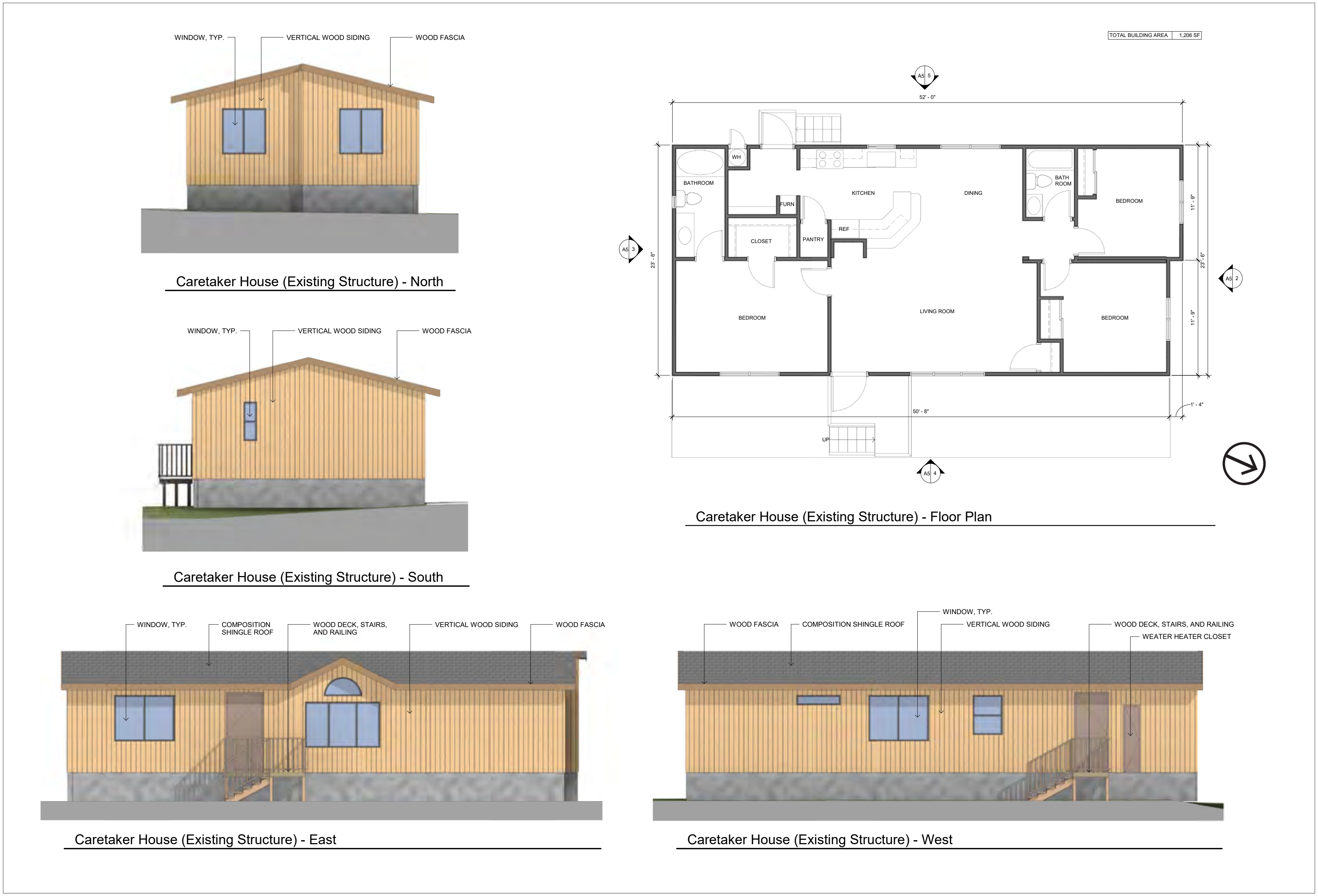
Staff Housing - Floor Plans and Elevations



Source: NorthStar, 2021.

Figure 3-12

Restroom Building – Floor Plan and Elevations



Source: NorthStar, 2021.

Figure 3-13

Caretaker House (Existing Structure) - Floor Plan and Elevations

TABLE 3-1 PROPOSED PROJECT BUILDOUT

	Number of Units	Floors	Total Square Footage
Recreational Vehicle (RV) Classification (Mobile Homes)			
Cabins	12	1	400
	Subtotal – Cabins	–	*4,800*
Staff House	1	1	2,636
	Subtotal – Family Dwelling	–	*2,636*
Caretaker's Unit	1	1	1,206
	Subtotal – Caretakers Unit	–	*1,206*
	Total RV	**–**	**8,642**
	Unit Type	**Floors**	**Total Square Footage**
Non-Residential			
Central Meeting and Dining Hall	1	2	8,506
	Subtotal – Central Meeting and Dining Hall	–	*8,506*
Restroom and Shower Building	1	1	1,025
	Subtotal – Restroom and Shower Building	–	*1,025*
	Total Non-Residential	–	**9,531**
Total Square Footage (RV + Non-Residential)			**18,173**

Source: NorthStar, 2021.

3.3.2 OPEN SPACE AND AMENITIES

Dirt roads and trails exist on the property and extend within the bay and oak woodland habitat that covers the slopes on the western side of the property. These existing roads and trails would be repurposed to serve as a recreational pedestrian trail system under the proposed project.

3.3.3 PARKING AND ACCESS

The property has two existing driveways on Cull Canyon Road. A gravel parking area also exists adjacent to the driveway on the northern portion of the project site.

As shown on Figure 3-6, Proposed Project Site Plan, buses and other vehicles would enter the site via the northerly driveway and exit the site from the southerly driveway. Vehicles would park in the gravel area adjacent to these driveways, with a few parking spaces, including ADA parking spaces, located near the caretaker's unit, the proposed staff lodging house, and the proposed cabins. Students would board or disembark buses from the driveway area and walk across the bridge. Only staff service vehicles would use the bridge to access the multipurpose building and facilities on the east side of Cull Creek.

Bicycle parking would be provided in the northern portion of the project site. Most bicycle parking would either be covered or secure. Bicycle parking would also be provided along the length of the multi-use trail.

In total, the proposed project would include construction of 15 surface vehicular parking spaces on the project site to serve the proposed staff and bus uses.

3.3.4 UTILITIES AND SERVICE CONNECTIONS

3.3.4.1 STORMWATER

Pursuant to the Stormwater Control Plan prepared for the proposed project, stormwater runoff will be conveyed to vegetated areas for infiltration. The project site currently drains toward Cull Creek and would continue to do so under the proposed project. Stormwater runoff from Cull Creek flows into San Lorenzo Creek, which discharges eventually into the San Francisco Bay.

The proposed project would be required to comply with Provision C.3 of the Municipal Regional Stormwater Permit in order to reduce post-construction stormwater pollutants.[6] Compliance with Provision C.3 could include, but is not limited to, incorporation of Low Impact Development practices, such as the use of bioswales, infiltration trenches, media filtration devices, pervious surface treatments, and bioretention areas to treat stormwater runoff from the project site.

3.3.4.2 POTABLE WATER SUPPLY

The proposed project would rely on groundwater obtained on-site to supply potable water. The project site currently has four groundwater wells. One well located adjacent to the west side of Cull Creek has been deemed inadequate as a potable water source. However, this well has two 5,000-gallon water storage facilities on-site that will be upgraded to serve the proposed project. The other existing groundwater wells would continue to provide potable water services for the proposed project, including water for fire suppression and irrigation. None of the wells are shared with neighbors or nearby residences. A new water supply and delivery system would be developed to connect to the facilities for the proposed project and sized to meet the proposed project's domestic and firefighting water needs. The piping network would be installed underground in trenches and sized to supply adequate flow and pressure.

[6] San Francisco Regional Water Quality Control Board (Region 2) Municipal Regional Stormwater Permit (Order No. R2-2009-0074) and NPDES Permit No. CAS612008, as amended by Order No. R2-2011-0083.

3.3.4.3 SANITARY SEWER SERVICE

An on-site wastewater system sized to serve the proposed project, including a leach field dispersal system, would be installed on the southern portion of the project site to the east of the cabins, where an existing septic system is located. The proposed septic area would be approximately 9,435 square feet. The system would employ a chamber system for blackwater treatment to reduce the area needed for effluent treatment. In addition, a greywater dispersal system would be utilized during dry months to reduce the hydraulic load going to the wastewater system. An estimated 30 percent of the total wastewater generated on-site would be greywater, reducing the blackwater flows by approximately 1,058 gallons per day. The greywater system would disperse filtered greywater to flow through tree basins located within the greywater dispersal area. The existing septic system at the caretaker site will not be modified.

3.3.4.4 ENERGY

Buildings would be sited to maximize natural lighting, use high-performance glazing, incorporate passive heating and cooling strategies, and employ low-flow fixtures to minimize energy consumption and exceed Title 24 energy requirements.

The project site currently includes two 499-gallon liquid propane tanks to serve existing facilities. One tank, located at the existing mobile home, will remain to serve the caretaker's unit under the proposed project, and the other tank, located behind the existing garage building, would be upgraded to serve the new multi-use building and shower building under the proposed project.

The project site includes existing overhead electrical lines connected to electrical poles and lines along Cull Canyon Road that serve the existing buildings on-site and neighboring properties. Electricity use for the proposed project would come from this existing service.

3.3.5 LANDSCAPING

The project site is relatively hilly with a downward slope to the east. The site is covered with vegetation, wild grasses, and bay and oak woodlands. All grass, brush, roots, and other organic matter would be cleared from areas where development is planned. Vegetation scrapings would be stockpiled for re-use in landscape areas or removed from the site.

The proposed project would include several landscaped outdoor spaces, including between the proposed cabins and at the counsel ring. Landscaping would consist of trees, shrubs, and groundcover, and plant material would be chosen for its compatibility with the regional climate and landscape conditions, drought tolerance, longevity, screening cap abilities, and overall attractiveness.

3.3.6 LIGHTING

Exterior lighting would be provided within the parking lots on the project site and around the cabins and buildings. Proposed lighting would be designed so that the lights are shielded or directed in such a way that there would be no impact on the adjacent land uses or nearby residences. In addition to the exterior lighting fixtures, the project site would include low-level lighting for security and identification purposes.

3.4 REQUIRED PERMITS AND APPROVALS

The project will require the following permits and approvals for construction:

- Conditional Use Permit
- Site Development Review for Agricultural Caretaker's Dwelling
- Williamson Act Compatibility Review
- Demolition Permit
- Alameda County Building Permits
- Alameda County Environmental Health Permits
- Alameda County Fire Department Permits

In addition to the above, other permits or approvals that may be required for the proposed Project include:

- National Pollutant Discharge Elimination System (NPDES) Construction General Permits for grading activities of 1-acre or larger.
- Clean Water Act Section 404 Nationwide Permit from the U.S. Army Corps of Engineers
- Clean Water Act Section 401 Water Quality Certification from the Regional Water Quality Control Board
- Fish and Game Code Section 1602 Lake and Streambed Alteration Agreement from California Department of Fish and Game

Attachment B: INITIAL STUDY

DISCUSSION OF ENVIRONMENTAL EVALUATION

This Initial Study Checklist was prepared to identify thresholds within the CEQA Checklist topics that will not be affected by the proposed project. For these topics, the impact conclusion boxes are checked. The remaining thresholds within the CEQA Checklist topics will be addressed in the project Environmental Impact Report (EIR). The checklist boxes for these topics are blank, pending analysis and conclusions in the EIR.

I. AESTHETICS

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

DISCUSSION

a) As described in Chapter 3, Project Description, the project site is bounded by Cull Canyon Road to the east, Twining Vine Winery to the north, Cull Canyon Regional Recreational Area to the west, and residential property to the south. Figure 3-1, Regional Location, shows the location of the project site.

Public views from Cull Canyon Road towards the project site are generally obstructed by existing ground vegetation and trees along the roadway. Within the boundaries of the project site, the area with existing structures is mostly flat and generally bisected by the bridge over Cull Canyon Creek which connects to an internal north – south concrete roadway ending at a large existing concrete building. The project site slopes sharply to the west where it is heavily vegetated and obstructs views extending beyond the site. Existing structures on the 37-acre parcel include a residential home, a barn, a bridge, several wells, a septic system, an outdoor barbeque and spit, and a large concrete building with a slab foundation. Cull Creek also runs through the eastern portion of the parcel.

Structures included as part of the proposed development include twelve- 400 square foot cabins, an 8,500 square foot meeting and dining hall, a 1,025 square foot restroom and shower building, a 2,600 square foot family dwelling, and the existing 1,200 square foot caretaker's unit. As shown on Figures 3-7 through 3-15 in Chapter 3, Project Description, the meeting/dining hall and family dwelling buildings are two stories in height while all the other buildings are one story.

Due to the site's location between a public roadway obstructed by large, existing trees and vegetation and the sloped hills to the west, as well the low one- and two-story building heights, scenic vistas of the adjoining hillsides would not be blocked by construction of the project. Therefore, this impact would be less than significant.

b) Cull Canyon is not a State Scenic Highway. The nearest scenic corridor is located approximately 1.25 miles east along Crow Canyon Road.[1] Therefore, there would be *no impact*.

c) Public views from Cull Canyon Road towards the project site are generally obstructed by vegetation and existing trees along the roadway. The property line extends to the edge of the two-lane roadway comprising Cull Canyon Road with minimal shoulder or bike and pedestrian path between the roadway and property. As described in the Chapter 3, Project Description, the proposed project would include development and facilities appurtenant to periodic recreational camping. The design of the proposed buildings as well as the scale and massing, would be consistent with the adjoining development including one- and two-story homes and supporting buildings. Therefore, there would *no impact*.

d) As described in Section 3.3.6 of the Project Description, exterior lighting would be provided within the parking lots on the project. Proposed lighting would be designed so that the lights are shielded or directed in such a way that there would be no impact on the adjacent land uses or nearby residences. Therefore, new sources of light installed for the proposed project would have *no impact* on day or nighttime views in the area.

[1]Alameda County, 2012, Castro Valley General Plan, https://www.acgov.org/cda/planning/generalplans/documents/CastroValleyGeneralPlan_2012_FINAL.pdf, accessed May 11, 2021.

II. AGRICULTURE AND FORESTRY RESOURCES

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	❒	❒	❒	■
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	❒	❒	❒	❑
c) Conflict with existing zoning for, or cause rezoning of, forestland (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	❒	❒	❒	❑
d) Result in the loss of forest land or conversion of forest land to non-forest use?	❒	❒	❒	❑
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	❒	❒	❒	❑

DISCUSSION

a) The project site is not classified as Prime Farmland, Unique Farmland or Farmland of Statewide Importance.[2] Therefore, there would be *no impact*.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

d) This threshold will be assessed within the full project EIR.

e) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

[2] California Department of Conservation, 2021, California Important Farmland Finder, https://maps.conservation.ca.gov/DLRP/CIFF/, accessed May 11, 2021.

III. AIR QUALITY

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	❒	❒	❒	❒
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under applicable federal or State ambient air quality standard?	❒	❒	❒	❒
c) Expose sensitive receptors to substantial pollutant concentrations?	❒	❒	❒	❒
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	❒	❒	❒	❒

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

d) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

IV. BIOLOGICAL RESOURCES

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

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

d) This threshold will be assessed within the full project EIR.

e) This threshold will be assessed within the full project EIR.

f) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

V. CULTURAL RESOURCES

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	❒	❒	❒	❒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	❒	❒	❒	❒
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	❒	❒	❒	❒

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

VI. ENERGY

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	❐	❐	❐	■
b) Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?	❐	❐	❐	■

DISCUSSION

a) The proposed project would be designed to maximize natural lighting, use high-performance glazing, incorporate passive heating and cooling strategies, and employ low-flow fixtures to minimize energy consumption and exceed Title 24 energy requirements. The proposed project would connect to existing electrical utilities and would continue to use one of the two 499-gallon liquid propane tanks currently on-site to serve existing facilities, while upgrading the other existing tank to serve the new multi-use building and shower building.

Construction of the proposed project would create temporary increased demands for electricity and vehicle fuels compared to existing conditions and would result in short-term transportation-related energy use. Electricity use during construction would vary during different phases, and electricity would not be required to power most construction equipment. Most of the construction equipment during demolition and grading would be gas- or diesel-powered, and the later construction phases would require electricity-powered equipment for interior construction and architectural coatings. Overall, the use of electricity would be temporary and would fluctuate according to the phase of construction. Additionally, it is anticipated that most of the electric-powered construction equipment would be hand tools (e.g., power drills, table saws, compressors) and lighting, which would result in minimal electricity usage during construction activities. It is not anticipated that construction equipment used for the proposed project would be powered by natural gas, and no natural gas demand is anticipated during construction.

Transportation energy use during construction would come from the transport and use of construction equipment, delivery vehicles and haul trucks, and construction employee vehicles that would use diesel fuel and/or gasoline. The use of energy resources by these vehicles would fluctuate according to the phase of construction and would be temporary. It is anticipated that most of the off-road construction equipment, such as those used during grading, would be gas- or diesel-powered. All construction-equipment would cease upon completion of project construction. Thus, transportation energy use during construction would be temporary and would not require expanded energy supplies or the construction of new infrastructure. Furthermore, to limit wasteful and unnecessary energy consumption, the construction contractors are anticipated to minimize nonessential idling of construction equipment during construction, in accordance with Section 2449 of the California Code of Regulations, Title 13, Article 4.8, Chapter 9. In addition, it is anticipated that the construction equipment would be well maintained and meet the appropriate tier ratings per CALGreen or EPA emissions standards, so that adequate energy efficiency level is achieved.

Operation of the proposed project would create additional energy demands compared to existing conditions and would result in increased transportation energy use. Operational use of energy would include heating, cooling, and ventilation of buildings; water heating; operation of electrical systems, use of on-site equipment and appliances; and indoor and outdoor lighting. Due to increased population on-site and use of the site, the proposed project would increase energy demand at the site compared to existing conditions. However, because the proposed project would be built to meet the Building Energy Efficiency Standards, it would not result in wasteful or unnecessary natural gas demands. Therefore, the proposed project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation, and there would be *no impact*.

b) The proposed project would be required to comply with all applicable energy regulations, including, for example, the Building Energy Efficient Standards, and CALGreen, which would contribute to minimizing wasteful energy consumption and promoting renewable energy sources. The proposed project would connect to existing electrical infrastructure and use two liquid propane tanks on-site for additional energy needs. As described under discussion (a), the proposed project would be designed to maximize natural lighting, use high-performance glazing, incorporate passive heating and cooling strategies, and employ low-flow fixtures to minimize energy consumption and exceed Title 24 energy requirements. Therefore, the proposed project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency, and there would be *no impact*.

MITIGATION MEASURES

None required.

VII. GEOLOGY AND SOILS

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

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

d) This threshold will be assessed within the full project EIR.

e) This threshold will be assessed within the full project EIR.

f) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

VIII. GREENHOUSE GAS EMISSIONS

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	❒	❒	❒	❒
b) Conflict with an applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	❒	❒	❒	❒

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

IX. HAZARDS AND HAZARDOUS MATERIALS

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

DISCUSSION

a) The proposed project would not involve the routine transport of hazardous waste, thus, no impacts to the public or the environment would occur. Potential impacts during construction of the proposed project could include potential spills associated with the use of fuels and lubricants in construction equipment. These potential impacts would be short-term in nature and would be reduced to less-than-significant levels through compliance with applicable local, State, and federal regulations, as well as the use of standard equipment operating practices by experienced, trained personnel. Additionally, during the operation phase of the proposed project, common cleaning substances, facility maintenance products, and similar items could be used on the project site. These potentially hazardous materials, however, would not be of a type or occur in sufficient quantities to pose a significant hazard to public health and safety or the environment. Compliance with the applicable laws, regulations, and conditions of approval, would minimize hazards associated with the routine transport, use, or disposal of hazardous materials to the maximum extent practicable. Therefore, impacts would be *less than significant*.

b) As discussed in Criterion (a) of this section, the operation phase of the proposed project could involve the use of common cleaning substances and facility maintenance products; however, these potentially hazardous substances would not be of a type or occur in sufficient quantities on-site to pose a significant hazard to public health and safety or the environment. The use of these materials would be subject to existing federal and State regulations. Compliance with these regulations would ensure that the risk of accidents and spills are minimized to the maximum extent practicable. Therefore, impacts related to accidental release of hazardous materials would be *less than significant*.

c) The project site is not located within 0.25 miles of a school. The closest schools, Proctor Elementary School and Vannoy Elementary School, are located approximately 2 miles and 2.5 miles south of the project site, respectively. Therefore, there would be *no impact*.

d) Based on information gathered from a review of the applicable regulatory databases, including EnviroStor and the GeoTracker, to identify known or suspected sources of contamination, it was determined that the project site does not contain any known hazardous materials spills or storage sites.[3,4] Therefore, there would be *no impact*.

e) The project site is not located within 2 miles of a public airport or public use airport. The closest airport to the project site is Oakland International Airport, located 8.5 miles west of the project site in the City of Oakland. Therefore, there would be *no impact*.

f) This threshold will be assessed within the full project EIR.

g) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

[3] Department of Toxic Substances Control, 2021, EnviroStor, https://www.envirostor.dtsc.ca.gov/public/map/?myaddress=map, accessed August 23, 2021.

[4] California State Water Resources Control Board, 2021, GeoTracker, https://geotracker.waterboards.ca.gov/map/, accessed August 23, 2021.

X. HYDROLOGY AND WATER QUALITY

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	❐	❐	❐	❐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	❐	❐	❐	❐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) Result in substantial erosion or siltation on- or off-site; ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv) Impede or redirect flood flows?	❐	❐	❐	❐
d) In a flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	❐	❐	❐	❐
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	❐	❐	❐	❐

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

d) This threshold will be assessed within the full project EIR.

e) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

ENVIRONMENTAL ANALYSIS

XI. LAND USE AND PLANNING

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Physically divide an established community?	❒	❒	❒	■
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	❒	❒	❒	❒

DISCUSSION

a) The proposed project would develop the site with a recreational camping facility. The proposed project would retain the existing roadway patterns and would not introduce any new major roadways or other physical features through existing residential neighborhoods or other communities that would create new barriers. Therefore, the proposed project would not divide any established community there would be *no impact*.

b) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

XII. MINERAL RESOURCES

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?	❒	❒	❒	■
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	❒	❒	❒	■

DISCUSSION

a) The California Geological Survey (CGS), formerly the California Division of Mines and Geology, classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act (SMARA) of 1975 and assists in the designation of lands containing significant aggregate resources. CSG's Mineral Land Classification (MLC) Project provides objective economic-geologic expertise to assist in the protection and development of mineral resources through the land-use planning process. Since its inception in 1978, the MLC Project has completed 97 classification studies covering about 34% of the state.[5] The SMARA classification for the area encompassing the project area is MRZ-4 on the Special Report 146 Plate 2.10 map.[6] The MRZ-4 category denotes areas of no known mineral occurrences where geologic information does not rule out either the presence or absence of significant mineral resources. The MRZ-4 classification does not imply that there is little likelihood for the presence of mineral resources, but rather that there is a lack of knowledge regarding mineral occurrences. Further exploration of the area could result in the reclassification of MRZ-4 areas.[7] No minerals are currently mined within the project site and no known mineral resources occur in the project vicinity. Therefore, the proposed project would not result in the loss of or access to mineral resources and there would be *no impact*.

[5] California Geologic Survey (CGS), 2017, Mineral Resources and Mineral Hazards Mapping Program, California Department of Conservation, https://maps.conservation.ca.gov/cgs/informationwarehouse/mlc/, accessed August 10, 2021.

[6] California Department of Conservation, 1983, Special Report 146 Plate 2.10, https://filerequest.conservation.ca.gov/, accessed August 24, 2021.

[7] California Department of Conservation, 2003, Mineral Land Classification of Granite Construction Inc.'s Handley Ranch Site, Monterey County, California, for Construction Aggregate Resources, https://www.conservation.ca.gov/cgs/Documents/Publications/Special-Reports/SR_180-MLC-Report.pdf, accessed August 24, 2021.

b) The project site has not been classified or nominated as a locally important mineral resource recovery site, according to the CGS Generalized Aggregate Resource Classification Map.[8] Therefore, no impact would result.

MITIGATION MEASURES

None required.

[8] California Department of Conservation, 1983, Special Report 146 Plate 2.10, https://filerequest.conservation.ca.gov/, accessed August 24, 2021.

XIII. NOISE

Would the proposed project result in:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?	❒	❒	❒	❒
b) Generation of excessive groundborne vibration or groundborne noise levels?	❒	❒	❒	❒
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	❒	❒	❒	❒

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

ENVIRONMENTAL ANALYSIS

XIV. POPULATION AND HOUSING

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Induce substantial unplanned population growth or growth for which inadequate planning has occurred, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	❐	❐	❐	■
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	❐	❐	❐	■

DISCUSSION

a) The proposed project, a recreation camping facility, would not involve new housing or employment centers; thus, the proposed project would not induce substantial population growth in the area. Furthermore, the proposed project does not have a long-term new housing component and would only be used intermittently by groups in a recreational capacity. Therefore, there would be *no impact*.

b) The existing caretaker home would remain on-site, and no additional long-term housing is proposed as part of the project. Therefore, the proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere. Therefore, there would be *no impact*.

MITIGATION MEASURES

None required.

XV. PUBLIC SERVICES

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
i) Fire protection?	❐	❐	❐	❐
ii) Police protection?	❐	❐	❐	❐
iii) Schools?	❐	❐	❐	■
iv) Parks?	❐	❐	❐	■
v) Other public facilities?	❐	❐	❐	■

DISCUSSION

The primary purpose of a public services impact analysis is to examine the impacts associated with physical improvements to public service facilities required to maintain acceptable service ratios, response times or other performance objectives. Public service facilities need improvements (i.e., construction, renovation or expansion) as demand for service increases. Increased demand is typically driven by increases in population. The proposed project would have a significant environmental impact if it would exceed the ability of public service providers to adequately serve residents, thereby requiring construction of new facilities or modification of existing facilities. As discussed above in Section XIV, Population and Housing, the proposed project would not result in a net increase of residents at the project site or elsewhere in the region because it does not propose housing and is not a major regional employer. Nevertheless, due to the location of the proposed project, within a rural area and a Wildfire Urban Interface, fire and police services are addressed in more detail within the EIR.

a) i) Fire Protection: This threshold will be assessed within the full project EIR.

b) ii) Police Protection: This threshold will be assessed within the full project EIR.

a) iii) Schools:

No schools exist within two miles of the project area. No changes would occur that would affect existing schools or require additional schools or school personnel. Therefore, there would be *no impact*.

ENVIRONMENTAL ANALYSIS

iv) Parks:

The proposed project consists of recreational camping facility that would serve disadvantaged youth throughout the region. All proposed visitor activities would occur on-site and would not involve the use of public parks. Although the multi-use trail on the western portion of the project site would ultimately lead to the Juan Bautista De Anza Trail, the connection is not intended to increase use of the regional trail because all activities are limited to the boundaries of the camping site. Other nearby parks include Deerview Park, Greenridge Park, the Columbia Trail, and the Cull Canyon Regional Recreation Area. These parks are located more than 0.5 miles away from the project site and would not be visited or used by visitors to the proposed project. Therefore, there would be *no impact* to parks.

v) Libraries:

The proposed project is more than two miles away from the nearest libraries. Due to the nature of the proposed project, a recreational camping facility with no increase in permanent residents, student visitors to the camping facility would not use regional libraries. Therefore, there would be *no impact* to libraries.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

XVI. RECREATION

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities, such that substantial physical deterioration of the facility would occur or be accelerated?	❐	❐	❐	■
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	❐	❐	❐	■

DISCUSSION

a), b) Increased demand for existing neighborhood and regional parks or other recreational facilities is typically driven by increases in population. The proposed project, a recreational camping facility, would not result in a net increase of permanent residents at the project site or elsewhere in the region because it does not include permanent housing. Furthermore, all activities during the operation of the recreational camping facility would be restricted to the facility itself and would not require the construction or expansion of recreational facilities. Therefore, the proposed project would not contribute to the deterioration of existing facilities nor require the construction or expansion of existing recreational facilities. Accordingly, there would be *no impact* with respect to parks and recreation.

MITIGATION MEASURES

None required.

XVII. TRANSPORTATION

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	❒	❒	❒	❒
b) Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	❒	❒	❒	❒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	❒	❒	❒	❒
d) Result in inadequate emergency access?	❒	❒	❒	❒

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

d) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

XVIII. TRIBAL CULTURAL RESOURCES

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a Tribal Cultural Resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American Tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	❒	❒	❒	❒
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resource Code Section 5024.1. In applying the criteria set forth in subdivision (c) of the Public Resource Code Section 5024.1 for the purposes of this paragraph, the lead agency will consider the significance to a California Native American tribe.	❒	❒	❒	❒

DISCUSSION

CEQA Guidelines Section 15064.5(b)(1), defines a substantial adverse change in the significance of a historical resource (defined as historical resource, archaeological resource, or tribal cultural resource) involves the "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical would be materially impaired."

a) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

XIX. UTILITIES AND SERVICE SYSTEMS

Would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	❐	❐	❐	❐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?	❐	❐	❐	❐
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project’s projected demand in addition to the provider’s existing commitments?	❐	❐	❐	■
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	❐	❐	❐	❐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	❐	❐	❐	❐

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) The closest wastewater treatment provider is the Castro Valley Sanitation District (CVSD) in Castro Valley. The project is outside the service area boundaries of the CVSD which end before the Cull Canyon Regional Recreation area. Therefore, there is *no impact*.

d) This threshold will be assessed within the full project EIR.

e) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

XX. WILDFIRE

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the proposed project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	❒	❒	❒	❒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	❒	❒	❒	❒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	❒	❒	❒	❒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	❒	❒	❒	❒

DISCUSSION

a) This threshold will be assessed within the full project EIR.

b) This threshold will be assessed within the full project EIR.

c) This threshold will be assessed within the full project EIR.

d) This threshold will be assessed within the full project EIR.

MITIGATION MEASURES

Any necessary mitigation measures will be included in the project EIR.

ENVIRONMENTAL ANALYSIS

XXI. MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	❐	❐	❐	❐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	❐	❐	❐	❐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	❐	❐	❐	❐

DISCUSSION

a) This finding will be addressed within the full project EIR.

b) This finding will be addressed within the full project EIR.

c) This finding will be addressed within the full project EIR.

Organizations and Persons Consulted

This Initial Study was prepared by the following consultants and individuals:

LEAD AGENCY

Alameda County

Sonia Urzua, Senior Planner

REPORT PREPARERS

LEAD CONSULTANT

PlaceWorks
Steve Noack, Principal, Principal-in-Charge
Allison Dagg, Associate, Project Manager

APPENDIX B

AIR QUALITY AND GREENHOUSE GAS EMISSIONS DATA

Emissions Worksheet

Phase Name	Start Date	End Date	CalEEMod Days	Total Days
Demolition	6/1/2022	7/18/2022	34	**47**
Demolition Debris Haul	6/1/2022	7/18/2022	34	**47**
Site Preparation	7/19/2022	7/22/2022	4	**3**
Grading	7/23/2022	8/2/2022	7	**10**
Building Construction	8/3/2022	12/1/2023	348	**485**
Paving	11/8/2023	12/1/2023	18	**23**
Architectural Coating	11/8/2023	12/1/2023	18	**23**

	Number of Construction Days Per Year		
2022	6/1/2022	12/31/2022	153
2023	1/1/2023	12/1/2023	240
		CONSTRUCTION DAYS	393

Total Construction Days Per Year		
1/1/2022	12/31/2022	260
1/1/2023	12/31/2023	260
	TOTAL DAYS	520

Construction Emissions - DPM
Input to Risk Tables

tons/year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Total Unmitigated	0.48	2.67	2.79	0.01	0.09	0.12	0.21	0.03	0.11	0.14

UNMITIGATED (Onsite)

tons/year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Total Onsite	0.45	2.52	2.58	0.00	0.02	0.11	0.13	0.01	0.11	0.12
Total Offsite	0.02	0.15	0.21	0.00	0.07	0.00	0.07	0.02	0.00	0.02
check	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FOR CONSTRUCTION RISK ASSESSMENT - Unmitigated Run

tons/year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
2022 Onsite	0.13	1.05	0.97	0.00	0.02	0.05	0.07	0.01	0.05	0.06
2022 Offsite	0.01	0.06	0.08	0.00	0.02	0.00	0.03	0.01	0.00	0.01
2023 Onsite	0.33	1.47	1.61	0.00	0.00	0.07	0.07	0.00	0.06	0.06
2023 Offsite	0.02	0.08	0.14	0.00	0.05	0.00	0.05	0.01	0.00	0.01

FOR CONSTRUCTION REGIONAL EMISSIONS - Unmitigated Run

tons/year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Total 2022	0.13	1.11	1.05	0.00	0.04	0.05	0.09	0.01	0.05	0.06
Total 2023	0.34	1.56	1.74	0.00	0.05	0.07	0.11	0.01	0.06	0.08
Construction Total	0.48	2.67	2.79	0.01	0.09	0.12	0.21	0.03	0.11	0.14
Check	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.2 Demolition - 2022

Unmitigated Construction On-Site

Category (tons/yr)	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	0.03	0.28	0.24	0.00	0.00	0.01	0.01	0.00	0.01	0.01
Total	0.03	0.28	0.24	0.00	0.00	0.01	0.01	0.00	0.01	0.01

Unmitigated Construction Off-Site

Category (tons/yr)	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.3 Demolition Debris Haul - 2022

Unmitigated Construction On-Site

Category (tons/yr)	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00
Off Road	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Unmitigated Construction Off-Site

Category (tons/yr)	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.4 Site Preparation - 2022

Unmitigated Construction On-Site

Category (tons/yr)	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					0.01	0.00	0.01	0.00	0.00	0.00
Off Road	0.00	0.03	0.01	0.00		0.00	0.00		0.00	0.00
Total	0.00	0.03	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00

Unmitigated Construction Off-Site

Category (tons/yr)	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5 Grading - 2022

Unmitigated Construction On-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust						0.01	0.00	0.01	0.01	0.00	0.01
Off Road		0.01	0.06	0.03	0.00		0.00	0.00		0.00	0.00
Total		0.01	0.06	0.03	0.00	0.01	0.00	0.01	0.01	0.00	0.01

Unmitigated Construction Off-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.6 Building Construction - 2022

Unmitigated Construction On-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Offroad		0.09	0.68	0.69	0.00	0.00	0.03	0.03	0.00	0.03	0.03
Total		0.09	0.68	0.69	0.00	0.00	0.03	0.03	0.00	0.03	0.03

Unmitigated Construction Off-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor		0.00	0.04	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Worker		0.01	0.00	0.05	0.00	0.02	0.00	0.02	0.00	0.00	0.00
Total		0.01	0.05	0.06	0.00	0.02	0.00	0.02	0.01	0.00	0.01

3.6 Building Construction - 2023

Unmitigated Construction On-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Offroad		0.18	1.41	1.51	0.00	0.00	0.06	0.06	0.00	0.06	0.06
Total		0.18	1.41	1.51	0.00	0.00	0.06	0.06	0.00	0.06	0.06

Unmitigated Construction Off-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor		0.00	0.07	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Worker		0.01	0.01	0.11	0.00	0.04	0.00	0.04	0.01	0.00	0.01
Total		0.01	0.08	0.13	0.00	0.05	0.00	0.05	0.01	0.00	0.01

3.7 Paving - 2023

Unmitigated Construction On-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road		0.01	0.06	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving		0.00				0.00	0.00	0.00	0.00	0.00	0.00
Total		0.01	0.06	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Unmitigated Construction Off-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.8 Architectural Coating - 2023

Unmitigated Construction On-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Archit. Coating		0.14					0.00	0.00		0.00	0.00
Off-Road		0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		0.14	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Unmitigated Construction Off-Site

Category	tons/yr	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Hauling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Criteria Air Pollutant Emissions Summary - Construction Unmitigated

Annual emissions divided by total construction duration to obtain average daily emissions. Average construction emissions accounts for the duration of each construction phase and the time each piece of construction equipment is onsite.

Total Construction Days	2022	2023	Calendar Days
393	153	240	549

Unmitigated Run - with Best Control Measures for Fugitive Dust

average lbs/day	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Total 2022	2	15	14	0.03	0.57	0.66	1	0.19	0.63	1
Total 2023	3	13	15	0.03	0.40	0.55	1	0.11	0.53	1
Average	2	14	14	0.03	0.46	0.59	1	0.14	0.57	1
BAAQMD Threshold	54	54	NA	NA	BMP	82	54	BMP	54	NA
Exceeds Threshold	No	No	NA	NA	NA	No	No	NA	No	NA

Average Daily Emissions and Emission Rates

Onsite Construction PM10 Exhaust Emissions[1]

Year	Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)
2022	0.65	8.15E-02	1.03E-02
2023	0.54	6.78E-02	8.55E-03

Onsite Construction PM2.5 Exhaust Emissions[2]

Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)
0.62	7.77E-02	9.79E-03
0.52	6.54E-02	8.24E-03

Offsite Construction PM10 Exhaust Emissions[1]

Year	Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000ft (lbs/day) [3]	Emission Rate (lbs/hr)	Emission Rate (g/s)
2022	9.15E-03	1.67E-04	2.09E-05	2.63E-06
2023	5.33E-03	9.73E-05	1.22E-05	1.53E-06

Offsite Construction PM2.5 Exhaust Emissions[2]

Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000ft (lbs/day) [3]	Emission Rate (lbs/hr)	Emission Rate (g/s)
8.76E-03	1.60E-04	2.00E-05	2.52E-06
5.08E-03	9.27E-05	1.16E-05	1.46E-06

Note: Emissions evenly distributed over 96 modeled volume sources.

Hauling Length (miles)	20	miles
Haul Length within 1,000 ft of Site (mile) [3]	0.36	miles
Hours per work day (7:00 AM to 4:00 PM, 1-hour of breaks) [4]	8	hours

Year	Workdays	Duration [5]
2022	153	0.59
2023	240	0.92

[1] DPM emissions taken as PM_{10} exhaust emissions from CalEEMod average daily emissions.

[2] $PM_{2.5}$ emissions taken as $PM_{2.5}$ exhaust emissions from CalEEMod average daily emissions.

[3] Emissions from CalEEMod offsite average daily emissions, which is based on proportioned haul truck trip distances, are adjusted to evaluate emissions from the 0.36-mile route within 1,000 of the project site.

[4] Work hours applied in By Hour/Day (HRDOW) variable emissions module in air dispersion model (see App B - Air Dispersion Model Output).

[5] Construction duration determined for each year of construction to adjust receptor exposures to the exposure durations for each construction year (see App C - Risk Calculations).

Criteria Air Pollutant Emissions Summary - Operations, 2023

Proposed Project

Unmitigated Operational

		ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Category	tons/yr										
Area		0.09	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy		0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mobile		0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		0.09	0.02	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BAAQMD Threshold (T/YR)		10	10	NA	NA	NA	NA	15	NA	NA	10
Exceeds thresholds		No	No					No			No

Criteria Air Pollutant Emissions Summary - Operations, 2023

Annual emissions divided by 365 days/year to obtain average daily emissions.

Proposed Project

lbs/day	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Area	0.48	0.01	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy	0.01	0.07	0.03	0.00	0.00	0.01	0.01	0.00	0.01	0.01
Mobile	0.00	0.03	0.03	0.00	0.02	0.00	0.02	0.00	0.00	0.00
Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.49**	**0.11**	**0.60**	**0.00**	**0.02**	**0.01**	**0.02**	**0.00**	**0.01**	**0.01**
BAAQMD Threshold (Daily)	54	54					82			54
Exceeds Threshold	No	No					No			No

Assumptions Worksheet

CalEEMod Inputs - The Mosaic Project, Construction

Name:	The Mosaic Project, Construction
Project Number:	TMP-01
Project Location:	17015 Cull Canyon Road
County:	Alameda County
Climate Zone:	5
Land Use Setting:	Urban
Operational Year:	2023
Utility Company:	PG&E/East Bay Community Energy
Air Basin:	SFBAAB
Air District:	Bay Area Air Quality Management District (BAAQMD)

Proiect Site Acreage	37
Disturbed Site Acreage	2.0

Project Components	SQFT	Tons			
Demolition					
Garage Demolition	7,500	345			
Other Asphalt Demolition	16,956	251			
Existing Structures to Remain	***Units***	***SQFT***	***Stories***	***Building Footprint (sqft)***	***ACRES***
Mobile Home *(future Caretaker's Unit)*		1,206	1	1,206	0.03
Barn		970	1	970	0.02
New Construction		***SQFT***	***Stories***	***Building Footprint (sqft)***	***ACRES***
Camping Cabins (12 x 400SF)	12	4,800	1	4,800	0.11
Central Meeting and Dining Hall		8,506	2	4,253	0.10
Restroom/Shower Building		1,025	1	1,025	0.02
Residential Home *(Staff Housing)*	1	2,636	2	1,318	0.03
Total New Building Area		**16,967**			**0.26**
Parking Lot[1]	15	6,000			0.14
Other Asphalt Surfaces[2]		**34,862**			0.80
Landscaping/Hardscaping[2]		**34,862**			0.80

Notes

[1] Model uses CalEEMod default parking area of 400sf/space

[2] Assumes half of remaning area not covered by building space or parking area will be half asphalt and half landscape/hardscape

CalEEMod Land Use Inputs

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage*	Land Use Square Feet
Residential	Mobile Home Park	12.000	DU	0.23	14,331
Residential	Single Family Housing	1.000	DU	0.03	2,636
Parking	Parking Lot	6.000	1000 sqft	0.14	6,000
Parking	Other Asphalt Surfaces	34.862	1000 sqft	0.80	34,862
Parking	Other Non-asphalt Surfaces	34.862	1000 sqft	0.80	34,862
				2.00	

Demolition

Component	Amount to be Demolished (Tons)	Haul Truck Capacity (Tons)[1]	Haul Distance (miles)[2]	Total Trip Ends	Duration (days)	Trip Ends/Day
Building Demolition	345	20	20	35	34	2
Asphalt Demolition	251	20	20	26	34	1
Total	596			61		

Notes

[1] CalEEMod default truck capacity

[2] CalEEMod default haul distance

Architectural Coating

	Percent Painted
Exterior	100%
Interior	100%

CalEEMod Default

	VOC content (grams/Liter)
Interior:	100
Exterior:	150

Structures	Land Use Square Feet	CalEEMod Factor[1]	Total Paintable Surface Area	Paintable Interior Area[2]	Paintable Exterior Area[2]
Total Residential Area[3]					
Camping Cabins (12 x 400SF)	4,800	2.7	12,960	9,720	3,240
Central Meeting and Dining Hall	8,506	2.7	22,966	17,225	5,742
Restroom/Shower Building	1,025	2.7	2,768	2,076	692
Residential Home (Staff Housing)	2,636	2.7	7,117	5,338	1,779
Mobile Home (future Caretaker's Unit)	1,206	2.7	3,256	2,442	814
Barn	970	2.7	2,619	1,964	655
				38,765	**12,922**
Parking					
Parking Lot [3]	6,000	6%	360		360
			360		360

Notes

[1] The program assumes the total surface for painting equals 2.7 times the floor square footage for residential and 2 times that for nonresidential square footage defined by the user.

[2] CalEEMod methodology calculates the paintable interior and exterior areas by multiplying the total paintable surface area by 75 and 25 percent, respectively.

[3] Architectural coatings for the parking lot is based on CalEEMod methodology applied to a surface parking lot (i.e., striping), in which 6% of surface area is painted.

BAAQMD Construction BMPs

Replace Ground Cover	PM10:	5	% Reduction
Replace Ground Cover	PM2.5:	5	% Reduction
Water Exposed Area	Frequency:	2	per day
	PM10:	55	% Reduction
	PM25:	55	% Reduction
Water Demolished Area	Frequency:	2	per day
	PM10:	36	% Reduction
	PM25:	36	% Reduction
Unpaved Roads	Vehicle Speed:	15	mph
	Clean Paved Road	9	% PM Reduction

Carbon Intensity Factors

East Bay Community Carbon Intensity Factors

EBC CO_2 Intensity Factor[1]	427.57	pounds per megawatt hour
CO2:	424.48	pounds per megawatt hour
CH4:[2]	0.0520	pound per megawatt hour
N2O:[2]	0.0062	pound per megawatt hour

Notes

[1] Based on the EBCE 2020 Power Mix

Construction Activities and Schedule Assumptions: The Mosaic Project

** Construction schedule provided by applicant*

		Construction Schedule		
Construction Activities	**Phase Type**	**Start Date**	**End Date**	**CalEEMod Duration**
Demolition	Demolition	6/1/2022	6/28/2022	20
Demolition Debris Haul	Demolition	6/1/2022	6/28/2022	20
Site Preparation	Site Preparation	6/29/2022	6/30/2022	2
Grading	Grading	7/1/2022	7/6/2022	4
Building Construction	Building Construction	7/7/2022	4/12/2023	200
Paving	Paving	3/30/2023	4/12/2023	10
Architectural Coating	Architectural Coating	3/30/2023	4/12/2023	10

Normalization Calculations *

CalEEMod Defaults Construction Duration	
315	days of construction
0.86	years of construction
10.36	months of construction

Assumed Construction Duration	
6/1/2022	12/1/2023
548	days
18.02	months

Normalization Factor: 1.74

Normalized CalEEMod Construction Schedule Inputs

Construction Activities	Phase Type	Start Date	End Date	CalEEMod Duration (Workday)
Demolition	Demolition	6/1/2022	7/18/2022	34
Demolition Debris Haul	Demolition	6/1/2022	7/18/2022	34
Site Preparation	Site Preparation	7/19/2022	7/22/2022	4
Grading	Grading	7/23/2022	8/2/2022	7
Building Construction	Building Construction	8/3/2022	12/1/2023	348
Paving	Paving	11/8/2023	12/1/2023	18
Architectural Coating	Architectural Coating	11/8/2023	12/1/2023	18

CalEEMod Construction Off-Road Equipment Inputs

**Based on CalEEMod defaults, assumed equipment would not be shared for most conservative results*

General Construction Hours: 8 hours btwn 7:00 AM to 4:00 PM (with 1 hr break), Mon-Fri

Water Truck Vendor Trip Calculation

Amount of Water (gal/acre/day)[1]	Water Truck Capacity (gallons)[2]
10,000	4,000

[1] Based on data provided in Guidance for Application for Dust Control Permit (https://www.epa.gov/sites/default/files/2019-04/documents/mr_guidanceforapplicationfordustcontrolpermit.pdf)

[2] Based on standard water truck capacity (https://www.mclellanindustries.com/trucks/water-trucks/)

[3] assumes that dozers, tractors/loaders/backhoes, and graders can disturb 0.50 acres per day and scrapers can disturb 1 acre per day.

Construction Equipment Details							
	Equipment	**model**	**# of Equipment**	**hr/day**	**hp**	**load factor***	**total trips**
Demolition							
	Concrete/Industrial Saws		1	8	81	0.73	
	Rubber Tired Dozers		1	8	247	0.4	
	Tractors/Loaders/Backhoes		3	8	97	0.37	
	Worker Trips						13
	Vendor Trips						0
	Hauling Trips						0
	Water Trucks (Added to Vendor Trips)			Acres Disturbed:	2		10
Demolition Debris Haul							
	No additional equipment for Demolition Debris Haul						
	Worker Trips						0
	Vendor Trips						0
	Hauling Trips						61
Site Preparation							
	Graders		1	8	187	0.41	
	Rubber Tired Dozers		1	7	247	0.4	
	Tractors/Loaders/Backhoes		1	8	97	0.37	
	Worker Trips						8
	Vendor Trips						0
	Hauling Trips						0
	Water Trucks (Added to Vendor Trips)			Acres Disturbed:	1.44		8
Grading							
	Graders		1	8	187	0.41	
	Rubber Tired Dozers		1	8	247	0.4	
	Tractors/Loaders/Backhoes		2	7	97	0.37	
	Worker Trips						10
	Vendor Trips						0
	Hauling Trips						0
	Water Trucks (Added to Vendor Trips)			Acres Disturbed:	1.88		10
Building Construction							
	Cranes		1	6	231	0.29	
	Forklifts		1	6	89	0.2	
	Generator Sets		1	8	84	0.74	
	Tractors/Loaders/Backhoes		1	6	97	0.37	
	Welders		3	8	46	0.45	
	Worker Trips						41
	Vendor Trips						14
	Hauling Trips						0
Paving							
	Cement and Mortar Mixers		1	6	9	0.56	
	Pavers		1	6	130	0.42	
	Paving Equipment		1	8	132	0.36	
	Rollers		1	7	80	0.38	
	Tractors/Loaders/Backhoes		1	8	97	0.37	
	Worker Trips						13
	Vendor Trips						0
	Hauling Trips						0
Architectural Coating							
	Air Compressors		1	6	78	0.48	
	Worker Trips						8
	Vendor Trips						0
	Hauling Trips						0

Pavement Volume to Weight Conversion

Component	Total SF of Area[1]	Assumed Thickness (foot)[2]	Debris Volume (cu. ft)	Weight of Crushed Asphalt (lbs/cf)[3]	AC Mass (lbs)	AC Mass (tons)
OtherAsphalt Demolition	16,956	0.333	5,652	89	502,400	251.20
Total	16,956					251

[1] Based on aerial image of existing project site.

[2] Pavements and Surface Materials. Nonpoint Education for Municipal Officials, Technical Paper Number 8. University of

[3] https://www.calrecycle.ca.gov/swfacilities/cdi/Tools/Calculations

Demo Haul Trip Calculation

*Conversion factors**

0.046	ton/SF
1.2641662	tons/cy
20	tons
15.82070459	CY
0.791035229	CY/ton

Building	BSF Demo	Tons/SF	Tons	Haul Truck (CY)	Haul Truck (Ton)	Round Trips	Total Trip Ends
Garage Demoltion	7,500	0.046	345	16	20.00	17	35

*CalEEMod User's Guide Version 2020.4, Appendix A

Construction Trips Worksheet

Phase Name	Worker Trip Ends Per Day	Vendor Trip Ends Per Day	Haul Truck Trip Ends Per Day	Total Haul Truck Trip Ends	Start Date	End Date	Workdays
Demolition	13	10	0	0	6/1/2022	7/18/2022	34
Demolition Debris Haul	0	0	2	61	6/1/2022	7/18/2022	34
Site Preparation	8	8	0	0	7/19/2022	7/22/2022	4
Grading	10	10	0	0	7/23/2022	8/2/2022	7
Building Construction	41	14	0	0	8/3/2022	12/1/2023	348
Paving	13	0	0	0	11/8/2023	12/1/2023	18
Architectural Coating	8	0	0	0	11/8/2023	12/1/2023	18

Construction Activity (Overlapping)	Worker Trip Ends Per Day	Vendor Trip Ends Per Day	Haul Truck Trip Ends Per Day	Total Trip Ends Per Day	Start Date	End Date	Workdays
Demolition	13	10	0	23	6/1/2022	7/18/2022	34
Demolition Debris Haul	0	0	2	2	6/1/2022	7/18/2022	34
Site Preparation	8	8	0	16	7/19/2022	7/22/2022	4
Grading	10	10	0	20	7/23/2022	8/2/2022	7
Building Construction	41	14	0	55	8/3/2022	12/1/2023	348
Building Construction, Paving, and Architectural Coating	62	14	0	76	11/8/2023	12/1/2023	18
Maximum Daily Trips	**62**	**14**	**2**	**76**			

CalEEMod Inputs - The Mosaic Project, Operations

Name: The Mosaic Project
Project Number: TMP-01
Project Location: 17015 Cull Canyon Road
County: Alameda County
Climate Zone: 5
Land Use Setting: Urban
Operational Year: 2023
Utility Company: PG&E/East Bay Community Energy
Air Basin: SFBAAB
Air District: Bay Area Air Quality Management District (BAAQMD)

Proiect Site Acreage 37
Disturbed Site Acreage 2.0

Project Components	**SQFT**	**Tons**			
Existing Structures to Remain	***Units***	***SQFT***	***Stories***	***Building Footprint (sqft)***	***ACRES***
Mobile Home *(future Caretaker's Unit)*		1,206	1	1,206	0.03
Barn		970	1	970	0.02
New Construction		***SQFT***	***Stories***	***Building Footprint (sqft)***	***ACRES***
Camping Cabins (12 x 400SF)	12	4,800	1	4,800	0.11
Central Meeting and Dining Hall		8,506	2	4,253	0.10
Restroom/Shower Building		1,025	1	1,025	0.02
Residential Home *(Staff Housing)*	1	2,636	2	1,318	0.03
Total New Building Area		**16,967**			**0.26**
Parking Lot[1]	15	6,000			0.14
Other Asphalt Surfaces[2]		**34,862**			0.80
Landscaping/Hardscaping[2]		**34,862**			0.80

CalEEMod Land Use Inputs

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Land Use Square Feet
Residential	Mobile Home Park[1]	12	DU	0.23	16,507
Residential	Single Family Housing	1	DU	0.03	2,636
Parking	Parking Lot	6	1000 sqft	0.14	6,000
Parking	Other Asphalt Surfaces	34.862	1000 sqft	0.80	34,862
Parking	Other Non-asphalt Surfaces	34.862	1000 sqft	0.80	34,862
				2.00	

Notes
[1] Includes the building area from the future caretakers unit and barn

Trips Calculations

Project will have: 23 Week Long Programs
12 Weekend Programs

	M[1]	T[2]	W[2]	Th[2]	F[1]	Sat[2]	Sun[2]
Bus Trips (Annual)	147				147	24	24
Passenger Vehicle Trips (Annual)	690	230	230	230	690	120	120
Food Truck Trips (Annual)	46				46	0	
Water Truck Trips (Annual)	92						48
Total Trips	975	230	230	230	883	144	192

	Weekday	Saturday	Sunday
Total Trips	2,548	144	192
Average Trips	1.96	2.77	3.69
Trip Rate	0.16	0.23	0.31

Notes
[1] Monday and Friday Trips are based on trip generation from W-Trans Focused Traffic Study.
[2] Based on assumption that feweer than 10 daily trips would occur during weekends, Tuesday, Wednesday, and Thursday from W-Trans Traffic Study.
[2] Assumes two trucks will travel to/from the project site following the 23 program weeks and 1 after each of the weekend programs to remove brine from the water treatment process

Water Use

Land Use	Indoor	Outdoor	Total (gal/yr)
Total Water Use	786,000	0	786,000

Notes
[1] Assumes 100% aerobic treatment
[2] Based on information from applicant. Assumes all potable water use and assigns all water use to mobile home park

Solid Waste

Land Use	Total Solid Waste (tons/yr)
Total Solid Waste	18

Notes
1 Based on information from applicant. Added all solid waste to mobile home park land use

Architectural Coating

	Percent Painted
Exterior	100%
Interior	100%

CalEEMod Default

	VOC content (grams/Liter)
Interior:	100
Exterior:	150

Structures	Land Use Square Feet	CalEEMod Factor[1]	Total Paintable Surface Area	Paintable Interior Area[2]	Paintable Exterior Area[2]
Total Residential Area[3]					
Camping Cabins (12 x 400SF)	4,800	2.7	12,960	9,720	3,240
Central Meeting and Dining Hall	8,506	2.7	22,966	17,225	5,742
Restroom/Shower Building	1,025	2.7	2,768	2,076	692
Residential Home (Staff Housing)	2,636	2.7	7,117	5,338	1,779
Mobile Home (future Caretaker's Uni	1,206	2.7	3,256	2,442	814
Barn	970	2.7	2,619	1,964	655
				38,765	**12,922**
Parking					
Parking Lot [3]	6,000	6%	360		360
			360		360

Notes

1 The program assumes the total surface for painting equals 2.7 times the floor square footage for residential and 2 times that for nonresidential square footage defined by the user. The model assumes total surface painting of 2.7 times the floor space for the most conservative results.
2 CalEEMod methodology calculates the paintable interior and exterior areas by multiplying the total paintable surface area by 75 and 25 percent, respectively.
3 painted.

Natural Gas Use from Fireplaces

Land Use Subtype	Number of Propane Fireplaces	Hours of Operation/Day[1]	Number of Days in Use/Year[1]	BTU/hr/fireplace	KBTU
Proposed Project	1.00	1.00	104.00	60,000.00	6,240.00

Notes
1 Assumes use 1 hour of use 3 days per week during 23 week long programs and 1 day per weekend during weekend program and occasionally to start the day

Electricity (Buildings)

Default CalEEMod Energy Use

Land Use Subtype	Title-24 Electricity Energy Intensity (kWhr/size/year)*	Nontitle-24 Electricity Energy Intensity (kWhr/size/year)	Lighting Energy Intensity (KWhr/size/year)	Title-24 Natural Gas Energy Intensity (KBTU/size/year)*	Nontitle-24 Natural Gas Energy Intensity (KBTU/size/year)
Mobile Home Park	**39.50**	4,004.74	1,038.60	**17,941.07**	2,615.00
Other Asphalt Surfaces	**0.00**	0.00	0.00	**0.00**	0.00
Other Non-Asphalt Surfaces	**0.00**	0.00	0.00	**0.00**	0.00
Parking Lot	**0.00**	0.00	0.35	**0.00**	0.00
Single Family Housing	**45.71**	6,155.97	1,608.84	**35,976.14**	2,615.00

Carbon Intensity Factors

East Bay Community Carbon Intensity Factors

EBC CO_2 Intensity Factor[1]	427.57	pounds per megawatt hour
CO2:	424.48	pounds per megawatt hour
CH4:[2]	0.0520	pound per megawatt hour
N2O:[2]	0.0062	pound per megawatt hour

Notes
1 Based on the EBCE 2020 Power Mix

Changes to the CalEEMod Defaults - Residential Fleet Mix 2025

Annual Project Trips:	2,885	
Bus Trips (Annual)	324	12%
Passenger Vehicle Trips (Annual)	2,090	80%
Food Truck Trips (Annual)	70	3%
Water Truck Trips (Annual)	140	5%
Total Trips	2,624	100%

Default	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH	
FleetMix (Model Default)	0.569121	0.056513	0.18087	0.112593	0.021111	0.005121	0.01319	0.012692	0.0008	0.00058	0.024593	0.000331	0.002484	100%
Trips	1,642	163	522	325	61	15	38	37	2	2	71	1	7	2,885
Percent	83%			11%	6%									100%
without buses/MH	0.569121	0.056513	0.180870	0.112593	0	0	0.013190	0	0	0	0	0.000331	0	93%
Percent	81%			11%	1%									93%
Adjusted without buses/MH	0.569121	0.056513	0.180870	0.112593	0.000000	0.000000	0.054931	0.000000	0.000000	0.000000	0.000000	0.001378	0.000000	
Percent adjusted	81%			11%	6%									98%
Assumed Mix	79.6%			0.00%	20.35%									100%
adjusted with Assumed	**0.562057**	**0.055812**	**0.178625**	**0.000000**	**0.000000**	**0.000000**	**0.080030**	**0.000000**	**0.000000**	**0.000000**	**0.000000**	**0.123476**	**0.000000**	**100%**
Percent Check:	80%			0%	20%									
Trips	1,621	161	515	0	0	0	231	0	0	0	0	356	0	2,885
	2,298			*0*	*231*									

East Bay Community Energy Carbon Intensity Factor Calculator

The project team calculated a custom electricity emissions factor for East Bay Community Energy (EBCE) by consulting the most recent data from the US EPA's Emissions & Generation Resource Integrated Database (eGRID). This database includes records of GHG emissions and power generation by all power plants in the United States. Using this information, the team determined the electricity emissions factor for all power plants within California by fuel source, since it is not feasible to identify the specific power plants that supply EBCE. The team consulted EBCE's Power Mix, which identifies the percent of EBCE's electricity generated by various fuel sources. Using the average emissions factor for power plants by fuel source, in combination with EBCE's specific fuel mix, the team was able to calculate an emissions factor that accurately reflects EBCE's particular sources of electricity.

Source: EBCE. 2022. 2020 Power Content Label. https://ebce.org/our-power-mix/. Accessed May 17, 2022

$MTCO_2e$			$MTCO_2e$/kWh
Source	**Percent**	**Adjusted percent**	**Emission factor**
Coal	0.00%	0.00%	0.00051255
Large hydro	14.50%	14.50%	0
Natural gas	0.10%	0.10%	0.00038755
Nuclear	0.90%	0.90%	0
Oil	0.00%	0.00%	0.00008742
Other/unspecified	44.90%	44.90%	0.00042800
Biomass	1.90%	1.90%	0.00003007
Geothermal	3.00%	3.00%	0.00002709
Small hydro	1.60%	1.60%	0
Solar	14.10%	14.10%	0
Wind	19.00%	19.00%	0
	100.00%	100.00%	

	MTCO2e/kWh
Emission factor	**0.000193943**
Calculation check	0.000193943
	MTCO2e/MWh
	0.1939434274
	lbsCO2e/MWh
	427.568

East Bay Community Energy Carbon Intensity Factor Calculator

The project team calculated a custom electricity emissions factor for East Bay Community Energy (EBCE) by consulting the most recent data from the US EPA's Emissions & Generation Resource Integrated Database (eGRID). This database includes records of GHG emissions and power generation by all power plants in the United States. Using this information, the team determined the electricity emissions factor for all power plants within California by fuel source, since it is not feasible to identify the specific power plants that supply EBCE. The team consulted EBCE's Power Mix, which identifies the percent of EBCE's electricity generated by various fuel sources. Using the average emissions factor for power plants by fuel source, in combination with EBCE's specific fuel mix, the team was able to calculate an emissions factor that accurately reflects EBCE's particular sources of electricity.

Source: EBCE. 2022. 2020 Power Content Label. https://ebce.org/our-power-mix/. Accessed May 17, 2022

$MTCO_2$

			$MTCO_2$/kWh
Source	**Percent**	**Adjusted percent**	**Emission factor**
Coal	0.00%	0.00%	0.000510373
Large hydro	14.50%	14.50%	0
Natural gas	0.10%	0.10%	0.000387161
Nuclear	0.90%	0.90%	0
Oil	0.00%	0.00%	8.70222E-05
Other/unspecified	44.90%	44.90%	0.00042508
Biomass	1.90%	1.90%	2.52789E-05
Geothermal	3.00%	3.00%	2.70861E-05
Small hydro	1.60%	1.60%	0
Solar	14.10%	14.10%	0
Wind	19.00%	19.00%	0
	100.00%	100.00%	

	MTCO2/kWh
Emission factor	**0.0001925429**

MTCO2/MWh

0.192542875307

lbsCO2/MWh

424.480

East Bay Community Energy Carbon Intensity Factor Calculator

The project team calculated a custom electricity emissions factor for East Bay Community Energy (EBCE) by consulting the most recent data from the US EPA's Emissions & Generation Resource Integrated Database (eGRID). This database includes records of GHG emissions and power generation by all power plants in the United States. Using this information, the team determined the electricity emissions factor for all power plants within California by fuel source, since it is not feasible to identify the specific power plants that supply EBCE. The team consulted EBCE's Power Mix, which identifies the percent of EBCE's electricity generated by various fuel sources. Using the average emissions factor for power plants by fuel source, in combination with EBCE's specific fuel mix, the team was able to calculate an emissions factor that accurately reflects EBCE's particular sources of electricity.

Source: EBCE. 2022. 2020 Power Content Label. https://ebce.org/our-power-mix/. Accessed May 17, 2022

$MTCH_4$			$MTCH_4$/kWh
Source	**Percent**	**Adjusted percent**	**Emission factor**
Coal	0.00%	0.00%	5.6246E-08
Large hydro	14.50%	14.50%	0
Natural gas	0.10%	0.10%	6.89108E-09
Nuclear	0.90%	0.90%	0
Oil	0.00%	0.00%	6.45126E-09
Other/unspecified	44.90%	44.90%	0.00000005
Biomass	1.90%	1.90%	7.65816E-08
Geothermal	3.00%	3.00%	0
Small hydro	1.60%	1.60%	0
Solar	14.10%	14.10%	0
Wind	19.00%	19.00%	0
	100.00%	100.00%	

	MTCH4/kWh
Emission factor	**0.000000023610**

MTCH4/MWh
0.0000236095118280
lbsCH4/MWh
0.052050

East Bay Community Energy Carbon Intensity Factor Calculator

The project team calculated a custom electricity emissions factor for East Bay Community Energy (EBCE) by consulting the most recent data from the US EPA's Emissions & Generation Resource Integrated Database (eGRID). This database includes records of GHG emissions and power generation by all power plants in the United States. Using this information, the team determined the electricity emissions factor for all power plants within California by fuel source, since it is not feasible to identify the specific power plants that supply EBCE. The team consulted EBCE's Power Mix, which identifies the percent of EBCE's electricity generated by various fuel sources. Using the average emissions factor for power plants by fuel source, in combination with EBCE's specific fuel mix, the team was able to calculate an emissions factor that accurately reflects EBCE's particular sources of electricity.

Source: EBCE. 2022. 2020 Power Content Label. https://ebce.org/our-power-mix/. Accessed May 17, 2022

MTN_2O

			MTN_2O/kWh
Source	**Percent**	**Adjusted percent**	**Emission factor**
Coal	0.00%	0.00%	8.16475E-09
Large hydro	14.50%	14.50%	0
Natural gas	0.10%	0.10%	7.46256E-10
Nuclear	0.90%	0.90%	0
Oil	0.00%	0.00%	8.36344E-10
Other/unspecified	44.90%	44.90%	0.00
Biomass	1.90%	1.90%	9.98064E-09
Geothermal	3.00%	3.00%	0
Small hydro	1.60%	1.60%	0
Solar	14.10%	14.10%	0
Wind	19.00%	19.00%	0
	100.00%	100.00%	

	MTN2O/kWh
Emission factor	**0.000000003**

MTN2O/MWh
0.00000279051243210
lbsN2O/MWh
0.00615196

CalEEMod Modeling: Construction and Operations

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

The Mosaic Project

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1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	34.86	1000sqft	0.80	34,862.00	0
Other Non-Asphalt Surfaces	34.86	1000sqft	0.80	34,862.00	0
Parking Lot	6.00	1000sqft	0.14	6,000.00	0
Mobile Home Park	12.00	Dwelling Unit	0.23	14,331.00	34
Single Family Housing	1.00	Dwelling Unit	0.03	2,636.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	5			**Operational Year**	2023
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	424.48	**CH4 Intensity (lb/MWhr)**	0.052	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on EBCE 2020 Power Mix

Land Use - "Mobile Home Park" includes area from dining hall and restroom/shower rooms.

Construction Phase - normalized schedule based on provided project duration of 1.5 years and CalEEMod defaults

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - No additional equipment for Demolition Debris Haul

Off-road Equipment -

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Off-road Equipment -

Off-road Equipment -

Trips and VMT - See calculations in assumptions file. Water truck trips added to vendor trips.

Demolition -

Grading -

Architectural Coating - includes area from existing mobile home and barn. Only considers parking lot asphalt area for parking painting.

Vehicle Trips - assigns all trips to mobile home park. Trips based on data from W-Trans and water treatment trips form applicant

Woodstoves - Assumes propane camp fireplace will be used for 1 hour over 3 days per week during 23 week long programs and 1 day per weekend during weekend

Area Coating - includes the area for mobile home and barn painting, parking coating only includes parking lot area

Energy Use -

Water And Wastewater - based on data from USS section. Assumes all potable water use, Assumes 100% aerobic treatment

Construction Off-road Equipment Mitigation - BAAQMD BMPs

Water Mitigation -

Fleet Mix - based on the vehicle fleet mix provided by the applicant

Solid Waste - 18 tons per year of waste generated based on USS section

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	4,543.00	360.00
tblArchitecturalCoating	ConstArea_Residential_Exterior	11,453.00	12,922.00
tblArchitecturalCoating	ConstArea_Residential_Interior	34,358.00	38,765.00
tblAreaCoating	Area_Parking	4543	360
tblAreaCoating	Area_Residential_Exterior	11453	12922
tblAreaCoating	Area_Residential_Interior	34358	38765
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	10.00	18.00
tblConstructionPhase	NumDays	200.00	348.00
tblConstructionPhase	NumDays	20.00	34.00
tblConstructionPhase	NumDays	20.00	34.00

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tblConstructionPhase	NumDays	4.00	7.00
tblConstructionPhase	NumDays	10.00	18.00
tblConstructionPhase	NumDays	2.00	4.00
tblConstructionPhase	PhaseEndDate	6/7/2023	12/1/2023
tblConstructionPhase	PhaseEndDate	5/10/2023	12/1/2023
tblConstructionPhase	PhaseEndDate	6/28/2022	7/18/2022
tblConstructionPhase	PhaseEndDate	7/26/2022	7/18/2022
tblConstructionPhase	PhaseEndDate	8/3/2022	8/2/2022
tblConstructionPhase	PhaseEndDate	5/24/2023	12/1/2023
tblConstructionPhase	PhaseEndDate	7/28/2022	7/22/2022
tblConstructionPhase	PhaseStartDate	5/25/2023	11/8/2023
tblConstructionPhase	PhaseStartDate	8/4/2022	8/3/2022
tblConstructionPhase	PhaseStartDate	6/29/2022	6/1/2022
tblConstructionPhase	PhaseStartDate	7/29/2022	7/23/2022
tblConstructionPhase	PhaseStartDate	5/11/2023	11/8/2023
tblConstructionPhase	PhaseStartDate	7/27/2022	7/19/2022
tblFireplaces	FireplaceDayYear	11.14	104.00
tblFireplaces	FireplaceDayYear	11.14	0.00
tblFireplaces	FireplaceHourDay	3.50	1.00
tblFireplaces	FireplaceHourDay	3.50	0.00
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	NumberGas	1.80	0.00
tblFireplaces	NumberGas	0.25	0.00
tblFireplaces	NumberNoFireplace	0.48	11.00
tblFireplaces	NumberNoFireplace	0.08	1.00
tblFireplaces	NumberPropane	0.00	1.00
tblFireplaces	NumberWood	2.04	0.00

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tblFireplaces	NumberWood	0.43	0.00
tblFleetMix	HHD	0.01	0.00
tblFleetMix	LDA	0.57	0.56
tblFleetMix	LDT1	0.06	0.06
tblFleetMix	LDT2	0.18	0.18
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	5.1210e-003	0.00
tblFleetMix	MCY	0.02	0.00
tblFleetMix	MDV	0.11	0.00
tblFleetMix	MH	2.4840e-003	0.00
tblFleetMix	MHD	0.01	0.08
tblFleetMix	OBUS	8.0000e-004	0.00
tblFleetMix	SBUS	3.3100e-004	0.12
tblFleetMix	UBUS	5.8000e-004	0.00
tblLandUse	LandUseSquareFeet	34,860.00	34,862.00
tblLandUse	LandUseSquareFeet	34,860.00	34,862.00
tblLandUse	LandUseSquareFeet	14,400.00	14,331.00
tblLandUse	LandUseSquareFeet	1,800.00	2,636.00
tblLandUse	LotAcreage	1.51	0.23
tblLandUse	LotAcreage	0.32	0.03
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CH4IntensityFactor	0.033	0.052
tblProjectCharacteristics	CO2IntensityFactor	203.98	424.48
tblProjectCharacteristics	N2OIntensityFactor	0.004	0.006
tblSolidWaste	SolidWasteGenerationRate	5.52	18.00
tblSolidWaste	SolidWasteGenerationRate	1.26	0.00

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tblTripsAndVMT	HaulingTripNumber	59.00	61.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	8.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	ST_TR	4.61	0.23
tblVehicleTrips	ST_TR	9.54	0.00
tblVehicleTrips	SU_TR	4.24	0.31
tblVehicleTrips	SU_TR	8.55	0.00
tblVehicleTrips	WD_TR	5.00	0.16
tblVehicleTrips	WD_TR	9.44	0.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	781,848.31	786,000.00
tblWater	IndoorWaterUseRate	65,154.03	0.00
tblWater	OutdoorWaterUseRate	492,904.37	0.00
tblWater	OutdoorWaterUseRate	41,075.36	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWoodstoves	NumberCatalytic	0.24	0.00
tblWoodstoves	NumberCatalytic	0.04	0.00
tblWoodstoves	NumberNoncatalytic	0.24	0.00
tblWoodstoves	NumberNoncatalytic	0.04	0.00
tblWoodstoves	WoodstoveDayYear	14.12	0.00

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tblWoodstoves	WoodstoveDayYear	21.06	0.00
tblWoodstoves	WoodstoveWoodMass	582.40	0.00
tblWoodstoves	WoodstoveWoodMass	956.80	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					
2022	0.1349	1.1101	1.0468	2.1000e-003	0.0703	0.0506	0.1209	0.0262	0.0482	0.0744	0.0000	180.6346	180.6346	0.0301	3.7200e-003	182.4937
2023	0.3426	1.5557	1.7447	3.4700e-003	0.0514	0.0658	0.1172	0.0139	0.0634	0.0774	0.0000	294.7639	294.7639	0.0419	5.7500e-003	297.5244
Maximum	**0.3426**	**1.5557**	**1.7447**	**3.4700e-003**	**0.0703**	**0.0658**	**0.1209**	**0.0262**	**0.0634**	**0.0774**	**0.0000**	**294.7639**	**294.7639**	**0.0419**	**5.7500e-003**	**297.5244**

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					
2022	0.1349	1.1101	1.0468	2.1000e-003	0.0433	0.0506	0.0939	0.0149	0.0482	0.0631	0.0000	180.6344	180.6344	0.0301	3.7200e-003	182.4935
2023	0.3426	1.5557	1.7447	3.4700e-003	0.0476	0.0658	0.1134	0.0130	0.0634	0.0764	0.0000	294.7636	294.7636	0.0419	5.7500e-003	297.5241
Maximum	**0.3426**	**1.5557**	**1.7447**	**3.4700e-003**	**0.0476**	**0.0658**	**0.1134**	**0.0149**	**0.0634**	**0.0764**	**0.0000**	**294.7636**	**294.7636**	**0.0419**	**5.7500e-003**	**297.5241**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not 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**	**25.32**	**0.00**	**12.95**	**30.60**	**0.00**	**8.08**	**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	**6-1-2022**	**8-31-2022**	0.5897	0.5897
2	**9-1-2022**	**11-30-2022**	0.4926	0.4926
3	**12-1-2022**	**2-28-2023**	0.4645	0.4645
4	**3-1-2023**	**5-31-2023**	0.4611	0.4611
5	**6-1-2023**	**8-31-2023**	0.4606	0.4606
6	**9-1-2023**	**9-30-2023**	0.1502	0.1502
		Highest	0.5897	0.5897

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	0.0878	1.5600e-003	0.0975	1.0000e-005		5.6000e-004	5.6000e-004		5.6000e-004	5.6000e-004	0.0000	0.5457	0.5457	1.6000e-004	3.0000e-005	0.5580
Energy	1.5400e-003	0.0131	5.5900e-003	8.0000e-005		1.0600e-003	1.0600e-003		1.0600e-003	1.0600e-003	0.0000	28.8748	28.8748	1.9600e-003	4.7000e-004	29.0646
Mobile	5.2000e-004	4.6600e-003	5.9600e-003	3.0000e-005	2.8100e-003	3.0000e-005	2.8400e-003	8.5000e-004	3.0000e-005	8.8000e-004	0.0000	2.5872	2.5872	6.0000e-005	2.0000e-004	2.6495
Waste						0.0000	0.0000		0.0000	0.0000	3.6538	0.0000	3.6538	0.2159	0.0000	9.0522
Water						0.0000	0.0000		0.0000	0.0000	0.2781	0.8189	1.0970	1.0600e-003	6.2000e-004	1.3071
Total	**0.0898**	**0.0194**	**0.1091**	**1.2000e-004**	**2.8100e-003**	**1.6500e-003**	**4.4600e-003**	**8.5000e-004**	**1.6500e-003**	**2.5000e-003**	**3.9319**	**32.8266**	**36.7585**	**0.2192**	**1.3200e-003**	**42.6314**

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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	0.0878	1.5600e-003	0.0975	1.0000e-005		5.6000e-004	5.6000e-004		5.6000e-004	5.6000e-004	0.0000	0.5457	0.5457	1.6000e-004	3.0000e-005	0.5580
Energy	1.5400e-003	0.0131	5.5900e-003	8.0000e-005		1.0600e-003	1.0600e-003		1.0600e-003	1.0600e-003	0.0000	28.8748	28.8748	1.9600e-003	4.7000e-004	29.0646
Mobile	5.2000e-004	4.6600e-003	5.9600e-003	3.0000e-005	2.8100e-003	3.0000e-005	2.8400e-003	8.5000e-004	3.0000e-005	8.8000e-004	0.0000	2.5872	2.5872	6.0000e-005	2.0000e-004	2.6495
Waste						0.0000	0.0000		0.0000	0.0000	3.6538	0.0000	3.6538	0.2159	0.0000	9.0522
Water						0.0000	0.0000		0.0000	0.0000	0.2385	0.7023	0.9408	9.1000e-004	5.3000e-004	1.1210
Total	**0.0898**	**0.0194**	**0.1091**	**1.2000e-004**	**2.8100e-003**	**1.6500e-003**	**4.4600e-003**	**8.5000e-004**	**1.6500e-003**	**2.5000e-003**	**3.8923**	**32.7100**	**36.6023**	**0.2190**	**1.2300e-003**	**42.4453**

	ROG	NOx	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**	**1.01**	**0.36**	**0.42**	**0.07**	**6.82**	**0.44**

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3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2022	7/18/2022	5	34	a
2	Demolition Debris Haul	Demolition	6/1/2022	7/18/2022	5	34	b
3	Site Preparation	Site Preparation	7/19/2022	7/22/2022	5	4	c
4	Grading	Grading	7/23/2022	8/2/2022	5	7	d
5	Building Construction	Building Construction	8/3/2022	12/1/2023	5	348	e
6	Paving	Paving	11/8/2023	12/1/2023	5	18	f
7	Architectural Coating	Architectural Coating	11/8/2023	12/1/2023	5	18	g

Acres of Grading (Site Preparation Phase): 3.75

Acres of Grading (Grading Phase): 7

Acres of Paving: 1.74

Residential Indoor: 38,765; Residential Outdoor: 12,922; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 360

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Demolition Debris Haul	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition Debris Haul	Rubber Tired Dozers	0	8.00	247	0.40
Demolition Debris Haul	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

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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	6.00	231	0.29
Building Construction	Forklifts		1	6.00	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	6.00	9	0.56
Paving	Pavers		1	6.00	130	0.42
Paving	Paving Equipment		1	8.00	132	0.36
Paving	Rollers		1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes		1	8.00	97	0.37
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
Demolition	5	13.00	10.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition Debris Haul	0	0.00	0.00	61.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	8.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	10.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	41.00	14.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	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

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3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0287	0.2826	0.2373	4.1000e-004		0.0142	0.0142		0.0133	0.0133	0.0000	35.8321	35.8321	9.1300e-003	0.0000	36.0603
Total	**0.0287**	**0.2826**	**0.2373**	**4.1000e-004**		**0.0142**	**0.0142**		**0.0133**	**0.0133**	**0.0000**	**35.8321**	**35.8321**	**9.1300e-003**	**0.0000**	**36.0603**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.5000e-004	9.3100e-003	2.6100e-003	4.0000e-005	1.1200e-003	9.0000e-005	1.2100e-003	3.2000e-004	9.0000e-005	4.1000e-004	0.0000	3.4323	3.4323	5.0000e-005	5.1000e-004	3.5870
Worker	6.2000e-004	4.5000e-004	5.3100e-003	2.0000e-005	1.7500e-003	1.0000e-005	1.7600e-003	4.6000e-004	1.0000e-005	4.7000e-004	0.0000	1.4045	1.4045	4.0000e-005	4.0000e-005	1.4179
Total	**9.7000e-004**	**9.7600e-003**	**7.9200e-003**	**6.0000e-005**	**2.8700e-003**	**1.0000e-004**	**2.9700e-003**	**7.8000e-004**	**1.0000e-004**	**8.8000e-004**	**0.0000**	**4.8368**	**4.8368**	**9.0000e-005**	**5.5000e-004**	**5.0048**

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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	0.0287	0.2826	0.2373	4.1000e-004		0.0142	0.0142		0.0133	0.0133	0.0000	35.8320	35.8320	9.1300e-003	0.0000	36.0603
Total	**0.0287**	**0.2826**	**0.2373**	**4.1000e-004**		**0.0142**	**0.0142**		**0.0133**	**0.0133**	**0.0000**	**35.8320**	**35.8320**	**9.1300e-003**	**0.0000**	**36.0603**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.5000e-004	9.3100e-003	2.6100e-003	4.0000e-005	1.0500e-003	9.0000e-005	1.1400e-003	3.1000e-004	9.0000e-005	4.0000e-004	0.0000	3.4323	3.4323	5.0000e-005	5.1000e-004	3.5870
Worker	6.2000e-004	4.5000e-004	5.3100e-003	2.0000e-005	1.6100e-003	1.0000e-005	1.6200e-003	4.3000e-004	1.0000e-005	4.4000e-004	0.0000	1.4045	1.4045	4.0000e-005	4.0000e-005	1.4179
Total	**9.7000e-004**	**9.7600e-003**	**7.9200e-003**	**6.0000e-005**	**2.6600e-003**	**1.0000e-004**	**2.7600e-003**	**7.4000e-004**	**1.0000e-004**	**8.4000e-004**	**0.0000**	**4.8368**	**4.8368**	**9.0000e-005**	**5.5000e-004**	**5.0048**

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3.3 Demolition Debris Haul - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.3800e-003	0.0000	6.3800e-003	9.7000e-004	0.0000	9.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	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**	**6.3800e-003**	**0.0000**	**6.3800e-003**	**9.7000e-004**	**0.0000**	**9.7000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	1.4000e-004	5.1000e-003	1.0500e-003	2.0000e-005	5.2000e-004	5.0000e-005	5.6000e-004	1.4000e-004	5.0000e-005	1.9000e-004	0.0000	1.8673	1.8673	4.0000e-005	2.9000e-004	1.9562
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.4000e-004**	**5.1000e-003**	**1.0500e-003**	**2.0000e-005**	**5.2000e-004**	**5.0000e-005**	**5.6000e-004**	**1.4000e-004**	**5.0000e-005**	**1.9000e-004**	**0.0000**	**1.8673**	**1.8673**	**4.0000e-005**	**2.9000e-004**	**1.9562**

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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					2.7300e-003	0.0000	2.7300e-003	4.1000e-004	0.0000	4.1000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	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**	**2.7300e-003**	**0.0000**	**2.7300e-003**	**4.1000e-004**	**0.0000**	**4.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	1.4000e-004	5.1000e-003	1.0500e-003	2.0000e-005	4.8000e-004	5.0000e-005	5.3000e-004	1.3000e-004	5.0000e-005	1.8000e-004	0.0000	1.8673	1.8673	4.0000e-005	2.9000e-004	1.9562
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.4000e-004**	**5.1000e-003**	**1.0500e-003**	**2.0000e-005**	**4.8000e-004**	**5.0000e-005**	**5.3000e-004**	**1.3000e-004**	**5.0000e-005**	**1.8000e-004**	**0.0000**	**1.8673**	**1.8673**	**4.0000e-005**	**2.9000e-004**	**1.9562**

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3.4 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0125	0.0000	0.0125	6.0100e-003	0.0000	6.0100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.6200e-003	0.0293	0.0142	3.0000e-005		1.2500e-003	1.2500e-003		1.1500e-003	1.1500e-003	0.0000	3.0231	3.0231	9.8000e-004	0.0000	3.0475
Total	**2.6200e-003**	**0.0293**	**0.0142**	**3.0000e-005**	**0.0125**	**1.2500e-003**	**0.0138**	**6.0100e-003**	**1.1500e-003**	**7.1600e-003**	**0.0000**	**3.0231**	**3.0231**	**9.8000e-004**	**0.0000**	**3.0475**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0000e-005	8.8000e-004	2.5000e-004	0.0000	1.1000e-004	1.0000e-005	1.1000e-004	3.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3230	0.3230	0.0000	5.0000e-005	0.3376
Worker	4.0000e-005	3.0000e-005	3.8000e-004	0.0000	1.3000e-004	0.0000	1.3000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.1017	0.1017	0.0000	0.0000	0.1027
Total	**7.0000e-005**	**9.1000e-004**	**6.3000e-004**	**0.0000**	**2.4000e-004**	**1.0000e-005**	**2.4000e-004**	**6.0000e-005**	**1.0000e-005**	**7.0000e-005**	**0.0000**	**0.4247**	**0.4247**	**0.0000**	**5.0000e-005**	**0.4403**

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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					5.3600e-003	0.0000	5.3600e-003	2.5700e-003	0.0000	2.5700e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.6200e-003	0.0293	0.0142	3.0000e-005		1.2500e-003	1.2500e-003		1.1500e-003	1.1500e-003	0.0000	3.0231	3.0231	9.8000e-004	0.0000	3.0475
Total	**2.6200e-003**	**0.0293**	**0.0142**	**3.0000e-005**	**5.3600e-003**	**1.2500e-003**	**6.6100e-003**	**2.5700e-003**	**1.1500e-003**	**3.7200e-003**	**0.0000**	**3.0231**	**3.0231**	**9.8000e-004**	**0.0000**	**3.0475**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0000e-005	8.8000e-004	2.5000e-004	0.0000	1.0000e-004	1.0000e-005	1.1000e-004	3.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3230	0.3230	0.0000	5.0000e-005	0.3376
Worker	4.0000e-005	3.0000e-005	3.8000e-004	0.0000	1.2000e-004	0.0000	1.2000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.1017	0.1017	0.0000	0.0000	0.1027
Total	**7.0000e-005**	**9.1000e-004**	**6.3000e-004**	**0.0000**	**2.2000e-004**	**1.0000e-005**	**2.3000e-004**	**6.0000e-005**	**1.0000e-005**	**7.0000e-005**	**0.0000**	**0.4247**	**0.4247**	**0.0000**	**5.0000e-005**	**0.4403**

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3.5 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0248	0.0000	0.0248	0.0120	0.0000	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.3900e-003	0.0594	0.0323	7.0000e-005		2.6000e-003	2.6000e-003		2.3900e-003	2.3900e-003	0.0000	6.3360	6.3360	2.0500e-003	0.0000	6.3872
Total	**5.3900e-003**	**0.0594**	**0.0323**	**7.0000e-005**	**0.0248**	**2.6000e-003**	**0.0274**	**0.0120**	**2.3900e-003**	**0.0144**	**0.0000**	**6.3360**	**6.3360**	**2.0500e-003**	**0.0000**	**6.3872**

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	7.0000e-005	1.9200e-003	5.4000e-004	1.0000e-005	2.3000e-004	2.0000e-005	2.5000e-004	7.0000e-005	2.0000e-005	9.0000e-005	0.0000	0.7067	0.7067	1.0000e-005	1.1000e-004	0.7385
Worker	1.0000e-004	7.0000e-005	8.4000e-004	0.0000	2.8000e-004	0.0000	2.8000e-004	7.0000e-005	0.0000	8.0000e-005	0.0000	0.2224	0.2224	1.0000e-005	1.0000e-005	0.2246
Total	**1.7000e-004**	**1.9900e-003**	**1.3800e-003**	**1.0000e-005**	**5.1000e-004**	**2.0000e-005**	**5.3000e-004**	**1.4000e-004**	**2.0000e-005**	**1.7000e-004**	**0.0000**	**0.9291**	**0.9291**	**2.0000e-005**	**1.2000e-004**	**0.9630**

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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					0.0106	0.0000	0.0106	5.1200e-003	0.0000	5.1200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.3900e-003	0.0594	0.0323	7.0000e-005		2.6000e-003	2.6000e-003		2.3900e-003	2.3900e-003	0.0000	6.3359	6.3359	2.0500e-003	0.0000	6.3872
Total	**5.3900e-003**	**0.0594**	**0.0323**	**7.0000e-005**	**0.0106**	**2.6000e-003**	**0.0132**	**5.1200e-003**	**2.3900e-003**	**7.5100e-003**	**0.0000**	**6.3359**	**6.3359**	**2.0500e-003**	**0.0000**	**6.3872**

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	7.0000e-005	1.9200e-003	5.4000e-004	1.0000e-005	2.2000e-004	2.0000e-005	2.3000e-004	6.0000e-005	2.0000e-005	8.0000e-005	0.0000	0.7067	0.7067	1.0000e-005	1.1000e-004	0.7385
Worker	1.0000e-004	7.0000e-005	8.4000e-004	0.0000	2.6000e-004	0.0000	2.6000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2224	0.2224	1.0000e-005	1.0000e-005	0.2246
Total	**1.7000e-004**	**1.9900e-003**	**1.3800e-003**	**1.0000e-005**	**4.8000e-004**	**2.0000e-005**	**4.9000e-004**	**1.3000e-004**	**2.0000e-005**	**1.5000e-004**	**0.0000**	**0.9291**	**0.9291**	**2.0000e-005**	**1.2000e-004**	**0.9630**

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3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0890	0.6752	0.6872	1.1900e-003		0.0318	0.0318		0.0307	0.0307	0.0000	98.0515	98.0515	0.0171	0.0000	98.4785
Total	**0.0890**	**0.6752**	**0.6872**	**1.1900e-003**		**0.0318**	**0.0318**		**0.0307**	**0.0307**	**0.0000**	**98.0515**	**98.0515**	**0.0171**	**0.0000**	**98.4785**

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	1.5400e-003	0.0414	0.0116	1.6000e-004	4.9700e-003	4.2000e-004	5.3900e-003	1.4400e-003	4.0000e-004	1.8400e-003	0.0000	15.2638	15.2638	2.3000e-004	2.2900e-003	15.9514
Worker	6.2200e-003	4.4800e-003	0.0532	1.5000e-004	0.0175	1.0000e-004	0.0176	4.6600e-003	9.0000e-005	4.7500e-003	0.0000	14.0702	14.0702	4.5000e-004	4.1000e-004	14.2045
Total	**7.7600e-003**	**0.0459**	**0.0648**	**3.1000e-004**	**0.0225**	**5.2000e-004**	**0.0230**	**6.1000e-003**	**4.9000e-004**	**6.5900e-003**	**0.0000**	**29.3341**	**29.3341**	**6.8000e-004**	**2.7000e-003**	**30.1559**

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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	0.0890	0.6752	0.6872	1.1900e-003		0.0318	0.0318		0.0307	0.0307	0.0000	98.0514	98.0514	0.0171	0.0000	98.4784
Total	**0.0890**	**0.6752**	**0.6872**	**1.1900e-003**		**0.0318**	**0.0318**		**0.0307**	**0.0307**	**0.0000**	**98.0514**	**98.0514**	**0.0171**	**0.0000**	**98.4784**

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	1.5400e-003	0.0414	0.0116	1.6000e-004	4.6500e-003	4.2000e-004	5.0700e-003	1.3600e-003	4.0000e-004	1.7600e-003	0.0000	15.2638	15.2638	2.3000e-004	2.2900e-003	15.9514
Worker	6.2200e-003	4.4800e-003	0.0532	1.5000e-004	0.0161	1.0000e-004	0.0162	4.3200e-003	9.0000e-005	4.4100e-003	0.0000	14.0702	14.0702	4.5000e-004	4.1000e-004	14.2045
Total	**7.7600e-003**	**0.0459**	**0.0648**	**3.1000e-004**	**0.0208**	**5.2000e-004**	**0.0213**	**5.6800e-003**	**4.9000e-004**	**6.1700e-003**	**0.0000**	**29.3341**	**29.3341**	**6.8000e-004**	**2.7000e-003**	**30.1559**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 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	0.1828	1.4052	1.5133	2.6500e-003		0.0617	0.0617		0.0596	0.0596	0.0000	217.9190	217.9190	0.0370	0.0000	218.8441
Total	**0.1828**	**1.4052**	**1.5133**	**2.6500e-003**		**0.0617**	**0.0617**		**0.0596**	**0.0596**	**0.0000**	**217.9190**	**217.9190**	**0.0370**	**0.0000**	**218.8441**

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	1.7000e-003	0.0735	0.0222	3.4000e-004	0.0110	4.4000e-004	0.0115	3.1900e-003	4.2000e-004	3.6200e-003	0.0000	32.4984	32.4984	4.4000e-004	4.8700e-003	33.9596
Worker	0.0129	8.8200e-003	0.1094	3.3000e-004	0.0389	2.0000e-004	0.0391	0.0104	1.9000e-004	0.0105	0.0000	30.2899	30.2899	9.0000e-004	8.5000e-004	30.5660
Total	**0.0146**	**0.0823**	**0.1316**	**6.7000e-004**	**0.0499**	**6.4000e-004**	**0.0506**	**0.0135**	**6.1000e-004**	**0.0142**	**0.0000**	**62.7882**	**62.7882**	**1.3400e-003**	**5.7200e-003**	**64.5256**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	0.1828	1.4052	1.5133	2.6500e-003		0.0617	0.0617		0.0596	0.0596	0.0000	217.9187	217.9187	0.0370	0.0000	218.8438
Total	**0.1828**	**1.4052**	**1.5133**	**2.6500e-003**		**0.0617**	**0.0617**		**0.0596**	**0.0596**	**0.0000**	**217.9187**	**217.9187**	**0.0370**	**0.0000**	**218.8438**

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	1.7000e-003	0.0735	0.0222	3.4000e-004	0.0103	4.4000e-004	0.0108	3.0200e-003	4.2000e-004	3.4500e-003	0.0000	32.4984	32.4984	4.4000e-004	4.8700e-003	33.9596
Worker	0.0129	8.8200e-003	0.1094	3.3000e-004	0.0359	2.0000e-004	0.0361	9.6100e-003	1.9000e-004	9.7900e-003	0.0000	30.2899	30.2899	9.0000e-004	8.5000e-004	30.5660
Total	**0.0146**	**0.0823**	**0.1316**	**6.7000e-004**	**0.0462**	**6.4000e-004**	**0.0469**	**0.0126**	**6.1000e-004**	**0.0132**	**0.0000**	**62.7882**	**62.7882**	**1.3400e-003**	**5.7200e-003**	**64.5256**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Paving - 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	5.8000e-003	0.0561	0.0792	1.2000e-004		2.7800e-003	2.7800e-003		2.5600e-003	2.5600e-003	0.0000	10.5952	10.5952	3.3600e-003	0.0000	10.6792
Paving	1.2300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.0300e-003**	**0.0561**	**0.0792**	**1.2000e-004**		**2.7800e-003**	**2.7800e-003**		**2.5600e-003**	**2.5600e-003**	**0.0000**	**10.5952**	**10.5952**	**3.3600e-003**	**0.0000**	**10.6792**

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	2.1000e-004	2.6000e-003	1.0000e-005	9.3000e-004	0.0000	9.3000e-004	2.5000e-004	0.0000	2.5000e-004	0.0000	0.7203	0.7203	2.0000e-005	2.0000e-005	0.7269
Total	**3.1000e-004**	**2.1000e-004**	**2.6000e-003**	**1.0000e-005**	**9.3000e-004**	**0.0000**	**9.3000e-004**	**2.5000e-004**	**0.0000**	**2.5000e-004**	**0.0000**	**0.7203**	**0.7203**	**2.0000e-005**	**2.0000e-005**	**0.7269**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	5.8000e-003	0.0561	0.0792	1.2000e-004		2.7800e-003	2.7800e-003		2.5600e-003	2.5600e-003	0.0000	10.5952	10.5952	3.3600e-003	0.0000	10.6791
Paving	1.2300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.0300e-003**	**0.0561**	**0.0792**	**1.2000e-004**		**2.7800e-003**	**2.7800e-003**		**2.5600e-003**	**2.5600e-003**	**0.0000**	**10.5952**	**10.5952**	**3.3600e-003**	**0.0000**	**10.6791**

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	2.1000e-004	2.6000e-003	1.0000e-005	8.5000e-004	0.0000	8.6000e-004	2.3000e-004	0.0000	2.3000e-004	0.0000	0.7203	0.7203	2.0000e-005	2.0000e-005	0.7269
Total	**3.1000e-004**	**2.1000e-004**	**2.6000e-003**	**1.0000e-005**	**8.5000e-004**	**0.0000**	**8.6000e-004**	**2.3000e-004**	**0.0000**	**2.3000e-004**	**0.0000**	**0.7203**	**0.7203**	**2.0000e-005**	**2.0000e-005**	**0.7269**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Architectural Coating - 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					
Archit. Coating	0.1360					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.7200e-003	0.0117	0.0163	3.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	2.2979	2.2979	1.4000e-004	0.0000	2.3014
Total	**0.1377**	**0.0117**	**0.0163**	**3.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**	**0.0000**	**2.2979**	**2.2979**	**1.4000e-004**	**0.0000**	**2.3014**

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	1.9000e-004	1.3000e-004	1.6000e-003	0.0000	5.7000e-004	0.0000	5.7000e-004	1.5000e-004	0.0000	1.5000e-004	0.0000	0.4433	0.4433	1.0000e-005	1.0000e-005	0.4473
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**0.0000**	**5.7000e-004**	**0.0000**	**5.7000e-004**	**1.5000e-004**	**0.0000**	**1.5000e-004**	**0.0000**	**0.4433**	**0.4433**	**1.0000e-005**	**1.0000e-005**	**0.4473**

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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	0.1360					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.7200e-003	0.0117	0.0163	3.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	2.2979	2.2979	1.4000e-004	0.0000	2.3014
Total	**0.1377**	**0.0117**	**0.0163**	**3.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**	**0.0000**	**2.2979**	**2.2979**	**1.4000e-004**	**0.0000**	**2.3014**

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	1.9000e-004	1.3000e-004	1.6000e-003	0.0000	5.3000e-004	0.0000	5.3000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.4433	0.4433	1.0000e-005	1.0000e-005	0.4473
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**0.0000**	**5.3000e-004**	**0.0000**	**5.3000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4433**	**0.4433**	**1.0000e-005**	**1.0000e-005**	**0.4473**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	5.2000e-004	4.6600e-003	5.9600e-003	3.0000e-005	2.8100e-003	3.0000e-005	2.8400e-003	8.5000e-004	3.0000e-005	8.8000e-004	0.0000	2.5872	2.5872	6.0000e-005	2.0000e-004	2.6495
Unmitigated	5.2000e-004	4.6600e-003	5.9600e-003	3.0000e-005	2.8100e-003	3.0000e-005	2.8400e-003	8.5000e-004	3.0000e-005	8.8000e-004	0.0000	2.5872	2.5872	6.0000e-005	2.0000e-004	2.6495

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Mobile Home Park	1.92	2.76	3.72	5,975	5,975
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Single Family Housing	0.00	0.00	0.00		
Total	1.92	2.76	3.72	5,975	5,975

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
Mobile Home Park	10.80	4.80	5.70	31.00	15.00	54.00	100	0	0
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
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
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Mobile Home Park	0.562057	0.055812	0.178625	0.000000	0.000000	0.000000	0.080030	0.000000	0.000000	0.000000	0.000000	0.123476	0.000000
Other Asphalt Surfaces	0.569121	0.056513	0.180870	0.112593	0.021111	0.005121	0.013190	0.012692	0.000800	0.000580	0.024593	0.000331	0.002484
Other Non-Asphalt Surfaces	0.569121	0.056513	0.180870	0.112593	0.021111	0.005121	0.013190	0.012692	0.000800	0.000580	0.024593	0.000331	0.002484
Parking Lot	0.569121	0.056513	0.180870	0.112593	0.021111	0.005121	0.013190	0.012692	0.000800	0.000580	0.024593	0.000331	0.002484
Single Family Housing	0.569121	0.056513	0.180870	0.112593	0.021111	0.005121	0.013190	0.012692	0.000800	0.000580	0.024593	0.000331	0.002484

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	13.6520	13.6520	1.6700e-003	1.9000e-004	13.7514
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	13.6520	13.6520	1.6700e-003	1.9000e-004	13.7514
NaturalGas Mitigated	1.5400e-003	0.0131	5.5900e-003	8.0000e-005		1.0600e-003	1.0600e-003		1.0600e-003	1.0600e-003	0.0000	15.2228	15.2228	2.9000e-004	2.8000e-004	15.3132
NaturalGas Unmitigated	1.5400e-003	0.0131	5.5900e-003	8.0000e-005		1.0600e-003	1.0600e-003		1.0600e-003	1.0600e-003	0.0000	15.2228	15.2228	2.9000e-004	2.8000e-004	15.3132

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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					
Mobile Home Park	246673	1.3300e-003	0.0114	4.8400e-003	7.0000e-005		9.2000e-004	9.2000e-004		9.2000e-004	9.2000e-004	0.0000	13.1634	13.1634	2.5000e-004	2.4000e-004	13.2416
Other 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
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
Single Family Housing	38591.1	2.1000e-004	1.7800e-003	7.6000e-004	1.0000e-005		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004	0.0000	2.0594	2.0594	4.0000e-005	4.0000e-005	2.0716
Total		**1.5400e-003**	**0.0132**	**5.6000e-003**	**8.0000e-005**		**1.0600e-003**	**1.0600e-003**		**1.0600e-003**	**1.0600e-003**	**0.0000**	**15.2228**	**15.2228**	**2.9000e-004**	**2.8000e-004**	**15.3132**

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					
Mobile Home Park	246673	1.3300e-003	0.0114	4.8400e-003	7.0000e-005		9.2000e-004	9.2000e-004		9.2000e-004	9.2000e-004	0.0000	13.1634	13.1634	2.5000e-004	2.4000e-004	13.2416
Other 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
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
Single Family Housing	38591.1	2.1000e-004	1.7800e-003	7.6000e-004	1.0000e-005		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004	0.0000	2.0594	2.0594	4.0000e-005	4.0000e-005	2.0716
Total		**1.5400e-003**	**0.0132**	**5.6000e-003**	**8.0000e-005**		**1.0600e-003**	**1.0600e-003**		**1.0600e-003**	**1.0600e-003**	**0.0000**	**15.2228**	**15.2228**	**2.9000e-004**	**2.8000e-004**	**15.3132**

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5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Mobile Home Park	60994.1	11.7439	1.4400e-003	1.7000e-004	11.8293
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	2100	0.4043	5.0000e-005	1.0000e-005	0.4073
Single Family Housing	7810.52	1.5038	1.8000e-004	2.0000e-005	1.5148
Total		**13.6520**	**1.6700e-003**	**2.0000e-004**	**13.7514**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Mobile Home Park	60994.1	11.7439	1.4400e-003	1.7000e-004	11.8293
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	2100	0.4043	5.0000e-005	1.0000e-005	0.4073
Single Family Housing	7810.52	1.5038	1.8000e-004	2.0000e-005	1.5148
Total		**13.6520**	**1.6700e-003**	**2.0000e-004**	**13.7514**

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6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0878	1.5600e-003	0.0975	1.0000e-005		5.6000e-004	5.6000e-004		5.6000e-004	5.6000e-004	0.0000	0.5457	0.5457	1.6000e-004	3.0000e-005	0.5580
Unmitigated	0.0878	1.5600e-003	0.0975	1.0000e-005		5.6000e-004	5.6000e-004		5.6000e-004	5.6000e-004	0.0000	0.5457	0.5457	1.6000e-004	3.0000e-005	0.5580

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	0.0136					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0712					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.0000e-005	4.4000e-004	2.6000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3867	0.3867	1.0000e-005	3.0000e-005	0.3951
Landscaping	2.9700e-003	1.1200e-003	0.0972	1.0000e-005		5.4000e-004	5.4000e-004		5.4000e-004	5.4000e-004	0.0000	0.1590	0.1590	1.6000e-004	0.0000	0.1629
Total	**0.0878**	**1.5600e-003**	**0.0975**	**1.0000e-005**		**5.6000e-004**	**5.6000e-004**		**5.6000e-004**	**5.6000e-004**	**0.0000**	**0.5457**	**0.5457**	**1.7000e-004**	**3.0000e-005**	**0.5580**

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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	0.0136					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0712					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.0000e-005	4.4000e-004	2.6000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3867	0.3867	1.0000e-005	3.0000e-005	0.3951
Landscaping	2.9700e-003	1.1200e-003	0.0972	1.0000e-005		5.4000e-004	5.4000e-004		5.4000e-004	5.4000e-004	0.0000	0.1590	0.1590	1.6000e-004	0.0000	0.1629
Total	**0.0878**	**1.5600e-003**	**0.0975**	**1.0000e-005**		**5.6000e-004**	**5.6000e-004**		**5.6000e-004**	**5.6000e-004**	**0.0000**	**0.5457**	**0.5457**	**1.7000e-004**	**3.0000e-005**	**0.5580**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.9408	9.1000e-004	5.3000e-004	1.1210
Unmitigated	1.0970	1.0600e-003	6.2000e-004	1.3071

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7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Mobile Home Park	0.786 / 0	1.0970	1.0600e-003	6.2000e-004	1.3071
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
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
Single Family Housing	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**1.0970**	**1.0600e-003**	**6.2000e-004**	**1.3071**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Mobile Home Park	0.674074 / 0	0.9408	9.1000e-004	5.3000e-004	1.1210
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
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
Single Family Housing	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.9408**	**9.1000e-004**	**5.3000e-004**	**1.1210**

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8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	3.6538	0.2159	0.0000	9.0522
Unmitigated	3.6538	0.2159	0.0000	9.0522

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Mobile Home Park	18	3.6538	0.2159	0.0000	9.0522
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**3.6538**	**0.2159**	**0.0000**	**9.0522**

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Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Mobile Home Park	18	3.6538	0.2159	0.0000	9.0522
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**3.6538**	**0.2159**	**0.0000**	**9.0522**

9.0 Operational Offroad

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

APPENDIX C

HEALTH RISK ASSESSMENT

1. Construction Health Risk Assessment

1.1 INTRODUCTION

The Mosaic Project (the project applicant) proposes the development of a camping facility (proposed project) in unincorporated Alameda County, California. The proposed project would result in approximately 2 acres of disturbed area within a 37-acre parcel that is currently undeveloped except for mobile home, barn, garage building, and paved areas. The project site is bounded by Cull Canyon Road to the east, Twining Vine Winery to the north, Cull Canyon Regional Recreational Area to the west, and a single-family residence to the south. The following provides the background methodology used for the construction health risk assessment for the proposed project.

The latest version of the Bay Area Air Quality Management District (BAAQMD) CEQA Air Quality Guidelines requires projects to evaluate the impacts of construction activities on sensitive receptors (BAAQMD, 2017). For the most conservative results, modeling assumed construction would start at the beginning of June 2022 and be completed by December 2023 (approximately 393 workdays or 1.51 years). The nearest sensitive receptors to the project site include the single-family residence to the east. The BAAQMD has developed *Screening Tables for Air Toxics Evaluation During Construction* (2017) that evaluate construction-related health risks associated with residential, commercial, and industrial projects. According to the screening tables, the receptors are closer than the distance of 200 meters (656 feet) that would screen out potential health risks and, therefore, could be potentially impacted from the proposed construction activities. As a result, a site-specific construction health risk assessment (HRA) has been prepared for the proposed project. This HRA considers the health impact to off-site sensitive receptors (i.e., the nearby residences) from construction emissions at the project site, including diesel equipment exhaust (diesel particulate matter or DPM) and particulate matter less than 2.5 microns ($PM_{2.5}$).

1.2 METHODOLOGY AND SIGNIFICANCE THRESHOLDS

For this HRA, the BAAQMD significance thresholds were deemed to be appropriate and the thresholds that were used for this project are shown below:

- Excess cancer risk of more than 10 in a million
- Non-cancer hazard index (chronic or acute) greater than 1.0
- Incremental increase in average annual $PM_{2.5}$ concentration of greater than 0.3 $\mu g/m^3$

The methodology used in this HRA is consistent with the following BAAQMD and the Office of Environmental Health Hazard Assessment (OEHHA) guidance documents:

- BAAQMD, 2017. *California Environmental Quality Act (CEQA) Air Quality Guidelines*. May 2017.

- BAAQMD, 2016. *Planning Healthy Places*. May 2016.
- BAAQMD, 2010. *Screening Tables for Air Toxics Evaluation During Construction.* May 2010.
- BAAQMD, 2012. *Recommended Methods for Screening and Modeling Local Risks and Hazards*. Version 3.0. May 2012.
- OEHHA. 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments.* February 2015.

Potential exposures to DPM and $PM_{2.5}$ from proposed project construction were evaluated for off-site sensitive receptors in close proximity to the site. Pollutant concentrations were estimated using an air dispersion model, and excess lifetime cancer risks and chronic non-cancer hazard indexes were calculated. These risks were then compared to the significance thresholds adopted for this HRA.

It should be noted that these health impacts are based on conservative (i.e., health protective) assumptions. The United States Environmental Protection Agency (USEPA, 2005) and OEHHA note that conservative assumptions used in a risk assessment are intended to ensure that the estimated risks do not underestimate the actual risks. Therefore, the estimated risks may not necessarily represent actual risks experienced by populations at or near a site. The use of conservative assumptions tends to produce upper-bound estimates of exposure and thus risk.

For residential-based receptors, the following conservative assumptions were used:

- It was assumed that maximum-exposed off-site residential receptors (both children and adults) stood outdoors and are subject to DPM at their residence for 8 hours per day, and approximately 260 construction days per year. In reality, California residents typically will spend on average 2 hours per day outdoors at their residences (USEPA, 2011), so actual exposures and risks would be significantly lower than those calculated in this HRA.

- The calculated risk for infants from third trimester to age 2 is multiplied by a factor of 10 to account for early life exposure and uncertainty in child versus adult exposure impacts (OEHHA, 2015).

1.3 CONSTRUCTION EMISSIONS

Construction emissions were calculated as average daily emissions in pounds per day, using the proposed construction schedule and the latest version of California Emissions Estimation Model, known as CalEEMod Version 2020.4 (CAPCOA, 2021). DPM emissions were based on the CalEEMod construction runs, using annual exhaust PM_{10} construction emissions presented in pounds (lbs) per day. The $PM_{2.5}$ emissions were taken from the CalEEMod output for exhaust $PM_{2.5}$ also presented in lbs per day.

The project was assumed to take place over approximately 18 months (393 workdays) from June 2022 to December 2023. The average daily emission rates from construction equipment used during the proposed project were determined by dividing the annual average emissions for each construction year by the number of construction days in that particular calendar year (i.e., 2022 and 2023). The off-site hauling emission rates were adjusted to evaluate localized emissions from the 0.36-mile haul route within 1,000 feet of the project site. The CalEEMod construction emissions output and emission rate calculations are provided in Appendix A of the HRA.

1.4 DISPERSION MODELING

Air quality modeling was performed using the AERMOD atmospheric dispersion model to assess the impact of emitted compounds on sensitive receptors near the project. The model is a steady state Gaussian plume model and is an approved model by BAAQMD for estimating ground level impacts from point and fugitive sources in simple and complex terrain. The on-site construction emissions for the project were modeled as poly-area sources. The off-site mobile sources were modeled as adjacent line volume sources. The model requires additional input parameters, including chemical emission data and local meteorology. Inputs for the construction emission rates are those described in Section 1.3. Meteorological data obtained from the California Air Resources Control Board (CARB) for the nearest representative meteorological station (Oakland International Airport) with the five latest available years (2009 to 2013) of record were used to represent local weather conditions and prevailing winds (CARB, 2022).

The modeling analysis also considered the spatial distribution and elevation of each emitting source in relation to the sensitive receptors. To accommodate the model's Cartesian grid format, direction-dependent calculations were obtained by identifying the Universal Transverse Mercator (UTM) coordinates for each source location. In addition, digital elevation model (DEM) data for the area were obtained and included in the model runs to account for complex terrain. An emission release height of 4.15 meters was used as representative of the stack exhaust height for off-road construction equipment and diesel truck traffic (CARB, 2000).

To determine contaminant impacts during construction hours, the model's Season-Hour-Day (HRDOW) scalar option was invoked to predict flagpole-level concentrations (1.5 m for ground floor receptors and 6.1 m for 2nd floor receptors) for construction emissions generated between the hours of 7:00 AM and 4:00 PM with a 1-hour lunch break.

A unit emission rate of 1 gram per second was used for all modeling runs. The unit emission rates were proportioned over the poly-area sources for on-site construction emissions and divided between the volume sources for off-site hauling emissions. The maximum modeled concentrations from the output files were then multiplied by the emission rates calculated in Appendix A to obtain the maximum flagpole-level concentrations at the off-site maximum exposed individual receptor (MEIR). The air dispersion modeling predicted the off-site MEIR is a single-family residence east of the site.[1]

The receptor locations are presented in Figure 1. The air dispersion model output is presented in Appendix B. The DPM and $PM_{2.5}$ concentrations at the MEIR are provided in Appendix C.

[1] The MEIR location is the receptor location associated with the maximum predicted AERMOD concentrations from off-road equipment (i.e., on-site emissions). The calculated on-site emission rates are approximately 3 to 4 orders of magnitude higher than the calculated off-site (hauling) emission rates (see Appendix A). Therefore, the maximum concentrations associated with the on-site emission sources produce the highest overall ground-level MEIR concentrations and, consequently, highest calculated health risks.

1.5 RISK CHARACTERIZATION

1.5.1 Carcinogenic Chemical Risk

A threshold of ten in a million ($10x10^{-6}$) has been established as a level posing no significant risk for exposures to carcinogens. Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. The cancer risk probability is determined by multiplying the chemical's annual concentration by its cancer potency factor (CPF), a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It is an upper-limit estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter ($\mu g/m^3$) over a lifetime of 70 years.

Recent guidance from OEHHA recommends a refinement to the standard point estimate approach with the use of age-specific breathing rates and age sensitivity factors (ASFs) to assess risk for susceptible subpopulations such as children. For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose for each age group. Once determined, contaminant dose is multiplied by the cancer potency factor in units of inverse dose expressed in milligrams per kilogram per day $(mg/kg/day)^{-1}$ to derive the cancer risk estimate. Therefore, to accommodate the unique exposures associated with the sensitive receptors, the following dose algorithm was used.

$$\text{Dose}_{\text{AIR,per age group}} = (C_{\text{air}} \times \text{EF} \times [\frac{\text{BR}}{\text{BW}}] \times \text{A} \times \text{CF})$$

Where:

Dose_{AIR}	=	dose by inhalation (mg/kg-day), per age group
C_{air}	=	concentration of contaminant in air ($\mu g/m^3$)
EF	=	exposure frequency (number of days/365 days)
BR/BW	=	daily breathing rate normalized to body weight (L/kg-day)
A	=	inhalation absorption factor (default = 1)
CF	=	conversion factor ($1x10^{-6}$, μg to mg, L to m^3)

The inhalation absorption factor (A) is a unitless factor that is only used if the cancer potency factor included a correction for absorption across the lung. The default value of 1 was used for this assessment. For residential receptors, the exposure frequency (EF) of 0.96 is used to represent 350 days per year to allow for a two-week period away from home each year (OEHHA, 2015).

For construction analysis, the exposure duration spans the length of construction (e.g. 393 workdays, approximately 1.51 years). As the length of construction is less than 2 years, only the third trimester and 0-2 age bins apply to the construction analysis for the off-site residential receptors. For residential receptors, the 95th percentile daily breathing rates (BR/BW), exposure duration (ED), age sensitivity factors (ASFs), and fraction of time at home (FAH) for the various age groups are provided herein:

Age Groups	BR/BW (L/kg-day)	ED	ASF	FAH
Third trimester	361	0.25	10	0.85
0-2 age group	1,090	2	10	0.85

To calculate the overall cancer risk, the risk for each appropriate age group is calculated per the following equation:

$$\text{Cancer Risk}_{\text{AIR}} = \text{Dose}_{\text{AIR}} \times \text{CPF} \times \text{ASF} \times \text{FAH} \times \frac{\text{ED}}{AT}$$

Where:

Dose_{AIR}	=	dose by inhalation (mg/kg-day), per age group
CPF	=	cancer potency factor, chemical-specific $(\text{mg/kg-day})^{-1}$
ASF	=	age sensitivity factor, per age group
FAH	=	fraction of time at home, per age group (for residential receptors only)
ED	=	exposure duration (years)
AT	=	averaging time period over which exposure duration is averaged (70 years)

The CPFs used in the assessment were obtained from OEHHA guidance. The excess lifetime cancer risks during the construction period to the maximally exposed resident were calculated based on the factors provided above. The cancer risks for each age group are summed to estimate the total cancer risk for each toxic chemical species. The final step converts the cancer risk in scientific notation to a whole number that expresses the cancer risk in "chances per million" by multiplying the cancer risk by a factor of $1\text{x}10^6$ (i.e., 1 million). The calculated results are provided in Appendix C.

1.5.2 Non-Carcinogenic Hazards

An evaluation was also conducted of the potential non-cancer effects of chronic chemical exposures. Adverse health effects are evaluated by comparing the annual receptor level (flagpole) concentration of each chemical compound with the appropriate reference exposure limit (REL). Available RELs promulgated by OEHHA were considered in the assessment.

The hazard index approach was used to quantify non-carcinogenic impacts. The hazard index assumes that chronic sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). Target organs presented in regulatory guidance were used for each discrete chemical exposure. To calculate the hazard index, each chemical concentration or dose is divided by the appropriate toxicity value. This ratio is summed for compounds affecting the same toxicological endpoint. A health hazard is presumed to exist where the total equals or exceeds one.

The chronic hazard analysis for DPM is provided in Appendix C. The calculations contain the relevant exposure concentrations and corresponding reference dose values used in the evaluation of non-carcinogenic exposures.

1.5.3 Criteria Pollutants

The BAAQMD has recently incorporated $PM_{2.5}$ into the District's CEQA significance thresholds due to recent studies that show adverse health impacts from exposure to this pollutant. An incremental increase of greater than 0.3 μg/m^3 for the annual average $PM_{2.5}$ concentration is considered to be a significant impact.

1.6 CONSTRUCTION HRA RESULTS

The calculated results are provided in Appendix C and the results are summarized in Table 1.

TABLE 1. CONSTRUCTION RISK SUMMARY - UNMITIGATED

Receptor	Cancer Risk (per million)	Chronic Hazards	$PM_{2.5}$ (μg/m^3)
Maximum Exposed Individual Resident (MEIR)	8.5	0.020	0.05
BAAQMD Threshold	10	1.0	0.30
Exceeds Threshold?	**No**	**No**	**No**

Note: Cancer risk calculated using 2015 OEHHA HRA guidance.

Cancer risk for the MEIR from project-related construction emissions was calculated to be 8.5 in a million, which would not exceed the 10 in a million significance threshold. In accordance with the latest 2015 OEHHA guidance, the calculated total cancer risk conservatively assumes that the risk for the MER consists of a pregnant woman in the third trimester that subsequently gives birth to an infant during the approximately 1.51-year construction period; therefore, all calculated risk values were multiplied by a factor of 10. In addition, it was conservatively assumed that the residents were outdoors 8 hours a day and exposed to all of the daily construction emissions.

For non-carcinogenic effects, the chronic hazard index identified for each toxicological endpoint totaled less than one for the MEIR. Therefore, chronic non-carcinogenic hazards are less than significant. The highest $PM_{2.5}$ annual concentration of 0.05 μg/m^3 at the MEIR location would not exceed the 0.3 μg/m^3 significance threshold.

2. References

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California Air Pollution Control Officers Association (CAPCOA). 2021. California Emissions Estimator Model (CalEEMod). Version 2020.4. Prepared by: ENVIRON International Corporation and the California Air Districts.

California Air Resources Board (CARB). 2022. *Meteorological Files.* https://ww2.arb.ca.gov/resources/documents/harp-aermod-meteorological-files, accessed February 18, 2022.

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Office of Environmental Health Hazard Assessment (OEHHA). 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments.* Dated February 2015.

United States Environmental Protection Agency (USEPA). 2011. *Exposure Factors Handbook 2011 Edition (Final).* EPA/600/R-09/052F, 2011.

______. 2005. *Guideline on Air Quality Models* (Revised). EPA-450/2-78-027R.

Source: Nearmap, 2022; PlaceWorks, 2022

Project Site Boundary

Truck Route

Residential Receptor

Maximum Exposed Individual Receptor (MEIR)

0 530

Scale (Feet)

Figure 1

Project Site and Offsite Receptor Locations

Appendix A. Emission Rate Calculations

Average Daily Emissions and Emission Rates

Onsite Construction PM10 Exhaust Emissions[1]

Year	Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)
2022	0.65	8.15E-02	1.03E-02
2023	0.54	6.78E-02	8.55E-03

Onsite Construction PM2.5 Exhaust Emissions[2]

Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)
0.62	7.77E-02	9.79E-03
0.52	6.54E-02	8.24E-03

Offsite Construction PM10 Exhaust Emissions[1]

Year	Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000ft (lbs/day) [3]	Emission Rate (lbs/hr)	Emission Rate (g/s)
2022	9.15E-03	1.67E-04	2.09E-05	2.63E-06
2023	5.33E-03	9.73E-05	1.22E-05	1.53E-06

Offsite Construction PM2.5 Exhaust Emissions[2]

Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000ft (lbs/day) [3]	Emission Rate (lbs/hr)	Emission Rate (g/s)
8.76E-03	1.60E-04	2.00E-05	2.52E-06
5.08E-03	9.27E-05	1.16E-05	1.46E-06

Note: Emissions evenly distributed over 96 modeled volume sources.

Hauling Length (miles)	20	miles
Haul Length within 1,000 ft of Site (mile) [3]	0.36	miles
Hours per work day (7:00 AM to 4:00 PM, 1-hour of breaks) [4]	8	hours

Year	Workdays	Duration [5]
2022	153	0.59
2023	240	0.92

[1] DPM emissions taken as PM_{10} exhaust emissions from CalEEMod average daily emissions.

[2] $PM_{2.5}$ emissions taken as $PM_{2.5}$ exhaust emissions from CalEEMod average daily emissions.

[3] Emissions from CalEEMod offsite average daily emissions, which is based on proportioned haul truck trip distances, are adjusted to evaluate emissions from the 0.36-mile route within 1,000 of the project site.

[4] Work hours applied in By Hour/Day (HRDOW) variable emissions module in air dispersion model (see App B - Air Dispersion Model Output).

[5] Construction duration determined for each year of construction to adjust receptor exposures to the exposure durations for each construction year (see App C - Risk Calculations).

Phase Name	Start Date	End Date	CalEEMod Days	Total Days
Demolition	6/1/2022	7/18/2022	34	**47**
Demolition Debris Haul	6/1/2022	7/18/2022	34	**47**
Site Preparation	7/19/2022	7/22/2022	4	**3**
Grading	7/23/2022	8/2/2022	7	**10**
Building Construction	8/3/2022	12/1/2023	348	**485**
Paving	11/8/2023	12/1/2023	18	**23**
Architectural Coating	11/8/2023	12/1/2023	18	**23**

	Number of Construction Days Per Year		
2022	6/1/2022	12/31/2022	153
2023	1/1/2023	12/1/2023	240
		CONSTRUCTION DAYS	393

Total Construction Days Per Year		
1/1/2022	12/31/2022	260
1/1/2023	12/31/2023	260
	TOTAL DAYS	520

Appendix B. Air Dispersion Model Output

```
*** MODELOPTs:    RegDFAULT  CONC  ELEV  FLGPOL  RURAL

                                          ***     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 RURAL Dispersion Only.

**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.

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

**Model Accepts FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of:  OTHER

**Model Calculates PERIOD Averages Only

**This Run Includes:     97 Source(s);       2 Source Group(s); and      15 Receptor(s)

               with:      0 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:     96 VOLUME source(s)
                and:      1 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 a total of     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 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) =     1.80 ;  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 =      3.7 MB of RAM.

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

**Detailed Error/Message File:   TMP-01.err
**File for Summary of Results:   TMP-01.sum
```

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0000001	0	0.10417E-01	583251.7	4177740.4	139.2	4.15	2.84	3.26	NO	HRDOW
L0000002	0	0.10417E-01	583254.5	4177735.0	139.0	4.15	2.84	3.26	NO	HRDOW
L0000003	0	0.10417E-01	583257.4	4177729.6	138.8	4.15	2.84	3.26	NO	HRDOW
L0000004	0	0.10417E-01	583260.2	4177724.2	138.5	4.15	2.84	3.26	NO	HRDOW
L0000005	0	0.10417E-01	583263.1	4177718.8	138.2	4.15	2.84	3.26	NO	HRDOW
L0000006	0	0.10417E-01	583265.9	4177713.4	137.8	4.15	2.84	3.26	NO	HRDOW
L0000007	0	0.10417E-01	583268.8	4177707.9	137.7	4.15	2.84	3.26	NO	HRDOW
L0000008	0	0.10417E-01	583271.6	4177702.5	137.6	4.15	2.84	3.26	NO	HRDOW
L0000009	0	0.10417E-01	583274.5	4177697.1	137.6	4.15	2.84	3.26	NO	HRDOW
L0000010	0	0.10417E-01	583277.3	4177691.7	137.5	4.15	2.84	3.26	NO	HRDOW
L0000011	0	0.10417E-01	583280.8	4177686.7	137.4	4.15	2.84	3.26	NO	HRDOW
L0000012	0	0.10417E-01	583284.4	4177681.8	137.1	4.15	2.84	3.26	NO	HRDOW
L0000013	0	0.10417E-01	583288.0	4177676.9	136.8	4.15	2.84	3.26	NO	HRDOW
L0000014	0	0.10417E-01	583291.6	4177671.9	136.3	4.15	2.84	3.26	NO	HRDOW
L0000015	0	0.10417E-01	583295.2	4177667.0	135.6	4.15	2.84	3.26	NO	HRDOW
L0000016	0	0.10417E-01	583298.8	4177662.0	136.0	4.15	2.84	3.26	NO	HRDOW
L0000017	0	0.10417E-01	583302.4	4177657.1	136.2	4.15	2.84	3.26	NO	HRDOW
L0000018	0	0.10417E-01	583306.0	4177652.1	135.9	4.15	2.84	3.26	NO	HRDOW
L0000019	0	0.10417E-01	583309.6	4177647.2	136.1	4.15	2.84	3.26	NO	HRDOW
L0000020	0	0.10417E-01	583313.1	4177642.3	136.3	4.15	2.84	3.26	NO	HRDOW
L0000021	0	0.10417E-01	583316.7	4177637.3	136.4	4.15	2.84	3.26	NO	HRDOW
L0000022	0	0.10417E-01	583319.5	4177631.9	136.0	4.15	2.84	3.26	NO	HRDOW
L0000023	0	0.10417E-01	583321.7	4177626.2	135.8	4.15	2.84	3.26	NO	HRDOW
L0000024	0	0.10417E-01	583323.9	4177620.5	135.9	4.15	2.84	3.26	NO	HRDOW
L0000025	0	0.10417E-01	583326.1	4177614.8	136.2	4.15	2.84	3.26	NO	HRDOW
L0000026	0	0.10417E-01	583328.2	4177609.1	136.4	4.15	2.84	3.26	NO	HRDOW
L0000027	0	0.10417E-01	583330.4	4177603.4	136.2	4.15	2.84	3.26	NO	HRDOW
L0000028	0	0.10417E-01	583332.6	4177597.7	135.8	4.15	2.84	3.26	NO	HRDOW
L0000029	0	0.10417E-01	583334.8	4177592.0	135.2	4.15	2.84	3.26	NO	HRDOW
L0000030	0	0.10417E-01	583337.0	4177586.3	134.7	4.15	2.84	3.26	NO	HRDOW
L0000031	0	0.10417E-01	583339.2	4177580.6	134.7	4.15	2.84	3.26	NO	HRDOW
L0000032	0	0.10417E-01	583341.4	4177574.9	134.6	4.15	2.84	3.26	NO	HRDOW
L0000033	0	0.10417E-01	583343.6	4177569.2	134.6	4.15	2.84	3.26	NO	HRDOW
L0000034	0	0.10417E-01	583345.8	4177563.5	134.6	4.15	2.84	3.26	NO	HRDOW
L0000035	0	0.10417E-01	583348.0	4177557.8	134.3	4.15	2.84	3.26	NO	HRDOW
L0000036	0	0.10417E-01	583349.5	4177551.9	133.6	4.15	2.84	3.26	NO	HRDOW
L0000037	0	0.10417E-01	583350.6	4177545.9	132.8	4.15	2.84	3.26	NO	HRDOW
L0000038	0	0.10417E-01	583351.7	4177539.9	132.1	4.15	2.84	3.26	NO	HRDOW
L0000039	0	0.10417E-01	583352.8	4177533.8	131.5	4.15	2.84	3.26	NO	HRDOW
L0000040	0	0.10417E-01	583353.9	4177527.8	131.0	4.15	2.84	3.26	NO	HRDOW

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0000041	0	0.10417E-01	583354.9	4177521.8	131.8	4.15	2.84	3.26	NO	HRDOW
L0000042	0	0.10417E-01	583356.0	4177515.8	132.5	4.15	2.84	3.26	NO	HRDOW
L0000043	0	0.10417E-01	583357.1	4177509.8	133.2	4.15	2.84	3.26	NO	HRDOW
L0000044	0	0.10417E-01	583358.2	4177503.8	133.7	4.15	2.84	3.26	NO	HRDOW
L0000045	0	0.10417E-01	583359.2	4177497.8	134.2	4.15	2.84	3.26	NO	HRDOW
L0000046	0	0.10417E-01	583360.3	4177491.7	134.1	4.15	2.84	3.26	NO	HRDOW
L0000047	0	0.10417E-01	583361.4	4177485.7	134.0	4.15	2.84	3.26	NO	HRDOW
L0000048	0	0.10417E-01	583362.5	4177479.7	133.9	4.15	2.84	3.26	NO	HRDOW
L0000049	0	0.10417E-01	583363.6	4177473.7	133.8	4.15	2.84	3.26	NO	HRDOW
L0000050	0	0.10417E-01	583364.6	4177467.7	133.7	4.15	2.84	3.26	NO	HRDOW
L0000051	0	0.10417E-01	583365.7	4177461.7	133.6	4.15	2.84	3.26	NO	HRDOW
L0000052	0	0.10417E-01	583366.8	4177455.7	133.6	4.15	2.84	3.26	NO	HRDOW
L0000053	0	0.10417E-01	583367.9	4177449.6	133.6	4.15	2.84	3.26	NO	HRDOW
L0000054	0	0.10417E-01	583369.0	4177443.6	133.6	4.15	2.84	3.26	NO	HRDOW
L0000055	0	0.10417E-01	583370.3	4177437.7	133.6	4.15	2.84	3.26	NO	HRDOW
L0000056	0	0.10417E-01	583371.6	4177431.7	133.6	4.15	2.84	3.26	NO	HRDOW
L0000057	0	0.10417E-01	583372.9	4177425.7	133.8	4.15	2.84	3.26	NO	HRDOW
L0000058	0	0.10417E-01	583374.2	4177419.8	134.0	4.15	2.84	3.26	NO	HRDOW
L0000059	0	0.10417E-01	583375.5	4177413.8	134.1	4.15	2.84	3.26	NO	HRDOW
L0000060	0	0.10417E-01	583376.8	4177407.8	134.1	4.15	2.84	3.26	NO	HRDOW
L0000061	0	0.10417E-01	583378.1	4177401.8	134.1	4.15	2.84	3.26	NO	HRDOW
L0000062	0	0.10417E-01	583379.4	4177395.9	134.0	4.15	2.84	3.26	NO	HRDOW
L0000063	0	0.10417E-01	583380.7	4177389.9	133.8	4.15	2.84	3.26	NO	HRDOW
L0000064	0	0.10417E-01	583382.0	4177383.9	133.6	4.15	2.84	3.26	NO	HRDOW
L0000065	0	0.10417E-01	583383.3	4177378.0	133.2	4.15	2.84	3.26	NO	HRDOW
L0000066	0	0.10417E-01	583384.6	4177372.0	133.0	4.15	2.84	3.26	NO	HRDOW
L0000067	0	0.10417E-01	583385.9	4177366.0	132.9	4.15	2.84	3.26	NO	HRDOW
L0000068	0	0.10417E-01	583387.1	4177360.0	132.8	4.15	2.84	3.26	NO	HRDOW
L0000069	0	0.10417E-01	583387.9	4177354.0	132.5	4.15	2.84	3.26	NO	HRDOW
L0000070	0	0.10417E-01	583388.6	4177347.9	132.2	4.15	2.84	3.26	NO	HRDOW
L0000071	0	0.10417E-01	583389.2	4177341.8	131.9	4.15	2.84	3.26	NO	HRDOW
L0000072	0	0.10417E-01	583389.9	4177335.8	131.6	4.15	2.84	3.26	NO	HRDOW
L0000073	0	0.10417E-01	583390.6	4177329.7	131.3	4.15	2.84	3.26	NO	HRDOW
L0000074	0	0.10417E-01	583391.2	4177323.6	131.1	4.15	2.84	3.26	NO	HRDOW
L0000075	0	0.10417E-01	583391.9	4177317.5	130.8	4.15	2.84	3.26	NO	HRDOW
L0000076	0	0.10417E-01	583392.5	4177311.5	130.7	4.15	2.84	3.26	NO	HRDOW
L0000077	0	0.10417E-01	583393.2	4177305.4	130.9	4.15	2.84	3.26	NO	HRDOW
L0000078	0	0.10417E-01	583393.9	4177299.3	131.1	4.15	2.84	3.26	NO	HRDOW
L0000079	0	0.10417E-01	583394.5	4177293.3	131.2	4.15	2.84	3.26	NO	HRDOW
L0000080	0	0.10417E-01	583395.2	4177287.2	131.4	4.15	2.84	3.26	NO	HRDOW

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0000081	0	0.10417E-01	583395.8	4177281.1	131.5	4.15	2.84	3.26	NO	HRDOW
L0000082	0	0.10417E-01	583396.5	4177275.0	131.5	4.15	2.84	3.26	NO	HRDOW
L0000083	0	0.10417E-01	583397.3	4177269.0	131.5	4.15	2.84	3.26	NO	HRDOW
L0000084	0	0.10417E-01	583398.3	4177263.0	131.7	4.15	2.84	3.26	NO	HRDOW
L0000085	0	0.10417E-01	583399.4	4177256.9	131.8	4.15	2.84	3.26	NO	HRDOW
L0000086	0	0.10417E-01	583400.4	4177250.9	131.9	4.15	2.84	3.26	NO	HRDOW
L0000087	0	0.10417E-01	583401.5	4177244.9	131.6	4.15	2.84	3.26	NO	HRDOW
L0000088	0	0.10417E-01	583402.5	4177238.9	131.3	4.15	2.84	3.26	NO	HRDOW
L0000089	0	0.10417E-01	583403.6	4177232.9	131.0	4.15	2.84	3.26	NO	HRDOW
L0000090	0	0.10417E-01	583404.7	4177226.8	130.7	4.15	2.84	3.26	NO	HRDOW
L0000091	0	0.10417E-01	583405.7	4177220.8	130.4	4.15	2.84	3.26	NO	HRDOW
L0000092	0	0.10417E-01	583406.8	4177214.8	130.3	4.15	2.84	3.26	NO	HRDOW
L0000093	0	0.10417E-01	583408.1	4177208.8	130.3	4.15	2.84	3.26	NO	HRDOW
L0000094	0	0.10417E-01	583409.5	4177202.9	130.2	4.15	2.84	3.26	NO	HRDOW
L0000095	0	0.10417E-01	583411.0	4177197.0	130.1	4.15	2.84	3.26	NO	HRDOW
L0000096	0	0.10417E-01	583412.4	4177191.0	129.9	4.15	2.84	3.26	NO	HRDOW

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
1	0	0.10626E-03	583245.9	4177742.9	138.6	4.15	34	1.93	NO	HRDOW

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs							
ONSITE	1 ,							
OFFSITE	L0000001 ,	L0000002 ,	L0000003 ,	L0000004 ,	L0000005 ,	L0000006 ,	L0000007 ,	L0000008 ,
	L0000009 ,	L0000010 ,	L0000011 ,	L0000012 ,	L0000013 ,	L0000014 ,	L0000015 ,	L0000016 ,
	L0000017 ,	L0000018 ,	L0000019 ,	L0000020 ,	L0000021 ,	L0000022 ,	L0000023 ,	L0000024 ,
	L0000025 ,	L0000026 ,	L0000027 ,	L0000028 ,	L0000029 ,	L0000030 ,	L0000031 ,	L0000032 ,
	L0000033 ,	L0000034 ,	L0000035 ,	L0000036 ,	L0000037 ,	L0000038 ,	L0000039 ,	L0000040 ,
	L0000041 ,	L0000042 ,	L0000043 ,	L0000044 ,	L0000045 ,	L0000046 ,	L0000047 ,	L0000048 ,
	L0000049 ,	L0000050 ,	L0000051 ,	L0000052 ,	L0000053 ,	L0000054 ,	L0000055 ,	L0000056 ,
	L0000057 ,	L0000058 ,	L0000059 ,	L0000060 ,	L0000061 ,	L0000062 ,	L0000063 ,	L0000064 ,
	L0000065 ,	L0000066 ,	L0000067 ,	L0000068 ,	L0000069 ,	L0000070 ,	L0000071 ,	L0000072 ,
	L0000073 ,	L0000074 ,	L0000075 ,	L0000076 ,	L0000077 ,	L0000078 ,	L0000079 ,	L0000080 ,
	L0000081 ,	L0000082 ,	L0000083 ,	L0000084 ,	L0000085 ,	L0000086 ,	L0000087 ,	L0000088 ,
	L0000089 ,	L0000090 ,	L0000091 ,	L0000092 ,	L0000093 ,	L0000094 ,	L0000095 ,	L0000096 ,

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = L0000001 TO L0000096 ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.0000E+00	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = 1 ; SOURCE TYPE = AREAPOLY :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.0000E+00	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

```
                                          *** DISCRETE CARTESIAN RECEPTORS ***
                                        (X-COORD, Y-COORD, ZELEV, ZHILL, ZFLAG)
                                                        (METERS)

    ( 583245.8, 4177327.3,     144.5,     356.0,       1.5);         ( 583379.6, 4177521.9,     137.0,     356.0,       1.5);
    ( 583445.0, 4177231.5,     138.3,     352.5,       1.5);         ( 583297.6, 4177787.6,     153.1,     356.0,       1.5);
    ( 583298.2, 4177880.6,     147.5,     356.0,       1.5);         ( 583341.8, 4177938.0,     147.8,     356.0,       1.5);
    ( 583199.8, 4177949.9,     139.5,     356.0,       1.5);         ( 583245.8, 4177327.3,     144.5,     356.0,       6.1);
    ( 583445.0, 4177231.5,     138.3,     352.5,       6.1);         ( 583297.6, 4177787.6,     153.1,     356.0,       6.1);
    ( 583298.2, 4177880.6,     147.5,     356.0,       6.1);         ( 583341.8, 4177938.0,     147.8,     356.0,       6.1);
    ( 583199.8, 4177949.9,     139.5,     356.0,       6.1);         ( 583450.2, 4177166.8,     134.7,     352.5,       1.5);
    ( 583450.2, 4177166.8,     134.7,     352.5,       6.1);
```

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54,   3.09,   5.14,   8.23, 10.80,

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: met data - 1.8m\724930.SFC Met Version: 14134
Profile file: met data - 1.8m\724930.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 23230 Upper air station no.: 23230
Name: OAKLAND/WSO_AP Name: OAKLAND/WSO_AP
Year: 2009 Year: 2009

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
09	01	01	1	01	-17.2	0.303	-9.000	-9.000	-999.	401.	147.2	0.63	0.86	1.00	2.36	81.	10.0	282.5	2.0
09	01	01	1	02	-21.8	0.383	-9.000	-9.000	-999.	569.	234.6	0.63	0.86	1.00	2.86	68.	10.0	282.0	2.0
09	01	01	1	03	-26.3	0.460	-9.000	-9.000	-999.	749.	337.1	0.63	0.86	1.00	3.36	84.	10.0	280.9	2.0
09	01	01	1	04	-15.4	0.270	-9.000	-9.000	-999.	368.	116.1	0.47	0.86	1.00	2.36	53.	10.0	280.9	2.0
09	01	01	1	05	-26.3	0.460	-9.000	-9.000	-999.	749.	336.3	0.63	0.86	1.00	3.36	73.	10.0	280.4	2.0
09	01	01	1	06	-21.9	0.383	-9.000	-9.000	-999.	573.	232.9	0.63	0.86	1.00	2.86	82.	10.0	280.4	2.0
09	01	01	1	07	-22.0	0.383	-9.000	-9.000	-999.	569.	232.5	0.63	0.86	1.00	2.86	95.	10.0	279.9	2.0
09	01	01	1	08	-11.2	0.196	-9.000	-9.000	-999.	238.	60.6	0.63	0.86	0.76	1.76	73.	10.0	279.9	2.0
09	01	01	1	09	-2.2	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.45	0.86	0.39	0.00	0.	10.0	280.4	2.0
09	01	01	1	10	6.8	0.266	0.264	0.016	98.	329.	-250.8	0.63	0.86	0.27	1.76	91.	10.0	280.9	2.0
09	01	01	1	11	15.5	-9.000	-9.000	-9.000	177.	-999.	-99999.0	0.45	0.86	0.22	0.00	0.	10.0	282.0	2.0
09	01	01	1	12	96.1	0.393	1.019	0.014	401.	591.	-57.4	0.22	0.86	0.21	3.36	266.	10.0	281.4	2.0
09	01	01	1	13	102.5	0.395	1.092	0.014	462.	595.	-54.4	0.22	0.86	0.20	3.36	283.	10.0	282.0	2.0
09	01	01	1	14	89.9	0.297	1.066	0.015	489.	394.	-26.5	0.22	0.86	0.21	2.36	249.	10.0	282.0	2.0
09	01	01	1	15	62.1	0.383	0.954	0.014	507.	569.	-82.1	0.22	0.86	0.24	3.36	242.	10.0	282.5	2.0
09	01	01	1	16	23.1	0.665	0.690	0.006	513.	1300.	-1150.4	0.52	0.86	0.33	4.86	304.	10.0	282.5	2.0
09	01	01	1	17	-37.0	0.486	-9.000	-9.000	-999.	846.	280.6	0.22	0.86	0.56	4.86	291.	10.0	281.4	2.0
09	01	01	1	18	-52.2	0.480	-9.000	-9.000	-999.	799.	191.9	0.52	0.86	1.00	3.86	307.	10.0	280.9	2.0
09	01	01	1	19	-25.6	0.224	-9.000	-9.000	-999.	327.	39.8	0.52	0.86	1.00	2.36	334.	10.0	280.4	2.0
09	01	01	1	20	-11.1	0.119	-9.000	-9.000	-999.	115.	13.8	0.52	0.86	1.00	1.76	317.	10.0	280.4	2.0
09	01	01	1	21	-10.3	0.119	-9.000	-9.000	-999.	98.	14.7	0.52	0.86	1.00	1.76	320.	10.0	280.4	2.0
09	01	01	1	22	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.45	0.86	1.00	0.00	0.	10.0	280.9	2.0
09	01	01	1	23	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.45	0.86	1.00	0.00	0.	10.0	281.4	2.0
09	01	01	1	24	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.45	0.86	1.00	0.00	0.	10.0	281.4	2.0

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
09	01	01	01	10.0	1	81.	2.36	282.6	99.0	-99.00	-99.00

F indicates top of profile (=1) or below (=0)

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** THE PERIOD (43872 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ONSITE ***
INCLUDING SOURCE(S): 1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC	
583245.75	4177327.30	0.15760	583379.64	4177521.91	5.22432	Residential MER (Onsite)
583444.96	4177231.53	0.21283	583297.64	4177787.64	2.05171	
583298.21	4177880.59	0.65650	583341.79	4177938.01	0.38734	
583199.79	4177949.93	0.37267	583245.75	4177327.30	0.14193	
583444.96	4177231.53	0.19684	583297.64	4177787.64	1.74498	
583298.21	4177880.59	0.61167	583341.79	4177938.01	0.36832	
583199.79	4177949.93	0.34623	583450.23	4177166.76	0.13763	
583450.23	4177166.76	0.13220				

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** THE PERIOD (43872 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: OFFSITE ***
INCLUDING SOURCE(S): L0000001 , L0000002 , L0000003 , L0000004 , L0000005 ,
L0000006 , L0000007 , L0000008 , L0000009 , L0000010 , L0000011 , L0000012 , L0000013 ,
L0000014 , L0000015 , L0000016 , L0000017 , L0000018 , L0000019 , L0000020 , L0000021 ,
L0000022 , L0000023 , L0000024 , L0000025 , L0000026 , L0000027 , L0000028 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC	
583245.75	4177327.30	0.54632	583379.64	4177521.91	11.56969	Residential MER (Offsite)
583444.96	4177231.53	6.35338	583297.64	4177787.64	1.06366	
583298.21	4177880.59	0.38862	583341.79	4177938.01	0.25276	
583199.79	4177949.93	0.23276	583245.75	4177327.30	0.45928	
583444.96	4177231.53	4.35750	583297.64	4177787.64	0.88147	
583298.21	4177880.59	0.36066	583341.79	4177938.01	0.23867	
583199.79	4177949.93	0.22026	583450.23	4177166.76	2.24715	
583450.23	4177166.76	1.73709				

```
*** MODELOPTs:    RegDFAULT  CONC  ELEV  FLGPOL  RURAL

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


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

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

ONSITE    1ST HIGHEST VALUE IS       5.22432 AT (  583379.64,  4177521.91,   136.98,   356.01,    1.50)  DC
          2ND HIGHEST VALUE IS       2.05171 AT (  583297.64,  4177787.64,   153.09,   356.01,    1.50)  DC
          3RD HIGHEST VALUE IS       1.74498 AT (  583297.64,  4177787.64,   153.09,   356.01,    6.10)  DC
          4TH HIGHEST VALUE IS       0.65650 AT (  583298.21,  4177880.59,   147.53,   356.01,    1.50)  DC
          5TH HIGHEST VALUE IS       0.61167 AT (  583298.21,  4177880.59,   147.53,   356.01,    6.10)  DC
          6TH HIGHEST VALUE IS       0.38734 AT (  583341.79,  4177938.01,   147.80,   356.01,    1.50)  DC
          7TH HIGHEST VALUE IS       0.37267 AT (  583199.79,  4177949.93,   139.46,   356.01,    1.50)  DC
          8TH HIGHEST VALUE IS       0.36832 AT (  583341.79,  4177938.01,   147.80,   356.01,    6.10)  DC
          9TH HIGHEST VALUE IS       0.34623 AT (  583199.79,  4177949.93,   139.46,   356.01,    6.10)  DC
         10TH HIGHEST VALUE IS       0.21283 AT (  583444.96,  4177231.53,   138.28,   352.48,    1.50)  DC

OFFSITE   1ST HIGHEST VALUE IS      11.56969 AT (  583379.64,  4177521.91,   136.98,   356.01,    1.50)  DC
          2ND HIGHEST VALUE IS       6.35338 AT (  583444.96,  4177231.53,   138.28,   352.48,    1.50)  DC
          3RD HIGHEST VALUE IS       4.35750 AT (  583444.96,  4177231.53,   138.28,   352.48,    6.10)  DC
          4TH HIGHEST VALUE IS       2.24715 AT (  583450.23,  4177166.76,   134.71,   352.48,    1.50)  DC
          5TH HIGHEST VALUE IS       1.73709 AT (  583450.23,  4177166.76,   134.71,   352.48,    6.10)  DC
          6TH HIGHEST VALUE IS       1.06366 AT (  583297.64,  4177787.64,   153.09,   356.01,    1.50)  DC
          7TH HIGHEST VALUE IS       0.88147 AT (  583297.64,  4177787.64,   153.09,   356.01,    6.10)  DC
          8TH HIGHEST VALUE IS       0.54632 AT (  583245.75,  4177327.30,   144.51,   356.01,    1.50)  DC
          9TH HIGHEST VALUE IS       0.45928 AT (  583245.75,  4177327.30,   144.51,   356.01,    6.10)  DC
         10TH HIGHEST VALUE IS       0.38862 AT (  583298.21,  4177880.59,   147.53,   356.01,    1.50)  DC

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

*** MODELOPTs: RegDFAULT CONC ELEV FLGPOL RURAL

*** 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 7953 Informational Message(s)

A Total of 43872 Hours Were Processed

A Total of 7152 Calm Hours Identified

A Total of 801 Missing Hours Identified (1.83 Percent)

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

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

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

Appendix C. Construction Risk Calculations

Table C2
Residential MER Health Risk Calculations

Contaminant (a)	Source (b)		Model Output [1] ($\mu g/m^3$) (c)	Emission Rates [2] (g/s) (d)	MEIR Conc. ($\mu g/m^3$) (e)	Total MEIR Conc. Annual Average ($\mu g/m^3$) (f)
Residential Receptors - Unmitigated						
DPM	2022	On-Site Emissions	5.22	1.03E-02	5.36E-02	5.36E-02
		Truck Route	11.57	2.63E-06	3.04E-05	
	2023	On-Site Emissions	5.22	8.55E-03	4.47E-02	4.47E-02
		Truck Route	11.57	1.53E-06	1.77E-05	
			Total DPM concentrations used for Cancer Risk and Chronic Hazard calculations			
$PM_{2.5}$	2022	On-Site Emissions	5.22	9.79E-03	5.11E-02	5.12E-02
		Truck Route	11.57	2.52E-06	2.91E-05	
	2023	On-Site Emissions	5.22	8.24E-03	4.31E-02	4.31E-02
		Truck Route	11.57	1.46E-06	1.69E-05	
			Maximum Annual $PM_{2.5}$ Concentration			**0.05**

Maximum Exposed Individual Resident (MEIR) UTM coordinates: 583379.64 E, 4177521.91 N

[1] Model Output at the MEIR based on unit emission rates for sources (1 g/s).

[2] Emission Rates from Emission Rate Calculations (Appendix A - Construction Emissions).

NOTE: The MEIR location is the receptor location associated with the maximum predicted AERMOD concentrations from off-road equipment (i.e., on-site emissions). The calculated on-site emission rates are approximately 3 to 4 orders of magnitude higher than the calculated off-site (hauling) emission rates (see Column d). Therefore, the maximum concentrations associated with the on-site emission sources produce the highest overall ground-level MEIR concentrations and, consequently, highest calculated health risks.

Table C2
Residential MER Health Risk Calculations

Source		MEIR	Weight	Contaminant			Dose (by age bin)		Carcinogenic Risks (by age bin)		**Total Cancer Risk**	**Chronic Hazards [3]**	
		Conc.	Fraction		URF	CPF	3rd Trimester	0 < 2 years	3rd Trimester	0 < 2 years		REL	RESP
		($\mu g/m^3$)			$(\mu g/m^3)^{-1}$	$(mg/kg/day)^{-1}$	(mg/kg-day)	(mg/kg-day)	per million	per million	per million	($\mu g/m^3$)	
(a)		(b)	(c)	(d)	(e)	(f)	(g)	(h)	(j)	(k)	(m)	(n)	(o)
Residential Receptors - Unmitigated													
2022	On & Off-	5.36E-02	1.00E+00	DPM	3.0E-04	1.1E+00	1.86E-05	5.61E-05	5.92E-01	2.42E+00	3.0	5.0E+00	1.07E-02
2023	Site	4.47E-02						4.67E-05		5.49E+00	5.5		8.93E-03
											8.5		**0.020**

Maximum Exposed Individual Resident (MEIR) UTM coordinates: 583379.64 E, 4177521.91 N

		3rd Trimester	0 < 2 years
	OEHHA age bin	3rd Trimester	0 < 2 years
	exposure year(s)	2022	2022-2023
Dose Exposure Factors:	exposure frequency (days/year)	350	350
	inhalation rate (L/kg-day) [1]	361	1090
	inhalation absorption factor	1	1
	conversion factor (mg/µg; m^3/L)	1.0E-06	1.0E-06
Risk Calculation Factors:	age sensitivity factor	10	10
	averaging time (years)	70	70
	per million	1.0E+06	1.0E+06
	fraction of time at home	0.85	0.85

exposure durations per age bin			exposure durations (year)	
	Construction Year	Duration [2]	3rd Trimester	0 < 2 years
	2022	0.59	0.25	0.34
	2023	0.92		0.92
	Total	1.51	0.25	1.26

[1] Inhalation rate taken as the 95th percentile breathing rates (OEHHA, 2015).

[2] Construction durations determined for each year of construction to adjust receptor exposures to the exposure durations for each construction year (see App A - Construction Emissions).

[3] Chronic Hazards for DPM using the chronic reference exposure level (REL) for the Respiratory Toxicological Endpoint.

APPENDIX D

BIOLOGICAL RESOURCES INFORMATION

List of Plant observed during botanical surveys of the Mosaic Project Site Development Area
Cull Canyon, Alameda County, California
Conducted on March 16, 2021, and April 18 and May 31, 2022

Scientific name	Common name	Native
Acer macrophyllum	big leaf maple	yes
Acer negundo	box elder	yes
Aesculus californica	California buckeye	yes
Agrostis exarata	spike bentgrass	yes
Aira caryophyllea	silver hairgrass	no
Alnus rhombifolia	white alder	yes
Anthriscus caucalis	bur chervil	no
Arbutus menziesii	madrone	yes
Artemisia douglasiana	California mugwort	yes
Avena barbata	slender wild oats	no
Baccharis glutinosa	saltmarsh baccharis	yes
Baccharis pilularis ssp. *consanguinea*	coyote brush	yes
Berberis thunbergii (Ornamental)	barberry	no
Brachypodium distachyon	false brome	no
Briza minor	little quacking grass	no
Bromus carinatus	California brome	yes
Bromus diandrus	ripgut brome	no
Bromus hordeaceus	soft chess	no
Bromus madritensis	Madrid brome	no
Bromus sitchensis var. *carinatus*	rescue grass	no
Cardamine oligosperma	bitter cress	yes
Carduus pycnocephalus	Italian thistle	no
Cedrus deodara (ornamental)	deodar cedar	no
Cerastium glomeratum	mouse ear chickweed	no
Cirsium vulgare	bull thistle	no
Claytonia perfoliata ssp. *perfoliata*	miner’s lettuce	yes
Conium maculatum	poison hemlock	no
Cotoneaster pannosus	silverleaf cotoneaster	no
Cynosurus echinatus	dog’s tail	no
Delairea odorata	German ivy	no
Deschampsia elongata	slender hairgrass	yes
Dittrichia graveolens	stinkwort	no
Dryopteris arguta	coastal wood fern	yes
Ehrharta erecta	panic veldtgrass	no
Epilobium brachycarpum	annual fireweed	yes
Epilobium ciliatum	fringed willowherb	yes
Epipactis helleborine	broad-leaved helleborine	no
Equisetum arvense	common horsetail	yes
Erodium cicutarium	red stemmed filaree	no
Erythranthe guttata	seep monkeyflower	yes

Euryops pectinatus (ornamental)	golden euryops	no
Festuca bromoides	brome fescue	no
Festuca perennis	Italian ryegrass	no
Galium aparine	common bedstraw	yes
Galium divaricatum	Lamarck's bedstraw	no
Gastridium phleoides	nit grass	no
Geranium dissectum	cutleaf geranium	no
Geranium purpureum	herb robert	no
Helenium puberulum	sneezeweed	yes
Helminthotheca echioides	bristly ox-tongue	no
Heracleum maximum	cow parsnip	yes
Hirschfeldia incana	short pod mustard	no
Hordeum murinum ssp. leporinum	lepor barley	no
Hypochaeris glabra	smooth cat's ears	no
Hypochaeris radicata	cat's ears	no
Iris pseudacorus	Pale yellow iris	no
Juglans californica	Calfornia black walnut	yes
Juglans regia	English walnut	no
Juncus bufonius	toad rush	yes
Juncus patens	common rush	yes
Juncus xiphioides	iris-leaved rush	yes
Kickxia elatine	sharp point fluellin	no
Lactuca saligna	willow leaf lettuce	no
Lactuca serriola	prickly lettuce	no
Lactuca virosa	wild lettuce	no
Lamium purpureum	purple dead nettle	no
Lapsana communis	common nipplewort	no
Lavandula stoechas (Ornamental)	Anouk Spanish lavender	no
Lepidium didymum	swine-cress	no
Lepidium strictum	upright knotweed	yes
Logfia gallica	narrowleaf cottonrose	no
Lonicera hispidula	pink honeysuckle	yes
Lonicera involucrata	twinberry honeysuckle	yes
Lysimachia arvensis	scarlet pimpernel	no
Madia sp.	tarweed	yes
Maianthemum stellatum	false Solomon's seal	yes
Malva nicaeensis	bull mallow	no
Marah fabaceus	man-root	yes
Mentha sp.	mint	yes
Mercurialis annua	annual mercury	no
Myosotis latifolia	forget-me-not	no
Narcissus sp.	daffodil	no
Nasturtium officinale	water cress	yes
Osmorhiza berteroi	sweet cicely	yes
Pentagramma triangularis	goldback fern	yes

Phalaris aquatica	Harding grass	no
Phormium tenax (ornamental)	New Zealand flax	no
Physocarpus capitatus	Pacific ninebark	yes
Pinus ponderosa	ponderosa pine	yes
Pinus sp.	pine	no
Plantago lanceolata	English plantain	no
Platanus racemosa	sycamore	yes
Poa annua	annual bluegrass	no
Polycarpon tetraphyllum	four-leaf allseed	no
Polygonum aviculare	common knotweed	no
Polypogon interruptus	ditch rabbitfoot grass	no
Pseudognaphalium californicum	California cudweed	yes
Pseudognaphalium luteoalbum	Jersey cudweed	no
Quercus agrifolia	coast live oak	yes
Ribes sp.	gooseberry	yes
Rubus ursinus	California blackberry	yes
Rumex conglomeratus	clustered dock	no
Rumex crispus	curly dock	no
Rupertia physodes	California tea	yes
Sagina apetala	annual pearlwort	no
Salix laevigata	red willow	yes
Salix lasiolepis	arroyo willow	yes
Sambucus nigra ssp. *caerulea*	blue elderberry	yes
Sanicula crassicaulis	gamble weed	yes
Scleranthus annuus	German knotgrass	no
Scrophularia californica	bee plant	yes
Senecio vulgaris	common groundsel	no
Sequoia sempervirens	redwood	yes
Sequoiadendron giganteum	giant sequoia	yes
Silybum marianum	milk thistle	no
Sisymbrium officinale	hedge mustard	no
Solanum douglasii	white nightshade	yes
Sonchus asper ssp. *asper*	prickly sow thistle	no
Sonchus oleraceus	sow thistle	no
Spergularia rubra	red sandspurry	no
Stachys rigida var. *quercetorum*	rough hedge nettle	yes
Stellaria media	chickweed	no
Stipa lepida	foothill needlegrass	yes
Stipa miliacea	smilo grass	no
Stipa pulchra	purple needle grass	yes
Symphoricarpos albus var. *laevigatus*	snowberry	yes
Tanacetum parthenium (ornamental)	fewerfew	no
Taraxacum officinale	dandelion	no
Torilis arvensis	spreading hedgeparsley	no
Toxicodendron diversilobum	poison oak	yes

Trifolium glomeratum	clustered clover	no
Trifolium hirtum	rose clover	no
Trillium chloropetalum	giant wakerobin	yes
Umbellularia californica	bay tree	yes
Urospermum picroides	prickly goldenfleece	no
Urtica dioica	stinging nettle	yes
Vicia sativa	common vetch	no
Vinca major	periwinkle	no
Wisteria sp. (ornamental)	wisteria	no

Nomenclature according to: on-line Jepson eFlora and Calflora.

Surveys conducted by Zoya Akulova-Barlow and James Martin.

Query Criteria: Quad IS (Oakland East (3712272) OR Las Trampas Ridge (3712271) OR Diablo (3712178) OR San Leandro (3712262) OR Hayward (3712261) OR Dublin (3712168))

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks: A	B	C	D	X	U	Population Status: Historic > 20 yr	Recent <= 20 yr	Presence: Extant	Poss. Extirp.	Extirp.
Accipiter cooperii Cooper's hawk	G5 S4	None None	CDFW_WL-Watch List IUCN_LC-Least Concern	260 950	118 S:2	0	0	1	0	0	1	0	2	2	0	0
Accipiter striatus sharp-shinned hawk	G5 S4	None None	CDFW_WL-Watch List IUCN_LC-Least Concern	1,180 1,180	22 S:1	1	0	0	0	0	0	1	0	1	0	0
Acipenser medirostris pop. 1 green sturgeon - southern DPS	G2T1 S1	Threatened None	AFS_VU-Vulnerable IUCN_NT-Near Threatened	0 0	13 S:1	0	1	0	0	0	0	0	1	1	0	0
Agelaius tricolor tricolored blackbird	G1G2 S1S2	None Threatened	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_EN-Endangered NABCI_RWL-Red Watch List USFWS_BCC-Birds of Conservation Concern	520 650	955 S:3	0	1	2	0	0	0	3	0	3	0	0
Ambystoma californiense pop. 1 California tiger salamander - central California DPS	G2G3T3 S3	Threatened Threatened	CDFW_WL-Watch List IUCN_VU-Vulnerable	20 1,750	1265 S:15	4	5	2	0	2	2	4	11	13	0	2
Amsinckia lunaris bent-flowered fiddleneck	G3 S3	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_UCBG-UC Botanical Garden at Berkeley SB_UCSC-UC Santa Cruz	575 1,611	93 S:13	0	1	1	0	0	11	1	12	13	0	0
Anomobryum julaceum slender silver moss	G5? S2	None None	Rare Plant Rank - 4.2		13 S:1	0	0	0	0	0	1	1	0	1	0	0
Antrozous pallidus pallid bat	G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFS_S-Sensitive WBWG_H-High Priority	30 770	420 S:11	0	0	0	0	0	11	10	1	11	0	0

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Aquila chrysaetos golden eagle	G5 S3	None None	BLM_S-Sensitive CDF_S-Sensitive CDFW_FP-Fully Protected CDFW_WL-Watch List IUCN_LC-Least Concern	950 1,560	325 S:2	1	1	0	0	0	0	2	0	2	0	0
Arctostaphylos auriculata Mt. Diablo manzanita	G2 S2	None None	Rare Plant Rank - 1B.3	1,300 1,800	17 S:4	2	2	0	0	0	0	1	3	4	0	0
Arctostaphylos manzanita ssp. laevigata Contra Costa manzanita	G5T2 S2	None None	Rare Plant Rank - 1B.2	1,200 2,000	10 S:5	0	1	0	0	0	4	4	1	5	0	0
Arctostaphylos pallida pallid manzanita	G1 S1	Threatened Endangered	Rare Plant Rank - 1B.1	1,120 1,500	9 S:6	0	0	4	1	1	0	1	5	5	1	0
Ardea herodias great blue heron	G5 S4	None None	CDF_S-Sensitive IUCN_LC-Least Concern	300 300	156 S:1	0	1	0	0	0	0	1	0	1	0	0
Astragalus tener var. tener alkali milk-vetch	G2T1 S1	None None	Rare Plant Rank - 1B.2	5 70	65 S:5	0	0	0	0	5	0	5	0	0	2	3
Athene cunicularia burrowing owl	G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	2 800	2011 S:12	0	3	2	3	1	3	6	6	11	1	0
Balsamorhiza macrolepis big-scale balsamroot	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive USFS_S-Sensitive	500 500	51 S:2	1	0	0	0	0	1	2	0	2	0	0
Bombus caliginosus obscure bumble bee	G2G3 S1S2	None None	IUCN_VU-Vulnerable	300 3,150	181 S:5	0	0	0	0	0	5	5	0	5	0	0
Bombus crotchii Crotch bumble bee	G2 S1S2	None None		350 2,000	437 S:3	0	0	0	0	0	3	3	0	3	0	0
Bombus occidentalis western bumble bee	G2G3 S1	None None	USFS_S-Sensitive	25 2,000	306 S:11	0	0	0	0	0	11	11	0	11	0	0
Buteo swainsoni Swainson's hawk	G5 S3	None Threatened	BLM_S-Sensitive IUCN_LC-Least Concern	2,000 2,000	2548 S:1	0	0	0	0	0	1	1	0	1	0	0

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Calochortus pulchellus Mt. Diablo fairy-lantern	G2 S2	None None	Rare Plant Rank - 1B.2	600 2,197	52 S:11	1	4	0	1	0	5	3	8	11	0	0
Campanula exigua chaparral harebell	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	3,200 3,200	50 S:2	0	0	0	0	0	2	2	0	2	0	0
Centromadia parryi ssp. congdonii Congdon's tarplant	G3T2 S2	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	9 750	98 S:16	3	2	3	1	3	4	9	7	13	1	2
Charadrius nivosus nivosus western snowy plover	G3T3 S2	Threatened None	CDFW_SSC-Species of Special Concern NABCI_RWL-Red Watch List	3 5	138 S:2	1	0	0	0	0	1	1	1	2	0	0
Chloropyron maritimum ssp. palustre Point Reyes salty bird's-beak	G4?T2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive		80 S:1	0	0	0	0	1	0	1	0	0	1	0
Chorizanthe robusta var. robusta robust spineflower	G2T1 S1	Endangered None	Rare Plant Rank - 1B.1	30 30	20 S:1	0	0	0	0	1	0	1	0	0	1	0
Circus hudsonius northern harrier	G5 S3	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	5 5	54 S:1	0	1	0	0	0	0	0	1	1	0	0
Clarkia concinna ssp. automixa Santa Clara red ribbons	G5?T3 S3	None None	Rare Plant Rank - 4.3	400 400	20 S:1	0	0	0	0	0	1	1	0	1	0	0
Clarkia franciscana Presidio clarkia	G1 S1	Endangered Endangered	Rare Plant Rank - 1B.1 SB_UCBG-UC Botanical Garden at Berkeley	1,000 1,000	4 S:1	0	1	0	0	0	0	0	1	1	0	0

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks A	B	C	D	X	U	Population Status Historic > 20 yr	Recent <= 20 yr	Presence Extant	Poss. Extirp.	Extirp.
Corynorhinus townsendii Townsend's big-eared bat	G4 S2	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFS_S-Sensitive WBWG_H-High Priority	700 3,790	635 S:3	0	0	0	0	1	2	3	0	2	1	0
Coturnicops noveboracensis yellow rail	G4 S1S2	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern NABCI_RWL-Red Watch List USFS_S-Sensitive USFWS_BCC-Birds of Conservation Concern	0 20	45 S:2	0	0	0	0	0	2	1	1	2	0	0
Danaus plexippus pop. 1 monarch - California overwintering population	G4T2T3 S2S3	Candidate None	USFS_S-Sensitive	5 25	383 S:4	0	1	1	0	0	2	0	4	4	0	0
Delphinium californicum ssp. interius Hospital Canyon larkspur	G3T3 S3	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	3,300 3,300	28 S:2	0	1	0	0	0	1	1	1	2	0	0
Dipodomys heermanni berkeleyensis Berkeley kangaroo rat	G4T1 S1	None None		580 3,200	8 S:6	0	0	0	0	0	6	5	1	6	0	0
Dirca occidentalis western leatherwood	G2 S2	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	675 1,655	90 S:16	1	6	2	0	0	7	5	11	16	0	0
Efferia antiochi Antioch efferian robberfly	G1G2 S1S2	None None		350 350	4 S:1	0	0	0	0	0	1	1	0	1	0	0
Elanus leucurus white-tailed kite	G5 S3S4	None None	BLM_S-Sensitive CDFW_FP-Fully Protected IUCN_LC-Least Concern	408 408	184 S:1	1	0	0	0	0	0	0	1	1	0	0

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks A	B	C	D	X	U	Population Status Historic > 20 yr	Recent <= 20 yr	Presence Extant	Poss. Extirp.	Extirp.
Emys marmorata western pond turtle	G3G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_VU-Vulnerable USFS_S-Sensitive	393 640	1404 S:7	1	3	1	0	0	2	3	4	7	0	0
Eremophila alpestris actia California horned lark	G5T4Q S4	None None	CDFW_WL-Watch List IUCN_LC-Least Concern	600 600	94 S:1	0	1	0	0	0	0	1	0	1	0	0
Eriogonum luteolum var. caninum Tiburon buckwheat	G5T2 S2	None None	Rare Plant Rank - 1B.2	850 950	26 S:3	0	0	1	0	0	2	0	3	3	0	0
Eriogonum truncatum Mt. Diablo buckwheat	G1 S1	None None	Rare Plant Rank - 1B.1 SB_UCBG-UC Botanical Garden at Berkeley		7 S:2	0	0	0	0	0	2	1	1	2	0	0
Eryngium jepsonii Jepson's coyote-thistle	G2 S2	None None	Rare Plant Rank - 1B.2	330 775	19 S:4	0	0	0	0	0	4	2	2	4	0	0
Eucyclogobius newberryi tidewater goby	G3 S3	Endangered None	AFS_EN-Endangered IUCN_VU-Vulnerable	5 5	127 S:1	0	0	0	0	0	1	1	0	1	0	0
Eumops perotis californicus western mastiff bat	G4G5T4 S3S4	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern WBWG_H-High Priority	120 120	296 S:1	0	0	0	0	0	1	1	0	1	0	0
Euphydryas editha bayensis Bay checkerspot butterfly	G5T1 S1	Threatened None		500 1,300	30 S:2	0	0	0	0	2	0	2	0	0	0	2
Extriplex joaquinana San Joaquin spearscale	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	700 730	127 S:3	0	1	0	0	2	0	3	0	1	1	1
Falco mexicanus prairie falcon	G5 S4	None None	CDFW_WL-Watch List IUCN_LC-Least Concern	1,769 1,860	451 S:3	3	0	0	0	0	0	0	3	3	0	0
Falco peregrinus anatum American peregrine falcon	G4T4 S3S4	Delisted Delisted	CDF_S-Sensitive CDFW_FP-Fully Protected	0 0	63 S:1	0	1	0	0	0	0	0	1	1	0	0
Fissidens pauperculus minute pocket moss	G3? S2	None None	Rare Plant Rank - 1B.2 USFS_S-Sensitive	985 985	22 S:1	0	0	0	0	0	1	1	0	1	0	0

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks A	B	C	D	X	U	Population Status Historic > 20 yr	Recent <= 20 yr	Presence Extant	Poss. Extirp.	Extirp.
Fritillaria liliacea fragrant fritillary	G2 S2	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden USFS_S-Sensitive	200 550	82 S:7	0	0	1	1	1	4	4	3	6	1	0
Geothlypis trichas sinuosa saltmarsh common yellowthroat	G5T3 S3	None None	CDFW_SSC-Species of Special Concern USFWS_BCC-Birds of Conservation Concern	0 0	112 S:1	1	0	0	0	0	0	1	0	1	0	0
Gilia millefoliata dark-eyed gilia	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive		54 S:1	0	0	0	0	1	0	1	0	0	0	1
Helianthella castanea Diablo helianthella	G2 S2	None None	Rare Plant Rank - 1B.2	500 2,705	107 S:36	5	9	9	0	0	13	17	19	36	0	0
Helminthoglypta nickliniana bridgesi Bridges' coast range shoulderband	G3T1 S1S2	None None	IUCN_DD-Data Deficient	1,400 1,950	6 S:2	0	0	0	0	0	2	2	0	2	0	0
Hesperolinon breweri Brewer's western flax	G2 S2	None None	Rare Plant Rank - 1B.2	1,150 2,190	29 S:2	0	1	0	0	0	1	1	1	2	0	0
Hoita strobilina Loma Prieta hoita	G2? S2?	None None	Rare Plant Rank - 1B.1		37 S:1	0	0	0	0	1	0	1	0	0	1	0
Holocarpha macradenia Santa Cruz tarplant	G1 S1	Threatened Endangered	Rare Plant Rank - 1B.1 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_UCBG-UC Botanical Garden at Berkeley		37 S:1	0	0	0	0	1	0	1	0	0	1	0
Horkelia cuneata var. sericea Kellogg's horkelia	G4T1? S1?	None None	Rare Plant Rank - 1B.1 SB_UCSC-UC Santa Cruz USFS_S-Sensitive	20 20	58 S:1	0	0	0	0	1	0	1	0	0	1	0
Lasionycteris noctivagans silver-haired bat	G3G4 S3S4	None None	IUCN_LC-Least Concern WBWG_M-Medium Priority	400 400	139 S:1	0	0	0	0	0	1	1	0	1	0	0
Lasiurus cinereus hoary bat	G3G4 S4	None None	IUCN_LC-Least Concern WBWG_M-Medium Priority	325 660	238 S:3	0	0	0	0	0	3	3	0	3	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks A	B	C	D	X	U	Population Status Historic > 20 yr	Recent <= 20 yr	Presence Extant	Poss. Extirp.	Extirp.
Lasthenia conjugens Contra Costa goldfields	G1 S1	Endangered None	Rare Plant Rank - 1B.1 SB_UCBG-UC Botanical Garden at Berkeley	5 5	36 S:1	0	0	0	0	0	1	1	0	1	0	0
Laterallus jamaicensis coturniculus California black rail	G3T1 S1	None Threatened	BLM_S-Sensitive CDFW_FP-Fully Protected IUCN_NT-Near Threatened NABCI_RWL-Red Watch List	1 6	303 S:4	1	1	0	0	1	1	2	2	3	1	0
Linderiella occidentalis California linderiella	G2G3 S2S3	None None	IUCN_NT-Near Threatened	550 650	508 S:4	0	4	0	0	0	0	0	4	4	0	0
Malacothamnus hallii Hall's bush-mallow	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	1,500 1,500	43 S:1	0	0	0	0	0	1	1	0	1	0	0
Masticophis lateralis euryxanthus Alameda whipsnake	G4T2 S2	Threatened Threatened		175 2,200	167 S:69	16	23	7	1	3	19	34	35	66	3	0
Meconella oregana Oregon meconella	G2G3 S2	None None	Rare Plant Rank - 1B.1	1,300 1,550	9 S:2	0	0	0	0	0	2	1	1	2	0	0
Melospiza melodia pusillula Alameda song sparrow	G5T2T3 S2S3	None None	CDFW_SSC-Species of Special Concern USFWS_BCC-Birds of Conservation Concern	5 1,300	38 S:7	0	2	0	0	0	5	5	2	7	0	0
Microcina leei Lee's micro-blind harvestman	G1 S1	None None		600 600	2 S:1	0	0	0	0	0	1	1	0	1	0	0
Microcina lumi Lum's micro-blind harvestman	G1 S1	None None		400 600	2 S:2	0	0	0	0	0	2	2	0	2	0	0
Monolopia gracilens woodland woollythreads	G3 S3	None None	Rare Plant Rank - 1B.2	1,700 3,000	68 S:4	0	0	0	0	0	4	2	2	4	0	0
Myotis yumanensis Yuma myotis	G5 S4	None None	BLM_S-Sensitive IUCN_LC-Least Concern WBWG_LM-Low-Medium Priority	380 380	265 S:1	0	0	0	0	0	1	0	1	1	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks A	B	C	D	X	U	Population Status Historic > 20 yr	Recent <= 20 yr	Presence Extant	Poss. Extirp.	Extirp.
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	G5T2T3 S2S3	None None	CDFW_SSC-Species of Special Concern	667 713	42 S:3	1	1	1	0	0	0	0	3	3	0	0
Northern Coastal Salt Marsh Northern Coastal Salt Marsh	G3 S3.2	None None		10 10	53 S:1	0	0	0	0	0	1	1	0	1	0	0
Northern Maritime Chaparral Northern Maritime Chaparral	G1 S1.2	None None		1,300 1,300	17 S:1	0	0	0	0	0	1	1	0	1	0	0
Phacelia phacelioides Mt. Diablo phacelia	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive	2,500 2,500	16 S:1	0	0	0	0	0	1	1	0	1	0	0
Plagiobothrys diffusus San Francisco popcornflower	G1Q S1	None Endangered	Rare Plant Rank - 1B.1 SB_UCSC-UC Santa Cruz	920 920	17 S:1	0	0	1	0	0	0	1	0	1	0	0
Plagiobothrys glaber hairless popcornflower	GX SX	None None	Rare Plant Rank - 1A	20 20	9 S:1	0	0	0	0	1	0	1	0	0	1	0
Polemonium carneum Oregon polemonium	G3G4 S2	None None	Rare Plant Rank - 2B.2		16 S:1	0	0	0	0	0	1	1	0	1	0	0
Polygonum marinense Marin knotweed	G2Q S2	None None	Rare Plant Rank - 3.1		32 S:1	0	0	0	0	0	1	1	0	1	0	0
Pomatiopsis californica Pacific walker	G1 S1	None None			4 S:1	0	0	0	0	1	0	1	0	0	0	1
Rallus obsoletus obsoletus California Ridgway's rail	G3T1 S1	Endangered Endangered	CDFW_FP-Fully Protected NABCI_RWL-Red Watch List	0 10	99 S:9	0	5	3	1	0	0	1	8	9	0	0
Rana boylii foothill yellow-legged frog	G3 S3	None Endangered	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_NT-Near Threatened USFS_S-Sensitive	120 3,790	2478 S:9	0	1	0	0	8	0	9	0	1	3	5
Rana draytonii California red-legged frog	G2G3 S2S3	Threatened None	CDFW_SSC-Species of Special Concern IUCN_VU-Vulnerable	300 1,819	1671 S:57	4	39	5	2	0	7	26	31	57	0	0
Reithrodontomys raviventris salt-marsh harvest mouse	G1G2 S1S2	Endangered Endangered	CDFW_FP-Fully Protected IUCN_EN-Endangered	1 3	144 S:4	2	0	0	0	0	2	3	1	4	0	0

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks A	B	C	D	X	U	Population Status Historic > 20 yr	Recent <= 20 yr	Presence Extant	Poss. Extirp.	Extirp.
Rynchops niger black skimmer	G5 S2	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern NABCI_YWL-Yellow Watch List USFWS_BCC-Birds of Conservation Concern	3 3	7 S:1	1	0	0	0	0	0	1	0	1	0	0
Sanicula maritima adobe sanicle	G2 S2	None Rare	Rare Plant Rank - 1B.1 SB_SBBG-Santa Barbara Botanic Garden USFS_S-Sensitive		17 S:1	0	0	0	0	1	0	1	0	0	0	1
Scapanus latimanus parvus Alameda Island mole	G5T1Q SH	None None	CDFW_SSC-Species of Special Concern	10 20	8 S:2	0	0	0	0	0	2	2	0	2	0	0
Serpentine Bunchgrass Serpentine Bunchgrass	G2 S2.2	None None		1,120 1,120	22 S:1	0	0	0	0	0	1	1	0	1	0	0
Setophaga petechia yellow warbler	G5 S3S4	None None	CDFW_SSC-Species of Special Concern	280 280	78 S:1	0	1	0	0	0	0	1	0	1	0	0
Sorex vagrans halicoetes salt-marsh wandering shrew	G5T1 S1	None None	CDFW_SSC-Species of Special Concern	1 2	12 S:3	0	0	0	0	0	3	3	0	3	0	0
Spergularia macrotheca var. longistyla long-styled sand-spurrey	G5T2 S2	None None	Rare Plant Rank - 1B.2		22 S:1	0	0	0	0	0	1	1	0	1	0	0
Spirinchus thaleichthys longfin smelt	G5 S1	Candidate Threatened		0 0	46 S:2	0	0	0	0	0	2	1	1	2	0	0
Sternula antillarum browni California least tern	G4T2T3Q S2	Endangered Endangered	CDFW_FP-Fully Protected NABCI_RWL-Red Watch List	5 6	75 S:3	1	0	0	0	1	1	2	1	2	0	1
Streptanthus albidus ssp. peramoenus most beautiful jewelflower	G2T2 S2	None None	Rare Plant Rank - 1B.2 SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden SB_UCBG-UC Botanical Garden at Berkeley USFS_S-Sensitive	800 900	103 S:6	0	0	1	0	0	5	3	3	6	0	0

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks A	B	C	D	X	U	Population Status Historic > 20 yr	Recent <= 20 yr	Presence Extant	Poss. Extirp.	Extirp.
Streptanthus hispidus Mt. Diablo jewelflower	G2 S2	None None	Rare Plant Rank - 1B.3	820 820	8 S:1	0	1	0	0	0	0	1	0	1	0	0
Stuckenia filiformis ssp. alpina northern slender pondweed	G5T5 S2S3	None None	Rare Plant Rank - 2B.2	600 1,600	21 S:2	0	0	0	0	0	2	2	0	2	0	0
Suaeda californica California seablite	G1 S1	Endangered None	Rare Plant Rank - 1B.1		18 S:3	0	0	0	0	2	1	2	1	1	1	1
Taxidea taxus American badger	G5 S3	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	500 1,000	594 S:6	2	1	0	0	0	3	5	1	6	0	0
Trifolium hydrophilum saline clover	G2 S2	None None	Rare Plant Rank - 1B.2		56 S:1	0	0	0	0	1	0	1	0	0	0	1
Triquetrella californica coastal triquetrella	G2 S2	None None	Rare Plant Rank - 1B.2 USFS_S-Sensitive	3,849 3,849	13 S:1	0	0	0	0	0	1	1	0	1	0	0
Tryonia imitator mimic tryonia (=California brackishwater snail)	G2 S2	None None	IUCN_DD-Data Deficient	0 0	39 S:2	0	0	0	0	2	0	2	0	0	0	2
Valley Needlegrass Grassland Valley Needlegrass Grassland	G3 S3.1	None None		500 500	45 S:1	0	0	1	0	0	0	1	0	1	0	0
Viburnum ellipticum oval-leaved viburnum	G4G5 S3?	None None	Rare Plant Rank - 2B.3	600 1,500	39 S:4	0	0	0	0	0	4	4	0	4	0	0
Vulpes macrotis mutica San Joaquin kit fox	G4T2 S2	Endangered Threatened		470 710	1020 S:3	0	0	0	0	0	3	3	0	3	0	0

APPENDIX E

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
THE MOSAIC PROJECT
17015 CULL CANYON ROAD
CASTRO VALLEY, CALIFORNIA

September 16, 2019

Prepared For:

THE MOSAIC PROJECT
478 Santa Clara Avenue, Suite 200
Oakland, California 94610

Mr. Brian Lowe, Chief Operating Officer

NV5

48 Bellarmine Court
Suite 40
Chico, CA 95928

125619-0070852.00.001

September 16, 2019
Project No. 70852.00.001

Mr. Brian Lowe, Chief Operating Officer
The Mosaic Project
478 Santa Clara Avenue, Suite 200
Oakland, California 94610

Via PDF: Brian@mosaicproject.org

Reference: **Geotechnical Engineering Investigation Report**
The Mosaic Project
17015 Cull Canyon Road
Castro Valley, Alameda County, California

Dear Mr. Lowe,

NV5 conducted a geotechnical engineering investigation for the proposed Mosaic Project educational development located at 17015 Cull Canyon Road in Castro Valley, California. NV5's geotechnical engineering investigation of the site was performed consistent with the scope of services presented in the February 22, 2019 proposal (PC19.043).

The findings, conclusions and recommendations presented in this report are based on the following relevant information collected and evaluated by NV5: literature review, surface observations, subsurface exploration, laboratory test results, and experience with similar projects, sites and conditions in the area. There were no seismic hazards identified on the site or in the immediate area that require design mitigation. There were geotechnical engineering hazards consisting of loose fill materials containing concrete and asphalt concrete (AC) rubble within the subgrade soils of the site. However, it is NV5's opinion that the site is suitable for the proposed construction provided the geotechnical engineering recommendations presented in this report are incorporated into the earthwork and structural improvements. This report should not be relied upon without review by NV5 if a period of 24 months elapses between the issuance report date shown above and the date when construction commences.

NV5 appreciates the opportunity to provide engineering geology services for this important project. If you have questions or need additional information, please do not hesitate to contact the undersigned at 530-894-2487.

Sincerely,
NV5

REGISTERED PROFESSIONAL ENGINEER
DOMINIC J. POTESTIO
NO. 69299
CIVIL
STATE OF CALIFORNIA

REGISTERED GEOLOGIST
SHANE D. CUMMINGS
No. 2492
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Dominic J. Potestio, PE 69299
Senior Engineer

Shane D. Cummings, CEG 2492
Associate Engineering Geologist

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ACRONYMS

AB	aggregate base
AC	asphalt concrete
ACI	American Concrete Institute
ASCE	American Society of Civil Engineers
ASTM	ASTM International
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
CAT	Caterpillar
CBC	California Building Code
CQA	Construction Quality Assurance
DTSC	Department of Toxic Substances Control
EFP	equivalent fluid pressure
FS	factor of safety
ft/sec	feet per second
GBA	Geoprofessional Business Association
H:V	horizontal to vertical
IBC	International Building Code
MCE	maximum considered earthquake
msl	mean sea level
mybp	million years before present
OSHA	Occupational Safety and Hazards Administration
oz/sy	ounce per square yard
PCA	Portland Cement Association
PGA_M	peak ground acceleration
PI	plasticity index
psf	pounds per square foot
psi	pounds per square inch
PVC	polyvinylchloride
S-wave	shear-wave
SEAOC	Structural Engineers Association of California
sf	square feet
SRMS	Seismic Refraction Microtremor Survey
SSD	saturated surface dry
USCS	Unified Soils Classification System

1.0 INTRODUCTION

NV5 performed a geotechnical engineering investigation and prepared a geotechnical engineering investigation report for the proposed Mosaic Project educational development at 17015 Cull Canyon Road in Castro Valley, California, consistent with the scope of services presented in NV5's *Proposal for Geotechnical Engineering Services* (PC19.043), dated February 22, 2019. NV5's findings, conclusions and recommendations are presented herein.

For your review, Appendix A presents a document prepared by the Geoprofessional Business Association (GBA) entitled *"Important Information about This Geotechnical Engineering Report."* This document summarizes project specific factors, limitations, content interpretation, responsibilities and other pertinent information.

1.1 SCOPE-OF-SERVICES

NV5 performed a specific scope-of-services to develop geotechnical engineering design recommendations for earthwork and structural improvements. Brief description of each work scope task is presented below. A detailed description of each work scope task is presented in Section 2 (Site Investigation) of this report.

- **Task 1 Site Investigation and Laboratory Testing:** NV5 performed a site investigation to characterize the existing surface and subsurface soil, rock and groundwater conditions encountered to the maximum depth excavated. NV5's field engineer/geologist made observations, collected representative soil samples, conducted seismic refraction survey, and performed field tests at a limited number of subsurface exploratory locations. NV5 performed laboratory tests on selected soil samples to evaluate their engineering material properties.
- **Task 2 Data Analysis and Engineering Design:** NV5 evaluated the field and laboratory site data and the proposed site improvements and used this information to develop geotechnical engineering design recommendations for earthwork and structural improvements. NV5 used engineering judgment to extrapolate NV5's observations and conclusions regarding the field and laboratory data to other onsite areas located between and beyond the locations of NV5's subsurface exploratory excavations.
- **Task 3 Report Preparation:** NV5 prepared this report to present the findings, conclusions and recommendations for this geotechnical engineering investigation.

1.2 SITE LOCATION AND DESCRIPTION

The proposed Mosaic Project educational development is located at 17015 Cull Canyon Road, north of Crow Canyon Road, in Castro Valley, California. The site is centered at about latitude 37.7418 North and longitude -122.0551 West. The property elevation ranges from approximately 72 feet above mean sea level (msl) along Cull Creek to approximately 150 feet above msl in the southwestern portion of the site, based on review of the topographical information presented on the *Topographic Survey* dated January 28, 2019, and prepared by Greenwood & Moore, Inc. Figure 1 shows the site location and vicinity.

NV5
48 BELLARMINE CT., Ste 40
CHICO, CA 95928
(530) 894-2487 FAX 894-2437

SITE LOCATION MAP
THE MOSAIC PROJECT
CASTRO VALLEY, ALAMEDA COUNTY, CALIFORNIA

PROJ NO.: 70852.00
DATE: AUGUST,2019
FIGURE NO.: 1

At the time of NV5's site investigation on June 6, 2019, the following site conditions were observed:

- The northeastern portion of the site supported an agricultural barn, a modular single-family residence, 2 outbuildings, and 2 metal storage containers. Numerous stockpiles of organics, primarily consisting of tree clippings, were observed to the south of the residence.

- Cull Creek was observed meandering through the eastern portion of the site. A concrete-decked bridge provided access to the portion of the site west of the creek. The creek had water in it at the time of NV5's site investigation.

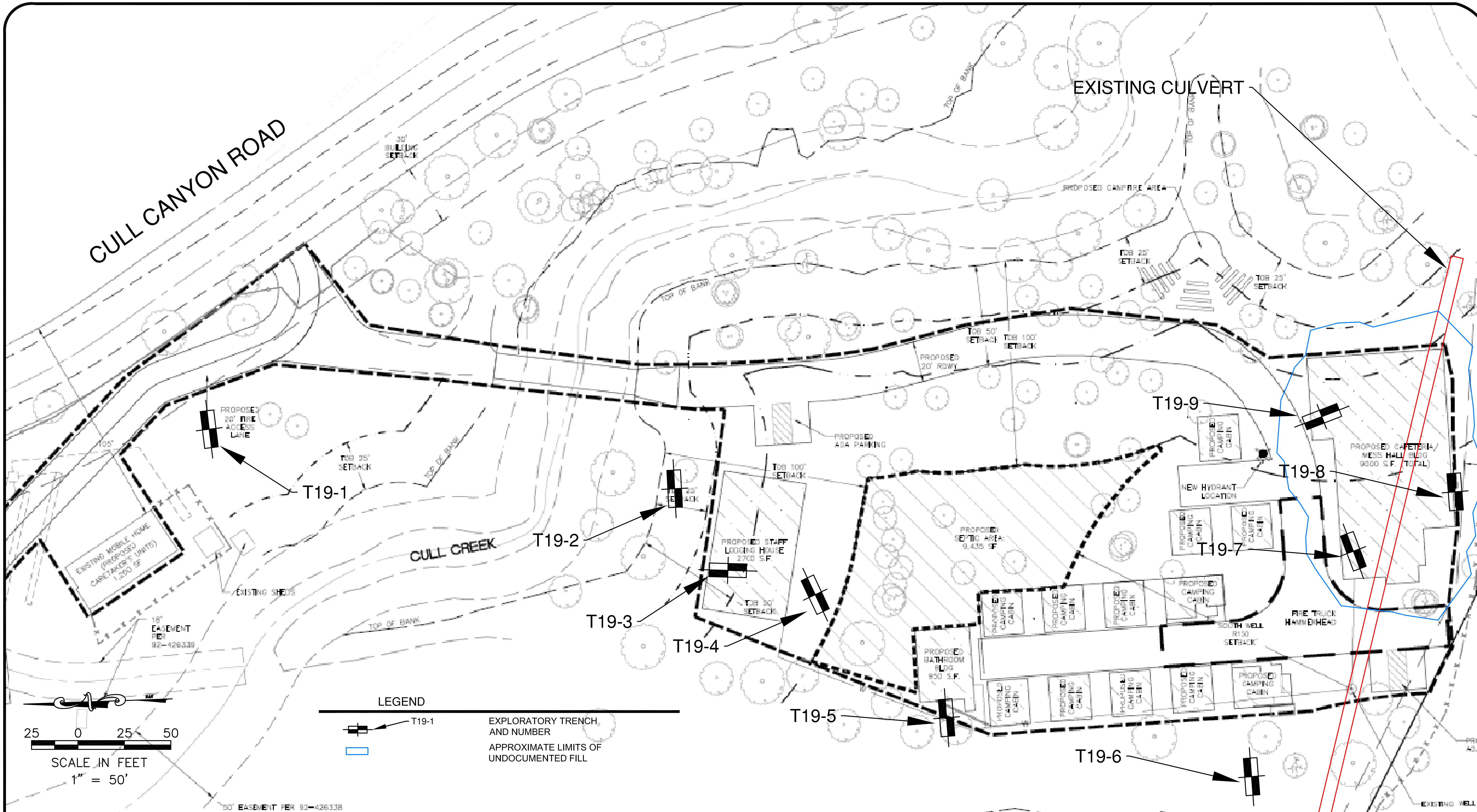
- The western portion of the site supported a small wood-framed well house, a metal free-standing shade structure covering an outdoor kitchen area, and one tall, single-story masonry recreational building. The recreational building was partially built into the existing slope on the west side. The slope was retained by a masonry retaining wall. Access to the recreational building was provided by a concrete driveway extending from the bridge to the building.

- The ground surface of the site supported slight to moderate concentration of volunteer weeds and grasses. Mature trees were observed throughout the project site.

1.3 PROPOSED IMPROVEMENTS

Based on the project information provided by representatives of NorthStar, NV5 understands the proposed Mosaic project will include construction of an Outdoor Program overnight camp for 4th and 5th grade students. NV5's review of *Proposed Site Layout* dated July 2019, and prepared by

Northstar, indicates site development will include construction of 12 new dormitory cabins for students, a new restroom/shower building approximately 950 square feet (sf) in size, a new cafeteria/mess hall building approximately 9,000 sf in size, and a new staff lodging house approximately 2,700 sf in size. NV5 anticipates the proposed structures will be constructed with wood or steel framed walls and supported on continuous spread and isolated foundations with an interior slab-on-grade, concrete floor. Associated development is indicated to include construction of retaining walls, underground utilities, a campfire area, asphalt concrete/concrete pavements, and exterior concrete slab-on-grade flatwork. Earthwork grading may include general site preparation and minor to moderate cuts and fills required to balance the site to meet the proposed building grades. Figure 2 shows the proposed site development.



NV5
48 BELLARMINE CT. STE 40
CHICO, CA, 95928
PH: 530-894-2437 FX: 530-894-2437

SITE PLAN AND EXPLORATORY TRENCH LOCATIONS

THE MOSAIC PROJECT
17015 CULL CANYON ROAD
CASTRO VALLEY, ALAMEDA COUNTY, CALIFORNIA

DRAWN BY	SC
CHECKED BY	SDC
PROJECT NO.	70852.00
DATE	AUGUST,2019

FIGURE NO.
2

70852.00_FIG2.dwg

1.4 INVESTIGATION PURPOSE

The purpose of NV5's investigation is to obtain sufficient on-site information about the soil, rock and groundwater conditions at the site to allow NV5 to prepare geotechnical engineering design recommendations for construction of the proposed earthwork and structural improvements described in the preceding. NV5 did not evaluate the site for the presence of hazardous waste, mold, asbestos and radon gas. Therefore, the presence and removal of these materials are not discussed in this report.

2.0 SITE INVESTIGATION

NV5 performed a site investigation to characterize the existing soil, rock and groundwater site conditions. The site investigation included a literature review of published and unpublished geologic documents and maps, review of historical aerial photographs, a surface reconnaissance investigation, and a subsurface exploratory investigation using seismic refraction survey equipment and a track-mounted excavator to excavate exploratory trenches. Each component of the site investigation is presented below.

2.1 LITERATURE REVIEW

NV5 performed a limited review of available literature that was pertinent to the project site. The following summarizes NV5's findings.

2.1.1 Site Improvement Plans

NV5 reviewed the following design improvement plans:

- Existing Site Layout, prepared by NorthStar, 111 Mission Ranch Blvd., Suite 100, Chico, CA 95926, dated July 2019.
- Proposed Site Layout, prepared by NorthStar, 111 Mission Ranch Blvd., Suite 100, Chico, CA 95926, dated July 2019.
- Topographic Survey, prepared by Greenwood & Moore, Inc., 3111 Castro Valley Road, Suite 200, Castro Valley, CA 94546, dated January 28, 2019.

2.1.2 Previous Site Investigation Reports

NV5 was not provided previous geotechnical reports for review that may be associated with the existing site.

2.1.3 Historical Aerial Photographs

NV5 reviewed historical aerial photographs of the project site and its vicinity from 1946 through 2016. NV5 reviewed the photographs for evidence of past land use on and around the subject property and visible signs of previous landslide scarps. NV5's review of the historical aerial photographs is summarized below. Copies of the aerial photographs are included in Appendix B.

1946 through 1963: The subject property appears to support at least four to five structures in the western portion of the site, near the area that currently supports the large, masonry recreational building. An unpaved access road is visible extending from Cull Canyon Road across Cull Creek to the developed area in a similar alignment to the access road observed during NV5's site investigation. A second unpaved access road is observed extending westerly from the developed area up the hillside to the west on the adjacent property. More mature trees are visible within the developed area in the later photographs.

1982: The subject property appears to be relatively unchanged since 1963 with the exception of several structures previously visible in the western portion of the site that are no longer visible.

1993 and 1998: A new structure is first visible in 1993 in the western portion of the site, just west of the previously visible structures. This structure is similar in shape and location to the masonry recreational building we observed on-site during our site investigation. By 1998, two structures are visible in the northern portion of the site similar in shape and location as the modular residence and barn observed during the NV5 site visit.

2002 and Subsequent Photographs: No apparent changes can be seen to the subject property on the 2002 and subsequent photographs from that viewed on the 1998 photograph other than a general increase in vegetation.

2.2 REGIONAL GEOLOGY

The project site is situated in Diablo Range within the Coast Range geologic province west of the boundary with the Great Valley geologic province. This province is characterized as a geologically complex and seismically active region consisting of sub-parallel northwest-trending faults, mountain ranges and valleys. The oldest geologic units are the Jurassic-Cretaceous Franciscan Complex and Great Valley sequence which consist of sediments originally deposited in a marine environment. Subsequent younger rocks such as Tertiary-age volcanic and sedimentary rocks were deposited throughout the region. During the late Cretaceous through early Tertiary period, extensive folding and thrust faulting created complex geologic conditions across the region. In the valleys, bedrock is covered by thick alluvial soils and floodplain deposits that are incised by meandering river channels. In the mountains, colluvial soils and landslides cover a highly varied and discontinuous bedrock in conjecture with the regional faulting.

2.3 SITE GEOLOGY

Based on review of the *Geologic Map of the Hayward Quadrangle, Contra Costa and Alameda Counties, California*, published by the Dibblee Geological Foundation (Dibblee, T.W. and Minch, J.A., 2005), the geology underlying the subject site is comprised of Quaternary Holocene alluvial deposits, east of Cull Creek and the Monterey Formation west of Cull Creek.

The Holocene alluvial deposits generally consist of unweathered gravel, sand and silt deposited by present-day stream channels during the Holocene Epoch (approximately 11,700 years before present to present-day).

The Monterey Formation is characterized as marine clastic and biogenic sedimentary rock generally consisting of clay shale or claystone and siltstone and siliceous shale that is thin bedded to bedded formed during the middle to late Miocene Epoch (16 to 5 million years before present [mybp]).

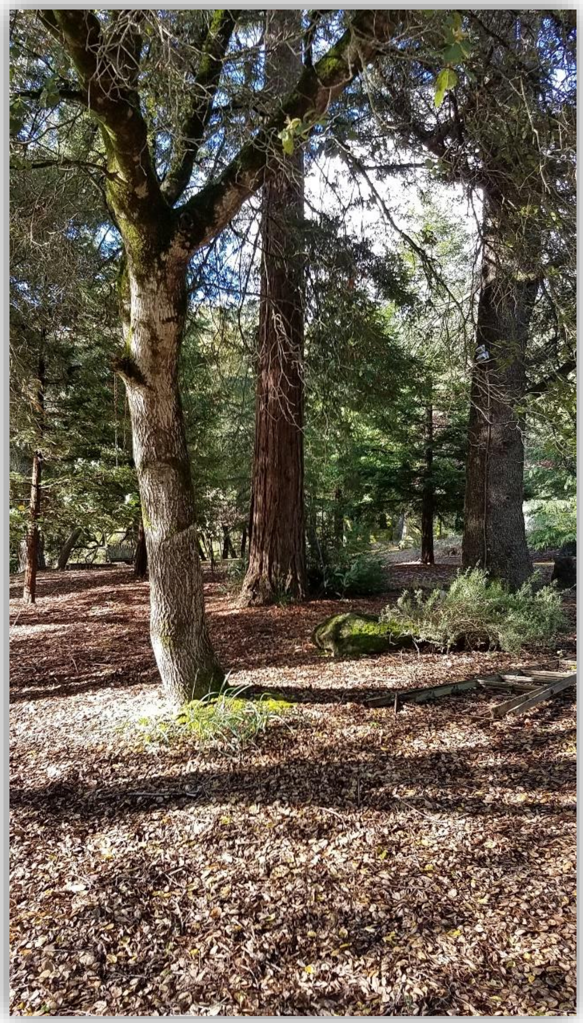
2.4 REGIONAL FAULTING AND SEISMIC SOURCES

Regional faulting is primarily associated with the Hayward Fault Zone located west of the site and the Calaveras Fault Zone located to the east of the site. The southern extent of the Miller Creek Fault Zone is mapped in the vicinity of Cull Creek, which meanders through the project site. The Miller Creek Fault Zone is identified as an age undifferentiated Quarternary fault.

NV5 reviewed the Official Maps of Earthquake Fault Zones delineated by the California Geological Survey through December 2010, on the internet at *http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm*. These maps are updates to Special Publication 42, Interim Revision 2007 edition *Fault Rupture Hazard Zones in California*, which describes active faults and fault zones (activity within 11,000 years), as part of the Alquist-Priolo Earthquake Fault Zoning Act. Special Publication 42 and the 2010 online update indicate that the site is not located within an Alquist-Priolo active fault zone.

According to the 2010 Fault Activity Map of California by the California Geological Survey, (*http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#*), Geologic Data Map No. 6, the closest known active faults which have surface displacement within Holocene time (about the last 11,000 years) are the Hayward Fault and the Calaveras Fault. The mapped Hayward Fault Zone is located approximately 4 miles to the west of the subject site and the mapped Calaveras Fault Zone is located approximately 5 miles to the east of the subject site.

2.5 FIELD INVESTIGATION



NV5 performed a field investigation of the site on June 6, 2019. NV5's field engineer/geologist described the surface and subsurface soil, rock and groundwater conditions observed at the site using the procedures cited in the ASTM International (ASTM), Volume 04.08, *Soil and Rock; Dimension Stone; and Geosynthetics* as general guidelines. The field geologist described the soil color using the general guideline procedures presented in the Munsell® Soil Color Chart. Engineering judgment was used to extrapolate the observed surface and subsurface soil, rock and groundwater conditions to areas located between and beyond the subsurface exploratory locations. The surface, subsurface and groundwater conditions observed during the field investigation are summarized below.

2.5.1 Surface Conditions

NV5 observed the following surface conditions during the field investigation of the property. Figure 2 shows the project site boundaries and the approximate exploratory trench locations. At the time of NV5's site investigation, the site supported a single-family residence and outbuildings in the northeastern portion of the site and a large recreational building in the western portion of the site. Cull Creek meandered through the center of the site in a northwest to southeast trend. Mature trees also were observed throughout the project site.

2.5.2 Subsurface Conditions

The subsurface soil, rock and groundwater conditions were investigated by excavating exploratory trenches across the project site. The subsurface information obtained from this investigation method is described in the following subsections.

2.5.2.1 Exploratory Trench Information

NV5 provided engineering oversight for the excavation of 9 exploratory soil trenches at the project site. The trenches were advanced with a Kubota U35-4 equipped with a 24-inch bucket. Figure 2 shows the approximate locations of the subsurface exploratory excavations. The trenches were excavated to depths ranging from 4 to 7 feet below ground surface (bgs). Engineering judgment was used to extrapolate the observed soil, rock and groundwater conditions to areas located between and beyond the subsurface exploratory excavations.

NV5's field engineer/geologist logged each exploratory trench using the ASTM D2487 Unified Soils Classification System (USCS) as guidelines for soil descriptions and the American Geophysical Union guidelines for rock descriptions. Representative bulk samples of the near-surface soil materials excavated from the exploratory trenches were sampled and placed in labeled sample bags.

Representative relatively undisturbed soil samples were collected from the exploratory trenches with a 2-inch, inside-diameter, split-spoon sampler equipped with steel liner sample tubes. The samples were collected from descript locations within the trenches. The sampler was driven into the soil using a 10-pound hand-operated hammer with an 18-inch drop. The steel liner tube samples were sealed with end-caps and labeled. The soil samples collected in the exploratory trenches were transported to NV5's Chico soil laboratory facility.

Detailed descriptions of the soil, rock and groundwater conditions that were encountered in each subsurface exploratory location are presented on the exploratory trench logs included in Appendix B. The soil and rock descriptions include visual field estimates of the particle size percentages (by dry weight), color, relative density or consistency, moisture content and cementation that comprise each soil/rock material encountered.

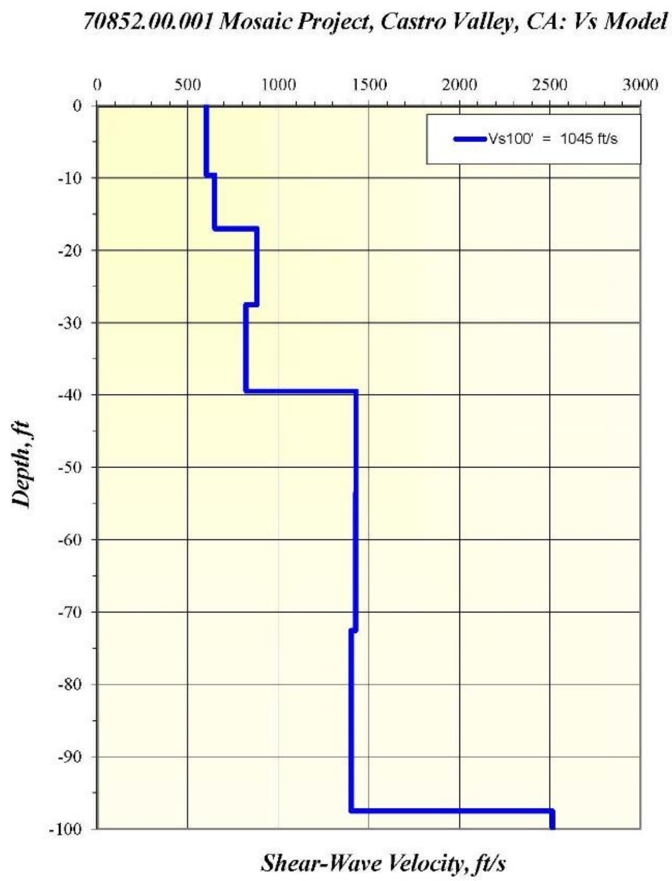
A generalized profile of the soil, rock and groundwater conditions encountered to the maximum depth excavated (7 feet) for the project site is presented below. The soil and/or rock units encountered in the subsurface exploratory excavations were generally stratigraphically continuous across the site with some variations in gradations and thicknesses. The units encountered in general stratigraphic sequence during the subsurface investigation of the site are described below.

- **CL, Low Plasticity Clay Soil:** This soil is considered to be a native soil consisting of the following field estimated particle size percentages: 65 percent low plasticity silt and clay fines and 35 percent fine sand. This soil is predominantly dark brown with a Munsell® Soil Color Chart designation of (7.5YR 3/2). This soil was medium stiff to hard and slightly moist to moist at the time of the subsurface investigation.

- **CH, High Plasticity Clay Soil:** This soil is considered to be a native soil consisting of the following field estimated particle size percentages: 85 percent high plasticity silt and clay fines and 15 percent fine sand. This soil is predominantly very dark grayish brown with a Munsell® Soil Color Chart designation of (2.5Y 3/2). This soil was stiff to hard and slightly moist to moist at the time of the subsurface investigation.

2.5.2.2 Seismic Refraction Microtremor Survey

The Seismic Refraction Microtremor Survey (SRMS) performed at the site used the SeisOpt® ReMi™ Vs30 method to determine the in-situ shear-wave (S-wave) velocity profile (Vs Model) of the uppermost 100 feet (30 meters) of soil beneath the site. The measured S-wave profile is used to determine the 2016 California Building Code (CBC) Site Class in accordance with Chapter 16, Section 1613.3.2 and Chapter 20 of ASCE 7-10.



The SRMS method is performed at the surface using a conventional seismograph equipped with geophones that record both seismic compression waves (P-waves) and S-waves. The P-wave and S-wave sources consist of ambient seismic microtremors which are constantly being generated by cultural activities and natural noise in the area. NV5 recorded the seismic vibrations generated by the excavator during the site investigation for some of the data acquisition recordings. The data was collected in a series of twenty-one, 30-second-long, continuous recording periods. The inset image below shows the Vs Model subsurface shear-wave velocity profile for the site that was developed from the SeisOpt® ReMi™ data.

The Vs Model developed for the site indicates that the harmonic mean seismic shear wave velocity for the upper 100 feet of the subsurface is approximately 1045 feet per second (ft/s). This weighted shear wave velocity corresponds to the upper range of Site Class D (Stiff Soil Profile), as described in Chapter 20, Table 20.3-1 Site Classification of ASCE 7-10.

2.5.2.3 Groundwater Conditions

The groundwater table was not encountered in the exploratory trenches excavated during this site investigation. The moisture content of each soil unit described on the exploratory trench logs is considered the natural moisture within the vadose soil zone (soil situated above the groundwater table). However, fluctuations in soil moisture content and groundwater levels should be anticipated depending on precipitation, irrigation, runoff conditions and other factors. Based on our experience in the project area, seasonal saturation of near-surface soil should be anticipated, especially during and immediately after seasonal prolonged rainstorms.

NV5 reviewed available groundwater data within the Department of Water Resources Sustainable Groundwater Management Program's database (http://sgma.water.ca.gov/webgis/?appid=SGMADataViewer). Based on review of well completion reports completed for wells located on the project site and within approximately 2 miles of the site, the approximate depth to groundwater is 30 to 40 feet below ground surface. Therefore, NV5 does not anticipate a permanent groundwater table being encountered at the minimum elevations achieved in the site excavations. Seasonal infiltration into the shallow subsurface may create perched water conditions at contacts between soil and less weathered rock or competent rock. Perched groundwater may cause moisture intrusion into foundation crawl spaces or through concrete slab-on-grade floors, degradation of asphalt concrete (AC) pavements, and other adverse conditions. Mitigation measures such as gravel underdrains, elevated building pads, trench drains, vertical water barriers, or other methods may be required to intercept shallow groundwater or reduce potential adverse effects on project features.

3.0 LABORATORY TESTING

NV5 performed laboratory tests on selected soil samples taken from the subsurface exploratory excavations to determine their geotechnical engineering material properties. These engineering material properties were used to develop geotechnical engineering design recommendations for earthwork and structural improvements. The following laboratory tests were performed using the cited ASTM guideline procedures:

- ASTM D422 Particle Size Gradation (Sieve Only)
- ASTM D2166 Unconfined Compressive Strength of Cohesive Soil
- ASTM D2216 Soil Moisture Content
- ASTM D2487 Soil Classification by the USCS
- ASTM D2850 Unconsolidated-Undrained Triaxial Compression Test
- ASTM D2937 Density of Soil In-Place by Drive-Cylinder Method
- ASTM D4318 Atterberg Limits (Dry Method)

Table 3.0-1 presents a summary of the geotechnical engineering classification laboratory test results. Appendix C presents the laboratory test data sheets.

Table 3.0-1, Laboratory Test Results

Trench	Sample		ASTM Test Results(1)								
No.	No.	Depth	D2487 D2488	D2216	D2937	D422		D4318		D2166	D2850
		(ft)	USCS (sym)	Moisture Content (%)	Dry Density (pcf)	Passing No. 4 Mesh Sieve (%)	Passing No. 200 Mesh Sieve (%)	Plasticity Index (%)	Liquid Limit (%)	Unconfined Compressive Strength (psf)	UU Compressive Strength (psf)
T19-1	B1	1 - 3	CL			96.4	64.9	13	36		
T19-2	B1	2 - 3	CL					27	39		
T19-4	B1	1 - 2	CL					13	32		
T19-4	L1	1	CH	17.7	89.3					886.2	
T19-5	B1	3	CL					34	50		
T19-5	L1	6.5	CL	23.2	98.6						4,643.2

Notes:
- (1) Laboratory test forms are presented in Appendix D
- ASTM ASTM International
- USCS Unified Soils Classification System
- No. number
- % percent
- ft feet
- psf pounds per square foot
- pcf pounds per cubic foot
- sym symbol

4.0 GEOLOGIC HAZARDS

NV5's evaluation of geologic hazards for the site was based on review of geologic maps and literature, regional aerial photographs, a site reconnaissance, and analysis of the soil and rock conditions encountered during the June 6, 2019 site investigation. This section provides additional information to meet the conditions of the 2016 CBC.

Portions of the property are mapped as being located within or adjacent to special geologic hazard zones designated by the California Geologic Survey or local building departments for liquefaction and landslides. The following presents NV5's evaluation of pertinent geologic hazards and their potential to negatively impact the site.

4.1 LIQUEFACTION

Soil liquefaction results when the shear strength of a saturated soil decreases to zero during cyclic loading that is generally caused by machine vibrations or earthquake shaking. Generally, saturated, clean, loose, uniformly graded sand and loose, silty sand soils of Holocene age are the most prone to undergo liquefaction, however, saturated, gravelly soil, and some clay-rich soil may be prone to liquefaction under certain conditions.

NV5's evaluation of the liquefaction potential for the site was based on literature review, the probabilistic seismic peak ground acceleration, and our site specific field data, which included exploratory trenches and a shear-wave velocity analysis. According to CGS Special Publication 117-A (2008), geophysical measurements of shear-wave velocities are appropriate methods to satisfy the screening evaluation of the resistance of soils to liquefaction. Accordingly, conservative "preliminary evaluation" methods (e.g., geologic assessments and/or shear-wave velocity measurements) often suffice for evaluation of their liquefaction potential. Based on the shear-wave velocity data measured at the site, NV5 determined that a more extensive study of the deeper subsurface was not warranted. NV5 respectfully requests the following factors be considered:

The site specific geology in the area of the proposed improvements consists of Monterey Formation formed during the middle to late Miocene Epoch (16 to 5 mybp). The Monterey Formation is characterized as marine clastic and biogenic sedimentary rock generally consisting of clay shale or claystone and siltstone and siliceous shale that is thin bedded to bedded. The soil generated from the Monterey Formation is predominately clay that varies from low plasticity to high plasticity. Soils with clay and silt contents greater than 30 percent typically are not prone to liquefaction.

Groundwater was not encountered in the trenches to the maximum depth explored of 7 feet bgs. However, groundwater data from nearby water wells indicates historically high groundwater levels are approximately 30 to 40 feet bgs and located within fractured rock of the Monterey Formation. Due to the predominant clay content of the soil and the weathered to slightly weathered rock of the Monterey Formation, it is NV5's opinion that the site subsurface conditions below the proposed building footprint make the probability of liquefaction occurring during ground shaking caused by a maximum considered earthquake (MCE) to be very low. Based on this information, NV5 believes that the age of the site geology, the groundwater conditions, and high clay content soil conditions above the slightly to moderately weathered rock make the probability of liquefaction occurring during a nearby earthquake to be very low.

NV5 conducted a seismic refraction microtremor survey across the proposed building footprint. The seismic refraction survey used the SeisOpt® ReMi™ Vs30 method to determine the in-situ shear-wave (S-wave) velocity profile of the first 100-feet of soil beneath the site, which is an indication of density and shear strength of the soil deposits. This method is used for earthquake site response and liquefaction analysis and is particularly advantageous for use in areas with shallow soil profiles underlain by competent rock. A mean shear-wave velocity of the upper 100 ft of sediments (Vs100) of 1,045 ft/s, equal to 318 meters per second (m/s), was calculated from the seismic refraction shear wave profile data. The shear-wave profile for the soil beneath the proposed building indicates show the lowest shear-wave velocity of approximately 600 ft/s (182 m/s) indicative of the lowest density and shear strength soil is from the ground surface to a depth of approximately 10 ft bgs. The shear-wave velocity increases at depth to 650 ft/s (192 m/s) from 10 to 17 feet bgs, increases to over 800 ft/s (243 m/s) from 17 to 40 ft bgs, and increased to 1400 ft.s (426 m/s) and higher below 40 feet. The shear-wave velocity profile of the subsurface is presented on page 11 of this report. . These Vs values indicated still to dense soil and soft rock, which are not typically prone to liquefaction under strong ground shaking conditions.

NV5 concludes that the subsurface lacks the conditions to promote liquefaction based on the estimated PGA at the site, the seismic shear-wave velocity values for the subsurface, the age of the geology underlying the building, and the very deep groundwater conditions.

4.2 SEISMIC SETTLEMENT AND LATERAL SPREADING

Because the potential for liquefaction of the soil beneath the site is considered low, and the relatively shallow depth to bedrock, NV5 considers there to be a low probability for the occurrence of post-liquefaction settlement and lateral spreading that would be detrimental to the proposed site improvements.

4.3 LANDSLIDES

The existing topography at the site and near vicinity consists of moderate to steep sloping terrain. The project site is located in a region of known historical landslides; however, there were no mapped or observed indications of historic landslides, including rock falls, debris flows or deep and shallow failure on the site. Therefore, the potential for the occurrence or reoccurrence of a landslide hazard within the proposed building areas is considered to be low.

5.0 CONCLUSIONS

The conclusions presented in this section are based on information developed from the field and laboratory investigations.

1. It is NV5's opinion that the site is suitable for the proposed construction improvements provided that the geotechnical engineering design recommendations presented in this report are incorporated into the earthwork and structural improvement project plans. Prior to construction, NV5 should be allowed to review the proposed final earthwork grading plan and structural improvement plans to determine if the geotechnical engineering recommendations have been properly incorporated, are still applicable or need modifications.
2. NV5's primary concern is the presence of undocumented fills that were encountered in Trenches T19-7 through T19-9 that extended from approximately 3 to at least 5 feet below existing site grades. These undocumented fills cannot be relied upon for support of the proposed improvements due to their unknown quality, unknown method of placement, and potential for settlement. Recommendations for mitigating the undocumented fills are presented in Section 6.1 of this report.
3. Based on the SeisOpt ReMi Vs30 shear-wave profile analysis, the site geology, and the observations within the exploratory trenches, the site soil profile can be modeled, according to the 2016 CBC, Chapter 16, and ASCE 7-10, Chapter 20, as a Site Class D (Stiff Soil Profile) designation for the purposes of establishing seismic design loads for the proposed improvements.
4. Based on the site geology, other field data, and literature review, NV5 believes that the site soil and groundwater conditions make the probability of liquefaction occurring during a nearby earthquake to be low.
5. Based on the site geology, other field data, and literature review, NV5 believes that the site soil and groundwater conditions make the probability of landslides occurring on the site to be low.
6. At the time of NV5's site investigation, the site supported a single-family residence and outbuildings in the northeastern portion of the site and a large recreational building in the western portion of the site. Cull Creek meandered through the center of the site in a northwest to southeast trend. Mature trees also were observed throughout the project site.
7. The native soil conditions observed to a maximum depth of 7 feet below the existing ground surface in our subsurface exploratory excavations (described relative to the existing ground surface) generally consisted of dark grayish brown silty clay (CH) underlain by brown silty clay (CL).
8. NV5's field and laboratory test data indicate that the silty clay (CH)/(CL) soil units encountered beneath the site has the following general geotechnical engineering properties: medium stiff to hard, low to high plasticity, and a low to moderate bearing capacity that is suitable for supporting shallow foundations.
9. Groundwater was not encountered in the exploratory trenches at the time of this subsurface investigation. Based on the above average rainfall, subsurface geologic conditions and review of monitoring well data near the site, NV5 assumes that for design and evaluation purposes, the historically high groundwater table is located approximately 30 to 40 feet bgs. However, perched groundwater could be encountered depending on the time of year construction takes place.

6.0 RECOMMENDATIONS

NV5 developed geotechnical engineering design recommendations for earthwork and structural improvements from the field and laboratory investigation data. Subsequent to earthwork and site preparation, it is anticipated that structures may be founded on conventional continuous and/or spread footings founded in properly compacted fill. NV5's recommendations are presented below.

6.1 EARTHWORK GRADING

NV5's earthwork grading recommendations include: import fill soil, temporary excavations, stripping and grubbing, native soil preparation for engineered fill placement, engineered fill construction with testable earth materials, cut-fill transitions, cut and fill slope grading, erosion controls, underground utility trenches, construction dewatering, soil corrosion potential, subsurface groundwater drainage, surface water drainage, grading plan review and construction monitoring.

6.1.1 Import Fill Soil

Import fill soil should meet the geotechnical engineering material properties described in Section 6.1.5.1 (Engineered Fill Construction with Non-Expansive Soil) of this report. Prior to importation to the site, the source generator should document that the import fill meets the guidelines set forth by the California Environmental Protection Agency (CalEPA) Department of Toxic Substances Control (DTSC) in their 2001 "Information Advisory, Clean Imported Fill Material." This advisory represents the best practice for characterization of soil prior to import for use as engineered fill. The NV5 project engineer should approve all proposed import fill soil for use in constructing engineered fills at the site.

6.1.2 Temporary Excavations

All temporary excavations must comply with applicable local, state and federal safety regulations, including the current Occupational Safety and Hazards Administration (OSHA) excavation and trench safety standards. Construction site safety is the responsibility of the contractor, who is solely responsible for the means, methods and sequencing of construction operations. Under no circumstances should the findings, conclusions and recommendations presented herein be inferred to mean that NV5 is assuming any responsibility for temporary excavations, or for the design, installation, maintenance and performance of any temporary shoring, bracing, underpinning or other similar systems. NV5 could provide temporary cut slope gradients, if required.

6.1.3 Stripping and Grubbing

The site should be stripped and grubbed of vegetation and other deleterious materials, as described below.

1. Strip and remove the top 4 to 6 inches of soil containing shallow vegetation roots and other deleterious materials. This highly organic topsoil can be stockpiled on-site and used for surface landscaping but should not be used for constructing compacted engineered fills. Grub the underlying 8 to 10 inches of soil to remove any large vegetation roots or other deleterious

material while leaving the soil in place. The NV5 project engineer or his/her representative should approve the use of any soil materials generated from the clearing and grubbing activities.

2. Remove all large shrub and tree roots and tree stumps. Excavate the remaining cavities or holes to a sufficient width so that an approved backfill soil can be placed and compacted in the cavities or holes. Sufficient backfill soil should be placed and compacted in order to match the surrounding elevations and grades. The NV5 project engineer or his/her representative should observe and approve the preparation of the cavities and holes prior to placing and compacting engineered fill soil in the cavities and holes.
3. Completely remove all undocumented fill materials, as exposed in our exploratory excavations. Rocks and rubble with a greatest dimension larger than 6 inches will be referred to in this report as "oversized" materials. Oversized rock materials can be stockpiled on-site and used to construct engineered fills, however, they must be blended with on-site or imported soils and placed at or near the bottom of deep fills but not shallower than 2 feet from the finished subgrade surface. Oversized rubble materials also can be broken down into pieces 6 inches or smaller, blended with on-site or imported soils and placed at or near the bottom of deep fills but not shallower than 2 feet from the finished subgrade surface. The oversized rocks should be placed with enough space between them to avoid clustering and the creation of void space. The NV5 project engineer or his/her representative should approve the use and placement of all oversized rock materials prior to constructing compacted engineered fills.
4. Excessively large amounts of vegetation, other deleterious materials and oversized rock materials should be removed from the site.

6.1.4 Native Soil Preparation for Engineered Fill Placement

After completing site stripping and grubbing activities, the exposed native soil should be prepared for placement and compaction of engineered fills, as described below.

1. The native soil should be scarified to a minimum depth of 8 inches below the existing land surface or stripped and grubbed surface and then uniformly moisture conditioned. If the soil is classified as a coarse-grained soil by the USCS (i.e., GP, GW, GC, GM, SP, SW, SC or SM) then it should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content. If the soil is classified as a low plasticity fine-grained soil by the USCS (i.e., CL, ML), then it should be moisture conditioned to between 2 and 4 percentage points greater than the ASTM D1557 optimum moisture content. If soil is classified as a high plasticity fine-grained soil by the USCS (i.e., CH, MH), the soil should be removed from the building pad area or should be prepared as specified in Section 6.1.5.2 (Engineered Fill Construction with Expansive Soils).
2. The native soil should then be compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry unit weight (density). The moisture content, density and relative percent compaction should be tested by the NV5 project engineer or his/her field representative to evaluate whether the compacted soil meets or exceeds the minimum percent compaction and moisture content requirements. The earthwork contractor shall assist the NV5 project engineer or his/her field representative by excavating test pads with the on-site earth moving equipment. Native soil preparation beneath concrete slab-on-grade structures (i.e., floors, sidewalks, patios, etc.) should be prepared as specified in Section 6.2 (Structural Improvements).

3. The prepared native soil surface should be proof-rolled with a fully-loaded 4,000-gallon-capacity water truck with the rear of the truck supported on a double-axle, tandem-wheel undercarriage or approved equivalent. The proof-rolled surface should be visually observed by the NV5 project engineer or his/her field representative to be firm, competent and relatively unyielding. The NV5 project engineer or his/her field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed in place of proof-rolling as described above.
4. Construction Quality Assurance (CQA) tests should be performed using the minimum testing frequencies presented in Table 6.1.4-1 or as modified by the NV5 project engineer to better suit the site conditions.
5. The native soil surface should be graded to minimize ponding of water and to drain surface water away from the building foundations and associated structures. Where possible, surface water should be collected, conveyed and discharged into natural drainage courses, storm sewer inlet structures, permanent engineered storm water runoff percolation/evaporation basins or engineered infiltration subdrain systems.

Table 6.1.4-1, Minimum Testing Frequencies

ASTM No.	Test Description	Minimum Test Frequency(1)
D1557	Modified Proctor Compaction Curve	1 per 1,500 CY or Material Change(2)
D6938	Nuclear Density and Nuclear Moisture Content	1 per 250 CY

Notes:
(1) These are minimum testing frequencies that may be increased or decreased at the NV5 project engineer's discretion based on the site conditions encountered during grading.
(2) Whichever criteria provide the greatest number of tests.

ASTM = ASTM International
CY = cubic yards
No. = number

6.1.5 Engineered Fill Construction with Testable Earth Materials

Engineered fills are constructed to support structural improvements. Engineered fills should be constructed using non-expansive soil as described in Section 6.1.5.1. If possible, the use of expansive soil for constructing engineered fills should be avoided. If the use of expansive soil cannot be avoided, then engineered fills should be constructed as described in Section 6.1.5.2 or as modified by the NV5 project engineer. If soil is to be imported to the site for constructing engineered fills, then NV5 should be allowed to evaluate the suitability of the borrowed soil source by taking representative soil samples for laboratory testing. Testable earth materials are generally considered to be soils with gravel and larger particle sizes retained on the No. 4 mesh sieve that make up less than 30 percent by dry weight of the total mass. The relative percent compaction of testable earth materials can readily be determined by the following ASTM test procedures: laboratory compaction curve (D1557), field moisture and density (D6938). Construction of engineered fills with non-expansive and expansive testable earth materials is described below.

6.1.5.1 Engineered Fill Construction with Non-Expansive Soil

Construction of engineered fills with non-expansive soil should be performed as described below.

1. Non-expansive soil used to construct engineered fills should consist predominantly of materials less than ½-inch in greatest dimension and should not contain rocks greater than 6 inches in greatest dimension (oversized material). Non-expansive soil should have a plasticity index (PI) of less than or equal to 15, as determined by ASTM D4318 Atterberg Indices testing. Oversized materials should be spread apart to prevent clustering so that void spaces are not created. The NV5 project engineer or his/her field representative should approve the use of oversized materials for constructing engineered fills.
2. Non-expansive soil used to construct engineered fills should be uniformly moisture conditioned. If the soil is classified by the USCS as coarse grained (i.e., GP, GW, GC, GM, SP, SW, SC or SM), then it should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content. If the soil is classified by the USCS as fine grained (i.e., CL, ML), then it should be moisture conditioned to between 2 and 4 percentage points greater than the ASTM D1557 optimum moisture content.
3. Engineered fills should be constructed by placing uniformly moisture conditioned soil in maximum 12-inch-thick loose lifts (layers) prior to compacting.
4. The soil should then be compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.
5. The earthwork contractor should compact each loose soil lift with a tamping foot compactor such as a Caterpillar (CAT) 815 Compactor or equivalent as approved by NV5's project engineer or his/her field representative. A smooth steel drum roller compactor should not be used to compact loose soil lifts for construction of engineered fills.
6. The field and laboratory CQA tests should be performed consistent with the testing frequencies presented in Table 6.1.5.1-1 or as modified by the NV5 project engineer to better suit the site conditions.

Table 6.1.5.1-1, Minimum Testing Frequencies for Non-Expansive Soil

ASTM No.	Test Description	Minimum Test Frequency(1)
D1557	Modified Proctor Compaction Curve	1 per 1,500 CY or Material Change(2)
D6983	Nuclear Moisture and Density	1 per 250 CY

Notes:
(1) These are minimum testing frequencies that may be increased or decreased at the NV5 project engineer's discretion on the basis of the site conditions encountered during grading.
(2) Whichever criteria provide the greatest number of tests.

ASTM = ASTM International
CY = cubic yards
No. = number

7. The moisture content, density and relative percent compaction of all engineered fills should be tested by the NV5 project engineer's field representative during construction to evaluate whether the compacted soil meets or exceeds the minimum compaction and moisture content requirements. The earthwork contractor shall assist the NV5 project engineer's field representative by excavating test pads with the on-site earth-moving equipment.
8. The prepared finished grade or finished subgrade soil surface should be proof-rolled, as mentioned above in Section 6.1.4, Paragraph 3.

6.1.5.2 Engineered Fill Construction with Expansive Soil

NV5 did encounter potentially expansive soil within the shallow soil, or zones within the foundation loads and slab-on-grade floors that would be influenced by shrinking or swelling conditions. NV5 recommends removing expansive soil from below the building footprints to avoid the potential damage that may be caused by soil heave.

If expansive soils are encountered during grading of the site and if the property owner desires to use the expansive soil to construct engineered fills, or have the building foundations or concrete-slab-on-grade floors bear directly upon the expansive soil, then the following three options should be considered. Each option has inherent risks and associated costs relative to future problems associated with expansive soil including shrinking and settlement (downward movement) and/or and swell and heave (upward movement) of foundations and concrete slab-on-grade floors. The options are presented in the general order of decreasing cost but increasing risk with regards to future problems related to soil shrink-swell behavior. Prior to implementing any of these options, NV5 should be notified so that further evaluation of the potentially expansive soil can be completed and these recommendations confirmed or modify NV5's recommendations as appropriate, if necessary.

Option 1 Remove and Replace with Non-Expansive Soil (NV5 Preferred Option-Lowest Shrink-Swell Behavior Risk):

This mitigation option has the lowest inherent risk of incurring future problems regarding settlement and/or heave of foundations and concrete slab-on-grade floors. This option consists of removing the expansive soil to a depth to be determined by the project geotechnical engineer. NV5 estimates that expansive soil, if encountered at the site, should be removed completely or removed to a minimum depth of 2 feet below the bottom of the building foundations and concrete slab-on-grade floors, whichever creates the greater depth below the adjacent finished grade surface. The actual removal depth or depths should be evaluated by the project geotechnical engineer’s field representative during grading and may be either increased or decreased depending upon the site conditions observed.

Non-expansive soil should then be placed, moisture conditioned and compacted to achieve the finished grades as described in Section 6.1.5.1 of this report. This option, when compared to the other two options, generally incurs the greatest upfront costs to the project but has the least risk for future problems arising from the high shrink-swell behavior of the soil. Repair of future problems due to soil shrink-swell behavior is generally from 10 to 100 times costlier than the cost of removing and replacing with non-expansive soil during initial grading.

Option 2 Expansive Soil Treatment with High Calcium Lime and Fly-Ash (Moderate Shrink-Swell Behavior Risk):

This mitigation option has an intermediate (moderate) inherent risk of incurring future problems regarding settlement and/or heave of foundations and concrete slab-on-grade floors. This option consists of mixing high calcium lime and fly-ash with the on-site expansive soil to reduce the expansive shrink-swell behavior of the soil. This option, when compared to the other two options, generally incurs an intermediate upfront cost to the project with an intermediate risk for future problems arising from the high shrink-swell behavior of the soil. NV5 did not evaluate the percentages of high calcium lime and fly-ash to be mixed with on-site expansive soil as part of the geotechnical engineering investigation work scope. If this option is selected by the owner to mitigate the on-site expansive soils, then NV5 should be consulted to prepare a proposed work scope to evaluate and develop construction specifications for lime and fly-ash treatment of the onsite expansive soil.

Option 3 Reworking Expansive Soil With Use of Post-Tensioned Concrete Slab-On-Ground Surface Reinforced Floors (Highest Shrink-Swell Behavior Risk):

This mitigation option has the highest inherent risk of incurring future problems with settlement and/or heave of foundations and concrete slab-on-grade floors. This option consists of reworking the existing on-site expansive soil to reduce its expansive shrink-swell behavior and the construction of post-tensioned concrete slab-on-ground surface reinforced floors. The post-tensioned reinforced slab-on-ground surface floors should be designed by a California-licensed civil engineer. This option, when compared to the other two options, generally incurs the lowest upfront cost to the project with the highest risk for future problems arising from the high shrink-swell behavior of the soil. Construction of engineered fills with expansive soil should be performed as described below; however, these recommendations may need to be revised by the project geotechnical engineer during grading depending upon the actual site conditions encountered. The project geotechnical engineer should be notified prior to implementing this expansive soil mitigation approach to determine if alternative foundation and concrete slab-on-grade floor designs will be necessary (i.e., pier and grade-beams, post-tension slabs, among others).

1. Expansive soil used to construct engineered fills should consist predominantly of materials less than 1-inch in greatest dimension and should not contain rocks greater than 3 inches in greatest dimension (oversized material). Expansive soil will have a PI greater than PI > 20 as determined by ASTM D4318 Atterberg Indices test. Oversized materials can be placed at or near the bottom of deep fills, but not within 3.0 feet of the finished subgrade surface or within 2.0 feet of the foundation bottom. Deep fills are defined as fills that are greater than 10 feet in vertical thickness. Oversized materials should be spread apart to prevent clustering so that void spaces are not created. The project geotechnical engineer or project geotechnical engineer’s field representative should approve the use of over sized materials for constructing engineered fills.
2. Expansive soil used to construct engineered fills should be uniformly moisture conditioned to within 2 to 4 percentage points greater than the ASTM D1557 optimum moisture content. The actual moisture content should be reviewed by the project geotechnical engineer to determine if this preliminary moisture content range is appropriate or should be modified.
3. Engineered fills should be constructed by placing uniformly moisture-conditioned expansive soil in maximum 12-inch-thick loose lifts (layers) prior to compacting.
4. The expansive soil should then be compacted to achieve a minimum relative compaction of 88 percent and a maximum relative compaction of 92 percent of the ASTM D1557 maximum dry density. The actual percent relative compaction should be reviewed by the project geotechnical engineer to determine if this preliminary relative percent compaction range is appropriate or should be modified.
5. Field and laboratory CQA tests should be performed consistent with the testing frequencies presented in Table 6.1.5.2-1 or as modified by the project geotechnical engineer to better suit the site conditions.

Table 6.1.5.2-1, Minimum Testing Frequencies for Expansive Soil

ASTM No.	Test Description	Minimum Test Frequency(1)
D1557	Modified Proctor Compaction Curve	1 per 1,500 CY or Material Change (2)
D6983	Nuclear Moisture and Density	1 per 100 CY

Notes:
(1) These are minimum testing frequencies that may be increased or decreased at the project engineer's discretion based on the site conditions encountered during grading.
(2) Whichever criteria provide the greatest number of tests.

ASTM = ASTM International
CY = cubic yards
No. = number

6. The earthwork contractor should compact each loose soil lift with a tamping foot compactor such as a CAT 815 Compactor or equivalent as approved by the project geotechnical engineer. A smooth steel drum roller compactor should not be used to compact loose soil lifts of engineered fills with expansive soil, however, it may be used at the finished subgrade to finish the surface following the completion of compaction.
7. The moisture content, density and relative percent compaction of all engineered fills constructed with expansive soil should be tested by the project geotechnical engineer's field representative during construction to evaluate whether the compacted soil meets or exceeds the minimum compaction and moisture content requirements. The earthwork contractor shall assist the project geotechnical engineer's field representative by excavating test pads with the onsite earth moving equipment.
8. The prepared finished grade or finished subgrade soil surface constructed with expansive soil should be proof-rolled with a fully-loaded 4,000-gallon capacity water truck with the rear of the truck supported on a double-axle, tandem-wheel, undercarriage or approved equivalent. The minimum tire pressure should be 65 pounds per square inch (psi). The proof-rolled surface should be visually observed by the project geotechnical engineer or the project geotechnical engineer's field representative to be firm, competent and relatively unyielding. The project geotechnical engineer or the project geotechnical engineer's field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed in place of proof-rolling as described in the preceding.

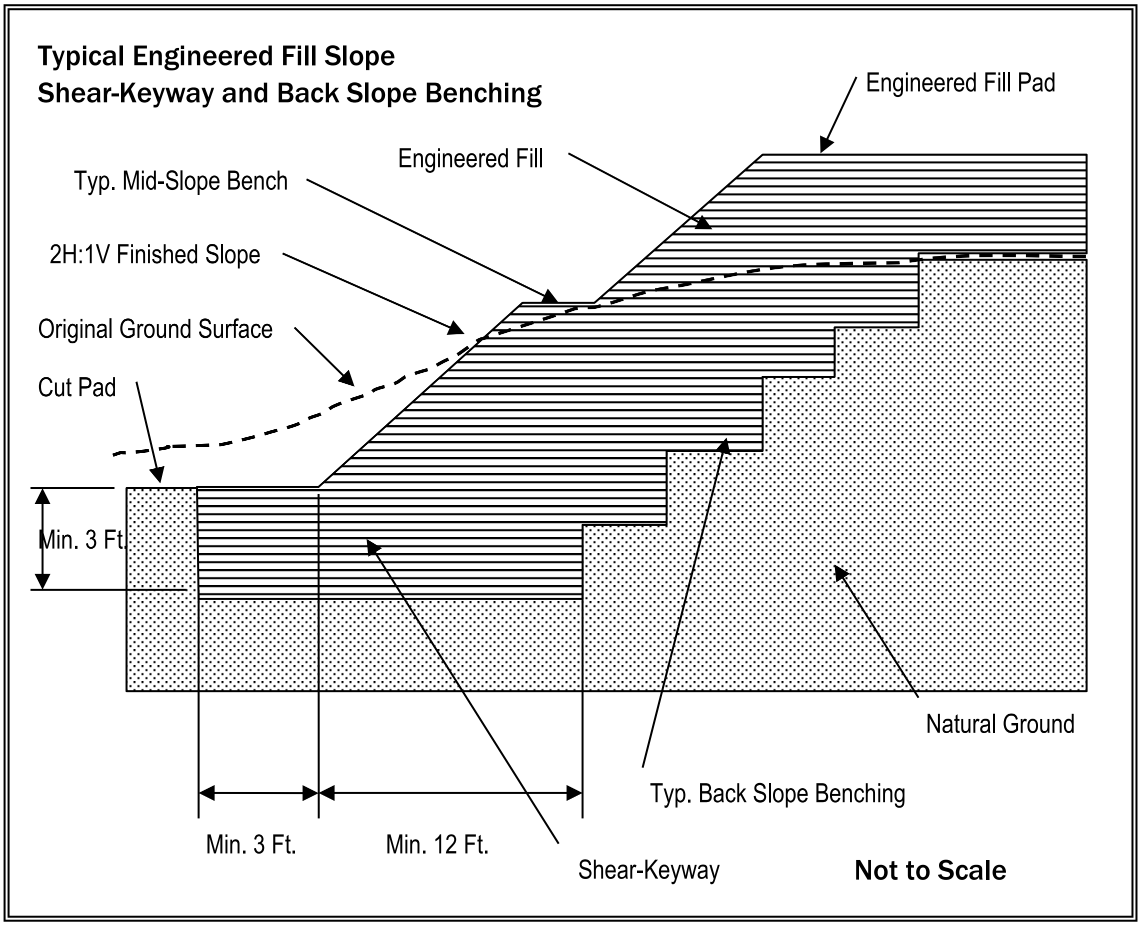
6.1.6 Fill Slope Grading

Fill slopes should be graded as described below.

1. Fill slopes should be graded with a maximum slope gradient of horizontal to vertical ratio (H:V) 2 H:1V, and with a maximum vertical height of 20 feet. If fill slopes are to be graded steeper than 2 H:1V and/or with a vertical height greater than 20 feet, then NV5 should be notified so that slope stability analysis of the proposed slope configuration can be performed, and revised recommendations provided.

2. A shear-keyway should be graded at the base of the fill slope prior to constructing the fill slope. The shear-keyway should be a minimum of 15-feet wide and extend to a minimum depth of 3 feet below the finished subgrade surface, or deeper as determined by the project engineer

during grading. The shear-keyway base should be graded with a minimum slope gradient of 2 percent toward the inside fill slope surface.



3. Fill slopes should be graded in horizontal lifts to the lines and grades shown on the grading plans. The design-finished grade of a fill slope should be achieved by overbuilding the slope face and then cutting it back to the design-finished grade. Fill slopes should not be graded (extended horizontally) by compacting moisture conditioned, loose soil lifts on the slope face as thin veneer layers. In other words, do not construct engineered fill slopes by placing and compacting successive thin layers (veneers) of soil over the fill slope face at an inclination that is roughly coincident with the final fill slope horizontal to vertical slope ratio. The in-slope edge of each horizontal lift should be benched into the firm, competent and relatively unyielding soil of the natural ground slope.

4. If groundwater seepage from the slope and/or shear-keyway areas is encountered during grading, or if the site conditions indicate that groundwater seepage does occur during the wet winter season, then NV5 should be notified so that NV5 can assess the conditions and provide a design for installation of permanent dewatering subdrains.

5. Surface benches should be graded into the finished fill slope with a minimum width of 10 feet and with maximum vertical intervals of 15 feet between benches, or at mid-slope height if the total vertical slope height is between 15 feet and 30 feet.

6. Benches should be graded with a minimum slope gradient of 2 percent toward the inside fill slope surface. In other words, the bench slope gradient should cause surface water to drain toward the fill slope side of the bench (not over and down the fill slope face).

7. Fill soils used to construct slopes should be uniformly moisture conditioned, placed in loose lifts, and compacted as described in Sections 5.1.5 and 5.1.6.

6.1.7 Cut Slope Grading

Cut slopes should be graded as described below.

1. Cut slopes should be graded with a maximum slope gradient of 2H:1V and with a maximum vertical height of 20 feet. If cut slopes are to be graded steeper than 2H:1V and/or with a vertical height greater than 20 feet, then NV5 should be notified so that NV5 can perform a slope stability analysis of the proposed slope configurations and provide revised recommendations, if necessary.

2. Surface benches should be graded into the finished cut slope with a minimum width of 10 feet and with maximum vertical intervals of 20 feet between benches, or at the mid-slope height if the total vertical slope height is greater than 20 feet but less than 30 feet.

3. The benches should be graded with a minimum slope gradient of 2 percent toward the cut. In other words, the bench slope gradient should cause surface water to drain toward the cut slope side of the bench (not over and down the cut slope face).

6.1.8 Erosion Controls

Erosion controls should be installed as described below.

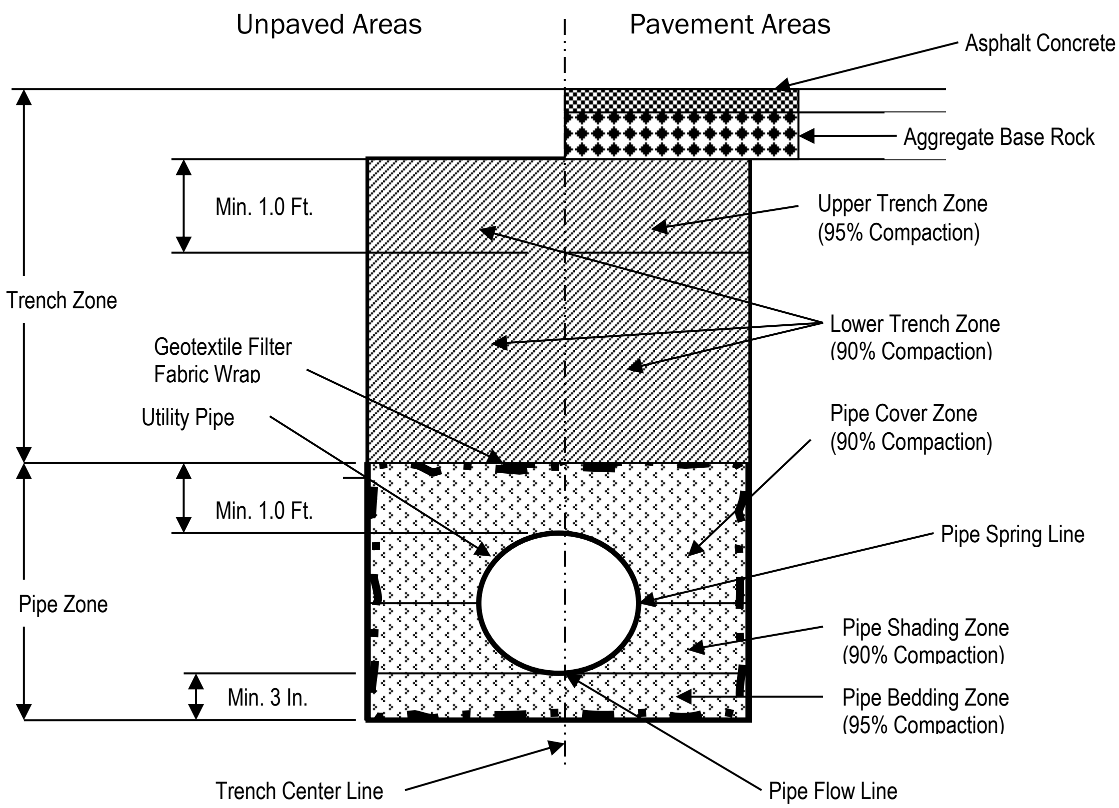
1. Erosion controls should be installed on all cut and fill slopes to minimize erosion caused by surface water runoff.
2. Install on all slopes either an appropriate hydroseed mixture compatible with the soil and climate conditions of the site, as determined by the local United States Soil Conservation District, or apply an appropriate manufactured erosion control mat.
3. Install surface water drainage ditches at the top of cut and fill slopes (as necessary) to collect and convey both sheet flow and concentrated flow away from the slope face.
4. The intercepted surface water should be discharged into a natural drainage course or into other collection and disposal structures.

6.1.9 Underground Utility Trenches

Underground utility trenches should be excavated and backfilled as described below for each trench zone shown in the figure below.

1. **Trench Excavation Equipment:** NV5 anticipates that the contractor will be able to excavate all underground utility trenches with a Case 580 Backhoe or equivalent.
2. **Trench Shoring:** All utility trenches that are excavated deeper than 4 feet bgs are required by California OSHA to be shored with bracing equipment or sloped back to an appropriate slope gradient prior to being entered by any individuals.
3. **Trench Dewatering:** NV5 does not anticipate that the proposed underground utility trenches will encounter shallow groundwater. However, if the utility trenches are excavated during the winter rainy season, then shallow or perched groundwater may be encountered. The earthwork contractor may need to employ dewatering methods as discussed in Section 6.1.10 in order to excavate, place and compact the trench backfill materials.
4. **Pipe Zone Backfill Type and Compaction Requirements:** The backfill material type and compaction requirements for the pipe zone, which includes the bedding zone, the shading zone and the cover zone, are described in Detail 6.1.9-1 below.

Detail 6.1.9-1 TYPICAL TRENCH BACKFILL ZONES



Not to Scale

- **Pipe Zone Backfill Material Type:** Trench backfill used within the pipe zone, which includes the bedding zone, the shading zone and the cover zone, should consist of ¾-inch-minus, washed, crushed rock. The crushed rock particle size gradation should meet the following requirements (percentages are expressed as dry weights using ASTM D422 test method): 100 percent passing the ¾-inch sieve, 80 to 100 percent passing the ½-inch sieve, 60 to 100 percent passing the 3/8-inch sieve, 0 to 30 percent passing the No. 4 sieve, 0 to 10 percent passing the No. 8 sieve, and 0 to 3 percent passing the No. 200 sieve. If groundwater is encountered within the trench during construction, perched water is anticipated in the trench, or if groundwater is expected to rise during the rainy season to an elevation that will infiltrate the pipe zone within the trench, then the pipe zone material should be wrapped with a minimum 6 ounce per square yard, non-woven geotextile filter fabric such as TenCate® Mirifi N140 or an approved equivalent. The geotextile seam should be located along the trench centerline and have a minimum 1-foot overlap. If the utility pipes are coated with a corrosion protection material, then the pipes should be wrapped with a minimum 6 ounce per square yard, non-woven, geotextile cushion fabric such as TenCate® Mirifi N140 or an approved equivalent. The geotextile cushion fabric should have a minimum 6-inch seam overlap. The geotextile cushion fabric will protect the pipe from being scratched by the crushed rock backfill material.
- **Pipe Bedding Zone Compaction:** Trench backfill soil placed in the pipe bedding zone (beneath the utilities) should be a minimum of 3 inches thick, moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.
- **Pipe Shading Zone Compaction**: Trench backfill soil placed within the pipe shading zone (above the bedding zone and to a height of one pipe radius above the pipe spring line) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. The pipe shading zone backfill material should be shovel-sliced to remove voids and to promote compaction.
- **Pipe Cover Zone Compaction:** Trench backfill soil placed within the pipe cover zone (above the pipe shading zone to 1 foot over the pipe top surface) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

5. **Trench Zone Backfill and Compaction Requirements:** The trench zone backfill materials consist of both lower and upper zones, as discussed below.
   - **Trench Zone Backfill Material Type:** Soil used as trench backfill within the lower and upper intermediate zones, as shown on the preceding figure, should consist of non-expansive soil with a PI of less than or equal to 15 (based on ASTM D4318) and should not contain rocks greater than 3 inches in greatest dimension.
   - **Lower Trench Zone Compaction:** Soil used to construct the lower trench zone backfills should be uniformly moisture conditioned to within 0 and 4 percentage points of the ASTM D1557 optimum moisture content, placed in maximum 12-inch-thick loose lifts prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

- **Upper Trench Zone Compaction (Pavement Areas):** Soil used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 and 4 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 8-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.
- **Upper Trench Zone Compaction (Non-Pavement Areas):** Soil used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 and 2 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 6-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

6. **CQA Testing and Observation Engineering Services:** The moisture content, dry density and relative percent compaction of all engineered utility trench backfills should be tested by the NV5 project engineer's field representative during construction to evaluate whether the compacted trench backfill materials meet or exceed the minimum compaction and moisture content requirements presented in this report. The earthwork contractor shall assist the NV5 project engineer's field representative by excavating test pads with the on-site earth moving equipment.
   - **Compaction Testing Frequencies:** The field and laboratory CQA tests should be performed consistent with the testing frequencies presented in Table 6.1.9-1 or as modified by the NV5 project engineer to better suit the site conditions.

Table 6.1.9-1, Minimum Testing Frequencies for Utility Trench Backfill

ASTM No.	Test Description	Minimum Test Frequency(1)
D1557	Modified Proctor Compaction Curve	1 per 500 CY (2) Or Material Change
D6983	Nuclear Moisture and Density	1 per 100 LF per 24-Inch-Thick Compacted Backfill Layer (2) The maximum loose lift thickness shall not exceed 12-inches prior to compacting.

Notes:
(1) These are minimum testing frequencies that may be increased or decreased at the NV5 project engineer's discretion based on the site conditions encountered during grading.
(2) Whichever criteria provide the greatest number of tests.

ASTM = ASTM International
CY = cubic yards
No. = number

- **Final Proof Rolling:** The prepared finished grade aggregate base (AB) rock surface and/or finished subgrade soil surface of utility trench backfill should be proof-rolled, as mentioned above in Section 6.1.4, Paragraph 3.

6.1.10 Construction Dewatering

NV5 does not anticipate the need to perform dewatering of the site during earthwork grading however, the earthwork contractor should be prepared to dewater the utility trench excavations and any other excavations if perched water or the groundwater table is encountered during winter or spring grading. The following recommendations are preliminary and are not based on performing a groundwater flow analysis. A detailed dewatering analysis was not a part of the proposed work scope. It should be understood that it is the earthwork contractor's sole responsibility to select and employ a satisfactory dewatering method for each excavation.

1. NV5 anticipates that dewatering of utility trenches can be performed by constructing sumps to depths below the trench bottom and removing the water with sump pumps.
2. Additional sump excavations and pumps should be added as necessary to keep the excavation bottom free of standing water and relatively dry when placing and compacting the trench backfill materials.
3. If groundwater enters the trench faster than it can be removed by the dewatering system, thereby allowing the underlying compacted soil to become unstable while compacting successive soil lifts, then it may be necessary to remove the unstable soil and replace it with free-draining, granular drain rock. Native backfill soil can again be used after placing the granular rock to an elevation that is higher than the groundwater table.
4. If granular rock is used, it should be wrapped in a non-woven geotextile fabric, such as TenCate® Mirifi® N140 or an approved equivalent. The geotextile filter fabric should have minimum 1-foot overlapped seams. The granular rock should meet or exceed the following gradation specifications (all percentages are expressed as dry weights using ASTM D422 test method): 100 percent passing the ¾-inch sieve, 80 to 100 percent passing the ½-inch sieve, 60 to 100 percent passing the 3/8-inch sieve, 0 to 30 percent passing the No. 4 sieve, 0 to 10 percent passing the No. 8 sieve, and 0 to 3 percent passing the No. 200 sieve.
5. NV5 recommends that the utility trench excavations be performed as late in the summer months as possible to allow the groundwater table to reach its lowest seasonal elevation.

6.1.11 Soil Corrosion Potential

The selected materials used for constructing underground utilities should be evaluated by a corrosion engineer for compatibility with the on-site soil and groundwater conditions. NV5 did not perform any testing to determine the corrosion potential of the shallow soils that are anticipated to be in contact with the underground pipes and concrete structures associated with the improvements. NV5's experience with soil encountered in the Castro Valley area is that their corrosion potential is relatively low. Buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron should be properly protected against corrosion depending on the critical nature of the structure.

6.1.12 Subsurface Groundwater Drainage

Due to the near-surface cohesive soils and relatively shallow depth to sedimentary rock, NV5 does anticipate encountering perched groundwater or a shallow local groundwater table during the wet weather construction season. If groundwater is encountered during grading, then NV5 should be allowed to observe the conditions and provide site-specific dewatering recommendations.

6.1.13 Surface Water Drainage

NV5 recommends the following surface water drainage mitigation measures:

1. Grade all slopes to drain away from building areas with a minimum 4 percent slope for a distance of not less than 10 feet from the building foundations.
2. Grade all landscape areas near and adjacent to buildings to prevent ponding of water.
3. Direct all building downspouts to solid pipe collectors which discharge to natural drainage courses, storm sewers, catchment basins, infiltration subdrains or other drainage facilities.

6.1.14 Grading Plan Review and Construction Monitoring

CQA includes review of plans and specifications and performing construction monitoring, as described below.

1. NV5 should be allowed to review the final earthwork grading improvement plans prior to commencement of construction to determine whether the recommendations have been implemented and, if necessary, to provide additional and/or modified recommendations.
2. NV5 should be allowed to perform CQA monitoring of all earthwork grading performed by the contractor to determine whether the recommendations have been implemented and, if necessary, to provide additional and/or modified recommendations.
3. NV5's experience, and that of the engineering profession, clearly indicate that during the construction phase of a project the risks of costly design, construction and maintenance problems can be significantly reduced by retaining a design geotechnical engineering firm to review the project plans and specifications and to provide geotechnical engineering observation and CQA testing services. Upon your request we will prepare a CQA geotechnical engineering services proposal that will present a work scope, a tentative schedule and a fee estimate for your consideration and authorization. If NV5 is not retained to provide geotechnical engineering CQA services during the construction phase of the project, then NV5 will not be responsible for geotechnical engineering CQA services provided by others nor any aspect of the project that fails to meet your or a third party's expectations in the future.

6.2 STRUCTURAL IMPROVEMENTS

NV5's structural improvement design criteria recommendations include: seismic design parameters, shallow continuous strip and isolated foundations for buildings, and concrete slab-on-grade interior floors, patios, sidewalks. These recommendations are presented hereafter.

6.2.1 Seismic Design Parameters

NV5 developed the code-based seismic design parameters in accordance with Section 1613 of the 2016 CBC and the Structural Engineers Association of California (SEAOC), *Seismic Design Maps* web application. The internet based application (www.seismicmaps.org) is used for determining seismic design values from the 2010 ASCE-7 Standard (erratum released March 2013) and the 2015 International Building Code (2015 IBC). The spectral acceleration, site class, site coefficients and adjusted maximum considered earthquake spectral response acceleration, and design spectral acceleration parameters are presented in Table 6.2.1-1 . The Seismic Design Maps report from the SEAOC analysis is provided in Appendix D.

Table 6.2.1-1 2016 CBC Seismic Design Parameters

Description	Value	Reference
Latitude North (degree)	37.7418	Google Earth
Longitude West (degree)	-122.0551	Google Earth
Site Coefficient, F_A	1.000	*2016 CBC, Table 1613.3.3(1),* SEAOC *Seismic Design Maps*
Site Coefficient, F_V	1.500	*2016 CBC, Table 1613.3.3(2),* SEAOC *Seismic Design Maps*
Site Class	D = Stiff Soil	*ASCE 7-10 Chapter 20, Table 20.3-1*
Short (0.2 sec) Spectral Response, S_S (g)	1.649	*ASCE 7-10, Section 11.4.3,* SEAOC *Seismic Design Maps*
Long (1.0 sec) Spectral Response, S_1 *(g)*	0.649	*ASCE 7-10, Section 11.4.3,* SEAOC *Seismic Design Maps*
Short (0.2 sec) MCE Spectral Response, S_{MS} *(g)*	1.649	*ASCE 7-10, Section 11.4.3,* SEAOC *Seismic Design Maps*
Long (1.0 sec) MCE Spectral Response, S_{M1} *(g)*	0.974	*ASCE 7-10, Section 11.4.3,* SEAOC *Seismic Design Maps*
Short (0.2 sec) Design Spectral Response, S_{DS} *(g)*	1.10	*ASCE 7-10, Section 11.4.3,* SEAOC *Seismic Design Maps*
Long (1.0 sec) Design Spectral Response, S_{D1} *(g)*	0.649	*ASCE 7-10, Section 11.4.3,* SEAOC *Seismic Design Maps*
Seismic Design Category (Risk Category I, II or II)	D	*ASCE 7-10, Section 11.4.3,* SEAOC *Seismic Design Maps*
Geometric Mean Peak Ground Acceleration (PGA_M) (g)	0.638	*ASCE 7-10, Section 11.8.3,* SEAOC *Seismic Design Maps*

deg = degrees
CBC = California Building Code
MCE = *Maximum Considered Earthquake*
g = gravitational acceleration (9.81 meters per second^2 = 32.2 feet per second^2)
sec = second

6.2.2 Seismic Design Category

Based on the short period response acceleration ground motion parameters above (S_{DS} = 1.10) and the Risk Category of I or II, and III, the Seismic Design Category is D. Based on the 1-S period response acceleration ground motion parameters above (S_{D1} = 0.649) and the Risk Category of I or II, and III, the Seismic Design Category is D. Therefore, the Seismic Design Category for the site is D.

6.2.3 Geometric Mean Peak Ground Acceleration

NV5 used the SEAOC *Seismic Design Maps* web application to determine the seismic design parameters for the site, including the geometric mean peak ground acceleration (PGA_M). The PGA_M is calculated by using the Site Coefficient (F_{PGA}) multiplied by the PGA mapped values found on Figure 22-7 from ASCE 7-10. The PGA_M was calculated using the following equation:

$$PGA_M = F_{PGA}PGA = 1.00 \times 0.638 = 0.638 \text{ g}$$

The Seismic Design Maps report from the SEAOC analysis is provided in Appendix E.

6.2.4 Shallow Foundations

Shallow continuous and isolated spread foundations that will support load bearing walls shall be designed as follows:

1. The base of all shallow foundations should bear on firm, competent non-expansive native soil, or non-expansive engineered fill compacted consistent with the earthwork recommendations of Section 6.1.
2. Continuous strip foundations should be constructed with the following dimensions:
    a. Minimum Width = 12 Inches
    b. Minimum Embedment Depth below the lowest adjacent exterior surface grade as shown in Table 6.2.4-1.
3. The bearing capacities to be used for structural design of shallow foundations embedded in either non-expansive native soil or non-expansive engineered fill are presented in Table 6.2.4-1.
    - The calculated factor of safety (FS) for allowable bearing pressures including live plus dead loads is 3.0 for all foundation embedment depths.
    - The allowable bearing pressure capacities were increased by a factor of 1.33 to include wind or seismic short-term loads.
    - The project structural engineer of record should review the factor of safety and confirm that it is not less than the over-strength factor for this structure.

Table 6.2.4-1, Foundation Bearing Pressures for Shallow Continuous Strip and Isolated Spread Foundations

Minimum Foundation Embedment Depth (in)	Maximum Ultimate Bearing Pressures For Live + Dead Loads (psf)	Maximum Allowable Bearing Pressures For Live + Dead Loads (psf)	Maximum Allowable Bearing Pressures For Live + Dead + Wind or Seismic Loads (psf)	Allowable Safety Factor (Ultimate/Total) (dim.)
12	6,000	2,000	2,660	3.0
18	7,500	2,500	3,325	3.0
24	9,000	3,000	3,990	3.0

psf = pounds per square foot
in = inches
dim = dimensionless

4. Foundation lateral resistance may be computed from passive pressure along the side of the foundation and sliding friction/cohesion resistance along the foundation base; however, the larger of the two resistance forces should be reduced by 50 percent when combining these two forces. The passive pressure can be assumed to be equal to an equivalent fluid pressure (EFP) per foot of depth. The passive pressure force and sliding friction coefficient for computing lateral resistance are as follows:

   a. Passive pressure = 300 (H), pounds per square foot (psf), where H = foundation embedment depth (feet) below lowest adjacent soil surface.

   b. Foundation bottom sliding friction coefficient = 0.30 (dimensionless).

5. Minimum steel reinforcement for continuous strip foundations should consist of four No. 4 bars with two bars placed near the top and two bars placed near the bottom of each foundation or as designated by a California-licensed structural engineer.

6. The concrete should have a minimum 3,000 psi compressive break strength after 28 days of curing, have a water-to-cement ratio from 0.40 to 0.50, and should be placed with minimum and maximum slumps of 4 and 6 inches, respectively. Since water is often added to uncured concrete to increase workability, it is important that strict quality control measures be employed during placement of the foundation concrete to ensure that the water-to-cement ratio is not altered prior to or during placement.

7. Concrete coverage over steel reinforcements should be a minimum of 3 inches as recommended by the American Concrete Institute (ACI).

8. Prior to placing concrete in any foundation excavations, the contractor shall remove all loose soil, rock, wood debris or other deleterious materials from the foundation excavations.

9. Foundation excavations should be saturated prior to placing concrete to aid the concrete curing process; however, concrete should not be placed in standing water.

10. Total settlement of individual foundations will vary depending on the plan dimensions of the foundation and actual structural loading. Based on the anticipated foundation dimensions and loads, we estimate that the total post-construction settlement of foundations designed and constructed in accordance with the recommendations will be on the order of 1 inch. Differential

settlement between similarly loaded, adjacent foundations is expected to be about 1/2 inch, provided the foundations are founded into similar materials (e.g., all on competent and firm engineered fill, native soil or rock).

11. Prior to placing concrete in any foundation excavation, the project geotechnical engineer or his/her field representative should observe the excavations to document that the following requirements have been achieved: minimum foundation dimensions, minimum reinforcement steel placement and dimensions, removal of all loose soil, rock, wood debris or other deleterious materials, and that firm and competent native or engineered fill soil is exposed along the entire foundation excavation bottom. Strict adherence to these requirements is paramount to the satisfactory behavior of a building foundation. Minor deviations from these requirements can cause the foundations to undergo minor to severe amounts of settlement which can result in cracks developing in the foundation and adjacent structural members, such as concrete slab-on-grade floors.

6.2.5 Retaining Walls Entirely Above the Groundwater Table

A California licensed civil engineer should design all retaining walls situated above the groundwater table with drained backfill using the following geotechnical engineering design criteria:

1. The retaining wall recommendations for static loading conditions are based on Rankine earth pressure theory published by W.J.M. Rankine (1857). The retaining wall recommendations for seismic loading conditions are based on the published work by Mononobe, N. and Matsuo, H. (1929).

2. Retaining walls should be founded on firm competent bedrock or engineered fill consistent with the requirements of Section 6.1.

3. The retaining wall should be designed using the geotechnical engineering design parameters presented in Table 6.2.5-1.

4. The retaining wall backfill soil should be free draining material that meets or exceeds the material requirements of and is placed and compacted consistent with the requirements of Section 6.2.6.

5. The static lateral earth pressures exerted on the retaining walls may be assumed to be equal to an equivalent fluid pressure per foot of depth below the top of the wall. The lateral pressures presented in the table below are ultimate values and, therefore, do not include a safety factor, and assumes a free draining backfill (no hydrostatic forces acting on the wall) and no surcharge loads applied within a distance of 0.50H, where H equals the total vertical wall height.

6. The retaining wall backfill slope shall have a horizontal slope gradient for a minimum horizontal distance of 0.50H, where H equals the total vertical wall height. If a steeper backfill slope ratio is desired, then NV5 should be notified and contracted to perform additional retaining wall designs.

7. The retaining wall foundation excavations should be saturated prior to placing concrete to aid the concrete curing process. However, concrete should not be placed in standing water.

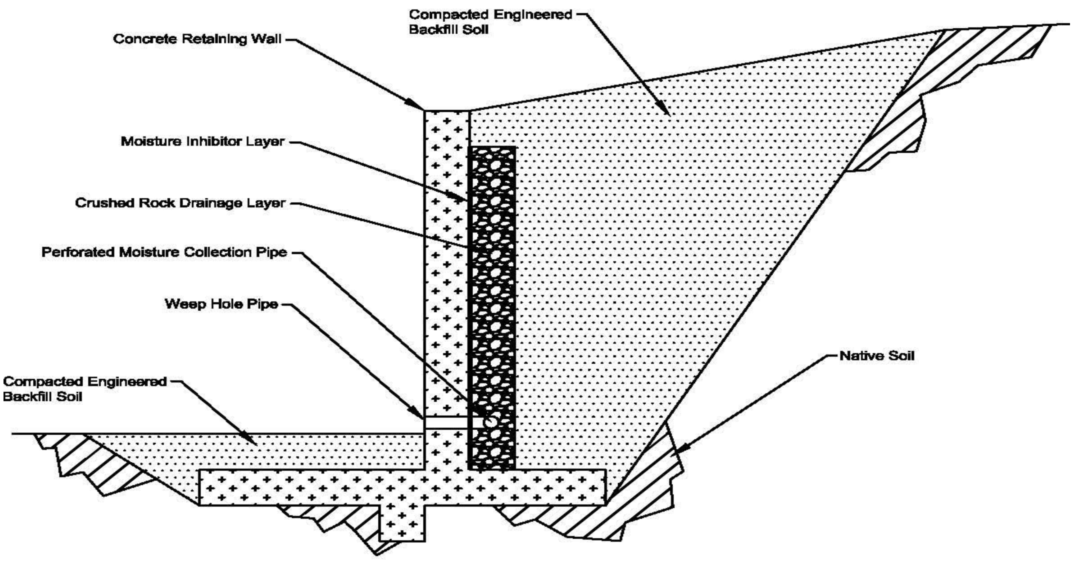
Table 6.2.5-1, Design Parameters for Retaining Walls		
Loading Conditions	**Static Loads On Retaining Wall With Horizontal Backfill Slope**	**Seismic Load On Retaining Wall With Horizontal Backfill Slope**
Wall Active Condition Pressures (psf) (1)	50 (H) (5)	9 (H)
Wall Passive Condition Pressures (psf) (2)	300 (H)	9 (H)
Wall At-Rest Condition Pressure (psf) (3)	70 (H)	9 (H)
P_{active} Force Located Above Foundation Base	0.33 (H)	Not Applicable
$P_{passive}$ Force Located Above Foundation Base	0.33 (H)	Not Applicable
$P_{at\text{-}rest}$ Force Located Above Foundation Base	0.33 (H)	Not Applicable
$P_{earthquake}$ Force Located Above Foundation Base	Not Applicable	0.60(H)
Maximum Allowable Foundation Bearing Capacity (psf), (Live + Dead Loads)	2,500	2,500
Maximum Allowable Foundation Bearing Capacity (psf) (Live + Dead + Wind or Seismic Loads)	3,325	3,325
Minimum Foundation Embedment Depth (in)	18	18
Foundation Bottom Friction Coefficient (dim.) (4)	0.30	0.30

Notes:
(1) The active pressure condition applies to a retaining wall with an unrestrained top (deflection allowed).
(2) The passive pressure condition applies to a retaining wall with soil resistance at the base. If passive pressures are used, then NV5 recommends that the top 1.0 feet of soil weight be ignored.
(3) The At-Rest pressure condition applies to a retaining wall with the top restrained (no deflection allowed).
(4) If the design horizontal resistance force acting on the wall foundation is computed by combining both the sliding friction force and passive soil pressure force, then the larger of the two forces should be reduced by 50 percent.
(5) H = The distance to a point in the backfill soil where the pressure is desired. The H distance is measured from the top of the wall for active and at-rest conditions and from one foot below the soil height at the toe of the wall for the passive condition (See Note 2 for passive condition).

6.2.6 Retaining Wall Backfill

Place and compact all retaining wall backfill and drainage layer materials as described below. NV5 did not review the final improvement plans for the site. If sub-structure retaining walls for below grade rooms, basements, garages, elevator shafts, etc., are designed for this project, then these structures should also incorporate a water proofing sealant as described below. The water proofing sealant products should be installed by a qualified waterproofing contractor according to the manufacturer's directions. A typical retaining wall and backfill material zones figure is shown below.

TYPICAL CANTILEVER RETAINING WALL
AND BACKFILL MATERIALS



1. **Waterproofing:** Waterproofing materials should be installed behind retaining walls prior to backfilling if retaining walls will be constructed for below grade rooms, basements, garages, elevator shafts, etc. The waterproofing materials should be installed by a qualified waterproofing contractor according to the manufacturer's directions.

2. **Drainage Layer:** A drainage layer should be placed between the wall and backfill material in order to prevent build up of hydrostatic pressures behind the wall. Additionally, care should be taken during placement of the drainage layer materials so as not to crush, tear, or damage the water proofing materials. The drainage layer can be constructed from drain rock, geosynthetic drain nets or a combination of both as described below.

   a. **Caltrans Class II Permeable Material Method:** Place a minimum 12-inch-thick layer of Caltrans Class II Permeable Material directly against the wall or water proofing system (as described below) without a geotextile wrapping to separate the backfill soil from the wall. The drainage material should extend from the wall bottom to within 12 inches of the wall top.

   b. **Geotextile Wrapped Drain Rock Method:** Place a minimum 12-inch-thick layer of drain rock wrapped in a geotextile filter fabric directly against the wall or water proofing system (as described below) to separate the backfill soil from the wall. The drain rock should extend from the wall bottom to within 12 inches of the wall top. A minimum 6-ounce per square yard (oz/sy) non-woven geotextile fabric, such as Amoco 4506 manufactured by Amoco Fabrics and Fibers Company or equivalent should be used.

   c. **Geosynthetic Composite Drainnet (Geonet) Method:** Place a geosynthetic composite drain-net (geonet) directly against the wall or water proofing system (as described below) to separate the backfill soil from the wall. The composite geonet should extend from the wall bottom to within 12 inches of the wall top. A geosynthetic composite drainnet such as

Hydroduct 200 or Hydroduct 220 distributed by Grace Construction Products or equivalent should be used.

3. **Drainage Layer Collection and Discharge Pipes:** A minimum 4-inch-diameter schedule 40, polyvinylchloride (PVC) perforated drainpipe should be placed at the wall base inside the geotextile wrapped drain rock or wrapped by the composite geonet. ¼ –inch-diameter perforations should be drilled into the pipe. The perforations should be orientated in cross section view at 90 degrees to one another and along the pipe length on 6-inch-centers. The pipe should be placed such that the perforations are oriented 45 degrees from the vertical. A minimum of 3 inches of drain rock should be placed below the perforated PVC pipe. The pipe should direct water away from the wall by gravity with a minimum 1 percent slope. The pipe should collect groundwater collected by the drainage layer discharged to the surface at the end of the wall or through weep-hole penetrations through the wall.

4. **Backfill Placement and Compaction Equipment:** Heavy conventional motorized compaction equipment should not be used directly adjacent to a retaining wall unless the wall is designed with sufficient steel reinforcements and/or bracing to resist the additional lateral pressures. Compaction of backfill materials within 5 feet of the retaining wall should be accomplished by lightweight, hand-operated, walk-behind, vibratory equipment. Additionally, care should be taken during placement of the general backfill materials so as not to crush, tear or damage the waterproofing and/or drainage layer materials.

5. **Backfill Materials and Compaction:** The backfill material should be free draining and classified by the USCS as a coarse-grained material (i.e., GP, GW, GC, GM, SP, SW, SC, and SM). Materials classified by the USCS as a fine-grained material (i.e., CL, CH, ML, or MH) should not be used as retaining wall backfill. The retaining wall backfill material placed between the drainage layer and temporary cut-slope should be moisture conditioned to between ± 3 percentage points of the ASTM D1557 optimum moisture content and then compacted to a minimum of 90 percent and a maximum of 95 percent of the ASTM D1557 maximum dry density.

6.2.7 Concrete Slab-On-Grade Interior, Sidewalk and Patio Construction

In general, NV5 recommends that subgrade elevations on which the concrete slab-on-grade floors are constructed be a minimum of 6 inches above the elevation of the surrounding parking lots, driveways and landscaped areas. Elevating the building will reduce the potential for subsurface water to enter beneath the concrete slab-on-grade floors and exterior surfaces and underground utility trenches.

The concrete slab-on-grade building floors, patios, sidewalks and driveway areas should be evaluated by a California-licensed civil engineer for expected live and dead loads to determine if the minimum slab thickness and steel reinforcement recommendations presented in this report should be increased or redesigned.

NV5 recommends using the guideline procedures, methods and material properties that are presented in the following ASTM and ACI documents for construction of concrete slab-on-grade floors:

- ACI 302.1R-15, Guide for Concrete Floor and Slab Construction, reported by ACI Committee 302.

- ASTM E1643-18a, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- ASTM E1745-17, Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
- ASTM F710-19, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

The interior building concrete slab-on-grade floor and exterior sidewalk and patio concrete slab-on-grade floor components are described below from top to bottom. If static or intermittent live floor loads greater than 250 psf are anticipated, then a California-licensed professional engineer should design the necessary concrete slab-on-grade floor thickness and steel reinforcements.

1. Minimum 4-Inch-Thick Concrete Slab: The concrete slab should be installed with a minimum 3,000 psi compressive strength after 28 days of curing. NV5 recommends that the concrete design use a water-to-cement ratio between 0.40 and 0.45 and should be placed with minimum and maximum slumps of 3 and 5 inches, respectively. The concrete mix design is the responsibility of the concrete supplier.
2. Steel Reinforcement: Reinforcement should be used to improve the load-carrying capacity, to reduce cracking caused by shrinkage during curing and from both differential and repeated loadings. It should be understood that it is nearly impossible to prevent all cracks from development in concrete slabs; in other words, it should be expected that some cracking will occur in all concrete slabs no matter how well they are reinforced. Concrete slabs that will be subjected to heavy loads should be designed with steel reinforcements by a California-licensed professional engineer.

   Rebar: As a minimum, use No. 3 rebar (ASTM A615/A615M-18e1 Grade 60), tied and placed with 18-inch centers in both directions (perpendicular) and supported on concrete “dobies” to position the rebar in the center of the slab during concrete pouring. NV5 does not recommend that the steel reinforcements of the concrete slab-on-grade floor be tied into the perimeter or interior continuous strip foundations or interior isolated column foundations. In other words, we recommend that the concrete slab-on-grade floors be constructed as independent structural members so that they can move (float) independently from the foundation structures.
3. Underslab Vapor-Moisture Retarder Membrane: The underslab retarder membrane should be placed in areas with moisture sensitive floor coverings as a floor component that will minimize transmission of both liquid water and water vapor transmission through the concrete slab-on-grade floor. NV5 recommends using at a minimum a Class A (ASTM E1745-17), minimum 10-mil-thick, plastic, vapor-moisture, retarder membrane material such as Stego Wrap® underslab vapor retarder membranes or equivalents. Additionally, the following materials are recommended: Stego® Tape and Stego® Mastic or equivalents to seal membrane joints and any utility penetrations.

   Regardless of the type of moisture-vapor retarder membrane used, moisture can wick up through a concrete slab-on-grade floor. Excessive moisture transmission through a concrete slab floor can cause adhesion loss, warping and peeling of resilient floor coverings, deterioration of adhesive, seam separation, formation of air pockets, mineral deposition beneath flooring, odor and both fungi and mold growth. Slabs can be tested for water transmissivity in areas that are moisture sensitive. Commercial sealants, polymer additives to the concrete at the batch plant, entrained air, flyash, and a reduced water-to-content ratio can be incorporated into the concrete slab-on-grade floor mix design to reduce its permeability and water-vapor transmissivity properties. A waterproofing consultant should be contacted to provide detailed recommendations if moisture sensitive flooring materials will be installed on the concrete slab-on-grade floors.

4. Minimum 4-Inch-Thick Crushed Rock or Class II Aggregate Base Rock Layer: Interior floors should be underlain by clean crushed rock, while exterior floors should use either crushed rock or Class II AB rock. The rock layer should be placed and compacted to a minimum of 95 percent of the ASTM D1557 dry density with a moisture content of ± 3 percentage points of the ASTM D1557 optimum moisture content. The crushed rock should be washed to produce a particle size distribution of 100 percent (by dry weight) passing the ¾ inch sieve and 5 percent passing the No. 4 sieve and 0 to 3 percent passing the No. 200 sieve. An alternative rock material for external slab-on-grade concrete surfaces would include AB rock meeting the specification of Caltrans Class II AB. Just prior to pouring the concrete slab, the rock layer should be moistened to a saturated surface dry (SSD) condition. This measure will reduce the potential for water to be withdrawn from the bottom of the concrete slab while it is curing and will help minimize the development of shrinkage cracks.

   If the current property owner elects to eliminate the crushed rock or AB rock layer beneath the interior and exterior concrete slabs-on-grade for economic reasons, then there will be an inherent greater risk assumed by the developer for the development of both shrinkage and bearing-related cracks in the associated slabs.

5. Subgrade Soil Preparation: The subgrade soil should be prepared and compacted consistent with the recommendations of Section 6.1. The top 12 inches of the non-expansive soil should be compacted to a minimum of 90 percent of the ASTM D1557 dry density with relatively uniform moisture content within ± 3 percentage points of the ASTM D1557 optimum moisture content.

6. Crack Control Grooves: Crack control grooves should be installed during placement or saw cuts should be made in accordance with the ACI and Portland Cement Association (PCA) specifications. Generally, NV5 recommends that expansion joints be provided between the slab and perimeter footings, and that crack control grooves or saw cuts are installed on 10-foot-centers in both directions (perpendicular).

7. Field Observations: Field observations should be made by an NV5 construction monitor of all concrete slab-on-grade surfaces and installed steel reinforcements prior to pouring concrete.

6.2.8 Rigid Concrete Pavement for Heavy Truck Traffic Areas and Fire Lanes

The rigid concrete pavement components are described below from top to bottom. If static or intermittent live floor loads greater than 250 psf are anticipated, then a California-licensed structural engineer should design the necessary concrete slab-on-grade floor thickness and steel reinforcements.

1. The recommended modulus of subgrade value of 200 kips/cubic foot should be used if the site subgrade is prepared in accordance with the recommendations presented in Section 7.1 above.

2. Minimum 5-Inch-Thick Concrete Slab: The rigid concrete pavement should be installed with a minimum 3,500 pounds psi compressive strength after 28 days of curing. NV5 recommends that the concrete design uses a water-to-cement ratio between 0.40 and 0.45 and should be placed with minimum and maximum slumps of 4 and 6 inches, respectively. The concrete mix design is the responsibility of the concrete supplier.

3. Steel Reinforcements: The rigid concrete pavement sections should include steel reinforcement to improve the load carrying capacity and to minimize cracking caused by shrinkage during curing and from both differential and repeated loadings. It should be understood that it is nearly impossible to prevent all cracks from development in concrete slabs; in other words, it should be expected that some cracking will occur in all concrete slabs no matter how well they are reinforced. Rigid concrete pavement that will be subjected to heavy loads should be designed with steel reinforcements by a California-licensed structural engineer.

   If the owner elects to eliminate the steel reinforcements from the exterior concrete slabs-on-grade for economic reasons, then there will be an inherent greater risk assumed by the developer for the development of both shrinkage and bearing related cracks in the associated slabs.

4. Steel Rebar: Use No. 4 steel rebar (ASTM A615/A 615M-04 Grade 60 reinforcement), tied and placed with 12-inch centers in both directions (perpendicular) and supported on concrete "dobies" to position the rebar in the center of the slab during concrete pouring.

5. Minimum 6-Inch Caltrans Class II AB Layer: The rigid concrete pavement should be underlain by Class II AB placed and compacted to a minimum of 95 percent of the ASTM D1557 dry density with a moisture content of ± 3 percentage points of the ASTM D1557 optimum moisture content.

6. Subgrade Soil Preparation: The subgrade soil below the rigid concrete pavement sections designed for vehicle traffic should be prepared and compacted consistent with the recommendations of Section 6.1. The top 12 inches of the non-expansive soil should be compacted to a minimum of 95 percent of the ASTM D1557 dry density with a relatively uniform moisture content of 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content.

7. Crack Control Grooves: The rigid concrete pavement should include crack control and expansion joint grooves installed during placement or saw cuts should be made in accordance with the ACI and PCA specifications. Generally, NV5 recommends that expansion joints be provided between the slab and perimeter footings, and that crack control grooves or saw cuts are installed on no greater than 10-foot-centers in both directions (perpendicular).

8. Field Observations: Field observations should be made by an NV5 construction monitor of all concrete slab-on-grade subgrade surfaces and installed steel reinforcements prior to placing concrete.

7.0 REFERENCES

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8.0 LIMITATIONS

The following limitations apply to the findings, conclusions and recommendations presented in this report:

1. This report should not be relied upon without review by NV5 if a period of 24 months elapses between the issuance report date shown above and the date when construction commences.
2. NV5's professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in Northern California. No warranties are either expressed or implied.
3. NV5 provided engineering services for the site project consistent with the work scope and contract agreement presented in the proposal and agreed to by the client. The findings, conclusions and recommendations presented in this report apply to the conditions existing when NV5 performed the services and are intended only for the client, purposes, locations, timeframes and project parameters described herein. NV5 is not responsible for the impacts of any changes in environmental standards, practices or regulations subsequent to completing the services. NV5 does not warrant the accuracy of information supplied by others, or the use of segregated portions of this report. This report is solely for the use of the client unless noted otherwise. Any reliance on this report by a third party is at the party's sole risk.
4. If changes are made to the nature or design of the project as described in this report, then the conclusions and recommendations presented in this report should be considered invalid by all parties. The validity of the conclusions and recommendations presented in this report can only be made by NV5; therefore, NV5 should be allowed to review all project changes and prepare written responses with regards to their impacts on the conclusions and recommendations. Additional fieldwork and laboratory testing may be required for NV5 to develop any modifications to the recommendations. The cost to review project changes and perform additional fieldwork and laboratory testing necessary to modify the recommendations is beyond the scope-of-services presented in this report. Any additional work will be performed only after receipt of an approved scope-of-work, budget and written authorization to proceed.
5. The analyses, conclusions and recommendations presented in this report are based on the site conditions as they existed at the time NV5 performed the surface and subsurface field investigations. NV5 has assumed that the subsurface soil and groundwater conditions encountered at the location of the exploratory trenches are generally representative of the subsurface conditions throughout the entire project site; however, if the actual subsurface conditions encountered during construction are different than those described in this report, then NV5 should be notified immediately so that we can review these differences and, if necessary, modify the recommendations.
6. The elevation or depth to the groundwater table underlying the project site may differ with time and location; therefore, the depth to the groundwater table encountered in the exploratory trenches is only representative of the specific time and location where it was observed.
7. The project site map shows approximate exploratory excavation locations as determined by pacing distances from identifiable site features; therefore, their locations should not be relied upon as being exact nor located with the accuracy of a California-licensed land surveyor.
8. NV5's geotechnical investigation scope-of-services did not include an evaluation of the project site for the presence of hazardous materials. Although NV5 did not observe the presence of

hazardous materials at the time of the field investigation, all project personnel should be careful and take the necessary precautions in the event hazardous materials are encountered during construction.

9. NV5's geotechnical investigation scope-of-services did not include an evaluation of the project site for the presence of mold nor for the future potential development of mold at the project site. If an evaluation of the presence of mold and/or for the future potential development of mold at the site is desired, then the property owner should contact a consulting firm specializing in these types of investigations. NV5 does not perform mold evaluation investigations.

10. NV5's experience and that of the civil engineering profession clearly indicates that during the construction phase of a project the risks of costly design, construction and maintenance problems can be significantly reduced by retaining a design geotechnical engineering firm to review the project plans and specifications and to provide geotechnical engineering CQA observation and testing services. Upon your request NV5 will prepare a CQA geotechnical engineering services proposal that will present a work scope, a tentative schedule and fee estimate for your consideration and authorization. If NV5 is not retained to provide geotechnical engineering CQA services during the construction phase of the project, then NV5 will not be responsible for geotechnical engineering CQA services provided by others nor any aspect of the project that fails to meet your or a third party's expectations in the future.

APPENDIX A:

Important Information about This Geotechnical Engineering Report (Included with permission of GBA, Copyright 2016)

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX B:

Historical Aerial Photographs

Mosaic Project

17031 Cull Canyon Road

Castro Valley, CA 94552

Inquiry Number: 5677202.1

June 10, 2019

The EDR Aerial Photo Decade Package

EDR®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

06/10/19

Site Name:	**Client Name:**
Mosaic Project	Holdrege & Kull Consultants
17031 Cull Canyon Road	792 Searls Avenue
Castro Valley, CA 94552	Nevada City, CA 95959
EDR Inquiry # 5677202.1	Contact: Dominic Potestio

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2016	1"=500'	Flight Year: 2016	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2006	1"=500'	Flight Year: 2006	USDA/NAIP
1998	1"=500'	Flight Date: August 27, 1998	USDA
1993	1"=500'	Acquisition Date: July 10, 1993	USGS/DOQQ
1982	1"=500'	Flight Date: July 05, 1982	USDA
1979	1"=500'	Flight Date: August 16, 1979	USDA
1968	1"=500'	Flight Date: April 22, 1968	USGS
1963	1"=500'	Flight Date: July 18, 1963	EDR Proprietary Aerial Viewpoint
1958	1"=500'	Flight Date: July 21, 1958	USGS
1950	1"=500'	Flight Date: March 13, 1950	USDA
1949	1"=500'	Flight Date: October 13, 1949	USGS
1946	1"=500'	Flight Date: July 26, 1946	USGS

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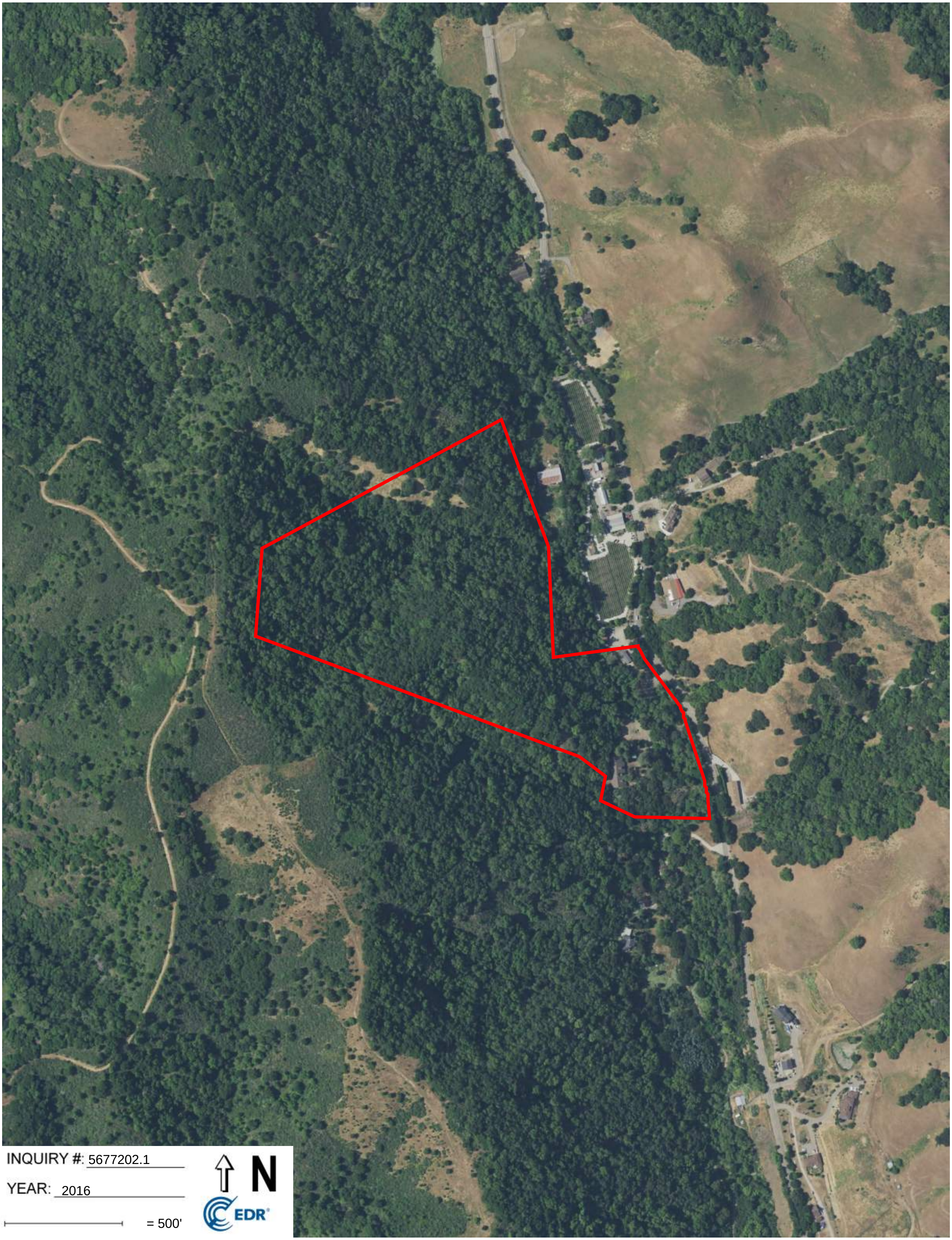
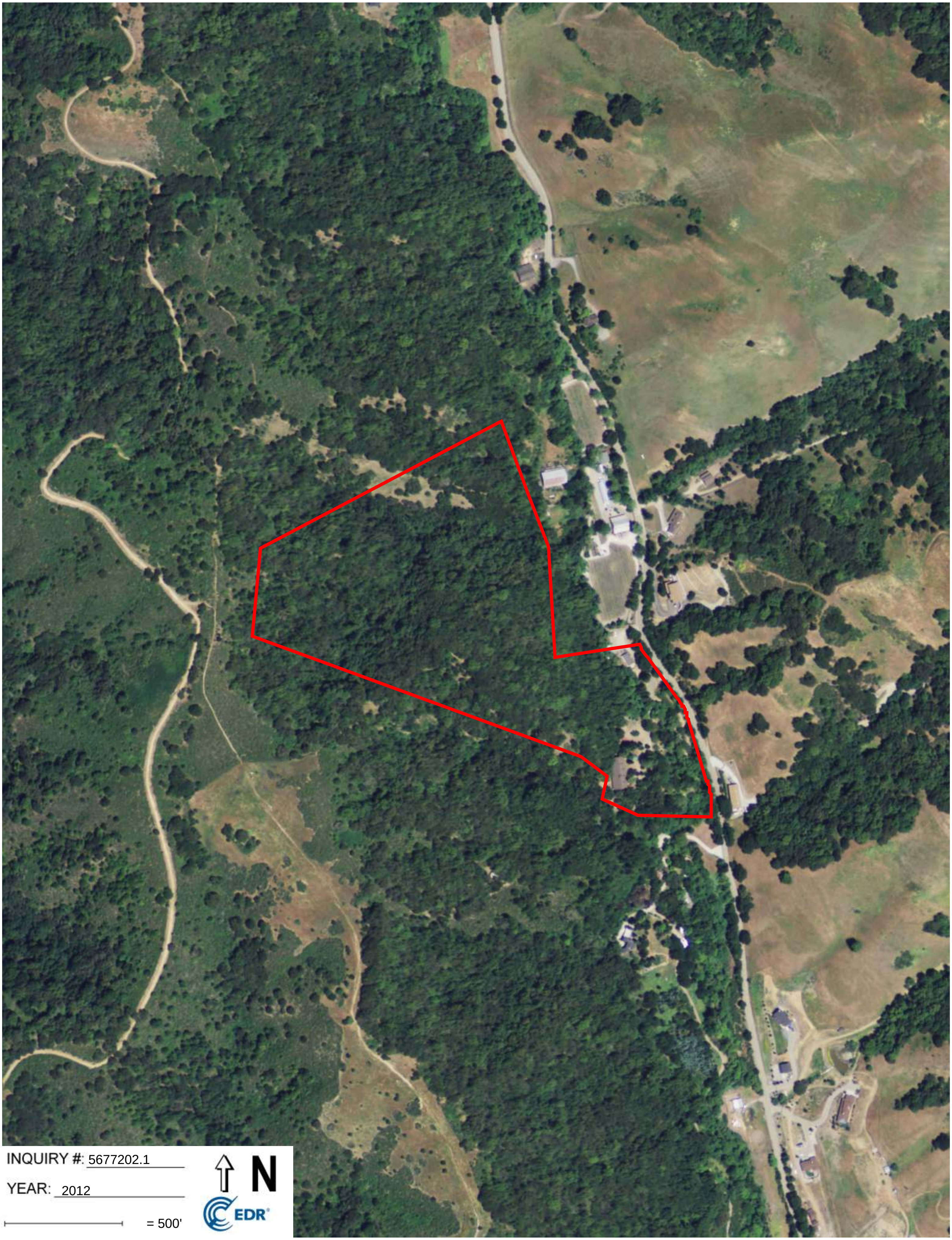


INQUIRY #: 5677202.1

YEAR: 2016

= 500'

N



INQUIRY #: 5677202.1

YEAR: 2012

= 500'

N

EDR

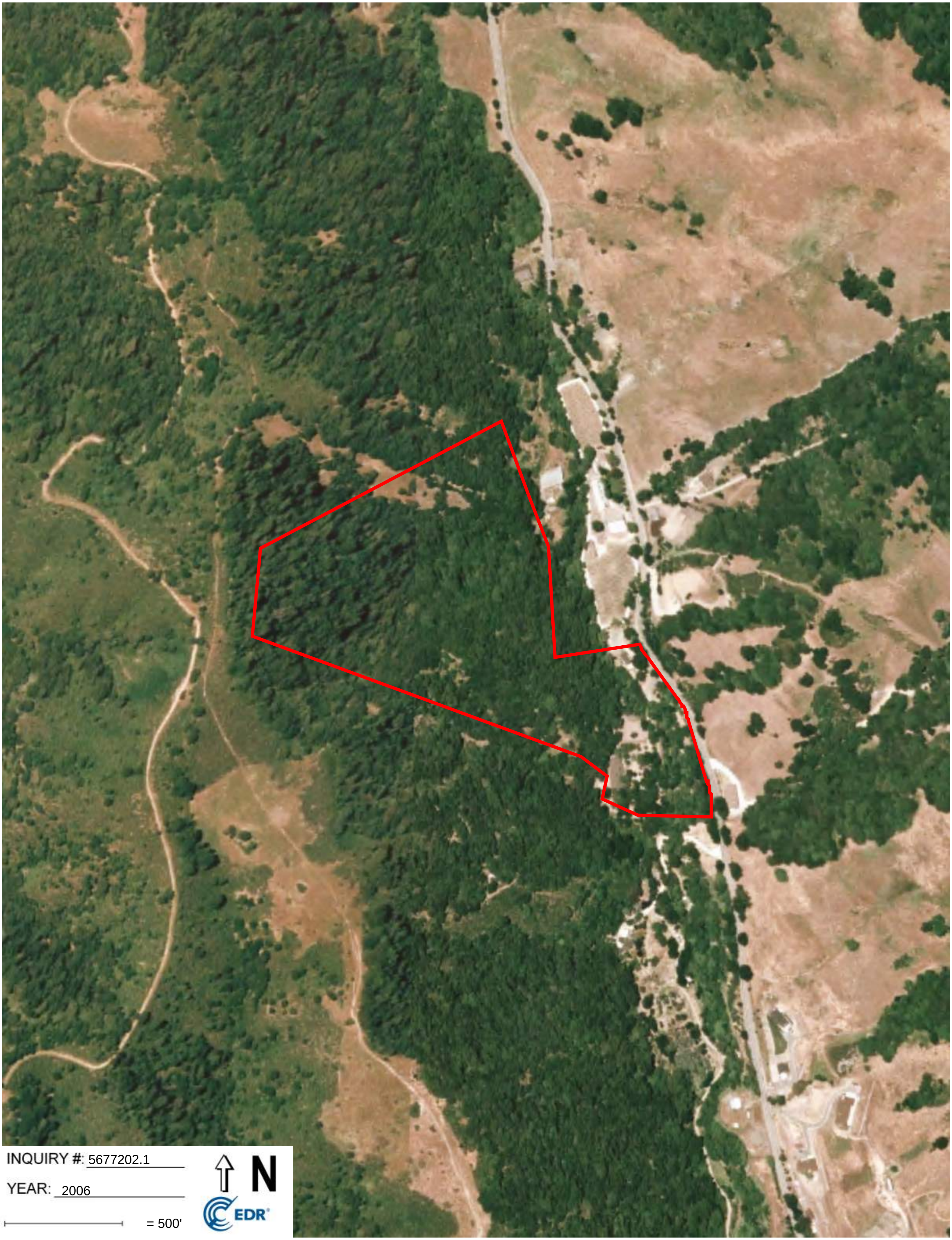
INQUIRY #: 5677202.1

YEAR: 2009

= 500'

N

EDR

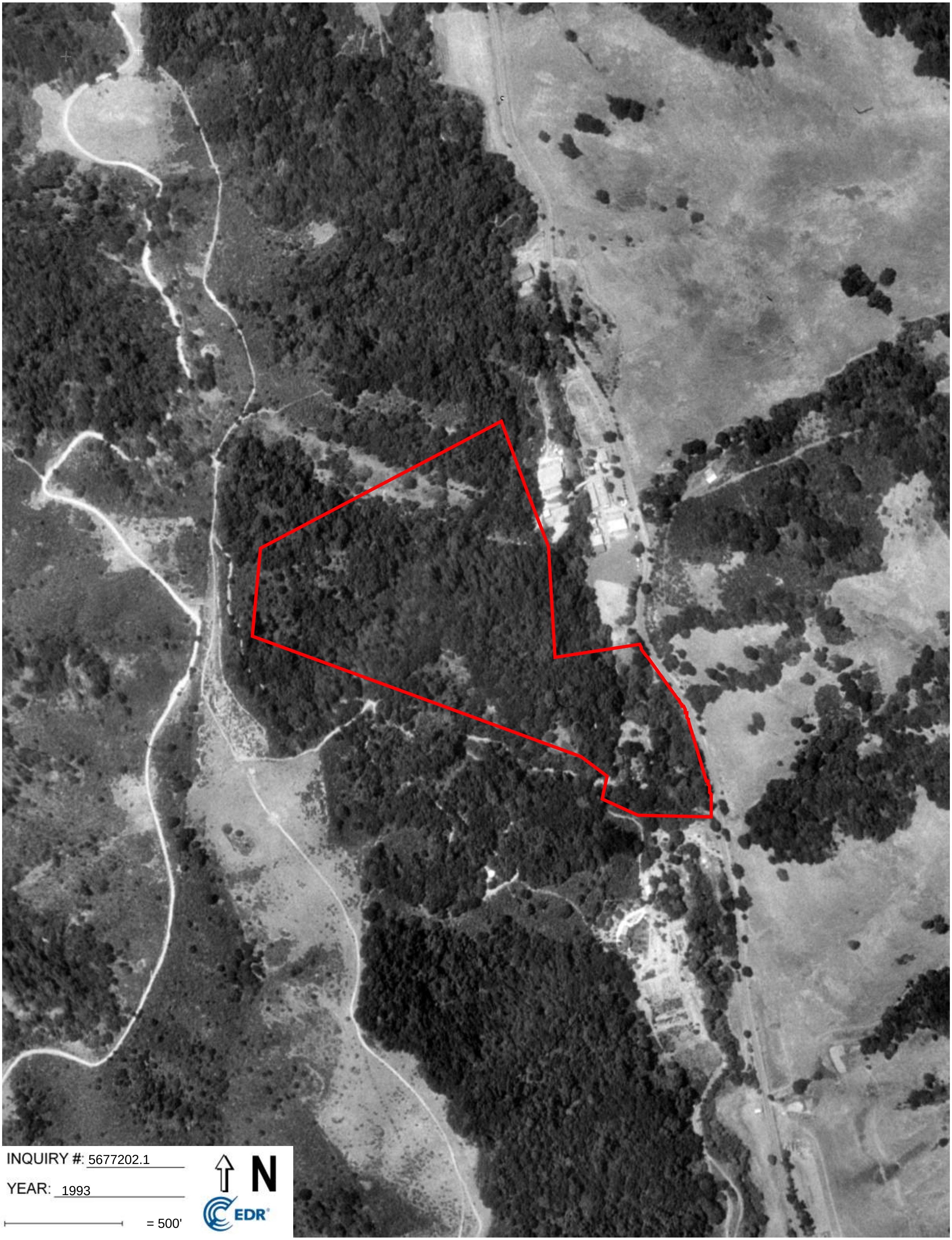

INQUIRY #: 5677202.1
YEAR: 2006
= 500'
N
EDR

INQUIRY #: 5677202.1

YEAR: 1998

= 500'

N



INQUIRY #: 5677202.1

YEAR: 1993

= 500'

N

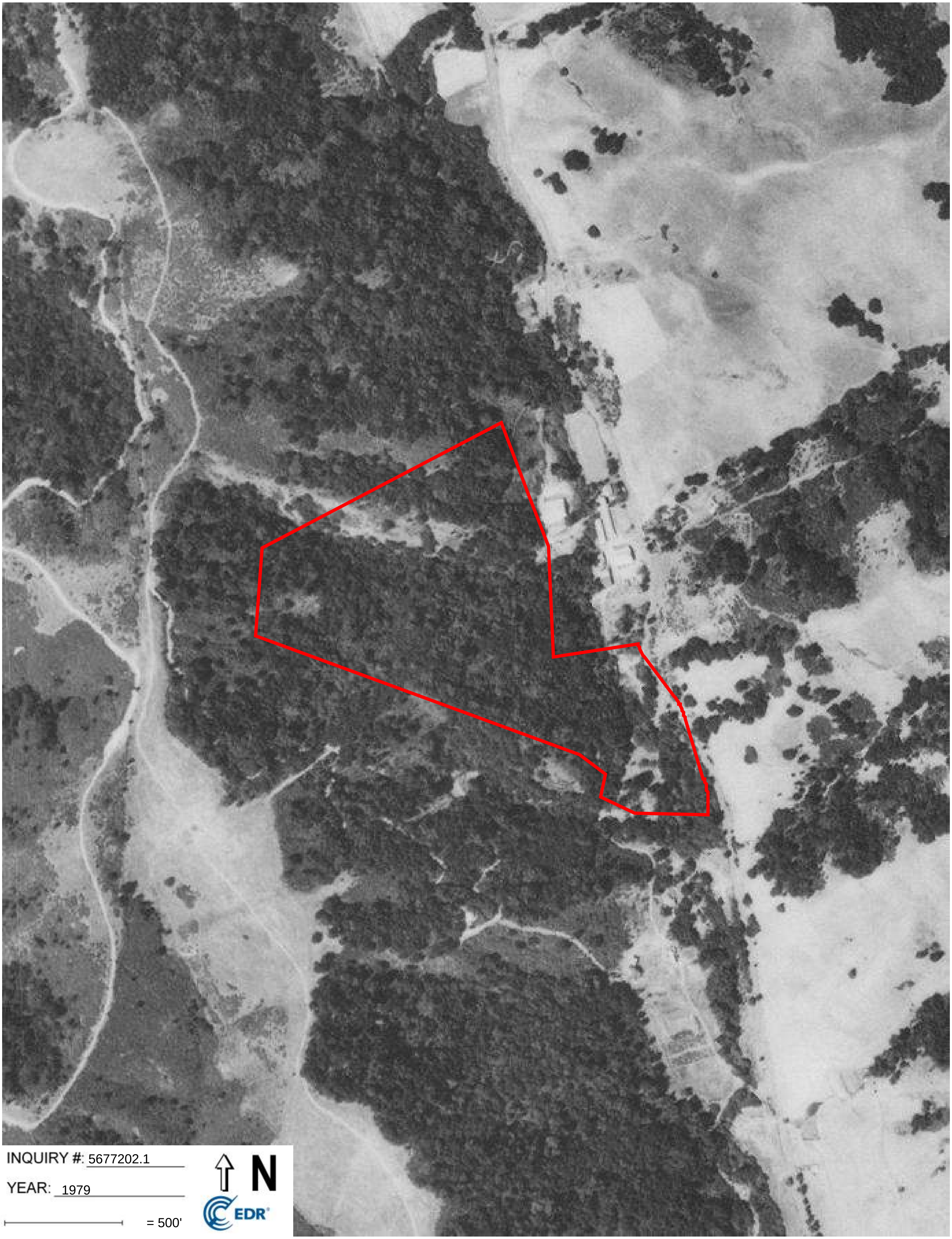
INQUIRY #: 5677202.1

YEAR: 1982

= 500'

N

EDR


INQUIRY #: 5677202.1
YEAR: 1979
= 500'
N
EDR

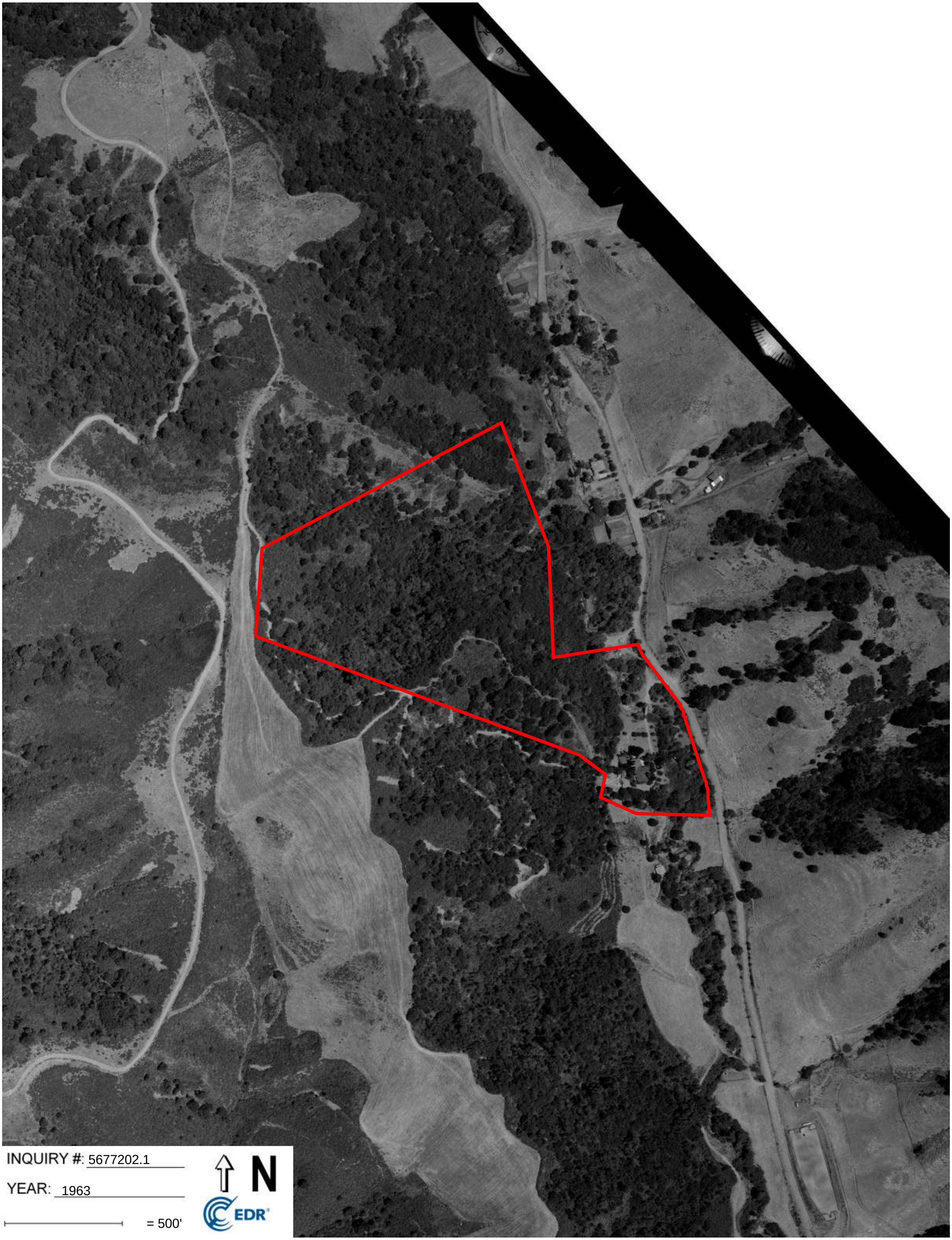
INQUIRY #: 5677202.1

YEAR: 1968

= 500'

N

EDR



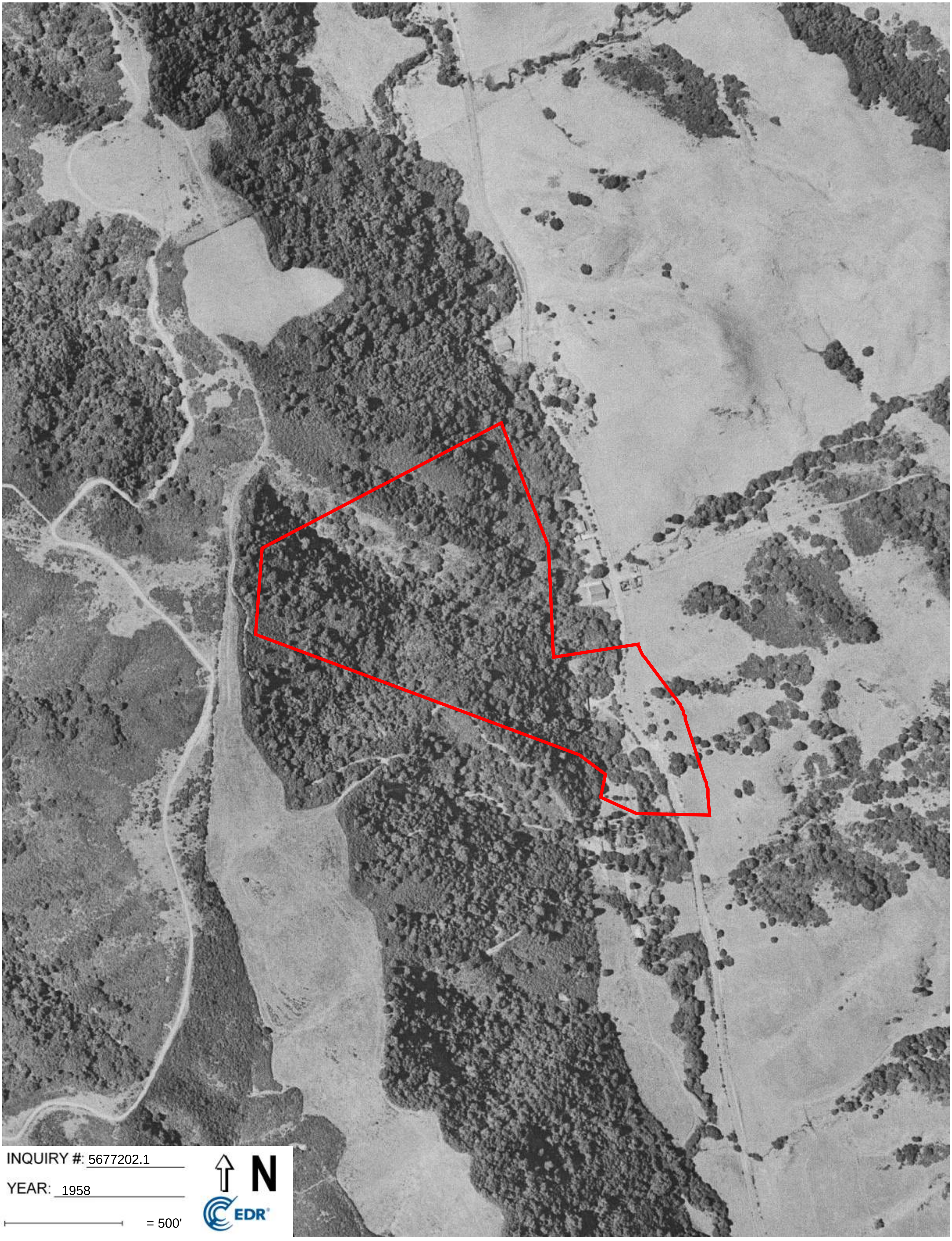
INQUIRY #: 5677202.1

YEAR: 1963

= 500'

N

EDR



INQUIRY #: 5677202.1

YEAR: 1958

= 500'

N

EDR

INQUIRY #: 5677202.1

YEAR: 1950

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

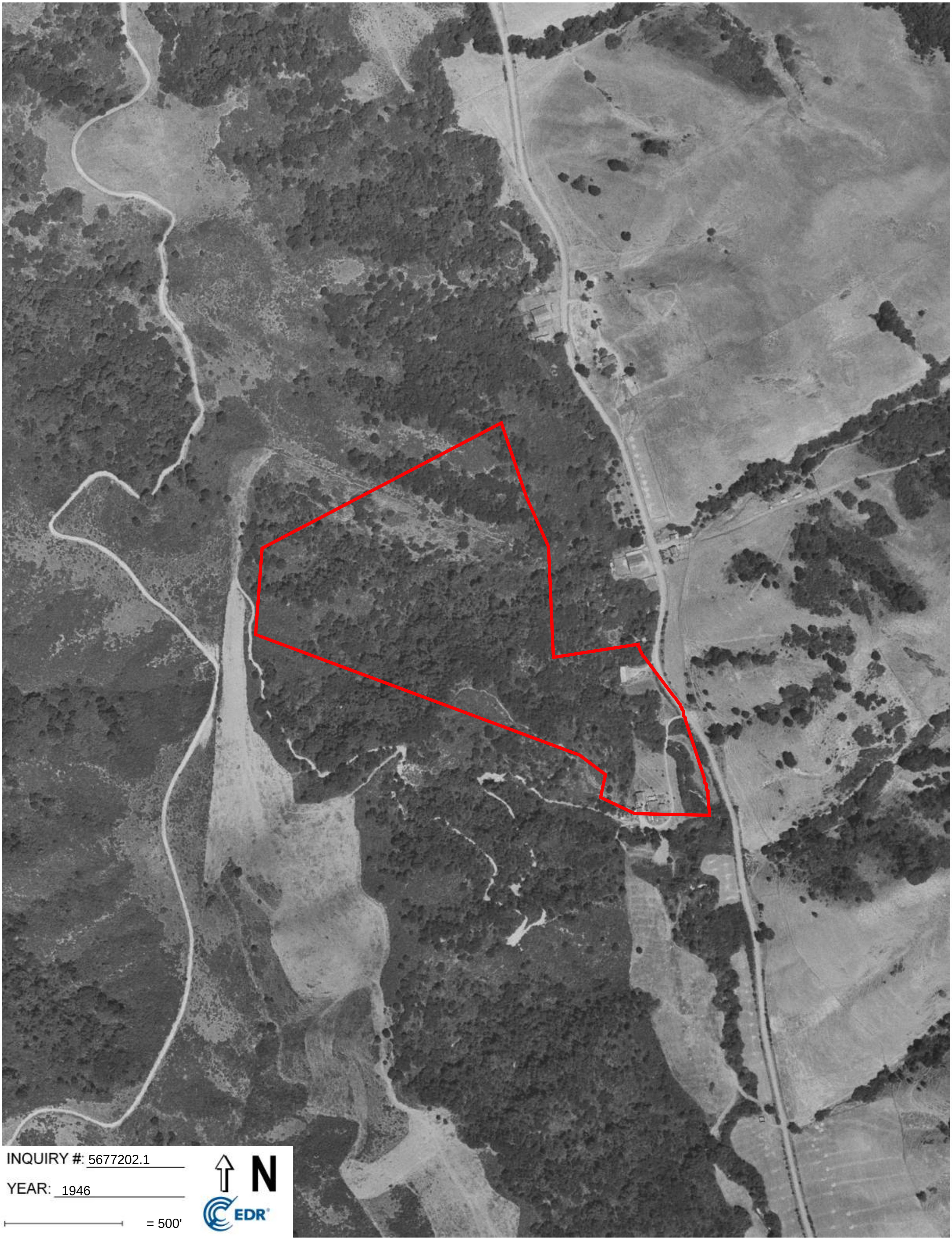
INQUIRY #: 5677202.1

YEAR: 1949

= 500'

N

EDR



INQUIRY #: 5677202.1

YEAR: 1946

= 500'

N

EDR

APPENDIX C:

Exploratory Trench Logs

APPENDIX D:

Soil Laboratory Test Results

ATTERBERG INDICES

ASTM D4318

DSA LEA No. 284

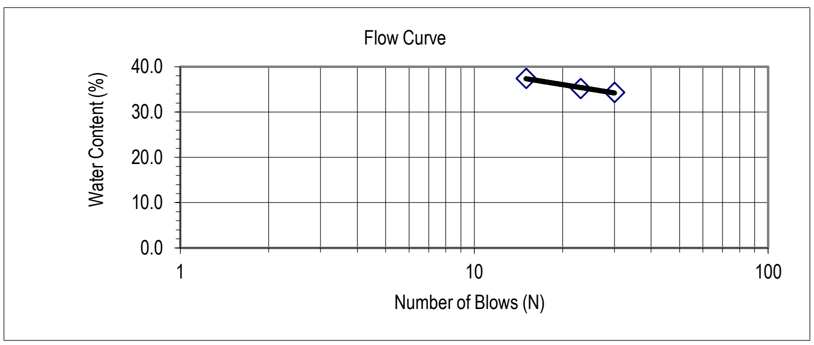
DSA File No. 0
DSA App No. 0

Project No.	70852.00.001	Project Name	Mosiac			Date:	07/11/19
Sample No.	T19-1	Boring/Trench	B-1	Depth, (ft.):	1-3'	Tested By:	LGH
Description:	(CL) sandy lean clay, dark brown (10YR 3/3)					Checked By:	SDC
Sample Location:		0				Lab. No.	C19-089

Estimated % of Sample Retained on No. 40 Sieve: Sample Air Dried: yes

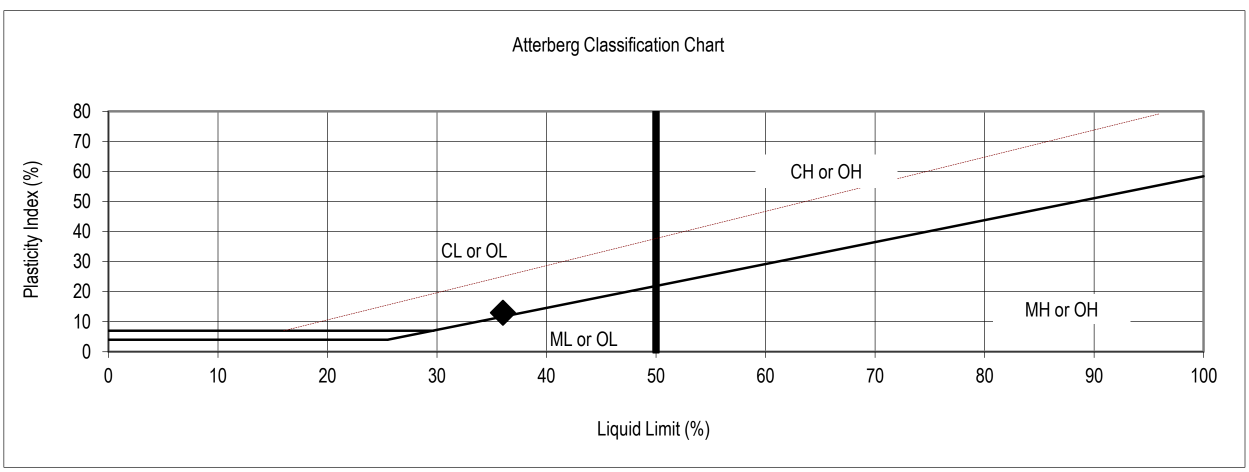
Test Method A or B: A

	LIQUID LIMIT:					PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	M-1	J-1	L			H	N-1	
Wt. Pan (gr)	60.89	63.31	61.22			61.61	64.90	
Wt. Wet Soil + Pan (	72.78	76.14	70.47			70.58	73.30	
Wt. Dry Soil + Pan (	69.74	72.80	67.95			68.89	71.71	
Wt. Water (gr)	3.04	3.34	2.52			1.69	1.59	
Wt. Dry Soil (gr)	8.85	9.49	6.73			7.28	6.81	
Water Content (%)	34.4	35.2	37.4			23.2	23.3	
Number of Blows, N	30	23	15					
				LIQUID LIMIT =	36		PLASTIC LIMIT =	23



Plasticity Index = 13

Group Symbol = CL



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DSA LEA No. 284

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422, C136

DSA File No. 0

DSA App No. 0

Sieve Only Analysis Worksheet

Project No.	70852.00.001	Project Name:	Mosiac			Date:	07/11/19
Sample No.	T19-1	Boring/Trench:	B-1	Depth, (ft.):	1-3'	Tested By:	LGH
Description:	(CL) sandy lean clay, dark brown (10YR 3/3)					Checked By:	SDC
Sample Location:	0					Lab. No.	C19-089

Moisture Content Data:			Total Material Sample Data:		
			Pan ID	0	
			Pan Weight	0.00	(gm)
Pan ID	0		Wet Soil + Pan Wt.	7,534.20	(gm)
Pan Weight	0.00	(gm)	Total Wet Weight	7,534.20	(gm)
Wet Soil + Pan	0.00	(gm)	Total Dry Weight	7,534.20	(gm)
Dry Soil + Pan	0.00	(gm)	Total Dry Wt. >#4 Sieve	265.20	(gm)
Water Weight	0.00	(gm)	Total Dry Wt.<#4 Sieve	7,269.00	(gm)
Dry Soil Weight	0.00	(gm)	Total Dry Wt. <#200 Sieve	4,886.95	(gm)
Moisture Content	0.0	(%)	Total Percent <#200 Sieve	64.86	(%)

GRAVEL PORTION SIEVE ANALYSIS
(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Dry Weight Percent Passing (%)
6 Inch	6.0000	152.40		0.00	0.00	7,534.20	100.0
3 Inch	3.0000	76.20		0.00	0.00	7,534.20	100.0
2 Inch	2.0000	50.80		0.00	0.00	7,534.20	100.0
1.5 Inch	1.5000	38.10		0.00	0.00	7,534.20	100.0
1.0 Inch	1.0000	25.40	41.70	41.70	41.70	7,492.50	99.4
3/4 Inch	0.7500	19.05	25.80	25.80	67.50	7,466.70	99.1
1/2 Inch	0.5000	12.70	36.70	36.70	104.20	7,430.00	98.6
3/8 Inch	0.3750	9.53	25.50	25.50	129.70	7,404.50	98.3
#4	0.1870	4.75	135.50	135.50	265.20	7,269.00	96.5
PAN			7,269.00	7,269.00			

SAND PORTION SIEVE ANALYSIS
(Portion Retained On < #4 Sieves)

Representative Sample Data:

			#200 Wash Data:		
Pan ID	0				
Pan Weight	0.00	(gm)	Portion >#200 Sieve:	124.10	(gm)
Wet Soil + Pan	378.70	(gm)	Portion <#200 Sieve:	254.60	(gm)
Wet Soil	378.70	(gm)	Percent <#200 Sieve	67.23	(%)
Dry Soil	378.70	(gm)	Total Wt. <#200 Sieve	4886.95	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	10.3	2.72	197.70	462.90	93.9
#20	0.033	0.850	11.30	2.98	216.90	679.80	91.0
#40	0.017	0.425	12.40	3.27	238.01	917.82	87.8
#60	0.010	0.250	17.50	4.62	335.91	1,253.72	83.4
#100	0.006	0.150	25.50	6.73	489.46	1,743.19	76.9
#200	0.003	0.075	47.10	12.44	904.07	2,647.25	64.9
PAN			Discard				

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Construction Quality Assurance - Infrastructure - Energy - Program Management - Environmental

PARTICLE SIZE DISTRIBUTION

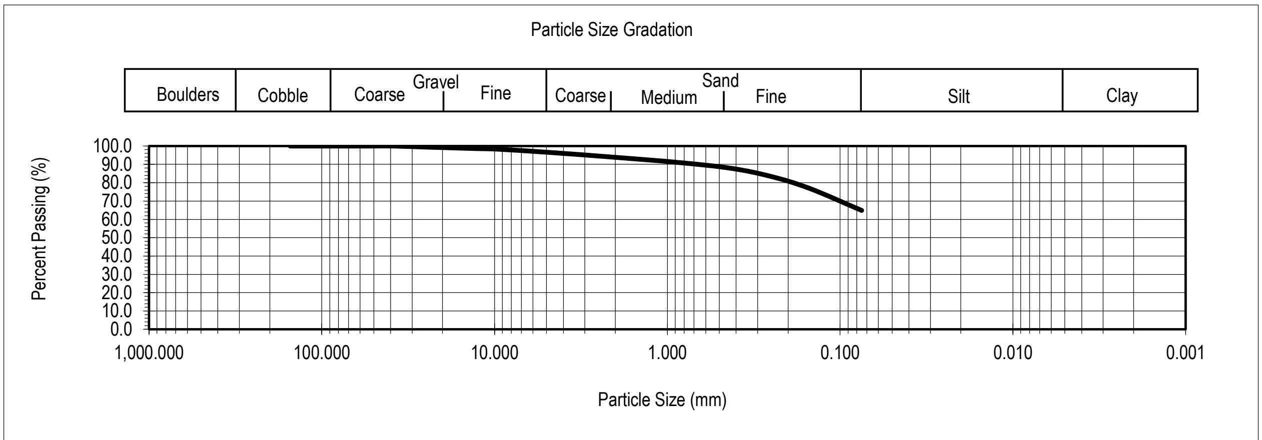
ASTM D422, C136

DSA LEA No.: 284

Project No.	70852.00.001	Project Name:	Mosiac		Date:	7/11/2019
Sample No.	T19-1	Boring/Trench:	B-1	Depth, (ft.): 1-3'	Tested By:	LGH
Description:	(CL) sandy lean clay, dark brown (10YR 3/3)				Checked By:	SDC
Sample Location:		0			Lab. No.	C19-089

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	7,534.2	**100.0**
3 Inch	3.0000	76.2	0.00	0.0	7,534.2	**100.0**
2 Inch	2.0000	50.8	0.00	0.0	7,534.2	**100.0**
1.5 Inch	1.5000	38.1	0.00	0.0	7,534.2	**100.0**
1.0 Inch	1.0000	25.4	41.70	41.7	7,492.5	**99.4**
3/4 Inch	0.7500	19.1	25.80	67.5	7,466.7	**99.1**
1/2 Inch	0.5000	12.7	36.70	104.2	7,430.0	**98.6**
3/8 Inch	0.3750	9.5	25.50	129.7	7,404.5	**98.3**
#4	0.1870	4.7500	135.50	265.2	7,269.0	**96.5**
#10	0.0790	2.0066	197.70	462.9	7,071.3	**93.9**
#20	0.0335	0.8500	216.90	679.8	6,854.4	**91.0**
#40	0.0167	0.4250	238.01	917.8	6,616.4	**87.8**
#60	0.0098	0.2500	335.91	1,253.7	6,280.5	**83.4**
#100	0.0059	0.1500	489.46	1,743.2	5,791.0	**76.9**
#200	0.0030	0.0750	904.07	2,647.3	4,886.9	**64.9**

Hydrometer



ATTERBERG INDICES

ASTM D4318

DSA LEA No. 284

DSA File No. 0

DSA App No. 0

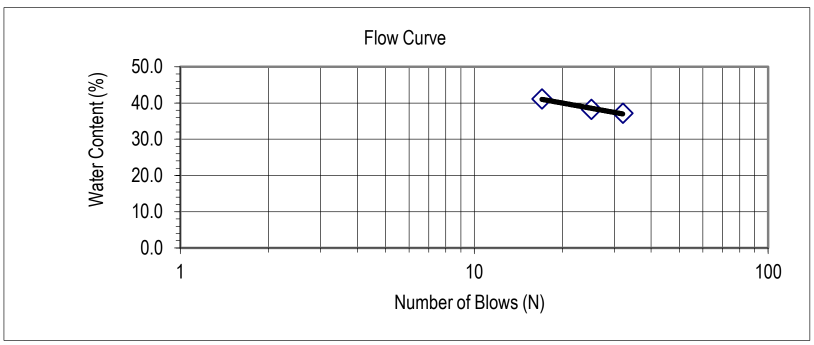
Project No.	70852.00.001	Project Name	Mosiac			Date:	07/11/19
Sample No.	T19-2	Boring/Trench	B-1	Depth, (ft.):	2-3'	Tested By:	LGH
Description:	(CL) Sandy lean clay , dark brown (10YR 3/3)					Checked By:	SDC
Sample Location:		0				Lab. No.	C19-089

Estimated % of Sample Retained on No. 40 Sieve: | Sample Air Dried: yes

Test Method A or B: A

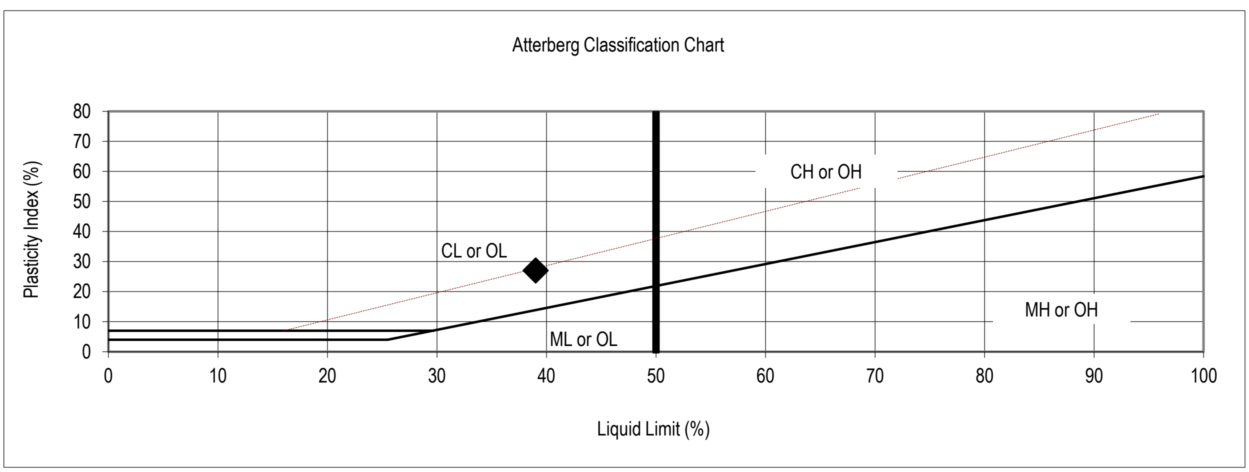
	LIQUID LIMIT:					PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	A	C	Z			Y	V	
Wt. Pan (gr)	38.46	38.47	37.43			37.10	37.34	
Wt. Wet Soil + Pan (	48.39	48.44	47.83			45.07	45.32	
Wt. Dry Soil + Pan (	45.70	45.68	44.80			44.19	44.46	
Wt. Water (gr)	2.69	2.76	3.03			0.88	0.86	
Wt. Dry Soil (gr)	7.24	7.21	7.37			7.09	7.12	
Water Content (%)	37.2	38.3	41.1			12.4	12.1	
Number of Blows, N	32	25	17					

LIQUID LIMIT = 39 | PLASTIC LIMIT = 12



Plasticity Index = 27

Group Symbol = CL



ATTERBERG INDICES

ASTM D4318

DSA LEA No. 284

DSA File No. 0

DSA App No. 0

Project No.	70852.00.001	Project Name	Mosiac	Date:	07/11/19
Sample No.	T19-4	Boring/Trencl	B-1 Depth, (ft.): 1-2'	Tested By:	LGH
Description:	(CL) lean clay with sand, dark brown (10YR 3/3)			Checked By:	SDC
Sample Location:	0			Lab. No.	C19-089

Estimated % of Sample Retained on No. 40 Sieve:

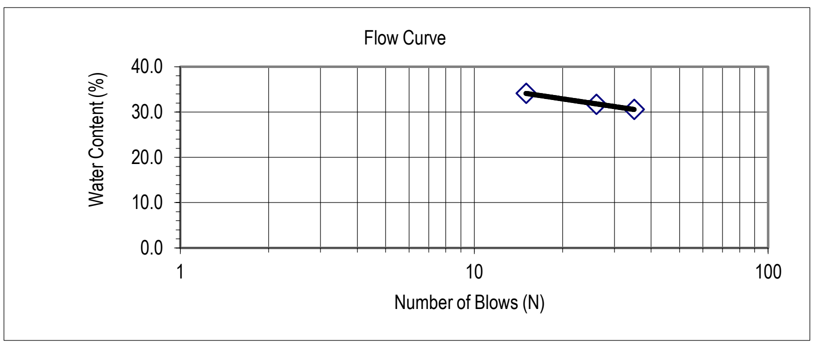
Sample Air Dried: yes

Test Method A or B: A

	LIQUID LIMIT:					PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	A	V	Z			C	Y	
Wt. Pan (gr)	38.47	37.34	37.43			38.47	37.11	
Wt. Wet Soil + Pan (	46.96	45.85	46.86			47.34	45.83	
Wt. Dry Soil + Pan (	44.97	43.80	44.46			45.90	44.41	
Wt. Water (gr)	1.99	2.05	2.40			1.44	1.42	
Wt. Dry Soil (gr)	6.50	6.46	7.03			7.43	7.30	
Water Content (%)	30.6	31.7	34.1			19.4	19.5	
Number of Blows, N	35	26	15					

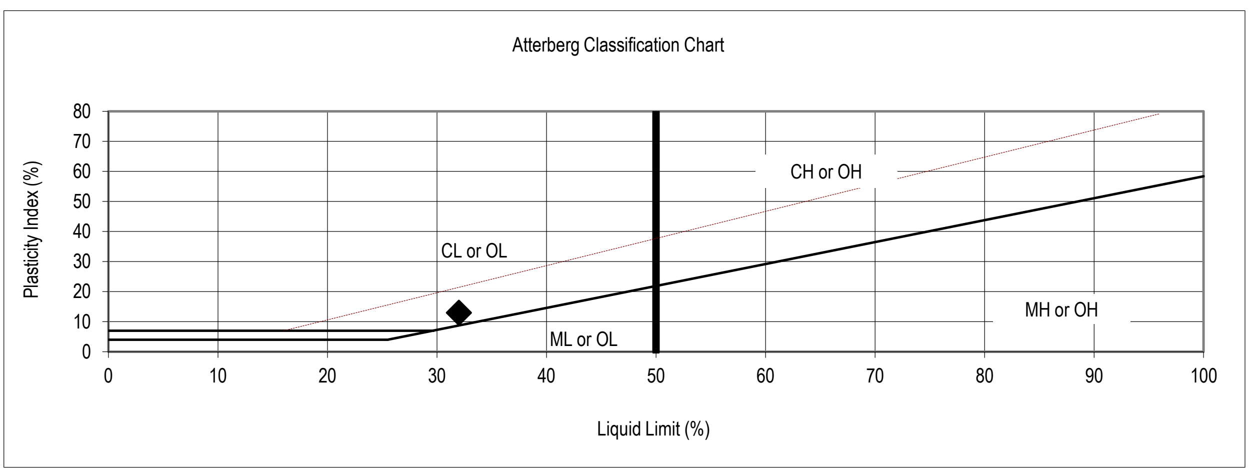
LIQUID LIMIT = 32

PLASTIC LIMIT = 19



Plasticity Index = 13

Group Symbol = CL



ATTERBERG INDICES
ASTM D4318

DSA LEA No. 284

DSA File No. 0
DSA App No. 0

Project No.	70852.00.001	Project Name	Mosiac	Date:	07/11/19
Sample No.	T19-5	Boring/Trench	B-1	Depth, (ft.): 3'	Tested By: LGH
Description:	(CH) Fat clay with sand, dark brown (10YR 3/3)			Checked By:	SDC
Sample Location:	0			Lab. No.	C19-089

Estimated % of Sample Retained on No. 40 Sieve:

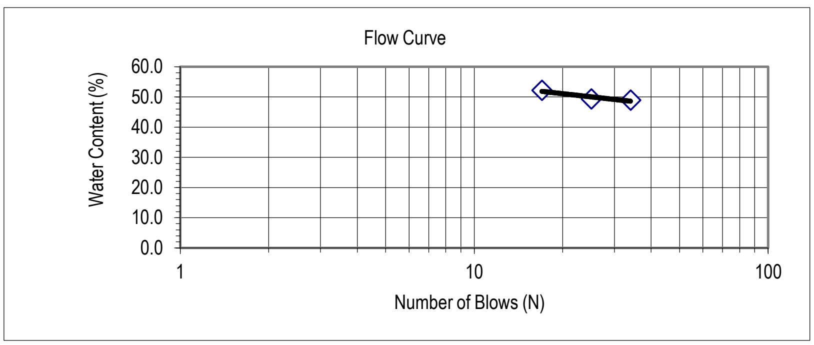
Sample Air Dried: yes

Test Method A or B: A

	LIQUID LIMIT:					PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	B	D	W			X	E	
Wt. Pan (gr)	38.97	38.28	37.77			38.20	36.45	
Wt. Wet Soil + Pan (	47.73	46.42	46.61			46.08	44.90	
Wt. Dry Soil + Pan (	44.85	43.73	43.58			45.02	43.75	
Wt. Water (gr)	2.88	2.69	3.03			1.06	1.15	
Wt. Dry Soil (gr)	5.88	5.45	5.81			6.82	7.30	
Water Content (%)	49.0	49.4	52.2			15.5	15.8	
Number of Blows, N	34	25	17					

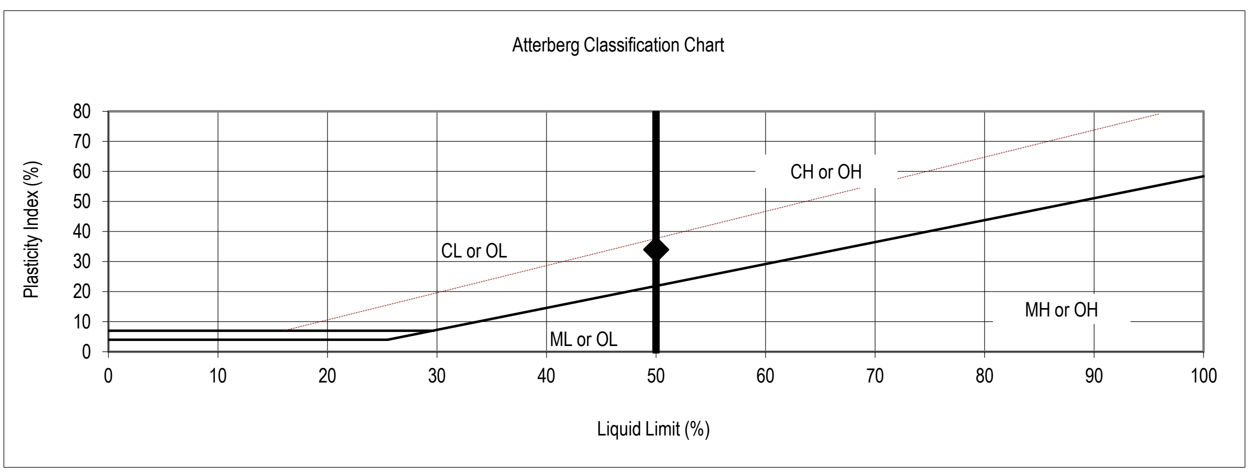
LIQUID LIMIT = 50

PLASTIC LIMIT = 16



Plasticity Index = 34

Group Symbol = CH



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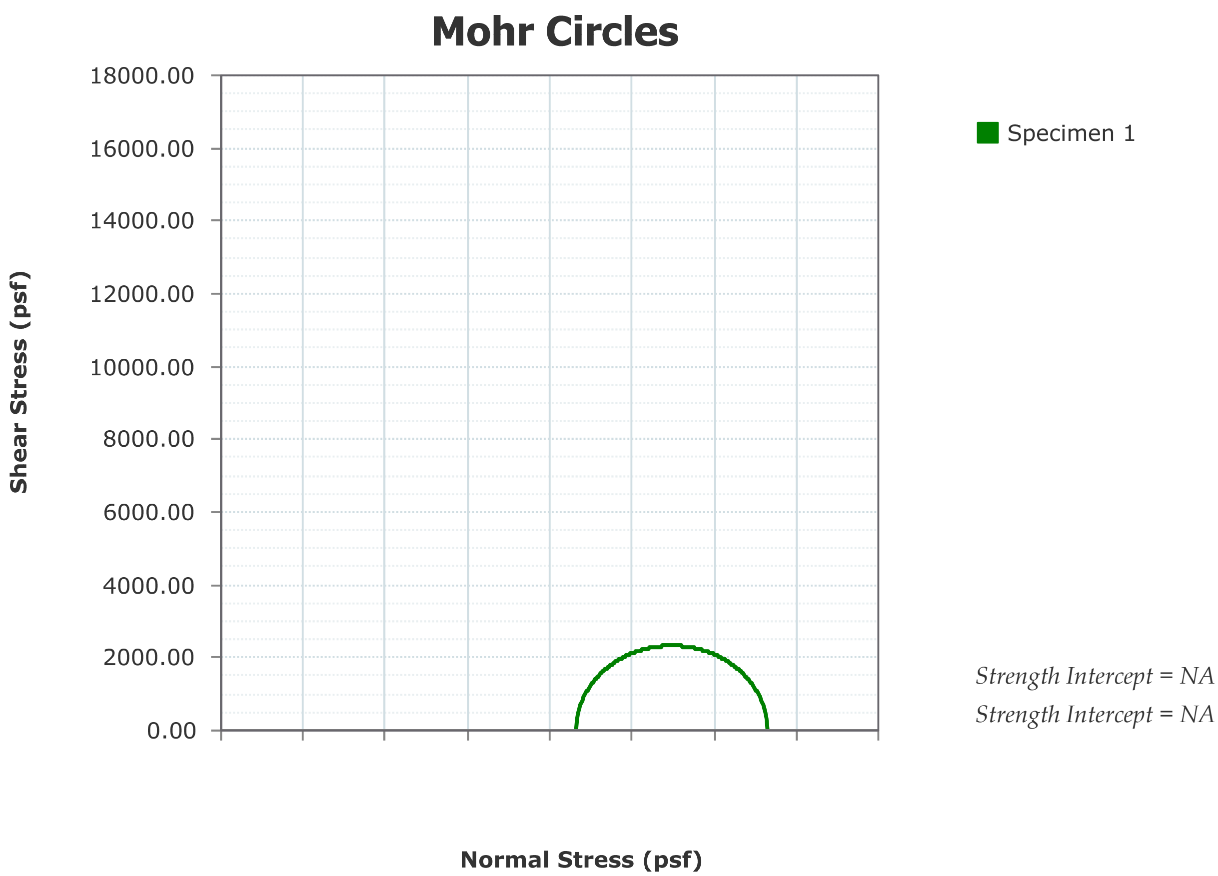
Unconsolidated Undrained Test

ASTM D2850



Project:	MOSIAC
Project Number:	70852
Sampling Date:	
Sample Number:	L-1
Sample Depth:	6.5
Location:	T19-5
Client Name:	
Remarks:	

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Unconsolidated Undrained Test

ASTM D2850

Before Test	Specimen Number 1	2	3	4	5	6	7	8
Membrane Thickness (in)	0.001							
Initial Cell Pressure (psi)	60.0							
Height (in)	5.194							
Diameter (in)	1.900							
Water Content (%)	23.2							
Wet Density (Units)	121.5							
Dry Density (pcf)	98.6							
Degree of Saturation (%)	87.3							
Void Ratio	0.722							
Height To Diameter Ratio	2.734							
Test Data	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Comp. Strength at Failure (psf)	4643.17							
σ1 at Failure (psf)	13283.16							
σ3 at Failure (psf)	8640.00							
Rate of Strain (in/min)	0.064925							
Axial Strain at Failure (%)	15.47							
After Test	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Final Water Content (%)	24.9							

Project:	MOSIAC
Project Number:	70852
Sampling Date:	
Sample Number:	L-1
Sample Depth:	6.5
Location:	T19-5
Client Name:	
Project Remarks:	

Specimen 1 Failure Sketch	Specimen 2 Failure Sketch	Specimen 3 Failure Sketch	Specimen 4 Failure Sketch	Specimen 5 Failure Sketch	Specimen 6 Failure Sketch	Specimen 7 Failure Sketch	Specimen 8 Failure Sketch

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Unconsolidated Undrained Test

ASTM D2850

Specimen 1			
Test Description:	D2850 unconsolidated Undrained		
Other Associated Tests:			
Device Details:	Master Loader		
Test Specification:			
Test Time:	8/7/2019		
Technician:	DJP/LGH	Sampling Method:	Undisturbed
Specimen Code:		Specimen Lab #:	T19-5
Specimen Description:			
Specific Gravity:	2.720		
Plastic Limit:	0	Liquid Limit:	0
Height (in):	5.194	Diameter (in):	1.900
Area (in^2):	2.835	Volume (in^3):	14.73
Large Particle:			
Moisture Material:	Specimen		
Moist Weight (g):	469.5		
Test Remarks:			

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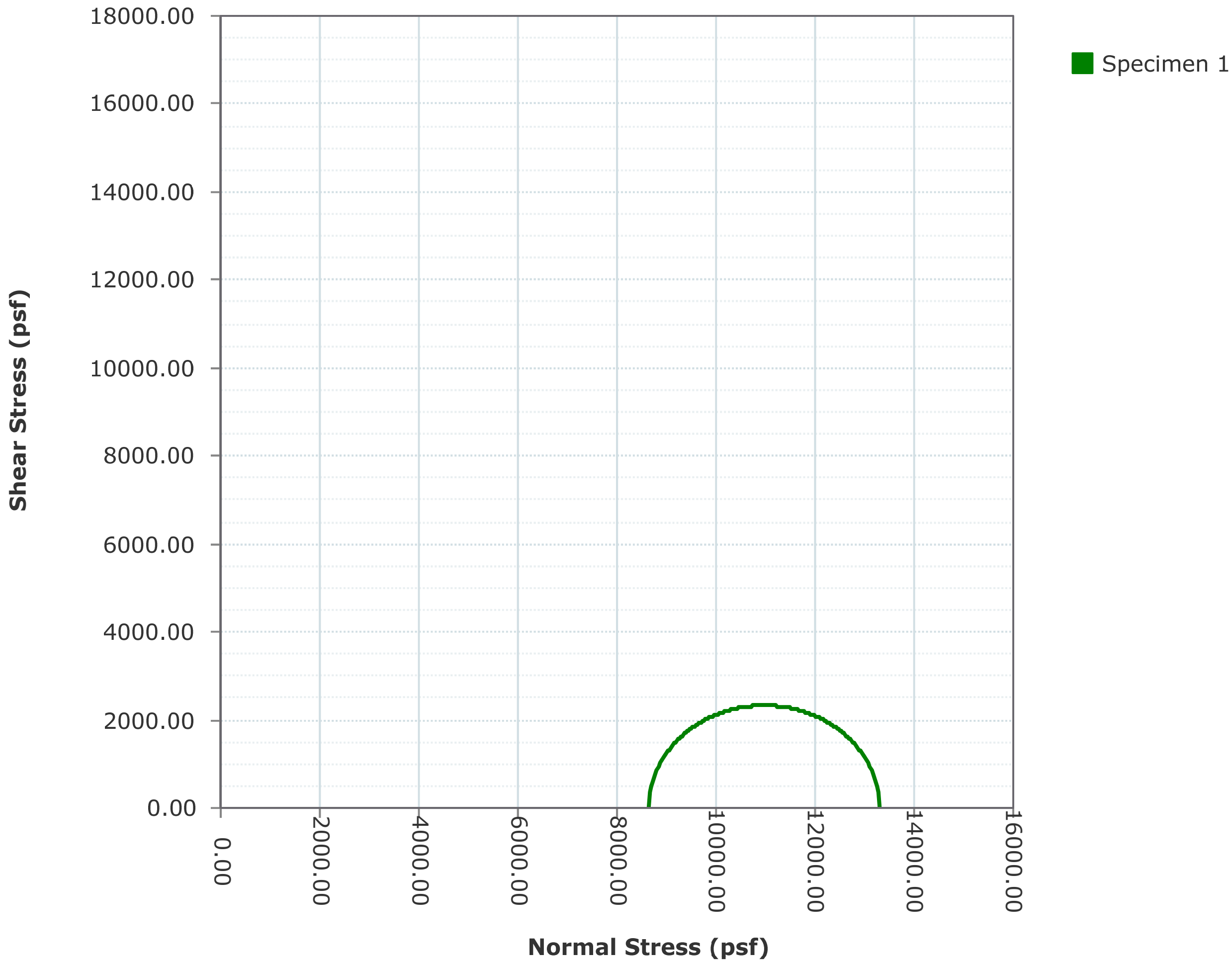
Mohr Circles (Total Stress) Graph

ASTM D2850



Tangent Results	
Strength Intercept (psi)	NA
Friction Angle (°)	NA

Sample: L-1 from trench T19-5, at 6.5 feet bgs

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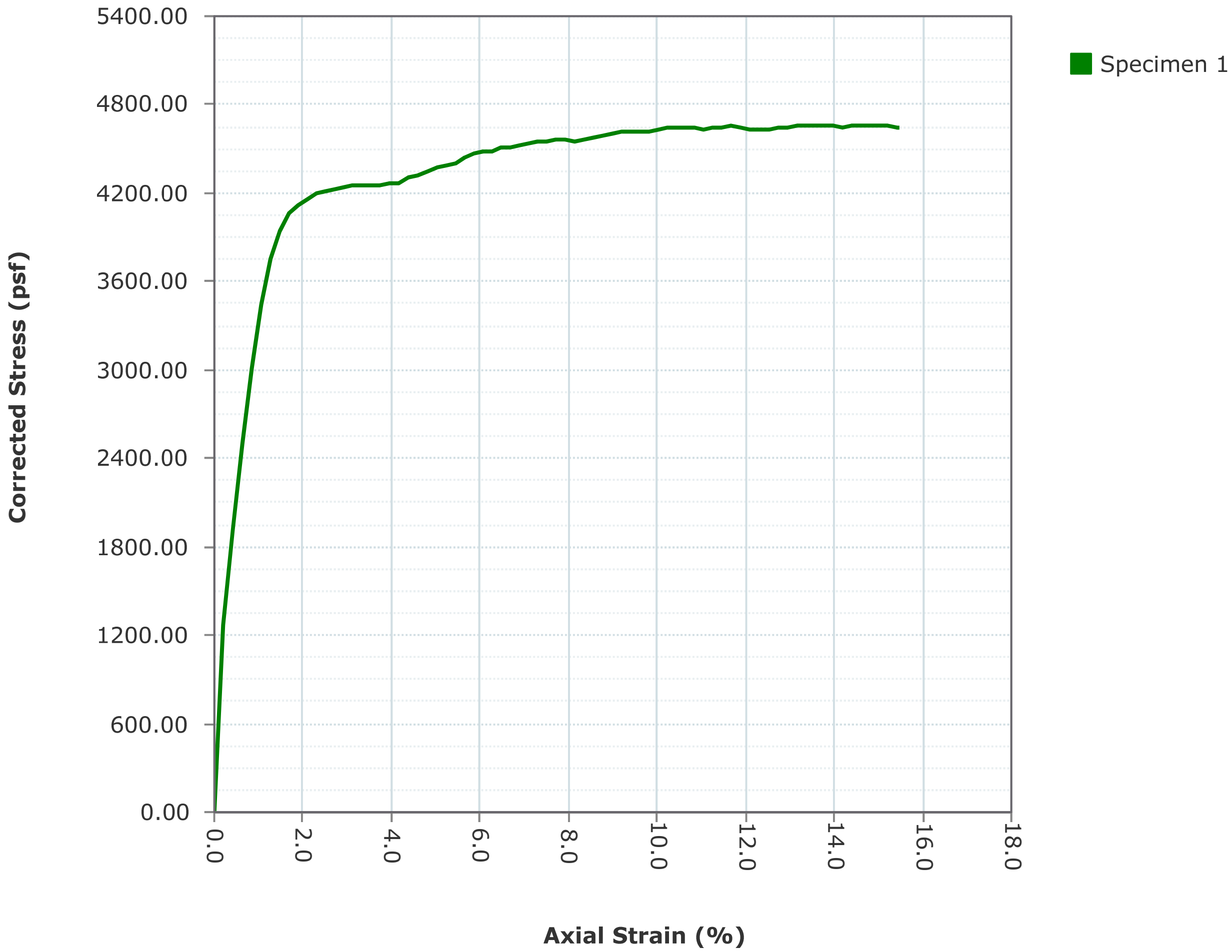
Stress-Strain Graph

ASTM D2850



Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
0	00:00:00	1.7	0.0001	0.0	0.000	2.835	0.0	0.00	0.00	8,640.00	8,640.00	1.000	8,640.00	0.00
1	00:00:10	26.7	0.0105	25.0	0.010	2.841	0.2	1,267.98	1,265.44	9,905.44	8,640.00	1.146	9,272.72	632.72
2	00:00:20	39.7	0.0218	37.9	0.022	2.847	0.4	1,927.13	1,919.07	10,559.07	8,640.00	1.222	9,599.53	959.53
3	00:00:30	51.1	0.0330	49.4	0.033	2.853	0.6	2,507.77	2,491.86	11,131.86	8,640.00	1.288	9,885.93	1,245.93
4	00:00:40	61.6	0.0440	59.9	0.044	2.859	0.8	3,040.14	3,014.42	11,654.42	8,640.00	1.349	10,147.21	1,507.21
5	00:00:50	70.3	0.0551	68.6	0.055	2.866	1.1	3,484.12	3,447.20	12,087.20	8,640.00	1.399	10,363.60	1,723.60
6	00:01:00	76.6	0.0660	74.8	0.066	2.872	1.3	3,800.18	3,751.93	12,391.93	8,640.00	1.434	10,515.97	1,875.97
7	00:01:10	80.6	0.0769	78.8	0.077	2.878	1.5	4,002.72	3,943.50	12,583.50	8,640.00	1.456	10,611.75	1,971.75
8	00:01:20	83.0	0.0876	81.3	0.088	2.884	1.7	4,127.01	4,057.43	12,697.43	8,640.00	1.470	10,668.71	2,028.71
9	00:01:30	84.4	0.0985	82.7	0.098	2.890	1.9	4,199.50	4,119.93	12,759.93	8,640.00	1.477	10,699.97	2,059.97
10	00:01:40	85.4	0.1093	83.7	0.109	2.896	2.1	4,250.41	4,161.01	12,801.01	8,640.00	1.482	10,720.50	2,080.50
11	00:01:50	86.2	0.1199	84.5	0.120	2.902	2.3	4,290.82	4,191.80	12,831.80	8,640.00	1.485	10,735.90	2,095.90
12	00:02:00	86.9	0.1304	85.2	0.130	2.908	2.5	4,326.37	4,217.81	12,857.81	8,640.00	1.488	10,748.91	2,108.91
13	00:02:10	87.4	0.1412	85.7	0.141	2.914	2.7	4,350.23	4,232.05	12,872.05	8,640.00	1.490	10,756.03	2,116.03
14	00:02:20	87.7	0.1517	86.0	0.152	2.921	2.9	4,366.13	4,238.63	12,878.63	8,640.00	1.491	10,759.31	2,119.31
15	00:02:30	88.0	0.1622	86.3	0.162	2.927	3.1	4,383.28	4,246.49	12,886.49	8,640.00	1.491	10,763.25	2,123.25
16	00:02:40	88.4	0.1730	86.7	0.173	2.933	3.3	4,402.01	4,255.47	12,895.47	8,640.00	1.493	10,767.74	2,127.74
17	00:02:50	88.6	0.1838	86.9	0.184	2.939	3.5	4,411.35	4,255.33	12,895.33	8,640.00	1.493	10,767.67	2,127.67
18	00:03:00	88.8	0.1945	87.1	0.194	2.946	3.7	4,423.29	4,257.75	12,897.75	8,640.00	1.493	10,768.88	2,128.88
19	00:03:10	89.2	0.2052	87.4	0.205	2.952	3.9	4,439.53	4,264.21	12,904.21	8,640.00	1.494	10,772.11	2,132.11
20	00:03:20	89.5	0.2164	87.8	0.216	2.959	4.2	4,458.11	4,272.44	12,912.44	8,640.00	1.494	10,776.22	2,136.22
21	00:03:30	90.4	0.2278	88.6	0.228	2.965	4.4	4,502.35	4,304.98	12,944.98	8,640.00	1.498	10,792.49	2,152.49
22	00:03:40	91.0	0.2390	89.2	0.239	2.972	4.6	4,531.58	4,323.15	12,963.15	8,640.00	1.500	10,801.57	2,161.57

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
23	00:03:50	91.7	0.2502	89.9	0.250	2.979	4.8	4,567.83	4,347.87	12,987.87	8,640.00	1.503	10,813.94	2,173.94
24	00:04:00	92.3	0.2614	90.5	0.261	2.986	5.0	4,598.72	4,367.31	13,007.30	8,640.00	1.505	10,823.65	2,183.65
25	00:04:10	92.9	0.2724	91.1	0.272	2.992	5.2	4,629.04	4,386.37	13,026.37	8,640.00	1.508	10,833.18	2,193.18
26	00:04:20	93.5	0.2831	91.8	0.283	2.999	5.5	4,661.33	4,407.29	13,047.29	8,640.00	1.510	10,843.64	2,203.64
27	00:04:30	94.4	0.2940	92.7	0.294	3.005	5.7	4,708.19	4,441.77	13,081.76	8,640.00	1.514	10,860.88	2,220.88
28	00:04:40	95.1	0.3046	93.3	0.305	3.012	5.9	4,740.46	4,462.51	13,102.51	8,640.00	1.516	10,871.26	2,231.26
29	00:04:50	95.6	0.3153	93.9	0.315	3.018	6.1	4,767.25	4,477.95	13,117.95	8,640.00	1.518	10,878.98	2,238.98
30	00:05:00	96.0	0.3258	94.3	0.326	3.025	6.3	4,787.40	4,487.13	13,127.13	8,640.00	1.519	10,883.57	2,243.57
31	00:05:10	96.6	0.3362	94.8	0.336	3.031	6.5	4,815.47	4,503.84	13,143.84	8,640.00	1.521	10,891.92	2,251.92
32	00:05:20	96.9	0.3468	95.2	0.347	3.038	6.7	4,834.52	4,511.78	13,151.78	8,640.00	1.522	10,895.89	2,255.89
33	00:05:30	97.4	0.3574	95.6	0.357	3.045	6.9	4,856.72	4,522.62	13,162.62	8,640.00	1.523	10,901.31	2,261.31
34	00:05:40	97.8	0.3681	96.0	0.368	3.051	7.1	4,877.32	4,531.77	13,171.77	8,640.00	1.525	10,905.88	2,265.88
35	00:05:50	98.3	0.3791	96.6	0.379	3.058	7.3	4,903.98	4,546.14	13,186.14	8,640.00	1.526	10,913.07	2,273.07
36	00:06:00	98.7	0.3897	96.9	0.390	3.065	7.5	4,922.93	4,553.59	13,193.59	8,640.00	1.527	10,916.80	2,276.80
37	00:06:10	99.1	0.4005	97.3	0.400	3.072	7.7	4,944.03	4,562.90	13,202.90	8,640.00	1.528	10,921.45	2,281.45
38	00:06:20	99.2	0.4115	97.4	0.411	3.079	7.9	4,949.20	4,557.12	13,197.12	8,640.00	1.527	10,918.56	2,278.56
39	00:06:30	99.4	0.4228	97.6	0.423	3.086	8.1	4,958.77	4,555.20	13,195.20	8,640.00	1.527	10,917.60	2,277.60
40	00:06:40	99.7	0.4339	97.9	0.434	3.094	8.4	4,974.68	4,559.18	13,199.18	8,640.00	1.528	10,919.59	2,279.59
41	00:06:50	100.2	0.4451	98.4	0.445	3.101	8.6	5,000.02	4,571.63	13,211.63	8,640.00	1.529	10,925.82	2,285.82
42	00:07:00	100.8	0.4565	99.1	0.456	3.108	8.8	5,031.46	4,589.31	13,229.31	8,640.00	1.531	10,934.66	2,294.66
43	00:07:10	101.5	0.4675	99.7	0.467	3.116	9.0	5,064.26	4,608.54	13,248.54	8,640.00	1.533	10,944.27	2,304.27
44	00:07:20	101.8	0.4782	100.1	0.478	3.123	9.2	5,084.13	4,616.08	13,256.08	8,640.00	1.534	10,948.04	2,308.04
45	00:07:30	102.2	0.4892	100.5	0.489	3.130	9.4	5,103.39	4,622.85	13,262.85	8,640.00	1.535	10,951.42	2,311.42

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
46	00:07:40	102.4	0.5000	100.7	0.500	3.137	9.6	5,114.38	4,622.13	13,262.13	8,640.00	1.535	10,951.06	2,311.06
47	00:07:50	102.7	0.5104	101.0	0.510	3.144	9.8	5,127.28	4,623.49	13,263.49	8,640.00	1.535	10,951.75	2,311.75
48	00:08:00	103.0	0.5211	101.3	0.521	3.151	10.0	5,143.91	4,627.91	13,267.91	8,640.00	1.536	10,953.96	2,313.96
49	00:08:10	103.5	0.5317	101.8	0.532	3.159	10.2	5,168.12	4,639.12	13,279.12	8,640.00	1.537	10,959.56	2,319.56
50	00:08:20	103.8	0.5423	102.0	0.542	3.166	10.4	5,181.48	4,640.58	13,280.58	8,640.00	1.537	10,960.29	2,320.29
51	00:08:30	104.0	0.5528	102.3	0.553	3.173	10.6	5,193.62	4,640.92	13,280.92	8,640.00	1.537	10,960.46	2,320.46
52	00:08:40	104.3	0.5632	102.5	0.563	3.180	10.8	5,206.39	4,641.91	13,281.91	8,640.00	1.537	10,960.96	2,320.96
53	00:08:50	104.4	0.5739	102.6	0.574	3.187	11.0	5,212.73	4,636.83	13,276.83	8,640.00	1.537	10,958.41	2,318.41
54	00:09:00	104.9	0.5846	103.2	0.585	3.195	11.3	5,239.91	4,650.19	13,290.18	8,640.00	1.538	10,965.09	2,325.09
55	00:09:10	105.1	0.5953	103.4	0.595	3.202	11.5	5,249.76	4,648.16	13,288.16	8,640.00	1.538	10,964.08	2,324.08
56	00:09:20	105.4	0.6061	103.7	0.606	3.210	11.7	5,265.20	4,650.87	13,290.87	8,640.00	1.538	10,965.43	2,325.44
57	00:09:30	105.4	0.6174	103.7	0.617	3.218	11.9	5,265.62	4,639.81	13,279.81	8,640.00	1.537	10,959.90	2,319.90
58	00:09:40	105.6	0.6284	103.8	0.628	3.226	12.1	5,272.94	4,635.04	13,275.04	8,640.00	1.536	10,957.52	2,317.52
59	00:09:50	105.8	0.6396	104.0	0.640	3.233	12.3	5,284.10	4,633.47	13,273.47	8,640.00	1.536	10,956.73	2,316.73
60	00:10:00	106.0	0.6509	104.3	0.651	3.241	12.5	5,296.90	4,633.20	13,273.20	8,640.00	1.536	10,956.60	2,316.60
61	00:10:10	106.4	0.6619	104.7	0.662	3.249	12.7	5,316.44	4,638.98	13,278.98	8,640.00	1.537	10,959.49	2,319.49
62	00:10:20	106.6	0.6728	104.9	0.673	3.257	13.0	5,327.54	4,637.52	13,277.52	8,640.00	1.537	10,958.76	2,318.76
63	00:10:30	107.3	0.6836	105.5	0.684	3.265	13.2	5,358.67	4,653.45	13,293.45	8,640.00	1.539	10,966.73	2,326.73
64	00:10:40	107.5	0.6944	105.8	0.694	3.273	13.4	5,372.80	4,654.58	13,294.58	8,640.00	1.539	10,967.29	2,327.29
65	00:10:50	107.8	0.7051	106.1	0.705	3.281	13.6	5,388.66	4,657.24	13,297.24	8,640.00	1.539	10,968.62	2,328.62
66	00:11:00	108.2	0.7157	106.4	0.716	3.288	13.8	5,405.89	4,661.09	13,301.09	8,640.00	1.539	10,970.54	2,330.55
67	00:11:10	108.2	0.7263	106.5	0.726	3.296	14.0	5,408.39	4,652.23	13,292.23	8,640.00	1.538	10,966.11	2,326.11
68	00:11:20	108.4	0.7370	106.6	0.737	3.304	14.2	5,415.65	4,647.25	13,287.25	8,640.00	1.538	10,963.63	2,323.63

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

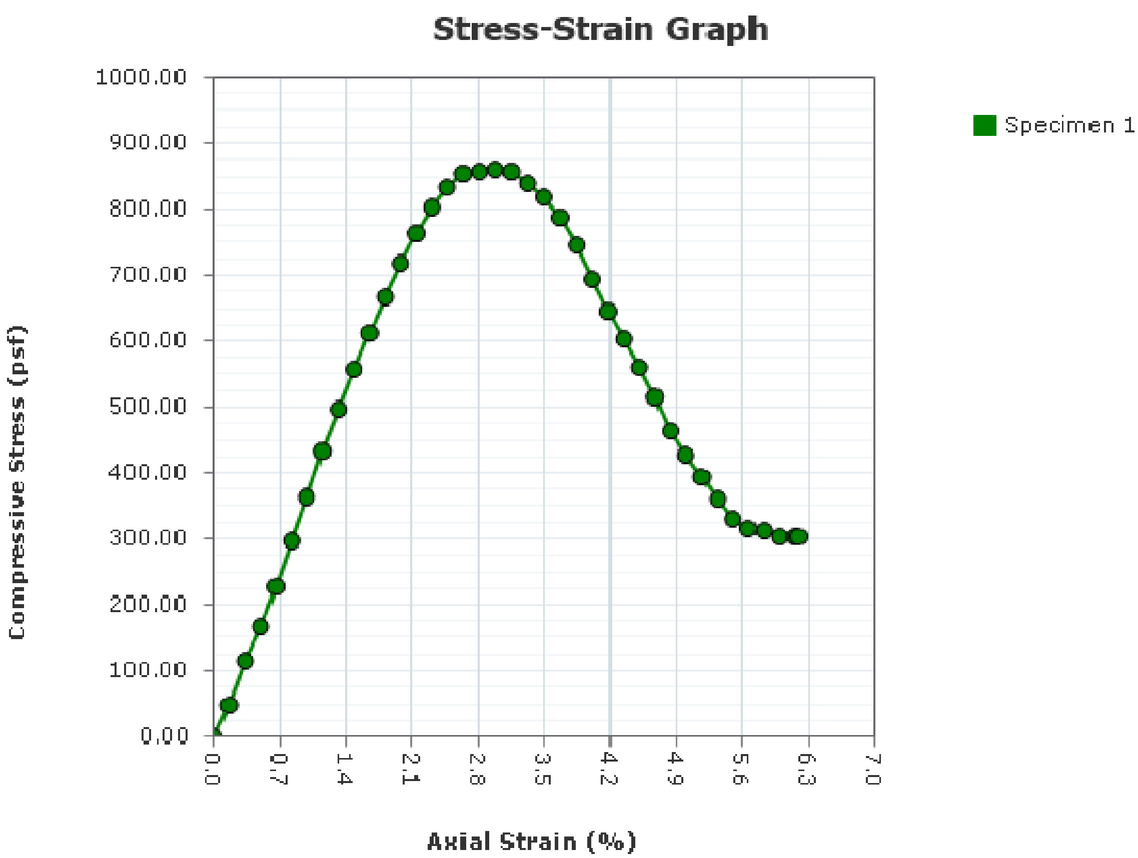
ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
69	00:11:30	108.9	0.7475	107.2	0.747	3.312	14.4	5,442.20	4,659.07	13,299.07	8,640.00	1.539	10,969.54	2,329.54
70	00:11:40	109.1	0.7580	107.4	0.758	3.320	14.6	5,454.16	4,658.32	13,298.32	8,640.00	1.539	10,969.16	2,329.16
71	00:11:50	109.4	0.7687	107.7	0.769	3.328	14.8	5,470.02	4,660.59	13,300.59	8,640.00	1.539	10,970.30	2,330.30
72	00:12:00	109.8	0.7794	108.0	0.779	3.336	15.0	5,486.99	4,663.75	13,303.75	8,640.00	1.540	10,971.87	2,331.87
73	00:12:10	109.8	0.7900	108.1	0.790	3.344	15.2	5,488.38	4,653.66	13,293.66	8,640.00	1.539	10,966.83	2,326.83
74	00:12:20	109.9	0.8008	108.1	0.801	3.352	15.4	5,491.29	4,644.76	13,284.76	8,640.00	1.538	10,962.38	2,322.38
75	00:12:22	109.9	0.8037	108.2	0.804	3.354	15.5	5,493.10	4,643.17	13,283.16	8,640.00	1.537	10,961.58	2,321.58

NV5
48 Bellarmine Court, Suite 40
Chico, CA 95928
530-894-2487

Unconfined Compression Test

D2166



Project:	Mosaic
Project Number:	70852.00
Received Date:	8/15/2019
Sampling Date:	6/6/2019
Sample Number:	L1
Sample Depth:	1.0 ft
Boring Number:	T19-4
Location:	
Client Name:	The Mosaic Project
Remarks:	

NV5
48 Bellarmine Court, Suite 40
Chico, CA 95928
530-894-2487

Unconfined Compression Test

D2166

Before Test	Specimen Number 1	2	3	4	5	6	7	8
Moisture Content (%):	17.7							
Wet Density (pcf)	105.1							
Dry Density (pcf)	89.3							
Saturation (%):	53.3							
Void Ratio:	0.902							
Height (in)	5.1270							
Diameter (in)	1.8860							
Strain Limit @ 15% (in)	0.8							
Height To Diameter Ratio:	2.72							
Test Data	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Failure Angle (°):	0							
Strain Rate (in/min)	0.05127							
Strain Rate (%/min):	1.00							
Unconfined Compressive Strength (psf)	859.79							
Undrained Shear Strength (psf)	429.89							
Strain at Failure (%):	2.98							

Specific Gravity:	2.72	Plastic Limit:	19	Liquid Limit:	32
Type:	Undisturbed	Soil Classification:	CL		

Project:	Mosaic
Project Number:	70852.00
Sampling Date:	6/6/2019
Sample Number:	L1
Sample Depth:	1.0 ft
Boring Number:	T19-4
Location:	
Client Name:	The Mosaic Project
Remarks:	

Specimen 1 Failure Sketch	Specimen 2 Failure Sketch	Specimen 3 Failure Sketch	Specimen 4 Failure Sketch	Specimen 5 Failure Sketch	Specimen 6 Failure Sketch	Specimen 7 Failure Sketch	Specimen 8 Failure Sketch

NV5
48 Bellarmine Court, Suite 40
Chico, CA 95928
530-894-2487

Unconfined Compression Test

D2166

LIMS Code: [TO COME FROM LIMS]

Specimen 1

Other Associated Tests:					
Sampling Method:	Intact	Material Moisture:	Specimen	Source Moisture:	After Shear
Molding Date:		Test Date:			
Large Particle:	NO	Sensitivity:	0		
Technician:	LGH	Test Time:	7/30/2019		
Specimen Description:	Unconfined Compression				
Test Remarks:					

Unconfined Compression Test - Specimen 1

D2166 LIMS Specimen Code: [TO COME FROM LIMS]

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Displacement (in)	Corrected Load (Lbf)	Corrected Displacement (in)	Axial Strain (%)	Cross Sectional Area (in²)	Stress (psf)	Compressive Stress (psf)
0	00:00:00	0.7123572	0.0001	0.0	0.0000	0.0	0.000	0.00	0.00
1	00:00:10	1.667856	0.0082	1.0	0.0082	0.2	2.798	49.25	49.17
2	00:00:20	2.969657	0.0169	2.3	0.0168	0.3	2.803	116.35	115.97
3	00:00:30	3.990159	0.0256	3.3	0.0255	0.5	2.808	168.96	168.11
4	00:00:40	5.179595	0.0338	4.5	0.0338	0.7	2.812	230.27	228.75
5	00:00:50	6.540264	0.0422	5.8	0.0421	0.8	2.817	300.40	297.93
6	00:01:00	7.850502	0.0505	7.1	0.0504	1.0	2.821	367.94	364.32
7	00:01:10	9.196599	0.0589	8.5	0.0589	1.1	2.826	437.32	432.30
8	00:01:20	10.47021	0.0676	9.8	0.0675	1.3	2.831	502.97	496.35
9	00:01:30	11.69838	0.0762	11.0	0.0762	1.5	2.836	566.28	557.86
10	00:01:40	12.78696	0.0846	12.1	0.0845	1.6	2.840	622.39	612.13
11	00:01:50	13.90717	0.0930	13.2	0.0929	1.8	2.845	680.13	667.80
12	00:02:00	14.92575	0.1015	14.2	0.1014	2.0	2.850	732.63	718.15
13	00:02:10	15.87665	0.1100	15.2	0.1099	2.1	2.855	781.65	764.89
14	00:02:20	16.68028	0.1183	16.0	0.1182	2.3	2.860	823.07	804.09
15	00:02:30	17.30002	0.1267	16.6	0.1267	2.5	2.864	855.02	833.89
16	00:02:40	17.7144	0.1353	17.0	0.1352	2.6	2.869	876.38	853.27
17	00:02:50	17.84517	0.1441	17.1	0.1441	2.8	2.874	883.12	858.30
18	00:03:00	17.905	0.1529	17.2	0.1528	3.0	2.879	886.20	859.79
19	00:03:10	17.86511	0.1615	17.2	0.1615	3.1	2.884	884.14	856.30
20	00:03:20	17.56272	0.1703	16.9	0.1703	3.3	2.890	868.56	839.71
21	00:03:30	17.18996	0.1794	16.5	0.1793	3.5	2.895	849.34	819.64
22	00:03:40	16.56024	0.1881	15.8	0.1880	3.7	2.900	816.88	786.92
23	00:03:50	15.74319	0.1970	15.0	0.1970	3.8	2.905	774.77	745.01
24	00:04:00	14.74436	0.2056	14.0	0.2055	4.0	2.910	723.28	694.29
25	00:04:10	13.80727	0.2141	13.1	0.2141	4.2	2.915	674.98	646.80
26	00:04:20	12.93825	0.2227	12.2	0.2226	4.3	2.920	630.19	602.83
27	00:04:30	12.10969	0.2312	11.4	0.2311	4.5	2.926	587.48	561.00
28	00:04:40	11.16838	0.2395	10.5	0.2394	4.7	2.930	538.96	513.79
29	00:04:50	10.19313	0.2479	9.5	0.2478	4.8	2.936	488.69	465.07
30	00:05:00	9.447026	0.2563	8.7	0.2562	5.0	2.941	450.23	427.73
31	00:05:10	8.764199	0.2649	8.1	0.2649	5.2	2.946	415.03	393.59
32	00:05:20	8.093068	0.2735	7.4	0.2735	5.3	2.951	380.44	360.15
33	00:05:30	7.506309	0.2819	6.8	0.2819	5.5	2.956	350.20	330.94

Unconfined Compression Test - Specimen 1

D2166 LIMS Specimen Code: [TO COME FROM LIMS]

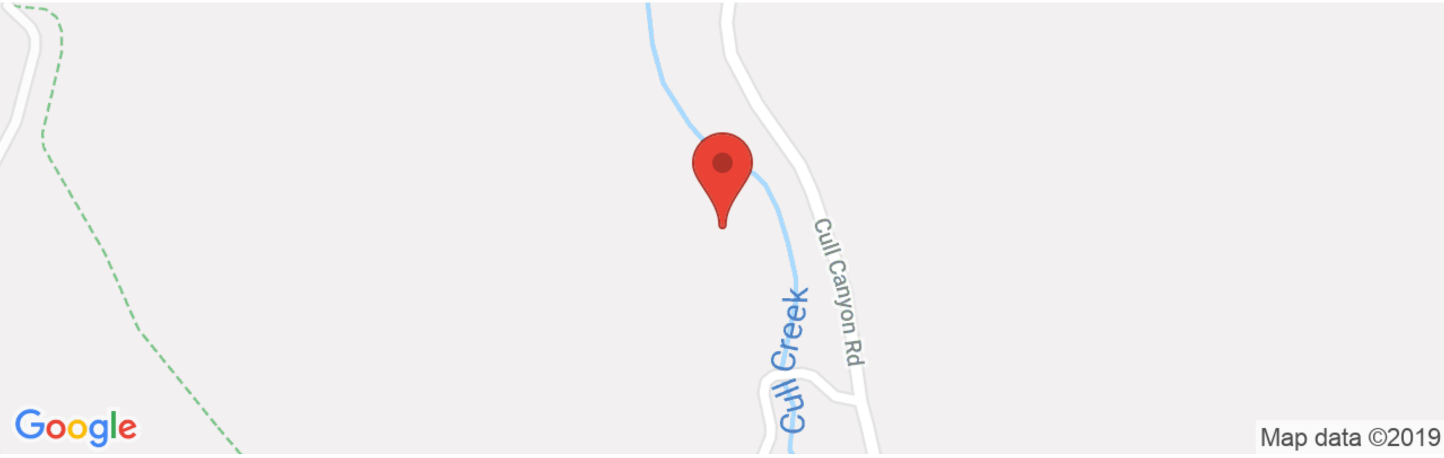
Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Displacement (in)	Corrected Load (Lbf)	Corrected Displacement (in)	Axial Strain (%)	Cross Sectional Area (in²)	Stress (psf)	Compressive Stress (psf)
34	00:05:40	7.17151	0.2904	6.5	0.2903	5.7	2.961	332.94	314.09
35	00:05:50	7.147541	0.2987	6.4	0.2987	5.8	2.966	331.70	312.38
36	00:06:00	6.973622	0.3074	6.3	0.3073	6.0	2.972	322.74	303.39
37	00:06:10	6.949461	0.3159	6.2	0.3158	6.2	2.977	321.49	301.69
38	00:06:11	6.968253	0.3176	6.3	0.3175	6.2	2.978	322.46	302.49

APPENDIX E:

Seismic Design Parameters

Mosaic

Latitude, Longitude: 37.7418, -122.0551

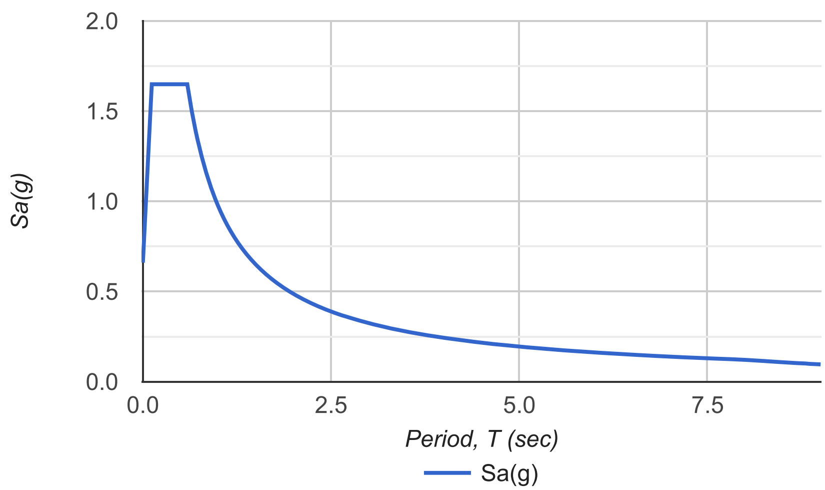


Date	8/13/2019, 2:11:48 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

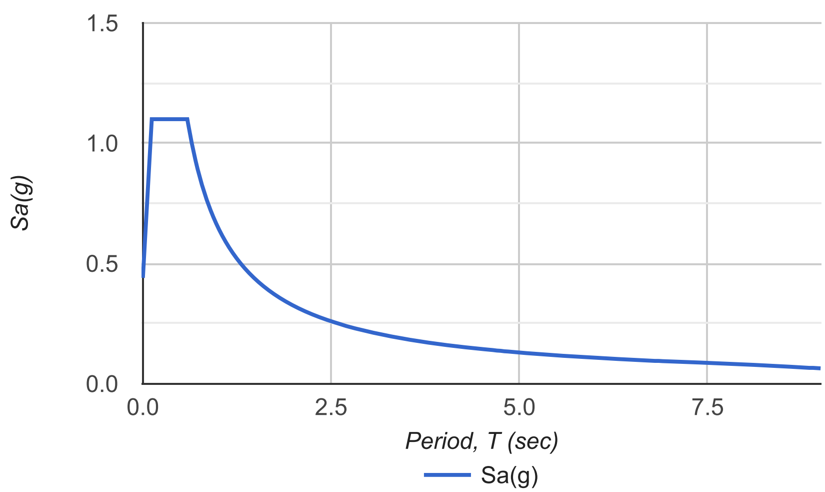
Type	Value	Description
S_S	1.649	MCE_R ground motion. (for 0.2 second period)
S_1	0.649	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.649	Site-modified spectral acceleration value
S_{M1}	0.974	Site-modified spectral acceleration value
S_{DS}	1.1	Numeric seismic design value at 0.2 second SA
S_{D1}	0.649	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	0.638	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.638	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.677	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.556	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.649	Factored deterministic acceleration value. (0.2 second)
S1RT	0.961	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.939	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.649	Factored deterministic acceleration value. (1.0 second)
PGAd	0.638	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	1.047	Mapped value of the risk coefficient at short periods
C_{R1}	1.023	Mapped value of the risk coefficient at a period of 1 s

MCER Response Spectrum



Design Response Spectrum



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APPENDIX F

DRAFT FIRE SAFETY AND EMERGENCY RESPONSE PLAN

DRAFT FIRE SAFETY & EMERGENCY RESPONSE PLAN
Prevention, Training, Signage, & Evacuation Procedures

We look forward to working with Alameda County to ensure that this plan meets all fire safety and emergency response requirements.

In accordance with the requirements of the County of Alameda, the following guidelines have been established to inform and train our employees about emergency response procedures, fire prevention, protection and suppression activities, personnel accountability, and response to other hazardous situations.

FIRE PREVENTION MEASURES

- No smoking is permitted on the site. All staff and students must sign a contract agreeing to this prior to arriving at the site. The rule will then be reinforced upon arrival.
- Staff and students are not permitted to bring anything flammable onto the site. A contract agreeing to this prior to arrival is signed and then reinforced once on site.
- A 1 to 7 staff to student ratio will be maintained in order to provide adequate supervision.
- Vegetation and defensible space will be maintained according to Alameda County regulations and the State of California Building and Fire Codes.
- We will follow the same guidelines as the East Bay Regional Parks:
    - Camp closures: When both the fire department has limited resources to fight fire and the National Weather Service declares a Red Flag Warning, camp sessions will be canceled.
    - Camp Modifications: If the fire danger is listed as “extreme” or “very high”, as declared by the County of Almeda Fire Department, the following will occur:
        - No open fires of any type, including barbeques
        - No use of gasoline powered equipment (e.g. mowers, weed eaters, etc.)
        - All fire equipment will be checked for readiness
        - All staff and groups will be immediately notified of restricted activities

STAFF TRAINING & DRILLS

- All staff and employees will be trained in safe evacuation and notification procedures. All staff must attend a training session yearly to learn and practice how to navigate calmly, quickly, and safely during an evacuation emergency.

- An emergency drill will be held within the first 24 hours of the beginning of each program session.

- When conducting the emergency drill, any people needing special assistance will be identified and any necessary special accommodations are put in place.

- Employ all means of notifying occupants to evacuate, e.g., intercom, alarms, walkie talkies.

- Interactive role plays practicing how staff should respond in different scenarios are included.

- Prior to the role plays and drills, we will:
  - Ensure that staff is familiar with the location of all fire alarms and extinguishers, evacuation routes, and Safety Zones.
  - Demonstrate how to properly use fire extinguishers, fire blankets, and fire hoses.

- The following exercises will be used as practice scenarios to increase individual confidence and effectiveness:
  - Activate, or direct that another designated individual activate, the fire alarm at the first sign of fire or other emergency.
  - Notify anyone in the immediate area of danger
  - Close doors to confine fire/smoke, but do not lock them.
  - Evacuate the buildings, assist site campers and fellow staff in evacuating.
  - Determine which Safety Zone to use.
  - Call the fire department (911 or other emergency number) and provide the following information:
    - Location/building name, address and nearest cross street
    - Location of fire in the building or area adjacent.
    - Known information about the fire/smoke
    - Identify a call-back phone number for emergency services.
    - Do not hang up until the emergency services operator does so.

- Test all staff to verify that they know how to evacuate their work areas and perform their fire drill duties in an emergency.

- At least once per quarter, a fire department representative will be invited to review our fire drill exercise to verify its effectiveness.

SIGNAGE & DOCUMENTATION

- Copies of the *Fire Safety & Emergency Response Guide* will be kept easily accessible for by all onsite staff.

- Emergency numbers will be posted in easily visible places throughout the site.

- Staff will review and update the *Guide* and procedures a minimum of once per calendar quarter.

- All buildings will have posted written fire evacuation procedures, included detailed instructions and numbers for contacting emergency personnel.

- All buildings will have posted maps of evacuation routes which also indicate the locations of fire alarms, fire extinguishers, and safe gathering zones.

- Appropriate safety signage will be nearby each building and throughout the site.

EVACUATION PREPARATION & PROCEDURES

- The Mosaic Project subscribes to Zonehaven AWARE "ACALERT '' used by Alameda County Emergency Services to report Zone specific emergencies, e.g. area wildfires.

- The Mosaic Project has established an emergency evacuation agreement with the Castro Valley Unified School District (see attached letter from Superintendent Parvin Ahmadi).
  - In case of the need for emergency evacuation, the District will provide two available school buses, each of which holds 50 individuals, to bring the campers to Canyon Middle School which is seven minutes away from the property. If Canyon Middle School is not a safe evacuation site, another District facility will be used.
  - To communicate a need for the buses, work and cell phone numbers of our primary contact person, as well as a backup contact and the Superintendent, will be maintained on site.

- Prior to their child's session, parents will be given the following instructions in case of an emergency: "Do **NOT** come in individual cars to pick up your child. This would cause traffic and disrupt evacuation procedures. We will utilize nearby school buses to quickly evacuate everyone to a nearby school. Your child's school will arrange further transportation."

- When there is a need to evacuate, all staff and campers will gather in the parking lot. If this area is not accessible, everyone will gather between the creek and the road on the south side of the property.

- Campers will line up according to their cabin group (as practiced in the emergency drills) and assigned staff will conduct a roll call.

- Staff will report any person unaccounted for to a fire department representative immediately and include a complete description of the individual.

- Staff will comply with all emergency direction as provided by the County of Alameda Fire Department

- If deemed safe, The Mosaic Project's land and buildings can be utilized as a shelter center for local residents to secure safety in the event of an emergency.

APPENDIX G

WASTEWATER BASIS OF DESIGN

November 2, 2020

Natali Colom Cruz
Engineering Technician – Hazardous Material Specialist
Alameda County Department of Environmental Health
Land Use Program
1131 Harbor Bay Parkway
Alameda, CA 94502

Subject: Basis of Design Report for The Mosaic Project - 17015 Cull Canyon Road Project Site (APN 85-1200-1-16)

Dear Natali,

The following is our Basis of Design Analysis for The Mosaic Project based on the project description submitted as part of the Conditional Use Permit Application (PLN2020-00093.) This basis of design follows the Alameda County *Onsite Wastewater Treatment System Manual June 2018* (Manual.)

PROJECT LOCATION

The Mosaic Project (Project) is located on an approximately 37-acre site, at 17015 Cull Canyon Road in the unincorporated portion of Alameda County, California, approximately 3 miles North of Interstate 580 (I-580). The site is bounded by Cull Canyon Road to the east, Twining Vine Winery to the north, Cull Canyon Regional Recreational Area to the west, and residential property to the south.

The site is centered at about 37°44'33.83"N latitude and 122° 3'18.85"W longitude, and is located in Section 23, Range 02W, Township 2S, Hayward USGS 7.5' Quad.

PROJECT OBJECTIVES

The Mosaic Project's mission is to work toward a peaceful future by uniting children of diverse backgrounds, providing them with essential community building skills, and empowering them to become peacemakers.

The primary program is the Outdoor Project which brings together 4th and 5th grade classes from markedly different backgrounds for a profound weeklong experience in nature.

PROJECT DESCRIPTION

The Outdoor Project facilitates three classes of 4th or 5th grade students (approximately 75-95 students) that are bussed to the project site from their schools for a 5-day, 4-night camp program in nature. Students arrive by bus +/- 11am Monday morning and depart +/- 1:30pm Friday afternoon.

The Outdoor Project currently operates seasonally during the school year with six consecutive camp sessions in the fall [September-October] and six consecutive camp sessions in the spring [April-May]. The goal is eventually to operate year-round, including summer sessions and occasional weekend programs. The programs would be spaced out so that there would never be more than two consecutive 5-day, 4-night programs. Likewise, weekend programs would never fall next to a weekday program. This will allow for the following:

- 18 Outdoor Project 5-day/4-night sessions (10 in the winter/spring and 8 in the fall)
- Four (4) 5-day/4-night summer sessions
- 12 weekend programs

WASTEWATER SOURCE AND FLOW ANALYSIS

The proposed project consists of the following structures and uses where wastewater will be generated. Wastewater predictions are based on a per person design flow assumption in terms of gallons per day. Predicted Wastewater Flows can be found in Table 1.

Central Meeting & Dining Hall: This 8,500 sf multi-purpose building would be constructed southeast of the cabins. It will be used for camp indoor activities and would contain restrooms, a medic room, kitchen, pantry, dining area, meeting space, laundry, restrooms, showers, and offices.

Restroom/Shower Building: A 1,025 sf restroom/shower building would be constructed near the camping cabins.

Family Dwelling: A 2,600 sf staff dwelling would be constructed to serve as Mosaic staff's permanent home.

Other Structures

Camping Cabins: Twelve 400 sq. non-permanent camping cabins would be placed on the project site. Cabins will be simple, light-footprint construction with no plumbing features in the buildings. Campers will be served by the Central Meeting and Dining Hall and the Restroom Shower Building.

Caretaker's Unit: The existing 1,200 sf structure will remain as a caretaker's dwelling and will be served by the existing septic system serving the structure and is not a part of this analysis.

Table 1 – Predicted Wastewater Flows

Occupant Type	Maximum Daily Occupants/Use	Flow/per Person (gpd)*	GPD
Campers	100	25	2,500
Day Staff	8	25	200
Family Dwelling Residence	8 Bedroom	N/A	825
		Total	**3,525**

* See Discussion on flow rate for details

Flow Rate Determination: The flow rate of 25gpd/person is based on multiple factors.

- Comparative Flow Analysis – a design flow per person of 25gpd/person was determined for this project based on our experience in designing similar systems and the factors below:

- Water use was measured via the water system flow meter at the current camp facility in the Spring of 2018. During a ten-day period with 124 staff and campers on site, the average water use recorded at 19 gallons per day per person. It should be noted this facility has an aging water infrastructure, which may have resulted in higher calculated water use that actual use by campers and staff.

- Review of EPA Onsite Wastewater Treatment Systems Manual (February 2002) Table 3-6. Typical wastewater flow rates from recreational facilities shows typical values for camps. Typical values for "Pioneer Camps" and "Children's Camps" are 25gpd and 45gpd respectively, with the average of these two flows at 35pgd/person. The way The Mosaic Project camp is operated is in line with a pioneer camp. Table 3-10. *Comparison of flow rates and flush volumes before and after U.S. Energy Policy Act* shows a reduction of flow for water saving fixtures at approximately 50% potential reduction in water used. This is consistent with what we see across the state in residential and school settings. Accounting for a 50% reduction in design flows for modern fixtures results in a predicted average water use per person at under 20gpd.

- A conservative design flow value 25gpd/per person was used for calculations.

- Total Design Flow Determination – The total design flow determination of 3,525gpd will be used for the sizing of the septic tanks, treatment system and dispersal field. Blackwater flow reductions as a result of any proposed or future greywater use for landscape irrigation are not subtracted from the design flow except in analyzing the impacts on secondary treatment sizing.

Conceptual Wastewater Treatment System Sizing

Wastewater treatment infrastructure is governed by the wastewater generated (both flow and waste strength), the soil resource, and the type of dispersal system selected.

In this conceptual phase of the project, primary and secondary treatment of effluent is assumed. This will require, at a minimum, grease interceptor tanks, septic tanks, and secondary treatment equipment and surge/dosing tanks with pumps and controls to move wastewater evenly and consistently to dispersal zones on the site.

Secondary wastewater treatment will be accomplished with Orenco Advantex textile filtration in with AX100 pod or AXMax configuration. The determination of secondary treatment equipment will be made as part of final design of the site and infrastructure.

Secondary treatment systems are sized for both hydraulic and organic loading. For hydraulic loading, peak flow (design flow) and average flow conditions are reviewed. Average flows are assumed as 80% of the design.

Organic loading sizing must also be reviewed again at peak and average flow conditions.

With the potential use of greywater diversion, two scenarios for treatment sizing have been analyzed;

- Scenario 1 – Full blackwater flow with no greywater diversion. This scenario models when a greywater system is not present or active, primarily when regulations limit the use of greywater in high precipitation conditions.
- Scenario 2 – Reduced blackwater flow with greywater diversion. This scenario models if a greywater system is present or active, lowering the daily flow and potentially increasing the organic loading.

A summary of the conceptual treatment sizing can be found below. Supporting calculations are attached.

Table 2 – Conceptual Treatment System Sizing		
Component	**Size**	**Notes:**
Septic Tank(s)	20,000 gallons	o May be multiple tanks serving various locations
Secondary Treatment	175s.f. of filter area	o Scenario 2 Average Flow Organic Loading Governs o May be reduced with pretreatment conditioning in final design phase.
Dosing Tank	5,000 gallons	o May be reduced with pretreatment conditioning in final design phase.

Conceptual Dispersal System Approach and Sizing

The dispersal concept includes applying secondary treated effluent to pressure dosed chambered trenches in the area identified on the attach concept site plan.

Soil profiles revealed loam/clay loam and silty clay loams soils with typical profiles to Yolo loam and Danville silty clay loam. NRCS mapping predicts Yolo loam in the vicinity of the proposed project with Danville silty clay loam appearing across Cull Canyon Road. Percolation tests results show adjusted percolation rates ranging from 8 to 48 minutes per inch (average percolation rate of 33 min.in.) These results are in the ranges outline in Table 8-4 - *Soil Types & Associated Percolation Rate Guidelines* on the Manual.

The conceptual design is based on a peak design flow of 3,525gpd and a soil application rate assumption of 1.03gpd/sf and 5.0sf of infiltrative area per lineal foot. With secondary treated effluent proposed, the final design may incorporate infiltrative area in the final design. With these conservative assumptions, the total lineal footage for the original dispersal field is approximately 480 lineal feet of pressure dosed trenches.

The replacement area would be identified in two distinct locations. The primary replacement area would be located in the spacing between the proposed pressure dosed trenches. This would use the same configuration as the original dispersal system, with 480 lineal feet of pressure dosed chambers.

A backup repair alternate would be to use a drip dispersal area on the sloped areas on the property. Using 3,525 gpd design flow and an application rate of 0.4 gpd/sf, an area of approximately 9,000 sf for drip dispersal would be required.

Soil profile and percolation test results are attached.

Table 3 – Conceptual Dispersal System Sizing			
Dispersal Method	**Application Rate:**	**Size:**	**Notes:**
Pressure Dosed Chambers	1.0gpd/sf @5sf/lf	480 lf	o Conservative application rate using enhanced application rates and infiltrative surface area
Pressure Dosed Chambers	1.0gpd/sf @8sf/lf	300 lf	o Conservative application rate and infiltrative surface area increased to 8sf/sf per Chapter 27.C.3.

Drip (only for replacement option on slope)	0.4gpd/sf	9,000 sf of surface area	o Future only for replacement field

Cumulative Impact Assessment
The project was analyzed for applicability under Chapter 10 of the Manual. The project is classified as a Nonresidential with a Design Wastewater Flow of over 2,500gpd outside the Upper Alameda Creek Watershed above Niles (Impaired Area.) Based on Table 10-1 - *Projects Requiring Cumulative Impact Assessment* in the Manual Groundwater Mounding Analysis and Nitrogen Loading Analysis are required.

- Assumptions and Data Sources:
  - Climatic Data
    - Precipitation was assumed at 22 inches per year based on Alameda County Hydrology & Hydraulics Manual from the Alameda County Flood Control District https://www.cleanwaterprogram.org/images/uploads/C3TG_v6_Oct_2017_Appendix_D_Rainfall_Map.pdf
    - Evapotranspiration was not used in any calculations keeping the calculations conservative in nature.
  - Background Groundwater Quality Data.
    - Water quality data is available from the development and permitting of the public water system wells from the project owner but not used in this report. However, because this project is not located in an area identified in Chapter 10.4.C.2 of the Manual as an Area of Concern (AOC) background data is not required for nitrogen loading calculations. A background nitrate concentration in rainfall was assumed as 2.0mg/l.
  - Soil Profile Data
    - Soil Profile Sheets and percolation test results are attached.
    - NRCS Soil Data is attached
  - Wastewater Characteristics
    - Flow – Predicted design flow is calculated at 3,525gpd and an average daily flow predicted at 80% of design flow or 2,820gpd. A summary of flows is above and detailed flow calculations are attached.
    - Biochemical Oxygen Demand (BOD) - BOD is assumed as less the 300mg/l with a peak of 400mg/l from potential greywater diversion.
    - Nitrogen - Nitrogen is assumed as similar to residential strength at 70mg/l from Table 10-2.
- Groundwater Mounding Analysis – Groundwater mounding was calculated using the Hantush Method (Case 2 in the attached methodology) and Bower Method (Case 4 in the attached methodology.) Based on these calculated methods, groundwater could mound up to 17 feet and

come within 10 feet of the bottom of the proposed dispersal trenches, which is greater than the 5 feet of separation found in Case 4 of Table 5-2 - *Nitrogen Loading Analysis Minimum Average Wastewater Flow & Nitrogen Concentration Criteria* in the Manual. Table 4 is a summary of these results. Calculations are attached.

Table 4 – Summary of Mounding Analysis Results

Scenario	Calculated Localized Mound Height	Depth to Saturated Zone Below Dispersal	Notes:
Case 2 – Design Flow	5.4 ft	21.6 ft.	o Conservative with design flow occurring 365 days per year.
Case 2 – Average Flow	4.5 ft	22.5 ft.	
Case 4 – Design Flow	17.0 ft	10.0 ft.	o Conservative with design flow occurring 365 days per year.
Case 4 – Average Flow	13.6 ft	13.4 ft.	

- Nitrogen Loading Analysis
  - Nitrogen Loading was calculated using the Hantzsche-Finnemore equation and the nitrogen limits listed in Table 10-4 - *Minimum Cumulative Nitrogen Loading Criteria from Proposed OWTS* in the manual. This calculation was used to determine nitrogen removal rate from the proposed secondary treatment system. The methodology used was to set the calculated average concentration of nitrate nitrogen entering the groundwater at 7.5mg/l and solve for the percent removal from the treatment system. Table 5 is a summary of these results. Calculations are attached.
  - For conservancy, no plant uptake or soil denitrification was assumed, leaving the nitrogen removal to the proposed secondary treatment system.

Table 5 – Summary of Nitrogen Loading Results

Scenario	Nitrogen Concentration Assumed	Calculated Percent Removal Required	Notes:
Design Flow – Predicted	70 mg/l	22.0%	
Design Flow – High	105 mg/l	48.0%	1.5 x Predicted concentration
Average Flow – Predicted	70 mg/l	5.0%	
Design Flow – High	140 mg/l	52.0%	2.0 x Predicted concentration

  - Table 5 shows that less than 25% nitrogen reduction is needed from the treatment system to satisfy the requirement of 7.5 mg/l groundwater nitrate concentration. Additionally, nitrogen concentrations ranging between 1.5 and 2.0 times higher than residential strength nitrogen would require approximately 50% reduction. This is well within a standard Orenco Advantex system without additional denitrification enhancements.

Summary

Based on the project description, the proposed use, soil testing, and conceptual sizing of treatment system components and cumulative impact assessment calculations, the project can be supported by an onsite wastewater treatment and dispersal system. The system would be sized to accommodate 3,525gpd design flow (2,820gpd average daily flow), domestic strength waste (BOD less than 300mg/l), nitrogen input ranging from 70mg/l to 140 mg/l. This system components would include:

1. Septic Tank Volume totaling 20,000 gallons.
2. An Orenco AX MAX textile filter system with 175 square feet of media and associated recirculation volume providing 30 mg/l BOD and 30 mg/l TSS and 50% nitrogen removal.
3. A 6,000-gallon dosing tank with the capacity to hold 1.5 days of design flow and delivery of secondary treated effluent to a subsurface dispersal field.
4. 480 lineal Feet of 24-inch wide x 24-inch deep pressure dosed chambered dispersal trenches.

I am happy to discuss any of the assumptions, calculations, and/or proposed treatment technologies with you at your convenience.

Best regards,
NorthStar

Dominickus J. Weigel III RCE 66282
President, Senior Managing Engineer

Enclosures:

- Design Calculations
- Mounding Calculations
- Nitrogen Loading Calculations
- Wastewater Dispersal Area Exhibit
- Mounding Analysis Exhibit
- Conceptual Dispersal Field Layout Exhibit
- Soil Profile Data Sheets
- Percolation Data Sheets
- NRCS Soil Map and Soil Unit Descriptions
- Orenco Preliminary Design Review Letter
- Alameda County Flood Control District Mean Annual Precipitation Map
- Excerpts from Methodologies for Assessment of Cumulative Impacts (Mounding Methodology Hantush and Bower)
- EPA Onsite Wastewater Treatment Systems Manual (February 2002) Table 3-6. *Typical wastewater flow rates from recreational facilities shows typical values for camps.*
- EPA Onsite Wastewater Treatment Systems Manual (February 2002) Table 3-10. *Comparison of flow rates and flush volumes before and after U.S. Energy Policy Act*

Conceptual Wastewater System Design Calculations - Treatment System

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person	BOD	Peak Design Flow
Campers/Counselors	100	25 gpd	<300mg/l	2,500 gpd
Day Staff	8	25 gpd	<300mg/l	200 gpd
Family Dwelling Residence (3-Bedroom)	3	150 gpd	<300mg/l	450 gpd
Family Dwelling Residence (+ Bedrooms)	5	75 gpd	<300mg/l	375 gpd
			Total Flow	3,525 gpd
			Average Flow	2,820 gpd

Septic Tank Sizing

Septic Tank Size	Detention (Days) Minimum	5	17,625 gal

Use 20,000 Gallon Septic Tank

Recirculation Tank Volume

Recirc Tank	Detention (Days)	1	3,525 gal

Use 5,000 Gallon Recirc Tank

Secondary Treatment System (Advantex)

Design Flow		Hydraulic Loading	Square Footage Required
Peak	3,525 gpd	50 gpd/sf	71 sf
Average	2,820 gpd	25 gpd/sf	113 sf

Waste Strength			
Peak	400 mg/l	50 gpd/sf	
Average	300 mg/l	25 gpd/sf	
Cumulative Pounds of BOD5 at Design Flow	11.76	lb BOD_5/day	
Cumulative Pounds of BOD5 at Average Flow	7.06	lb BOD_5/day	
Design Flow Loading Rate	0.08	lb $BOD_{5/day/sf}$	147 sf
Average Flow Loading Rate	0.04	lb $BOD_{5/day/sf}$	176 sf

Dosing Tank Sizing

Dosing Tank	Detention (Days)	1.5	5,288 gal

Use 6,000 Gallon Dosing Tank

Conceptual Wastewater System Design Calculations - Original Dispersal Field

Dispersal Trenches With Chambers in Main Campus Area

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person		Peak Design Flow
Campers/Counselors	100	25 gpd		2,500 gpd
Day Staff	8	25 gpd		200 gpd
Family Dwelling Residence (3-Bedroom)	3	150 gpd		450 gpd
Family Dwelling Residence (+ Bedrooms)	5	75 gpd		375 gpd
			Total Flow	3,525 gpd

Minimum Dispersal Field Sizing Trenches

Required Capacity			3,525 gpd
Application Rate	Average Precolation Rate 33 min/in.		1.03 gpd/sf
Dispersal Area (Using 36" wide chambers)			5.00 sf/lf
Standard Dispersal Trench Length Required			684 lf
With Chambers	Reduction	30%	479 lf

Use 480 Lineal Feet of 36-inch wide x 24-inch deep pressure dosed chambered dispersal trenches.

Conceptual Wastewater System Design Calculations - Replacement Dispersal Field

The Mosaic Project
Alameda County CA

Drip Dispersal Located on Slopes

Wastewater Design Flow

	Number	Flow Per Person	BOD	Peak Design Flow
Campers/Counselors	100	25 gpd	<300mg/l	2,500 gpd
Day Staff	8	25 gpd	<300mg/l	200 gpd
Care Taker/Security Residence (Bed 1-3)	3	150 gpd	<300mg/l	450 gpd
Care Taker/Security Residence (Bed 4+)	5	75 gpd	<300mg/l	375 gpd
			Total Flow	3,525 gpd

Minimum Dispersal Field Sizing Trenches

Required Capacity	3,525 gpd
Application Rate	0.20 gpd/sf
Drip Square Footage Required	17,625 sf

Conceptual Wastewater System Design Calculations - Mounding Analysis

Mounding Analysis as listed in Chapter 10 OWTS Manual - Design Flow

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person		Peak Design Flow
Campers/Counselors	100	25 gpd		2,500 gpd
Day Staff	8	25 gpd		200 gpd
Care Taker/Security Residence (Bed 1-3)	3	150 gpd		450 gpd
Care Taker/Security Residence (Bed 4+)	5	75 gpd		375 gpd
			Total Flow	3,525 gpd
			Average Flow	2,820 gpd

Localized Mounding Using Case 2

Width of Absorption Field Area (Feet) W	100
Length of Absorption Field (Feet) L	200
Wastewater Flow (GPD) Qw	3,525 gpd
Wastewater Application Rate (Ft/Day) I	0.023562834
Soil Pore Space (Cu Ft/Cu Ft) V	0.3
Horizontal Hydraulic Conductivity of Soil (Ft/Day) K	2.77
Depth to Saturated Zone From Bottom of Disposal Trench (Feet) H	27
Assumed Initial Depth of Saturated Zone (Feet) hi	5
Duration of Wastewater Application (Days) t	365.00
Assumed Maximum Depth of Saturated Zone (Feet) hm	10.40
b (Feet)	7.70
Vo	71.10
alpha	0.31
beta	0.16
Value of Function from Table 1	0.19
Calculated Maximum Depth of Saturated Zone (Feet) hm (Note: This value should equal the	10.39
Calculated Maximum Height of Localized Mounding (Feet) hm-hi	5.40
Calculated Depth to Saturated Zone from Bottom of Disposal Trench (Feet) z	**21.61**

Ksat from NRCS Yolo Loam 0.57 to 2.2 in/hr. =1.14 to 4.4 Used Average for Calculations
H assumed as difference of lowest elevations of dispersal field (105 contour) - creek bed (75 contour) - assumed dispersal trench depth of 3 feet.

Conceptual Wastewater System Design Calculations - Mounding Analysis

Mounding Analysis as listed in Chapter 10 OWTS Manual - Average Flow

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person		Peak Design Flow
Campers/Counselors	100	25 gpd		2,500 gpd
Day Staff	8	25 gpd		200 gpd
Care Taker/Security Residence (Bed 1-3)	3	150 gpd		450 gpd
Care Taker/Security Residence (Bed 4+)	5	75 gpd		375 gpd
			Total Flow	3,525 gpd
			Average Flow	2,820 gpd

Localized Mounding Using Case 2

Width of Absorption Field Area (Feet) W	100
Length of Absorption Field (Feet) L	200
Wastewater Flow (GPD) Qw	2,820 gpd
Wastewater Application Rate (Ft/Day) I	0.018850267
Soil Pore Space (Cu Ft/Cu Ft) V	0.3
Horizontal Hydraulic Conductivity of Soil (Ft/Day) K	2.77
Depth to Saturated Zone From Bottom of Disposal Trench (Feet) H	27
Assumed Initial Depth of Saturated Zone (Feet) hi	5
Duration of Wastewater Application (Days) t	365.00
Assumed Maximum Depth of Saturated Zone (Feet) hm	9.45
b (Feet)	7.23
Vo	66.73
alpha	0.32
beta	0.16
Value of Function from Table 1	0.19
Calculated Maximum Depth of Saturated Zone (Feet) hm (Note: This value should equal the	9.5
Calculated Maximum Height of Localized Mounding (Feet) hm-hi	4.5
Calculated Depth to Saturated Zone from Bottom of Disposal Trench (Feet) z	**22.5**

Ksat from NRCS Yolo Loam 0.57 to 2.2 in/hr =1.14 to 4.4 Used Average for Calculations
H assumed as difference of lowest evelations of dispersal field (105 contour) - creek bed (75 contour) - assumed dispersal trench depth of 3 feet.

Conceptual Wastewater System Design Calculations - Mounding Analysis

Mounding Analysis as listed in Chapter 10 OWTS Manual - Design Flow

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person		Peak Design Flow
Campers/Counselors	100	25 gpd		2,500 gpd
Day Staff	8	25 gpd		200 gpd
Care Taker/Security Residence (Bed 1-3)	3	150 gpd		450 gpd
Care Taker/Security Residence (Bed 4+)	5	75 gpd		375 gpd
			Total Flow	3,525 gpd
			Average Flow	2,820 gpd

Localized Mounding Using Case 4

Width of Absorption Field Area (Feet) W	100
Length of Absorption Field (Feet) L	200
Wastewater Flow (GPD) Qw	3,525 gpd
Wastewater Application Rate (Ft/Day) I	0.023562834
Horizontal Hydraulic Conductivity of Soil (Ft/Day) K	2.77
Average Thickness of Saturated Zone Perpendicular to Flow (D)	20
Lateral Flow Distance from Disposal Field to Discharge Point (feet) d	200
Height of Dispersal Point Above Downslope Outlet (feet) H	27.00
Calculated Maximum Groundwater Depth Above Outlet (feet) h	17.0
Calculated Effective Separation Distance (feet) z	**10.0**

Ksat from NRCS Yolo Loam 0.57 to 2.2 in/hr =1.14 to 4.4 Used Average for Calculations
H assumed as difference of lowest elevations of dispersal field (105 contour) - creek bed (75 contour) - assumed dispersal trench depth of 3 feet.

Conceptual Wastewater System Design Calculations - Mounding Analysis

Mounding Analysis as listed in Chapter 10 OWTS Manual - Average Flow

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person		Peak Design Flow
Campers/Counselors	100	25 gpd		2,500 gpd
Day Staff	8	25 gpd		200 gpd
Care Taker/Security Residence (Bed 1-3)	3	150 gpd		450 gpd
Care Taker/Security Residence (Bed 4+)	5	75 gpd		375 gpd
			Total Flow	3,525 gpd
			Average Flow	2,820 gpd

Localized Mounding Using Case 4

Width of Absorption Field Area (Feet) W	100
Length of Absorption Field (Feet) L	200
Wastewater Flow (GPD) Qw	2,820 gpd
Wastewater Application Rate (Ft/Day) I	0.018850267
Horizontal Hydraulic Conductivity of Soil (Ft/Day) K	2.77
Average Thickness of Saturated Zone Perpendicular to Flow (D)	20
Lateral Flow Distance from Disposal Field to Discharge Point (feet) d	200
Height of Dispersal Point Above Downslope Outlet (feet) H	27.00
Calculated Maximum Groundwater Depth Above Outlet (feet) h	13.6
Calculated Effective Separation Distance (feet) z	**13.4**

Ksat from NRCS Yolo Loam 0.57 to 2.2 in/hr =1.14 to 4.4 Used Average for Calculations
H assumed as difference of lowest elevations of dispersal field (105 contour) - creek bed (75 contour) - assumed dispersal trench depth of 3 feet.

Conceptual Wastewater System Design Calculations - Nitrogen Analysis

Nitrogen Loading Mass Balance as listed in Chapter 10 OWTS Manual - Design Flow

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person	Nitrogen	Peak Design Flow
Campers/Counselors	100	25 gpd	<70mg/l	2,500 gpd
Day Staff	8	25 gpd	<70mg/l	200 gpd
Care Taker/Security Residence (Bed 1-3)	3	150 gpd	<70mg/l	450 gpd
Care Taker/Security Residence (Bed 4+)	5	75 gpd	<70mg/l	375 gpd
			Total Flow	3,525 gpd
			Average Flow	2,820 gpd

Nitrogen Loading Analysis Design Flow High

Daily Wastewater Flow (Gallons per Day) W	3,525 gpd	
Total Surface Area (Acres)	37.0 acres	
Duration of Wastewater Application (Days) t	365	
Calculated Volume of Wastewater Entering Soil (Inches per Year) I	1.28	
Total Nitrogen Concentration in Wastewater Entering System (mg/l) nw	70	
Percent of Nitrate-Nitrogen loss due to Soil Denitrification d	0	
Average Rainfall Recharge Rate (50% of Annual Rainfall Assumed) (Inches per Year) R	11	
Background Nitrate-Nitrogen[1] Concentration in Rainfall Recharge (mg/l) nb	2	
Percent Nitrogen Removal Required From Treatment System Tr	**22%**	
Calculated Average Concentration of Nitrate-Nitrogen (mg/l) nr	**7.50**	

Ref: HANTZSCHE-FINNEMORE EQUATION

Nitrogen Loading Analysis Design Flow High Concentration Assumption

Daily Wastewater Flow (Gallons per Day) W	3,525 gpd	
Total Surface Area (Acres)	37.0 acres	
Duration of Wastewater Application (Days) t	365	
Calculated Volume of Wastewater Entering Soil (Inches per Year) I	1.28	
Total Nitrogen Concentration in Wastewater Entering System (mg/l) nw	105	**1.5X of anticipated**
Percent of Nitrate-Nitrogen loss due to Soil Denitrification d	0	
Average Rainfall Recharge Rate[1] (50% of Annual Rainfall Assumed) (Inches per Year) R	11	
Background Nitrate-Nitrogen Concentration in Rainfall Recharge (mg/l) nb	2	
Percent Nitrogen Removal Required From Treatment System Tr	**48%**	
Calculated Average Concentration of Nitrate-Nitrogen (mg/l) nr	**7.50**	

Ref: HANTZSCHE-FINNEMORE EQUATION

1 From Attachment 6 of the Alameda County Hydrology & Hydraulics Manual and may be downloaded as a GIS file from the Alameda County Flood Control District website
https://www.cleanwaterprogram.org/images/uploads/C3TG_v6_Oct_2017_Appendix_D_Rainfall_Map.pdf

Castro Valley 22-24 inches (22 used)

Conceptual Wastewater System Design Calculations - Nitrogen Analysis

Nitrogen Loading Mass Balance as listed in Chapter 10 OWTS Manual - Average Flow

The Mosaic Project
Alameda County CA

Wastewater Design Flow

	Number	Flow Per Person	Nitrogen	Peak Design Flow
Campers/Counselors	100	25 gpd	<70mg/l	2,500 gpd
Day Staff	8	25 gpd	<70mg/l	200 gpd
Care Taker/Security Residence (Bed 1-3)	3	150 gpd	<70mg/l	450 gpd
Care Taker/Security Residence (Bed 4+)	5	75 gpd	<70mg/l	375 gpd
			Total Flow	3,525 gpd
			Average Flow	2,820 gpd

Nitrogen Loading Analysis Design Flow High

Daily Wastewater Flow (Gallons per Day) W	2,820 gpd	
Total Surface Area (Acres)	37.0 acres	
Duration of Wastewater Application (Days) t	365	
Calculated Volume of Wastewater Entering Soil (Inches per Year) I	1.02	
Total Nitrogen Concentration in Wastewater Entering System (mg/l) nw	70	
Percent of Nitrate-Nitrogen loss due to Soil Denitrification d	0	
Average Rainfall Recharge Rate (50% of Annual Rainfall Assumed) (Inches per Year) R	11	
Background Nitrate-Nitrogen Concentration in Rainfall Recharge (mg/l) nb	2	
Percent Nitrogen Removal Required From Treatment System Tr	**5%**	
Calculated Average Concentration of Nitrate-Nitrogen (mg/l) nr	**7.50**	

Ref: HANTZSCHE-FINNEMORE EQUATION

Nitrogen Loading Analysis Design Flow High Concentration Assumption

Daily Wastewater Flow (Gallons per Day) W	2,820 gpd	
Total Surface Area (Acres)	37.0 acres	
Duration of Wastewater Application (Days) t	365	
Calculated Volume of Wastewater Entering Soil (Inches per Year) I	1.02	
Total Nitrogen Concentration in Wastewater Entering System (mg/l) nw	140	**2X of anticipated**
Percent of Nitrate-Nitrogen loss due to Soil Denitrification d	0	
Average Rainfall Recharge Rate (50% of Annual Rainfall Assumed) (Inches per Year) R	11	
Background Nitrate-Nitrogen Concentration in Rainfall Recharge (mg/l) nb	2	
Percent Nitrogen Removal Required From Treatment System Tr	**52%**	
Calculated Average Concentration of Nitrate-Nitrogen (mg/l) nr	**7.50**	

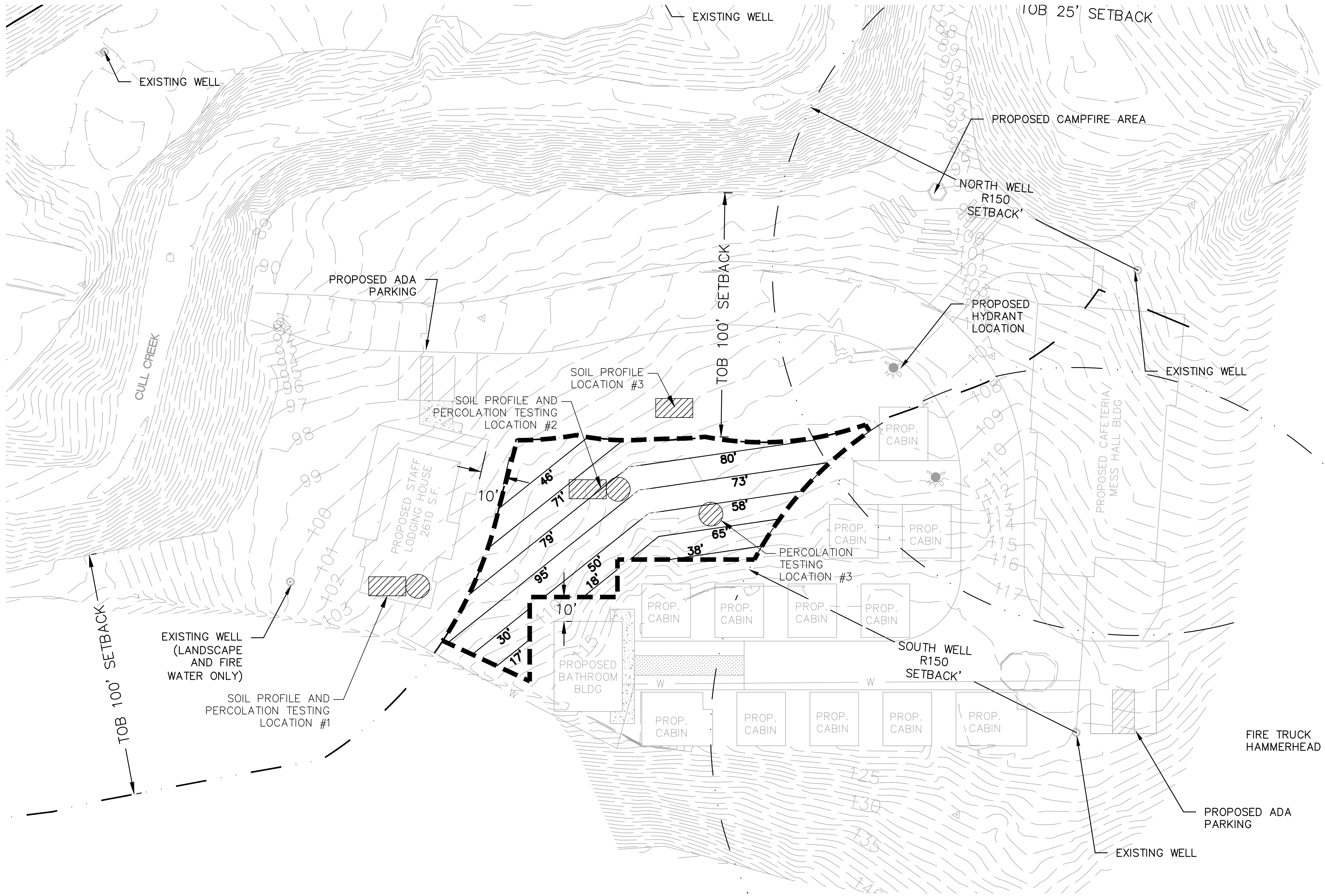
Ref: HANTZSCHE-FINNEMORE EQUATION

1 From Attachment 6 of the Alameda County Hydrology & Hydraulics Manual and may be downloaded as a GIS file from the Alameda County Flood Control District website
https://www.cleanwaterprogram.org/images/uploads/C3TG_v6_Oct_2017_Appendix_D_Rainfall_Map.pdf

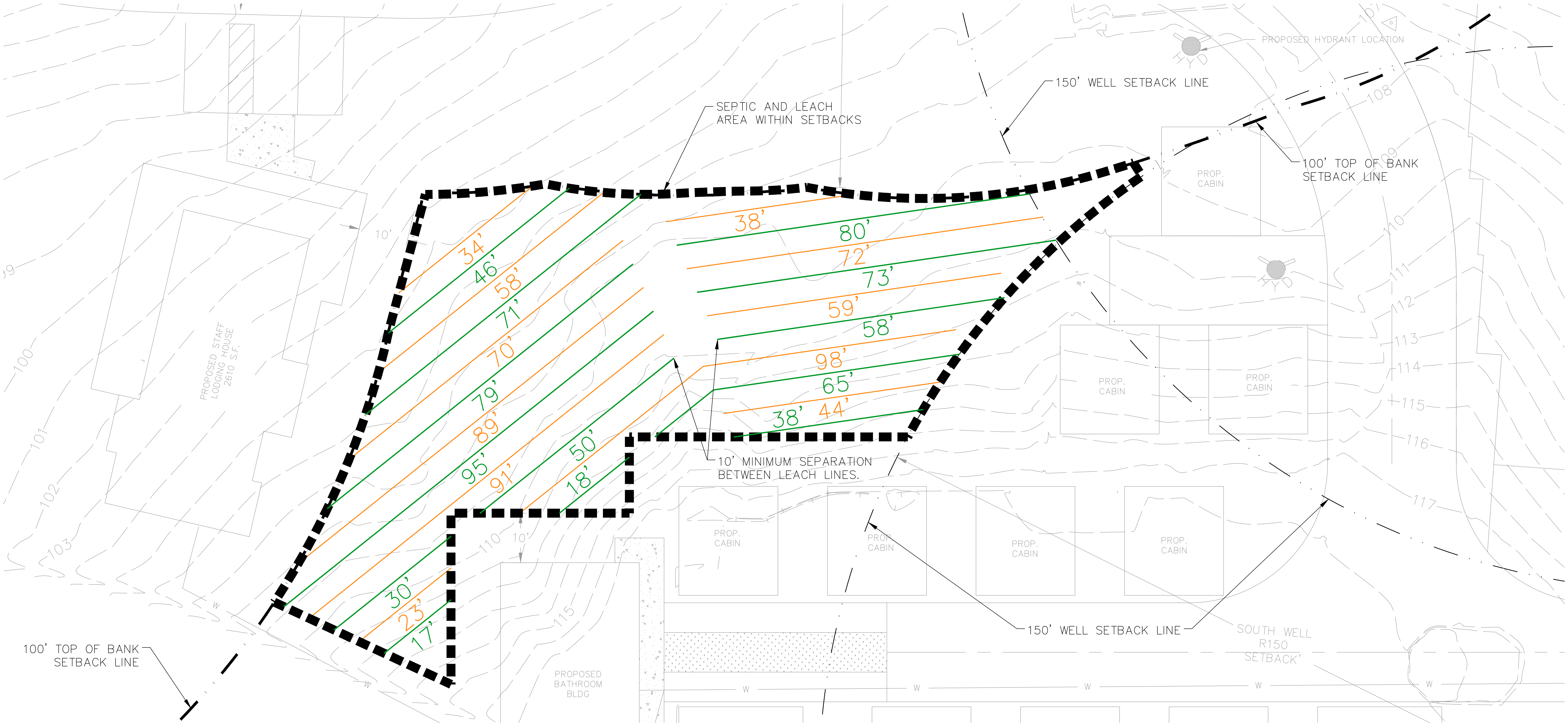
Castro Valley 22-24 inches (22 used)

LEGEND

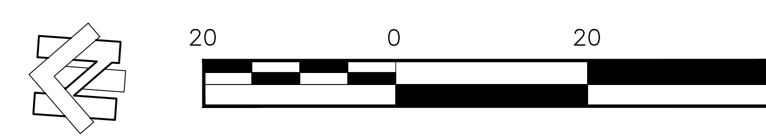
- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT
- EXISTING WELL
- SOIL PROFILE LOCATION
- PERC. TESTING LOCATION
- PERC. TEST AND SOIL PROFILE LOCATION
- 100' TOP OF BANK SETBACK
- 150' WELL SETBACK
- SEPTIC AND LEACH AREAS WITHIN SETBACKS
- PROPOSED DISPERSAL FIELD



Designed: DJW	NORTHSTAR ... Designing Solutions 111 MISSION RANCH BLVD. SUITE 100, CHICO, CA 95926 PHONE: (530) 893-1600 www.northstareng.com	THE MOSAIC PROJECT 17015 CULL CANYON CASTRO VALLEY, CALIFORNIA	WASTEWATER DISPERSAL AREA EXHIBIT
Drawn By: SEB			THE MOSAIC PROJECT
Approved:			APN Number 085-1200-001-16 · Job Number 17-231 · Scale 1"= 50' Horz. N/A Vert. · Sheet 1 Of 1
Date: 10-19-2020			



ORIGINAL FIELD – 720 LINEAL FEET
REPLACEMENT FIELD – 680 LINEAL FEET
REQUIRED LINEAL FOOTAGE – 480 LINEAL FEET



Designed:	DJW
Drawn By:	SEB
Approved:	
Date:	10-19-2020

NORTHSTAR
... Designing Solutions

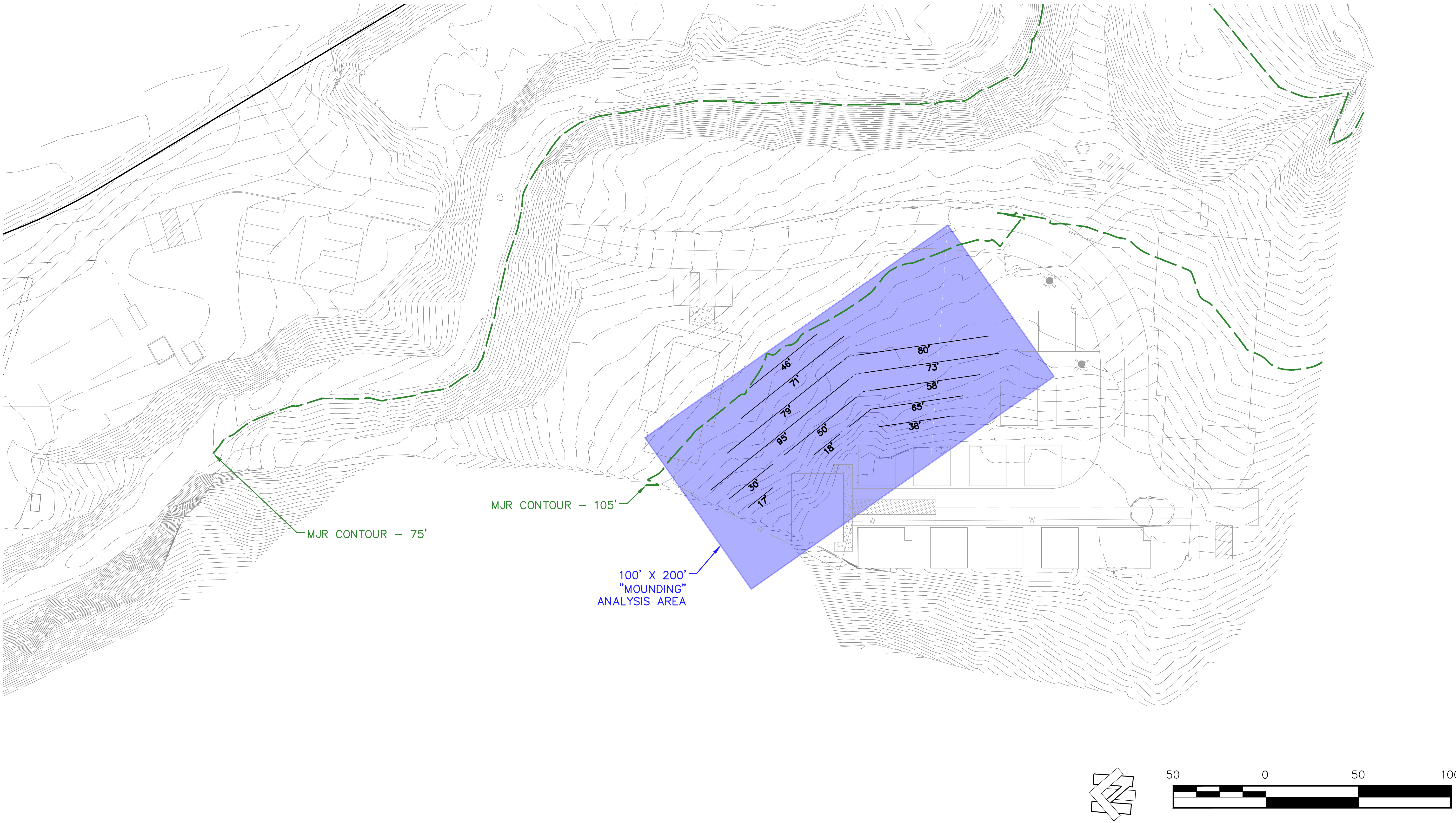
111 MISSION RANCH BLVD. SUITE 100, CHICO, CA 95926
PHONE: (530) 893-1600 www.northstareng.com

THE MOSAIC PROJECT
17015 CULL CANYON
CASTRO VALLEY, CALIFORNIA

PROPOSED DISPERSAL FIELD EXHIBIT

THE MOSAIC PROJECT

APN Number	Job Number	Scale		Sheet
085-1200-001-16	17-231	1"= 50' Horz.	N/A Vert.	Sheet 1 Of 1



Designed: DJW

Drawn By: SEB

Approved:

Date: 10-19-2020

NORTHSTAR ... Designing Solutions

111 MISSION RANCH BLVD. SUITE 100, CHICO, CA 95926

PHONE: (530) 893-1600 www.northstareng.com

THE MOSAIC PROJECT

17015 CULL CANYON

CASTRO VALLEY, CALIFORNIA

MOUNDING ANALYSIS EXHIBIT

THE MOSAIC PROJECT

APN Number	Job Number	Scale		Sheet
085-1200-001-16	17-231	1"= 50' Horz.	N/A Vert.	Sheet 1 Of 1

Property Owner: THE MOSAIC PROJECT Location: 17015 Mill Canyon Rd Job #: 17-231
AP#: 85-1200-1-16 Date: 10/9/2020 Weather/Lighting/Temp: OVERCAST 65

Test Pit #: #1

Horizon Depth: 0 – 24"
Color Chip: 7.5 YR 3/2
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: LOAM
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar blocky (angular/subanglar) granular single grain sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots

Redoximorphic Characteristics yes no
Redox concen: ___nodules ___concretions ___masses ___Pore linings
Redox depletions: iron/clay Depth to: obs/ind water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments: WELL PUMP TEST WATER DISCHARGE IN AREA

Test Pit #: #1

Horizon Depth: 72" – 84"
Color Chip: 2.5 YR 2/3/2
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: Silty clay loam
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar blocky (angular/subanglar) granular single grain sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots

Redoximorphic Characteristics yes no Possible
Redox concen: X nodules ___concretions ___masses ___Pore linings
Redox depletions: iron/clay Depth to: obs/ind water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #:

Horizon Depth: 24" – 72"
Color Chip: 2.5 YR 3/2
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: Silty clay loam
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar blocky (angular/subanglar) granular single grain sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots

Redoximorphic Characteristics yes no
Redox concen: ___nodules ___concretions ___masses ___Pore linings
Redox depletions: iron/clay Depth to: obs/ind water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #:

Horizon Depth: #1 84" – 121"
Color Chip:
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: Silty clay loam
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar blocky (angular/subanglar) granular single grain sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots

Redoximorphic Characteristics yes no Possible
Redox concen: X nodules ___concretions ___masses ___Pore linings
Redox depletions: iron/clay Depth to: obs/ind water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Property Owner: THE MOSAIC PROJECT Location: 17015 Cull Canyon Rd Job #: 17-231
AP#: 85-1200-1-16 Date: 10/9/2020 Weather/Lighting/Temp: OVERCAST / 65

Test Pit #: #1

Horizon Depth: 0-48"
Color Chip: 7.5 YR 3/3
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: CLAY LOAM
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in
Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots @48"+
Redoximorphic Characteristics yes no Possible localized
Redox concen: X nodules ____concretions ____masses ____Pore linings
Redox depletions: iron/clay Depth to: obs/ind ____ water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #: #2

Horizon Depth: 48"-111"
Color Chip: 7.5 YR 3/2
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: Silty clay loam
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in
Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots
Redoximorphic Characteristics yes no Possible localized
Redox concen: X nodules ____concretions ____masses ____Pore linings
Redox depletions: iron/clay Depth to: obs/ind ____ water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #: 2

Horizon Depth:
Color Chip:
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture:
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in
Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots
Redoximorphic Characteristics yes no
Redox concen: ____nodules ____concretions ____masses ____Pore linings
Redox depletions: iron/clay Depth to: obs/ind ____ water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #: 2

Horizon Depth:
Color Chip:
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture:
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary: abrupt <1 in clear 1-2.5 in gradual 2.5-5 in diffuse >5 in
Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots
Redoximorphic Characteristics yes no
Redox concen: ____nodules ____concretions ____masses ____Pore linings
Redox depletions: iron/clay Depth to: obs/ind ____ water
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Property Owner: THE MOSAIC PROJECT Location: 17015 Cull Canyon Rd Job #: 17-231
AP#: 85-1290-1-16 Date: 10/9/2020 Weather/Lighting/Temp: Overcast 65

Test Pit #: 3

Horizon Depth: 0-18"
Color Chip: 7.5YR 3/2
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: Loam
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary:	abrupt <1 in	clear 1-2.5 in	gradual 2.5-5 in	diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots
Redoximorphic Characteristics yes no
Redox concen: ____nodules____concretions____masses____Pore linings
Redox depletions: iron/clay Depth to: obs/ind ____ water ____
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #: 3

Horizon Depth: #3 24"-86"
Color Chip: 2.5YR 3/2
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: Silty clay loam
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary:	abrupt <1 in	clear 1-2.5 in	gradual 2.5-5 in	diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots
Redoximorphic Characteristics yes no Possible
Redox concen: X nodules____concretions____masses____Pore linings
Redox depletions: ~~iron/clay~~ Depth to: obs/ind 76" water —
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #: 3

Horizon Depth: 18"-24"
Color Chip: 7.5YR 3/2
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture: Silty clay loam
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
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Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary:	abrupt <1 in	clear 1-2.5 in	gradual 2.5-5 in	diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots
Redoximorphic Characteristics ? yes no
Redox concen: ____nodules____concretions____masses____Pore linings
Redox depletions: iron/clay Depth to: obs/ind ____ water ____
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Test Pit #:

Horizon Depth:
Color Chip:
Rock: 0-15% 15-35% 35-50% 50%-75% %
Texture:
Structure:
Grade: structureless weak moderate strong
Shape: platy prismatic columnar
blocky (angular/subanglar) granular single grain
sandy texture massive
Sand Size: very fine fine medium coarse very coarse
Consistence:
Dry: loose soft slight-hard hard very-hard Ex-hard
Moist: loose V-friable friable firm V-firm Ex-firm
Sticky: not s slight s s very s
Plasticity: not p slight p p very p

Roots:	very fine 1mm	fine 1-2mm	medium 2-5mm	coarse 5-10mm
Few:	<10	<10	<1	<1
Common:	10-100	10-100	1-10	1-5
Many:	>100	>100	>10	>5

Pores:	very fine .1-.5mm	fine .5-2mm	medium 2-5mm	coarse 5-10mm
Few:	<25	<10	<1	<1
Common:	25-200	10-50	1-5	1-5
Many:	>200	>50	>5	>25

Boundary:	abrupt <1 in	clear 1-2.5 in	gradual 2.5-5 in	diffuse >5 in

Mottles: yes no
Size: fine <5mm medium 5-15mm large >15mm
Quantity: few 2% common 2-20% many <20%
Contrast: faint distinct prominent
Shape: streaks bands spots
Redoximorphic Characteristics yes no
Redox concen: ____nodules____concretions____masses____Pore linings
Redox depletions: iron/clay Depth to: obs/ind ____ water ____
Soil Water: Dry Moist Sat. Groundwater/Seepage: Yes No
Comments:

Project Name: The Mosaic Project

PERCOLATION TEST NO. 1

SITE DATA

Hole Diameter: 6 " Hole Depth Below Ground Surface: ____ " Pipe Diameter: 4 "

Soil Description: Color: ________ Texture:

Cover: dry grass

Test Method: Standard: ____ Standpipe: X

Location: APN: 85-1200-1-16 Address: 17015 Cull Canyon Road

PRESOAKING DATA

Date: 10/7/2020 Test Performed By: DJW3

Start Time	Record Time	Depth of Water Level Remaining	Depth of Water Level After Filling	Remarks
11:30	11:45	0 "	12 "	
11:45	12:13	0 "	12 "	
12:13	12:38	0 "	12 "	
12:38	1:03	0 "	12 "	
1:03	1:25	5 "	12 "	
1:25	2:11	5 "	12 "	
2:11	2:34	1 "	7 "	
2:34	2:49	5 "	5 "	
2:49	2:59	3.5 "	- "	
		"	"	

PERCOLATION DATA

Date: 10/8/2020 Depth of Presoak Remaining: 0 "

Start Time	Record Time	Depth of Water Level Remaining	Depth of Water Level After Filling	Time Measured	Inches of Drop	Minutes Per Inch	Remarks
		----------	"	------	------	------	
11:38	12:08	0 "	6 "	30	6	5.00	
12:08	12:38	0 "	6 "	30	6	5.00	
12:38	13:08	0 "	6 "	30	6	5.00	
13:08	13:38	0 "	6 "	30	6	5.00	
		"	"				
		"					
				Average:	5.00	Min/Inch	

Interval: 30.0 minutes Drop: 6.0 inch Rate: 5.0 min/inch

Standpipe Method Multiplier: 1.6 **Adjusted Percolation Rate: 8 min/inch**

Signed: ________________ R.C.E. No. C66282

Client: Town of Paradise Job No. 9228

Project Name: The Mosaic Project

PERCOLATION TEST NO. 2

SITE DATA

Hole Diameter: 6 " Hole Depth Below Ground Surface: ____ " Pipe Diameter: 4 "

Soil Description: Color: ________ Texture:

Cover: dry grass

Test Method: Standard: ____ Standpipe: X

Location: APN: 85-1200-1-16 Address: 17015 Cull Canyon Road

PRESOAKING DATA

Date: 10/7/2020 Test Performed By: DJW3

Start Time	Record Time	Depth of Water Level Remaining	Depth of Water Level After Filling	Remarks
11:32	11:45	0 "	12 "	
11:45	12:04	8 "	12 "	
12:04	12:34	11 "	12 "	
12:34	1:04	10.5 "	12 "	
1:04	1:36	11 "	11 "	
1:36	2:19	11 "	10 "	
2:19	2:49	11 "	9 "	
		"	"	

PERCOLATION DATA

Date: 10/8/2020 Depth of Presoak Remaining: 0 "

Start Time	Record Time	Depth of Water Level Remaining	Depth of Water Level After Filling	Time Measured	Inches of Drop	Minutes Per Inch	Remarks
		----------	"	------	------	------	
11:26	12:06	4.625 "	6 "	30	1.375	21.82	
12:06	12:36	4.75 "	6 "	30	1.250	24.00	
12:36	1:06	4.875 "	6 "	30	1.125	26.67	
1:06	1:36	4.875 "	6 "	30	1.125	26.67	
		"	"				
		"					
				Average:	24.79	Min/Inch	

Interval: 30.0 minutes Drop: 1.125 inch Rate: 26.67 min/inch

Standpipe Method Multiplier: 1.6 **Adjusted Percolation Rate: 43 min/inch**

Signed: ____________________ R.C.E. No. C66282

Client: Town of Paradise Job No. 9228

Project Name: The Mosaic Project

PERCOLATION TEST NO. 3

SITE DATA

Hole Diameter: 6 " Hole Depth Below Ground Surface: ____ " Pipe Diameter: 4 "

Soil Description: Color: ________ Texture:

Cover: dry grass

Test Method: Standard: ____ Standpipe: X

Location: APN: 85-1200-1-16 Address: 17015 Cull Canyon Road

PRESOAKING DATA

Date: 10/7/2020 Test Performed By: DJW3

Start Time	Record Time	Depth of Water Level Remaining	Depth of Water Level After Filling	Remarks
11:33	12:10	7 "	12 "	
12:10	12:35	10.5 "	12 "	
12:35	12:35	11 "	12 "	
12:35	1:07	11 "	12 "	
1:07	1:40	10.5 "	12 "	
1:40	2:20	10.5 "	12 "	
2:20	2:53	10.35 "	12 "	
		"	"	

PERCOLATION DATA

Date: 10/8/2020 Depth of Presoak Remaining: 0 "

Start Time	Record Time	Depth of Water Level Remaining	Depth of Water Level After Filling	Time Measured	Inches of Drop	Minutes Per Inch	Remarks
		----------	"	------	------	------	
11:31	12:01	4.313 "	6 "	30	1.687	17.78	
12:01	12:31	4.8125 "	6 "	30	1.188	25.26	
12:31	13:01	5 "	6 "	30	1.000	30.00	
13:01	13:31	5 "	6 "	30	1.000	30.00	
		"	"				
		"					
				Average:	25.76	Min/Inch	

Interval: 30.0 minutes Drop: 1.000 inch Rate: 30.00 min/inch

Standpipe Method Multiplier: 1.6 **Adjusted Percolation Rate: 48 min/inch**

Signed: ____________________ R.C.E. No. C66282

Client: Town of Paradise Job No. 9228

Soil Map—Alameda Area, California
(The Mosaic Project)

Map Scale: 1:3,010 if printed on B landscape (17" x 11") sheet.

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

N

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 14, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 31, 2019—Jun 6, 2019

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
DaB	Danville silty clay loam, 3 to 10 percent slopes	8.8	13.0%
HnF2	Henneke rocky loam, eroded	5.2	7.7%
LpF2	Los Gatos-Los Osos complex, 30 to 75 percent slopes, eroded, MLRA 15	31.5	46.6%
LtD	Los Osos silty clay loam, 7 to 30 percent slopes	0.4	0.7%
LtE2	Los Osos silty clay loam, 30 to 45 percent slopes, eroded	2.4	3.5%
LtF2	Los Osos silty clay loam, 45 to 75 percent slopes, eroded	14.6	21.5%
YmB	Yolo loam, 0 to 8 percent slopes, MLRA 15	4.8	7.0%
Totals for Area of Interest		**67.6**	**100.0%**

Alameda Area, California

YmB—Yolo loam, 0 to 8 percent slopes, MLRA 15

Map Unit Setting

National map unit symbol: 2w89h
Elevation: 70 to 2,530 feet
Mean annual precipitation: 16 to 29 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 260 to 360 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Yolo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yolo

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from metamorphic and sedimentary rock

Typical profile

Ap - 0 to 8 inches: loam
A - 8 to 16 inches: loam
C1 - 16 to 24 inches: very fine sandy loam
C2 - 24 to 46 inches: fine sandy loam
C3 - 46 to 60 inches: loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline (0.3 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Unnamed
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Livermore
Percent of map unit: 5 percent
Hydric soil rating: No

Sycamore
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 11, Sep 13, 2017

Alameda Area, California

DaB—Danville silty clay loam, 3 to 10 percent slopes

Map Unit Setting

National map unit symbol: hb35
Elevation: 100 to 2,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 360 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Danville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Danville

Setting

Landform: Fan terraces, fans
Landform position (two-dimensional): Footslope
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 21 inches: silty clay loam
H2 - 21 to 53 inches: silty clay
H3 - 53 to 80 inches: clay loam

Properties and qualities

Slope: 3 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Los osos

Percent of map unit: 10 percent
Hydric soil rating: No

Los gatos

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 14, May 29, 2020

Changing the Way the World Does Wastewater®

10/05/2020

Nick Weigel
Northstar Engineering
111 Mission Ranch Blvd
Suite 100
Chico, CA 95926

Subject: Preliminary Design Review of the Mosaic Project

Mr. Weigel,

Orenco Systems, Inc. ("Orenco") has received the Plans and other documents that comprise the Preliminary Design for the Mosaic Project. Orenco staff reviews the Final Design of all wastewater collection and treatment systems for commercial applications to ensure that the design is compliant with the most current version of the system's applicable design criteria published by Orenco for the specified parameters provided by the system's designer in the Plans. The findings and conclusions of my review of this Preliminary Design are as follows:

Design Basis

The system has been designed for a Campground application. Influent flow and constituent concentrations and effluent constituent concentration requirements have been provided by the system's designer on the Plans and were used in my review of the Preliminary Design.

The influent flow on the Plans were not extrapolated from the metered flows from the subject site, but in our experience, they are consistent with influent flows from other, similar Campground systems that Orenco has previously observed. As such, I have no reason to doubt the accuracy of the designer's findings and assumptions as to the influent flow, and find that it was reasonable for the designer to use them as the design basis for the system.

System Design

The proposed Preliminary Design of the system consists of sewage from a central meeting & dining hall, a restroom shower building, and family dwelling going to 20,000 gallons of septic tankage for primary treatment. Effluent flows to a one AdvanTex AX-Max175-28 for secondary treatment. Treated effluent flows to 5,000-gallon dosing tank where it is pumped to a pressurized drainfield for final disposal.

Design Criteria

The applicable design criteria for this system, which I used to conduct the review of its Preliminary Design, is revision 7.0 of document NDA-ATX-1, titled *Orenco® AdvanTex® Design Criteria, Commercial Treatment Systems*, which was published by Orenco in May, 2019. A copy of the design criteria can be downloaded from Orenco's online document library at www.orenco.com/corporate/doclibrary.cfm.

Findings

The findings of my review as to whether the Preliminary Design complies with Orenco's design criteria for treating wastewater to the effluent constituent concentration requirements are as follows:

Primary Treatment

Orenco always recommends the use of a pre-anoxic return tank and requires them on all projects that require significant nitrogen reduction. This pre-anoxic tank should be sized equal to one day at maximum day design flow and is considered part of the overall primary tank volume.

The Preliminary Design specifies the use of 20,000 gallons of septic tankage for primary treatment. Using the flow data specified on the Plans the hydraulic retention times for primary treatment calculate as follows:

Primary Tank(s) Hydraulic Retention Time (HRT)[1]				
Design Average Flow (gpd)	Design Maximum Day Flow (gpd)	Effective Combined Primary Tankage (gpd)	Avg HRT (days)	Max Day HRT (days)
2820	3525	20000	7.1	5.7

[1] Design Max Day Flow is the maximum daily flow a facility is expected to receive no more than one day within any week's time.

According to the Primary Tank Sizing Recommendations in the applicable design criteria, Campground treatment systems are recommended to have a minimum of 3 days of hydraulic retention time at the Design Max Day Flow. Therefore, the specification of the septic tanks in the Preliminary Design satisfies Orenco's design criteria.

Recirculation Tank — Standard Stage

The Preliminary Design further specifies the use of an AX-Max Treatment System for recirculation and blending of the AdvanTex-treated effluent with primary tank effluent. The recirculation volume in the AX-Max System satisfies the requirement for recirculation tank volume.

Hydraulic Load — Standard Stage

The Preliminary Design specifies the use of one AX-Max175-28, which contains a nominal surface area of 175 square feet of treatment media. Using the flow data specified on the Plans the hydraulic loading rate for the system calculates as follows:

Hydraulic Loading Rate (HLR) — Standard Stage				
Design Average Flow (gpd)	Design Maximum Day Flow (gpd)	Nominal Textile Area (sq. ft.)	Average HLR (gal. per day/sq. ft.)	Peak HLR (gal. per day/sq. ft.)
2820	3525	175	16	20

According to the AdvanTex System Loading Chart in the applicable design criteria, the standard AdvanTex treatment system (Stage 1) should not be hydraulically loaded more than 25 gpd/square foot at Design Average Flow or 50 gpd/square foot at Design Max Day Flow. Therefore, the specified type and number of AdvanTex units in the Preliminary Design satisfy Orenco's design criteria to achieve the effluent quality listed in the design criteria at a 95% confidence level for this Campground application.

Organic Load — Standard Stage

The following influent characteristics were estimated and not derived from direct sampling. Even though the influent characteristics were not derived from direct sampling, the values assumed are consistent with values we have seen in other, similar Campground applications.

Influent (Primary Tank Effluent) Characteristics — Loading to Textile		
Average BOD_5 (mg/L)	Average TSS (mg/L)	Max FOG (mg/L)
300	150	25

Based on the average influent biochemical oxygen demand (BOD_5) concentration and flow data specified on the Plans, the system will receive approximately 7.1 pounds of BOD_5 per day at Design Average Flow, and 8.8 pounds of BOD_5 per day at Maximum Day Design Flow. Using this information, the organic loading rate of the system calculates as:

Organic Loading Rate (OLR) — Standard Stage				
Average Organic Load (lbs/day)	Maximum Organic Load (lbs/day)	Nominal Treatment Area (sq. ft.)	Average OLR (lbs BOD/sq. ft./day)	Maximum OLR (lbs BOD/sq. ft./day)
7.1	8.8	175	0.04	0.05

According to the Organic Load Requirements in the applicable design criteria, an AdvanTex Treatment System should not be organically loaded more than 0.04 pounds BOD_5/square foot at Design Average Flow or 0.08 pounds BOD_5/square foot at Design Peak Flow. Therefore, the specified type and number of AdvanTex units in the preliminary design satisfy Orenco's design criteria to achieve the effluent quality listed in the design criteria at a 95% confidence level for this Campground application.

Nitrogen Reduction — Standard Stage

According to the Nitrogen Reduction Standards in the applicable design criteria, the standard configuration of a single-stage AdvanTex Treatment System will typically achieve 60% reduction of Total Nitrogen, depending on wastewater strength and other characteristics such as BOD_5, grease and oils, pH, and alkalinity concentrations, primary treatment hydraulic retention time, or temperature.

Based on the average influent Total Kjeldahl Nitrogen (mg/L) concentrations and other influent constituent concentrations and flow data specified on the Plans the nitrogen loading for the standard stage calculates as follows:

Total Nitrogen Loading Rate — Standard Stage		
Total Kjeldahl Nitrogen (mg/L)	Average Nitrogen Load (lbs/day)	Total Nitrogen Loading Rate (lbs/day/square foot)
70	1.6	0.009

The standard stage loading is 0.014 pounds per day/square foot based on Design Average Flow. Therefore, the specified type and number of AdvanTex units in the final design satisfy Orenco's design criteria to achieve the effluent quality listed in the design criteria at a 95% confidence level for this shopping center application.

Conclusions

I have reviewed the Preliminary Design of the Mosaic Project wastewater treatment system, and have found that the design is compliant with the most current version of the system's applicable design criteria published by Orenco for the specified parameters provided by the system's designer in the Plans. In addition, I noted no anomalies in the site layout or configuration of the system during my review.

Compliance Table — Meets Minimum Design Standards	
	Standard Stage
Recirc Tank Size	Yes
Hydraulic Load	Yes
Organic Load	Yes
Nitrogen Load	Yes

As such, the system as designed satisfactorily complies with Orenco's design criteria to meet the following effluent limits at a 95% confidence level, provided that all influent flows and constituent concentrations specified in the Plans are not exceeded:

Expected Effluent Quality	
Constituent	**Average (mg/L)**
BOD_5	<30
TSS	<30
TN	>50% reduction

It is important to note that even though the AdvanTex Treatment System has the capability to meet or exceed the required treatment parameters, there is no way that Orenco can guarantee that a particular system will be operated or maintained in a manner consistent with the Preliminary Design reviewed. Once the facility is placed into operation, the influent flows and constituent concentrations to the facility should be monitored, and if flow or any of the influent constituent concentrations exceed those listed in the Plans, measures should be taken to reduce the flow or constituent concentration to those listed. However, if additional treatment capacity becomes necessary, the system is designed to have the capability to expand to account for the new flow or constituent concentration.

Proper air ventilation is a critical feature of all commercial AdvanTex Treatment Systems, and as such, adequate active ventilation is required for all systems. In addition, please note that disposing of toxics or chemicals into the system is strictly prohibited. Examples of toxics include restaurant degreasers, cleansers, wax strippers for linoleum, carpet shampoo, waste products, or any other toxins. Furthermore, water softener brine discharge is prohibited from being discharged into the AdvanTex Treatment System. Failure to adhere to these policies will void Orenco's limited product warranties.

If you have any questions about my review process, findings, or conclusions, please feel free to call or e-mail me.

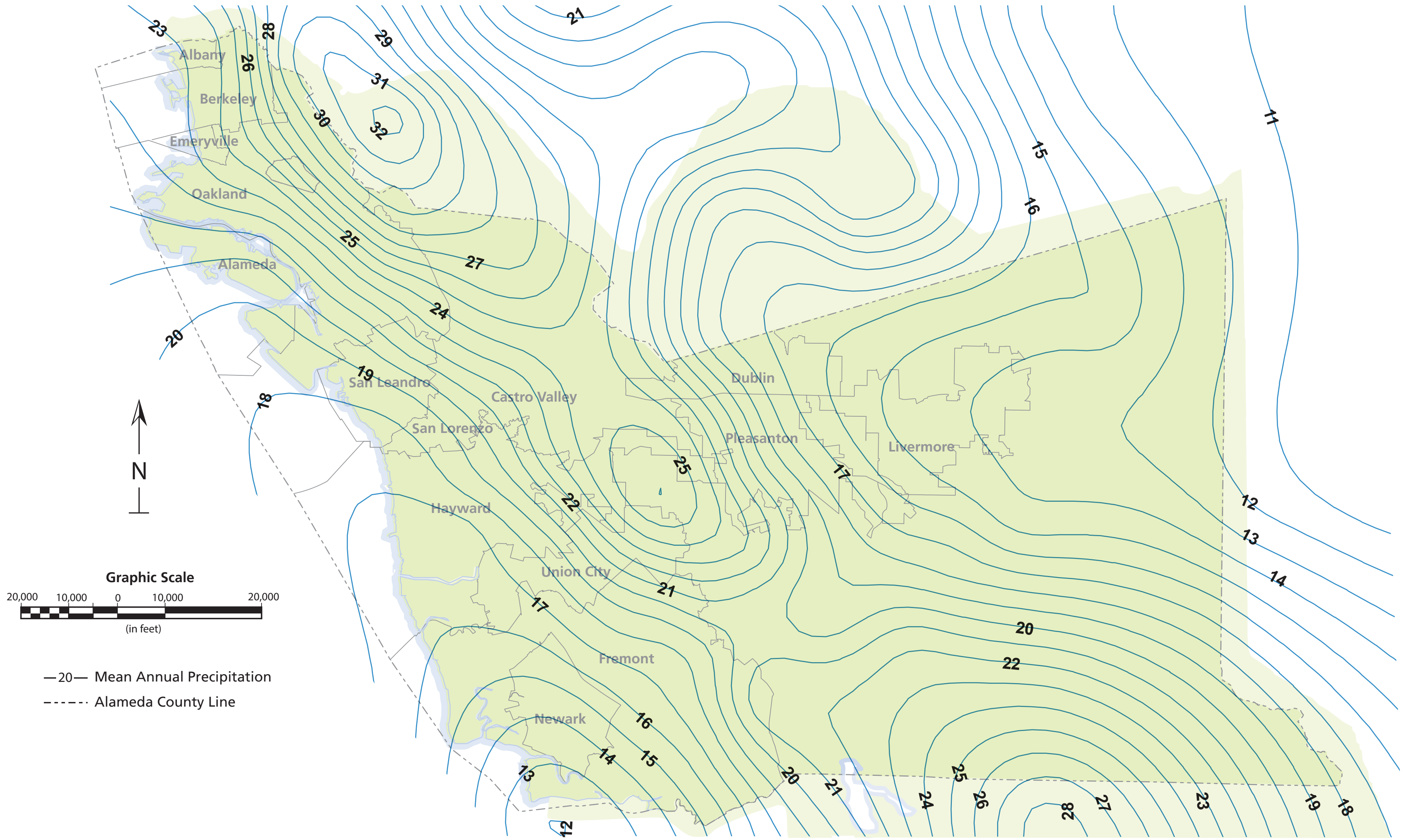
Sincerely,

Keith Fortenbach
Systems Engineering
Orenco Systems Inc.
(800) 348-9843 ext. 412
kfortenbach@orenco.com

Appendix

D

Mean Annual Precipitation Map: Alameda County



This map is Attachment 6 of the Alameda County Hydrology & Hydraulics Manual and may be downloaded as a GIS file from the Alameda County Flood Control District website.

(District 2011)

Alameda County Flood Control & Water Conservation District

Mean Annual Precipitation

North Coast RWQCB

SECTION III

METHODOLOGIES FOR ASSESSMENT OF CUMULATIVE IMPACTS

Standard siting and design criteria for on-site sewage disposal systems are mainly for the purpose of protecting water supplies and public health from the standpoint of bacterial contamination and disease transmission. The primary objective is to assure that inadequately treated sewage effluent does not discharge to the surface of the ground or enter useable groundwaters. Individual septic tank/soil absorption systems are generally evaluated independently of one another. The effects of many systems in a concentrated area are not directly taken into account. The purpose of this section is to propose various procedures and criteria that can be utilized to examine the potential cumulative impacts of on-site sewage disposal practices.

The methodologies presented in this section are aimed at providing simplified, yet technically sound, assessment tools for use by the Regional Board and local health and planning officials in their review of land use plans and specific development proposals. While the results of these analyses may influence the siting or design of systems for individual residences, it is not anticipated that they would be exercised by local health departments in the routine review and permitting of sewage disposal systems for single family dwellings. The main usefulness is likely to be in reviewing and setting standards for major subdivisions, large common on-site systems, and zoning and land use plans.

The presentation is divided into several sections addressing the following cumulative impact issues:

- *Groundwater Hydraulics;*
- *Salt Accumulation in Groundwater;*
- *Nitrate Accumulation in Groundwater;*
- *Nutrient Additions to Surface Waters;*
- *Bacteriological-Public Health Impacts.*

The main focus of the assessment methodologies is on the projection of areawide water quality and public health effects, which is the overall objective of this study. Where appropriate, additional techniques for examining localized impacts are presented as an indication of more site-specific analyses that may be required in certain instances.

It should be recognized further that the procedures and criteria presented here are of a general nature. They do not attempt to cover the many special considerations relative to hydrology, geology, water quality, etc., that may need to be addressed in follow-up detailed studies of individual impact areas. The methodologies are offered as initial guidelines, with the expectation that alternative analytical approaches and refinements may evolve as additional experience is gained. At this time, they may be most useful in establishing an orderly review process and reducing the need for individual and repititious research with each new development proposal or land use decision.

GROUNDWATER HYDRAULICS

Problem Overview

The introduction of wastewater into the soil by means of on-site systems has a surcharging effect on the groundwater system which is not necessarily addressed by standard siting and design criteria. The occurrence of long-term groundwater hydraulic problems in any particular instance depends upon the ability of the soil and groundwater system to accept and disperse the added wastewater loading. The specific areawide and localized concerns are briefly as follows:

(1) The potential areawide problem is that of an overall rise in groundwater levels in a particular area due to the hydraulic loading from large numbers of systems. A general rise of the water table occurring over all or portions of a development area would effectively reduce the amount of unsaturated soil available for wastewater renovation.

(2) The potential localized problem is that of hydraulic mounding immediately beneath the disposal field. The rise of the groundwater table in response to wastewater loading will reduce the effective "depth to groundwater" and likewise the filtering potential of the soil. In the extreme case, mounding of groundwater may reach as high as the leaching trenches, (a) resulting in direct introduction of sewage effluent into groundwater, and (b) promoting anaerobic soil conditions, clogging of infiltrative surfaces and premature system failure.

An additional consideration in regard to groundwater hydraulics is the relative proportion of wastewater loading in comparison with normal background amounts of rainfall percolation (recharge) in the project area. As will be discussed later, this determines the effective initial dilution ratio, and, in the case of conservative substances, controls the quality of combined wastewater-rainfall percolate eventually reaching groundwaters.

In developing workable assessment approaches to these problems it must be recognized that the soil and groundwater conditions at any particular site will be extremely complex and differ markedly from one site to the next. A highly accurate scientific analysis cannot be made for each site without investing significant time and money, and even then all uncertainties will not necessarily be eliminated. The approaches outlined here are aimed at defining general types of conditions likely to be encountered, and providing simplifying assumptions and analytical tools to make reliable assessments needed for regulatory, planning and design decisions.

Areawide Groundwater Effects

Evaluation of potential areawide influences on groundwater from on-site systems should focus on the water balance and comparison of wastewater additions with natural inputs to the groundwater system. Figure 1 provides a schematic summary of the steps and typical computations involved. Discussion of the various elements and the key assumptions and data needs is provided below.

Step 1: Rainfall-Runoff

The first step in evaluating the water balance is determining rainfall and runoff amounts for the project area. Average yearly rainfall should be estimated from long-term weather data. Various methods are available to estimate runoff amounts. A convenient and reliable method is that developed and used widely by the USDA Soil Conservation Service (U.S. SCS, 1964). The method involves (1) assigning "curve numbers" for the wateshed area according to type of hydrologic soil-cover complex, and then (2) computing total runoff amounts for individual storms using established rainfall-runoff plots.

In assessing impacts from on-site systems, the main interest is in determining yearly or seasonal rainfall-runoff amounts. This may be done by computing and summing runoff from actual or statistical series of storm events over the period of a year. The resulting runoff computation

Figure 1

Areawide Groundwater Hydraulics Analysis

Data Needs	Analytical Steps	Key Assumptions/ Techniques
• Ave. Ann PPT • Typical Storm Frequencies • Soils/Vegetation • Impervious Area • Development Density	(1) Rainfall-Runoff (P) (R)	• SCS Curve Number Analysis for Total Runoff
• Computed Actual ET (U.S. Weather Bureau) or • Temperature and Latitude	(2) Evapotranspiration (ET)	• Thornthwaite/Mather Technique
	(3) Deep Percolation (DP) DP = (D)(1-R)(ET)	DP = (D)(1-R) -(ET)
• # of Dwelling Units (D.U.)	(4) Wastewater Loading (WL) WL = (DU)(150)	• 50 gpcd • 3 persons/D.U.
• Total Acreage (A)	(5) Areal Distribution of Wasteload W = (WL / A)(.0134)	• Uniform Distribution of Wastewater over Study Area • in/yr = (.0134)(gpd/ac)
	(6) Relative Change in Hydraulic Loading % = (W / DP)(100)	
• Specific Yield (V) of Soils/Aquifer	(7) Groundwater Rise (H) H = W / V	• Month-to-Month Analysis of Wasteload • 50% Drainage of Aquifer Recharge per Month

can be compared to total rainfall to estimate the runoff percentage.

Step 2: Evapotranspiration

Losses due to plant uptake and evaporation can be estimated on the basis of "actual evapotranspiration" (ET). This is defined as the "computed amount of water loss under existing conditions of temperature and precipitation" (Elford and McDonough, 1963). Computations may be made following the water balance techniques developed by Thornthwaite & Mather (1957). Actual ET values have been computed by the U.S. Weather Bureau for a number of locations in the North Coast Region (Elford and McDonough, 1963-1966). For typical computations it is assumed that the soil in the root zone is capable of storing 4 inches of plant-available moisture. Available moisture (i.e., rainfall) in excess of this is assumed to runoff or percolate to underlying soils and groundwater, beyond the reach of plant roots. It is also assumed that plants use stored moisture at the full, or "potential" rate until all stored moisture has been used.

For purposes of cumulative impact assessment, actual ET values may be estimated from existing U.S. Weather Bureau computations or developed individually for specific sites using the basic methodology outlined by Thornthwaite and Mather.

Step 3: Deep Percolation of Rainfall

Computation of the amount of deep percolation (recharge) of rainfall may be made from the preceding estimates of rainfall, runoff and actual ET. The average yearly deep percolation is computed as follows:

$$(DP) = (P)(1-R) - (ET)$$

where:

DP = Average deep percolation of rainfall (in/yr);
P = Average precipitation (in/yr);
R = Runoff percentage;
ET = Actual evapotranspiration (in/yr).

Step 4: Wastewater Loading

Wastewater discharges through subsurface disposal systems will generally be beneath the root zone, resulting in complete percolation to groundwater. The long-term hydraulic loading can be computed on the basis of average wastewater flow over the area under study. For typical residential on-site systems the following assumptions are appropriate:

(1) 50 gpcd
(2) 3 persons/dwelling unit.

These are consistent with reported literature values and planning studies (NEHA, 1979; EPA, 1980). Maximum wastewater flow estimates (e.g., 150 gpd per bedroom) are suitable for designing individual systems, but do not adequately represent average long-term loading characteristics which are of chief concern in assessing cumulative effects.

Step 5: *Areal Distribution of Wasteload*

The next step is the determination of the areal distribution of wastewater loading. This is expressed as waste flow per unit area (e.g., gpd/acre). It may be approximated by dividing the total wastewater flow by the total acreage under study. Conversion can then be made to in/yr as follows:

$$(\text{in/yr}) = (\text{gpd/acre})(0.0134)$$

Step 6: *Relative Change in Hydraulic Loading*

Hydraulic impacts due to wastewater additions can be assessed by determining the relative change in hydraulic loading. This is done simply by computing wastewater loading as a percentage of average background deep percolation. The results are a useful indicator of the amount of natural dilution normally available on-site. Additionally, projected changes in salt and nitrate loadings may conveniently be expressed as a function of the amount of wastewater loading relative to deep percolation (see following sections dealing with salts and nitrates).

Step 7: *Groundwater Rise*

Potential areawide increases in groundwater levels can be approximated by dividing the wastewater hydraulic loading by the specific yield of the underlying soils or aquifer. Specific yield varies among soils and water bearing formations, and normally falls between about 5 and 30%. The potential for change in natural water table levels should be examined on a month-to-month and seasonal basis. In the water balance method of Thornthwaite and Mather (1957), 50 percent of the surplus waters percolating to groundwater are assumed to discharge to surface streams each month. This is based on studies of watersheds in the Eastern United States. Month-to-month accumulation of wastewater should be reduced by a similar amount.

Whether or not long-term (yearly) accumulation occurs depends upon the natural fluctuations and drainage characteristics of the groundwater system. To assess the potential impacts specifically requires more detailed characterization of aquifer properties and groundwater movement. In many instances it is likely that natural fluctuations from year-to-year will far outweigh the effects from wastewater additions. Also, a detailed analysis should account for related land use and development activities which may contribute to changes in groundwater levels, e.g., groundwater withdrawals, irrigation, and alteration of natural recharge areas. These effects may further negate impacts from on-site sewage disposal systems.

Localized Hydraulic Mounding

The growth and decay of groundwater mounds in response to percolation and recharge of surface water has been studied by a number of investigators (Glover, 1966; Hantush, 1967; Bianchi, 1970; Bouwer, 1976; DeCoster, 1976). Various predictive equations have been developed and tested. While derived specifically for the purpose of assessing groundwater recharge operations, many of the techniques are equally applicable to the case of subsurface effluent disposal systems.

These analytical methods can be applied by defining four typical situations which characterize the conditions under which on-site systems are generally employed. These are:

- *Case 1* - Relatively level topography with underlying unconfined shallow aquifer of greater than 50' thickness and of effectively "infinite" lateral extent;

- *Case 2* - Relatively level topography with underlying unconfined shallow aquifer of less than 50' thickness (includes perched water) and of effectively "infinite" lateral extent;

- *Case 3* - Level to moderately sloping topography, with shallow groundwater having a defined lateral seepage or discharge point near the disposal field;

- *Case 4* - Sloping terrain with perched groundwater and/or a clearly defined impermeable substrata.

Assessment techniques applicable to each of these situations are described below.

Case 1. The case of percolation to an aquifer of relatively large thickness is illustrated in Figure 2. Analysis can follow a method developed by Glover (1966). It allows prediction of the shape and maximum rise of the water table beneath square and rectangular recharge plots under different loading rates and soil-groundwater conditions. The maximum rise is of most concern with on-site sewage disposal systems.

1. Data Needs

Computation of the height at the center of the groundwater mound requires the following input data:

- W = Width of the disposal field (ft);
- L = Length of the disposal field (ft);
- I = Wastewater application rate (ft/day);
- V = Specific yield or fillable pore space of the soil (ft^3/ft^3);
- K = Horizontal hydraulic conductivity of the aquifer (ft/day);
- D = Saturated thickness of the aquifer (ft);
- H = Depth to groundwater from bottom of the disposal trenches (ft);
- t = Duration of wastewater application (days).

The parameters W, L and I are readily obtainable from the design and layout of the disposal system. Soil and aquifer characteristics, V,K,D and H, may be obtained from prior groundwater studies or site-specific field investigations. A useful reference on this topic is the EPA Land Treatment Design Manual (1977). The duration of wastewater application, t, corresponds to the period for mound height analysis during which a given background water table level is sustained. For seasonally fluctuating water tables (common to most of the North Coast) the most critical time for analysis would likely be for periods of 30 to 180 days during the wet weather season. The selected value should be based upon observed or estimated characteristics of the aquifer.

2. Analysis

The maximum groundwater rise may be estimated with the following 3-step procedure:

Step 1: Compute the following quantities:

(1) $\alpha = \dfrac{KD}{V}$

(2) $R = \dfrac{I}{V}$

(3) $\dfrac{W}{\sqrt{4\ t}}$

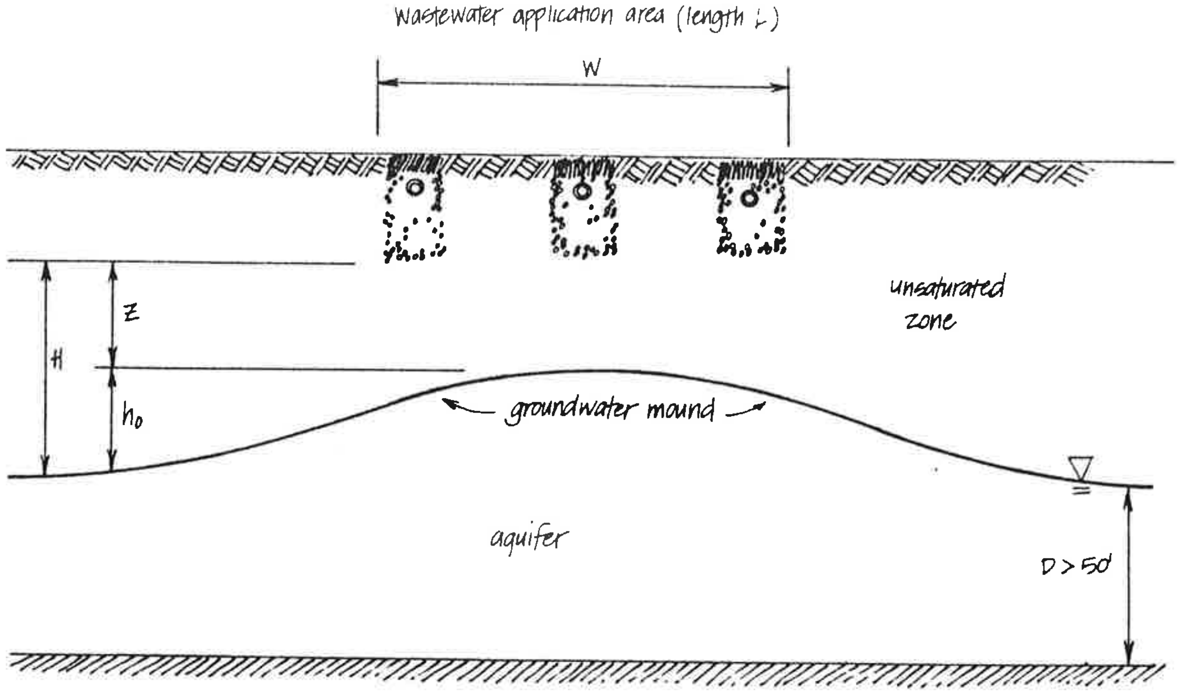


Fig. 2. Groundwater Mounding for Case 1 - Aquifer of Relatively Large Thickness

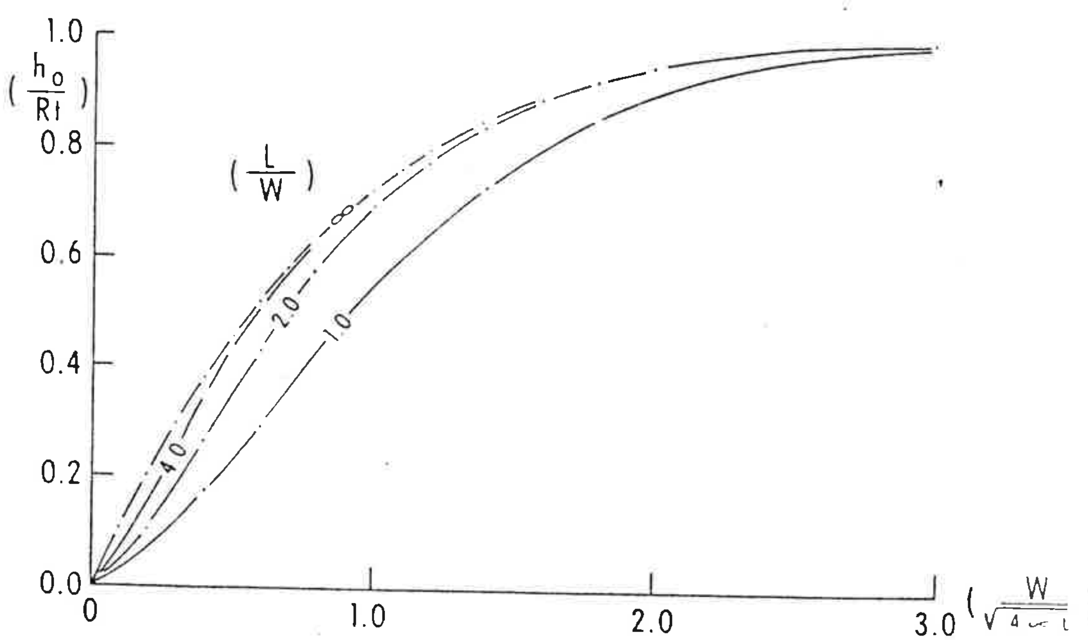


Fig. 3. Dimensionless Plot of the Rise at the Center (h_o) of the Mound Beneath a Rectangular Recharge Area for Different Ratios of Length to Width (Glover,1966)

Step 2: Obtain values of $\frac{h_o}{Rt}$ from Figure 3; from these compute the maximum mound height h_o.

Step 3: Compute the effective separation distance (z) between the disposal point and the maximum groundwater height:

$$z = H - h_o$$

Case 2. The case of a relatively thin aquifer is illustrated in Figure 4. A method developed by Hantush (1967) provides a suitable means for estimating groundwater mounding. The approach is similar to that previously described for the case of a thick aquifer. The estimation method has been shown to provide fairly accurate estimates when the rise of the water table relative to the initial depth of saturation does not exceed about 50%.

1. Data Needs

Computation of maximum mound height requires the following input data:

W = Width of disposal field (ft);
L = Length of disposal field (ft);
I = Wastewater application rate (ft/day);
V = Specific yield or fillable pore space of the soil (ft^3/ft^3);
K = Horizontal hydraulic conductivity of the aquifer (ft/day);
H = Depth to groundwater from point of disposal (ft);
h_i = Initial water table height (ft);
t = Duration of wastewater application (days).

As discussed for Case 1, these data are readily obtainable or can be reasonably estimated in most instances.

2. Analysis

The maximum mound height (h_m) is determined by the following 4-step procedure:

Step 1: Compute the following:

(1) $\bar{b} = 0.5\ (h_i + h_m)$*

(2) $V_o = \frac{K\bar{b}}{V}$

(3) $\alpha = \frac{L}{4\sqrt{V_o t}}$

*Estimated value of h_m is assumed initially and final solution derived by method of successive approximation.

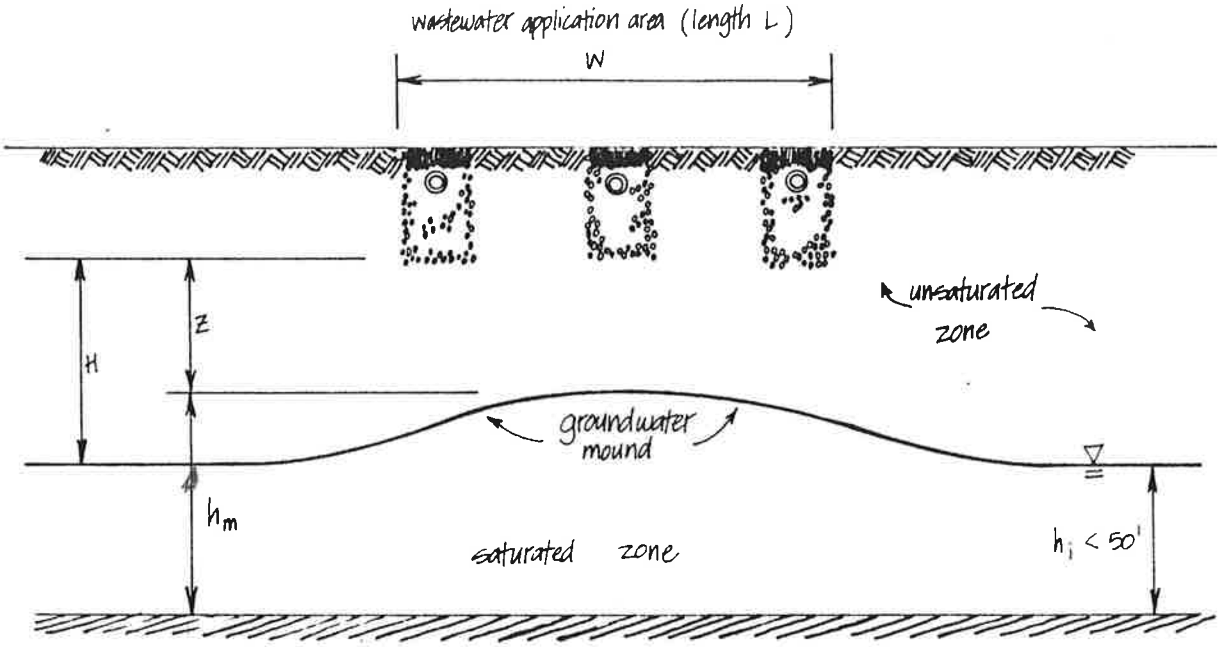


Fig. 4. Groundwater Mounding for Case 2 -
Relatively Thin Groundwater Zone

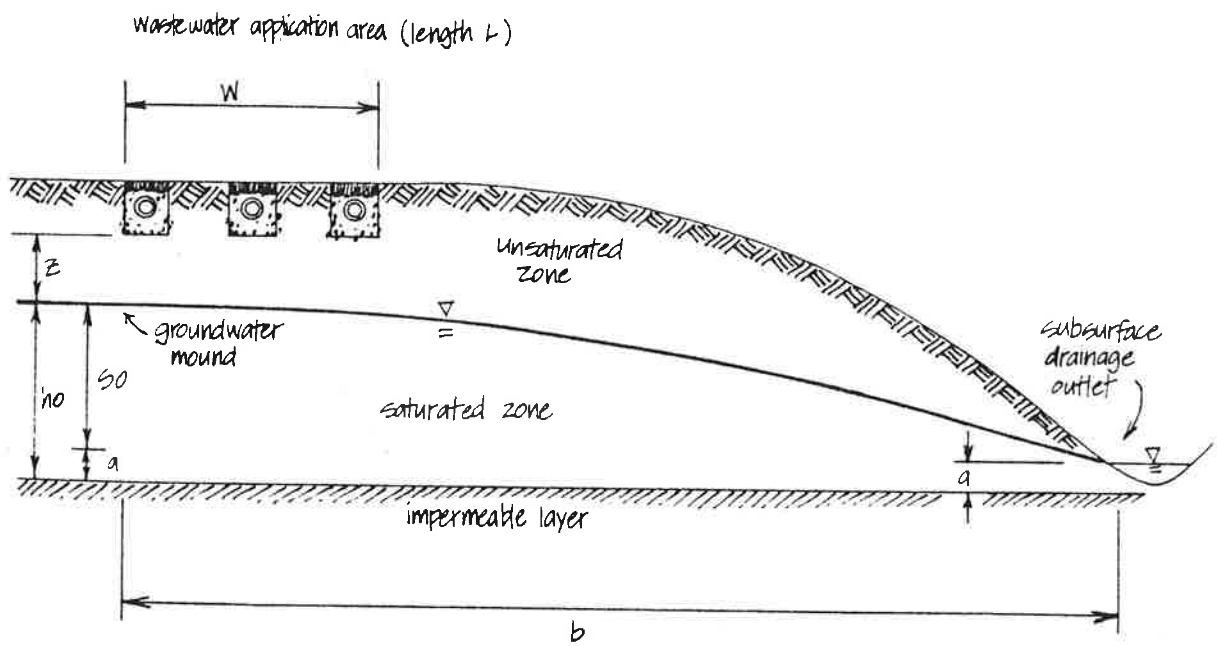


Fig. 5. Groundwater Mounding for Case 3 -
Flow to Lateral Seepage Outlet

TABLE 1. Numerical Solutions for Groundwater Mounding Analysis

Values of the function $S^{*}(\alpha,\beta) = \int_0^1 \mathrm{erf}\left(\frac{\alpha}{\sqrt{\tau}}\right) \mathrm{erf}\left(\frac{\beta}{\sqrt{\tau}}\right) d\tau$

α \ β	0.02	0.04	0.06	0.08	0.10	0.14	0.18	0.22	0.26	0.30	0.34	0.38	0.42	0.46	0.50	0.54	0.58	0.62
0.02	0.0041	0.0073	0.0101	0.0125	0.0146	0.0184	0.0216	0.0243	0.0267	0.0288	0.0306	0.0322	0.0337	0.0349	0.0361	0.0371	0.0380	0.0387
0.04	0.0073	0.0135	0.0193	0.0236	0.0278	0.0353	0.0416	0.0470	0.0518	0.0559	0.0596	0.0628	0.0657	0.0683	0.0705	0.0725	0.0743	0.0759
0.06	0.0101	0.0193	0.0265	0.0335	0.0398	0.0509	0.0602	0.0684	0.0751	0.0817	0.0871	0.0920	0.0963	0.1001	0.1035	0.1065	0.1091	0.1115
0.08	0.0125	0.0236	0.0335	0.0425	0.0508	0.0652	0.0776	0.0884	0.0978	0.1060	0.1133	0.1197	0.1254	0.1305	0.1350	0.1389	0.1425	0.1456
0.10	0.0146	0.0278	0.0398	0.0508	0.0605	0.0786	0.0939	0.1072	0.1188	0.1290	0.1381	0.1461	0.1532	0.1595	0.1650	0.1700	0.1744	0.1783
0.14	0.0184	0.0353	0.0509	0.0652	0.0786	0.1025	0.1232	0.1414	0.1573	0.1714	0.1839	0.1949	0.2048	0.2135	0.2212	0.2281	0.2343	0.2397
0.18	0.0216	0.0416	0.0602	0.0776	0.0939	0.1232	0.1490	0.1716	0.1916	0.2094	0.2251	0.2391	0.2515	0.2626	0.2724	0.2812	0.2890	0.2959
0.22	0.0243	0.0470	0.0684	0.0884	0.1072	0.1414	0.1716	0.1984	0.2222	0.2433	0.2621	0.2789	0.2938	0.3071	0.3189	0.3295	0.3389	0.3472
0.26	0.0267	0.0518	0.0754	0.0978	0.1188	0.1573	0.1916	0.2222	0.2494	0.2737	0.2954	0.3147	0.3320	0.3474	0.3612	0.3735	0.3844	0.3941
0.30	0.0288	0.0559	0.0817	0.1060	0.1290	0.1714	0.2094	0.2433	0.2737	0.3009	0.3252	0.3470	0.3665	0.3839	0.3995	0.4134	0.4257	0.4368
0.34	0.0306	0.0596	0.0871	0.1133	0.1381	0.1839	0.2251	0.2621	0.2954	0.3252	0.3520	0.3761	0.3976	0.4169	0.4341	0.4495	0.4633	0.4756
0.38	0.0322	0.0628	0.0920	0.1197	0.1461	0.1949	0.2391	0.2789	0.3147	0.3470	0.3761	0.4022	0.4256	0.4466	0.4654	0.4823	0.4973	0.5108
0.42	0.0337	0.0657	0.0963	0.1254	0.1532	0.2048	0.2515	0.2938	0.3320	0.3665	0.3976	0.4256	0.4508	0.4734	0.4937	0.5119	0.5281	0.5427
0.46	0.0349	0.0683	0.1001	0.1305	0.1595	0.2135	0.2626	0.3071	0.3474	0.3839	0.4167	0.4466	0.4734	0.4975	0.5191	0.5385	0.5559	0.5715
0.50	0.0361	0.0705	0.1035	0.1350	0.1650	0.2212	0.2724	0.3189	0.3612	0.3995	0.4341	0.4654	0.4937	0.5191	0.5420	0.5626	0.5810	0.5975
0.54	0.0371	0.0725	0.1065	0.1389	0.1700	0.2281	0.2812	0.3295	0.3735	0.4134	0.4495	0.4823	0.5119	0.5385	0.5626	0.5842	0.6036	0.6209
0.58	0.0380	0.0743	0.1091	0.1425	0.1744	0.2343	0.2890	0.3389	0.3844	0.4257	0.4633	0.4973	0.5281	0.5559	0.5810	0.6036	0.6239	0.6420
0.62	0.0387	0.0759	0.1115	0.1456	0.1783	0.2397	0.2959	0.3472	0.3941	0.4368	0.4756	0.5108	0.5427	0.5715	0.5975	0.6209	0.6420	0.6609
0.66	0.0394	0.0773	0.1136	0.1484	0.1815	0.2445	0.3022	0.3547	0.4027	0.4466	0.4865	0.5227	0.5556	0.5854	0.6122	0.6364	0.6582	0.6778
0.70	0.0401	0.0785	0.1154	0.1509	0.1849	0.2488	0.3075	0.3612	0.4104	0.4553	0.4962	0.5334	0.5672	0.5977	0.6254	0.6503	0.6728	0.6929
0.74	0.0406	0.0796	0.1171	0.1531	0.1876	0.2526	0.3123	0.3671	0.4172	0.4630	0.5048	0.5429	0.5774	0.6087	0.6371	0.6627	0.6857	0.7064
0.78	0.0411	0.0806	0.1185	0.1550	0.1900	0.2559	0.3165	0.3722	0.4232	0.4699	0.5125	0.5513	0.5865	0.6185	0.6475	0.6736	0.6972	0.7184
0.82	0.0415	0.0814	0.1198	0.1567	0.1921	0.2589	0.3203	0.3768	0.4286	0.4760	0.5192	0.5587	0.5946	0.6272	0.6567	0.6834	0.7074	0.7291
0.86	0.0419	0.0822	0.1207	0.1582	0.1940	0.2615	0.3237	0.3808	0.4333	0.4813	0.5252	0.5653	0.6017	0.6348	0.6648	0.6920	0.7165	0.7386
0.90	0.0422	0.0828	0.1219	0.1595	0.1957	0.2638	0.3266	0.3844	0.4374	0.4860	0.5305	0.5711	0.6080	0.6416	0.6721	0.6996	0.7245	0.7469
0.94	0.0425	0.0834	0.1228	0.1607	0.1971	0.2658	0.3292	0.3875	0.4411	0.4902	0.5351	0.5762	0.6136	0.6476	0.6784	0.7063	0.7316	0.7543
0.98	0.0428	0.0839	0.1236	0.1617	0.1984	0.2676	0.3314	0.3902	0.4442	0.4938	0.5392	0.5807	0.6184	0.6528	0.6840	0.7123	0.7378	0.7603
1.00	0.0429	0.0842	0.1239	0.1622	0.1990	0.2684	0.3324	0.3914	0.4457	0.4955	0.5410	0.5827	0.6206	0.6552	0.6865	0.7150	0.7406	0.7633
1.20	0.0437	0.0858	0.1263	0.1654	0.2030	0.2740	0.3395	0.4001	0.4558	0.5070	0.5540	0.5969	0.6362	0.6719	0.7044	0.7339	0.7605	0.7846
1.40	0.0441	0.0866	0.1275	0.1669	0.2049	0.2767	0.3431	0.4043	0.4608	0.5127	0.5603	0.6039	0.6438	0.6801	0.7132	0.7432	0.7704	0.7949
1.80	0.0444	0.0871	0.1283	0.1680	0.2062	0.2785	0.3454	0.4071	0.4641	0.5165	0.5645	0.6086	0.6489	0.6856	0.7190	0.7494	0.7769	0.8018
2.00	0.0444	0.0871	0.1284	0.1681	0.2064	0.2787	0.3457	0.4075	0.4645	0.5169	0.5651	0.6092	0.6495	0.6863	0.7198	0.7502	0.7778	0.8027
2.20	0.0444	0.0872	0.1284	0.1682	0.2065	0.2788	0.3458	0.4076	0.4646	0.5171	0.5653	0.6094	0.6497	0.6865	0.7200	0.7505	0.7781	0.8030
2.50	0.0444	0.0872	0.1284	0.1682	0.2065	0.2789	0.3458	0.4077	0.4647	0.5172	0.5653	0.6095	0.6498	0.6867	0.7202	0.7506	0.7782	0.8032
3.00	0.0444	0.0872	0.1284	0.1682	0.2065	0.2789	0.3459	0.4077	0.4647	0.5172	0.5654	0.6095	0.6499	0.6867	0.7202	0.7506	0.7782	0.8032

Source: (Hantush, 1967)

TABLE 2. (cont.)

α \ β	0.62	0.66	0.70	0.74	0.78	0.82	0.86	0.90	0.94	0.98	1.00	1.20	1.40	1.80	2.00	2.20	2.50	3.00
0.02	0.0387	0.0394	0.0401	0.0406	0.0411	0.0415	0.0419	0.0422	0.0425	0.0428	0.0429	0.0437	0.0441	0.0444	0.0444	0.0444	0.0444	0.0444
0.04	0.0759	0.0773	0.0785	0.0796	0.0806	0.0814	0.0822	0.0828	0.0834	0.0839	0.0842	0.0855	0.0866	0.0871	0.0871	0.0872	0.0872	0.0872
0.06	0.1115	0.1136	0.1154	0.1171	0.1185	0.1198	0.1209	0.1219	0.1228	0.1236	0.1239	0.1263	0.1275	0.1283	0.1284	0.1284	0.1284	0.1284
0.08	0.1456	0.1484	0.1509	0.1531	0.1550	0.1567	0.1582	0.1595	0.1607	0.1617	0.1622	0.1654	0.1669	0.1680	0.1681	0.1682	0.1682	0.1682
0.10	0.1783	0.1818	0.1849	0.1876	0.1900	0.1921	0.1940	0.1957	0.1971	0.1984	0.1990	0.2030	0.2049	0.2062	0.2064	0.2065	0.2065	0.2065
0.14	0.2397	0.2445	0.2488	0.2526	0.2559	0.2589	0.2615	0.2638	0.2658	0.2676	0.2684	0.2740	0.2767	0.2785	0.2787	0.2788	0.2788	0.2789
0.18	0.2959	0.3020	0.3075	0.3123	0.3166	0.3203	0.3237	0.3266	0.3292	0.3314	0.3324	0.3386	0.3431	0.3454	0.3457	0.3458	0.3458	0.3458
0.22	0.3472	0.3547	0.3612	0.3671	0.3722	0.3768	0.3808	0.3844	0.3875	0.3902	0.3914	0.4001	0.4043	0.4071	0.4075	0.4076	0.4077	0.4077
0.26	0.3941	0.4027	0.4104	0.4172	0.4232	0.4285	0.4333	0.4374	0.4411	0.4442	0.4457	0.4558	0.4608	0.4641	0.4645	0.4646	0.4647	0.4647
0.30	0.4368	0.4465	0.4553	0.4630	0.4699	0.4760	0.4813	0.4860	0.4902	0.4938	0.4955	0.5070	0.5127	0.5165	0.5169	0.5171	0.5172	0.5172
0.34	0.4756	0.4865	0.4962	0.5048	0.5125	0.5192	0.5252	0.5305	0.5351	0.5392	0.5410	0.5540	0.5603	0.5645	0.5651	0.5653	0.5653	0.5654
0.38	0.5108	0.5227	0.5334	0.5429	0.5513	0.5587	0.5653	0.5711	0.5762	0.5807	0.5827	0.5969	0.6039	0.6086	0.6092	0.6094	0.6095	0.6095
0.42	0.5427	0.5556	0.5672	0.5774	0.5865	0.5946	0.6017	0.6080	0.6136	0.6184	0.6206	0.6362	0.6438	0.6489	0.6495	0.6497	0.6498	0.6499
0.46	0.5715	0.5854	0.5977	0.6087	0.6185	0.6272	0.6348	0.6416	0.6476	0.6528	0.6552	0.6719	0.6801	0.6856	0.6863	0.6865	0.6867	0.6867
0.50	0.5975	0.6122	0.6254	0.6371	0.6475	0.6567	0.6648	0.6721	0.6784	0.6842	0.6865	0.7044	0.7132	0.7190	0.7198	0.7200	0.7202	0.7202
0.54	0.6209	0.6364	0.6503	0.6627	0.6736	0.6834	0.6920	0.6996	0.7063	0.7123	0.7150	0.7339	0.7432	0.7494	0.7502	0.7505	0.7506	0.7506
0.58	0.6420	0.6582	[illegible]	0.6857	0.6972	0.7074	0.7165	0.7245	0.7316	0.7378	0.7406	0.7605	0.7704	0.7769	0.7778	0.7781	0.7782	[illegible]
0.62	0.6609	0.6778	[illegible]	0.7064	0.7184	0.7291	0.7386	0.7469	0.7543	0.7608	0.7638	0.7846	0.7949	0.8018	0.8027	0.8030	0.8032	0.8032
0.66	0.6778	0.6953	0.7110	0.7250	0.7375	0.7485	0.7584	0.7671	0.7748	0.7816	0.7846	0.8064	0.8171	0.8243	0.8252	0.8255	0.8257	0.8257
0.70	0.6929	0.7110	0.7272	0.7417	0.7546	0.7660	0.7762	0.7852	0.7932	0.8002	0.8034	0.8259	0.8370	0.8445	0.8454	0.8458	0.8460	[illegible]
0.74	0.7064	0.7250	0.7417	0.7566	0.7698	0.7816	0.7921	0.8014	0.8096	0.8165	0.8201	0.8434	0.8549	0.8627	0.8636	0.8640	0.8642	0.8642
0.78	0.7184	0.7375	0.7546	0.7695	0.7834	0.7956	0.8063	0.8159	0.8243	0.8317	0.8351	0.8591	0.8710	0.8789	0.8799	0.8803	0.8805	0.8805
0.82	0.7291	0.7486	0.7660	0.7816	0.7956	0.8080	0.8190	0.8288	0.8374	0.8450	0.8485	0.8731	0.8853	0.8935	0.8945	0.8949	0.8951	0.8951
0.86	0.7386	0.7584	0.7762	0.7921	0.8063	0.8190	0.8302	0.8402	0.8491	0.8569	0.8604	0.8855	0.8980	0.9065	0.9075	0.9079	0.9081	0.9081
0.90	0.7469	0.7671	0.7852	0.8014	0.8159	0.8288	0.8402	0.8504	0.8594	0.8674	0.8710	0.8966	0.9094	0.9180	0.9191	0.9195	0.9197	0.9197
0.94	0.7543	0.7745	0.7932	0.8096	0.8243	0.8374	0.8491	0.8594	0.8686	0.8767	0.8803	0.9064	0.9195	0.9282	0.9294	0.9298	0.9300	0.9300
0.98	0.7608	0.7816	0.8002	0.8168	0.8317	0.8450	0.8569	0.8674	0.8767	0.8849	0.8886	0.9151	0.9231	0.9373	0.9384	0.9389	0.9391	0.9391
1.02	0.7638	0.7848	0.8034	0.8201	0.8351	0.8485	0.8604	0.8710	0.8805	0.8886	0.8924	0.9191	0.9324	0.9414	0.9426	0.9430	0.9432	0.9433
1.20	0.7846	0.8064	0.8259	0.8434	0.8591	0.8731	0.8855	0.8966	0.9064	0.9151	0.9191	0.9472	0.9614	0.9709	0.9722	0.9726	0.9728	0.9729
1.40	0.7949	0.8171	0.8370	0.8549	0.8710	0.8853	0.8980	0.9094	0.9195	0.9284	0.9324	0.9614	0.9759	0.9858	0.9871	0.9875	0.9878	0.9878
1.80	0.8018	0.8243	0.8445	0.8627	0.8789	0.8935	0.9065	0.9180	0.9282	0.9373	0.9414	0.9709	0.9858	0.9959	0.9972	0.9977	0.9979	0.9980
2.00	0.8027	0.8252	0.8454	0.8636	0.8799	0.8945	0.9075	0.9191	0.9294	0.9384	0.9426	0.9722	0.9871	0.9972	0.9985	0.9990	0.9992	0.9993
2.20	0.8030	0.8255	0.8458	0.8640	0.8803	0.8949	0.9079	0.9195	0.9298	0.9389	0.9430	0.9726	0.9875	0.9977	0.9990	0.9995	0.9997	0.9998
2.50	0.8032	0.8257	0.8460	0.8642	0.8805	0.8951	0.9081	0.9197	0.9300	0.9391	0.9432	0.9728	0.9878	0.9979	0.9992	0.9997	1.0000	1.0000
3.00	0.8032	0.8257	0.8460	0.8642	0.8805	0.8951	0.9081	0.9197	0.9300	0.9391	0.9433	0.9729	0.9878	0.9980	0.9993	0.9998	1.0000	1.0000

Source: Hantush (1967)

(4) $\beta = \dfrac{W}{4\sqrt{V_o t}}$

Step 2: Using Table 1, obtain values for the function $S^*(\alpha,\beta)$.

Step 3: Compute the maximum mound height (h_m) from the following formula:

$$h_m = \sqrt{(2I/K)V_o t S^*(\alpha,\beta) + h_i^2}$$

Case 3. The situation where lateral drainage of groundwater is influenced by an adjacent road cut, underdrain, rock outcropping, etc., is illustrated in Figure 5. Groundwater mounding can be estimated using a method developed by Decoster (1976). Based upon the Dupuit-Forcheimer approximation and Darcy's law, Decoster developed an equation describing the shape of the phreatic surface extending from the disposal field to the drainage outlet. The equation which gives the maximum height of groundwater beneath the disposal field is:

$$\frac{h_o}{W} = \left[\frac{P_o}{K}\left(\frac{2b}{W} - 1\right) + \left(\frac{a}{W}\right)^2\right]^{\frac{1}{2}}$$

where parameters are as shown in Figure 5 and are described in data needs below.

1. Data Needs

The following input data are required for this analysis:

W = Width of disposal field (ft);
P_o = Wastewater application rate (ft/day);
K = Horizontal hydraulic conductivity of the soil (ft/day);
d = Depth to impervious layer below point of disposal (ft);
a = Height of water at the drainage outlet (ft);
b = Lateral distance from far edge of disposal field to drainage outlet (ft).

2. Analysis

Estimation of the maximum rise of the water table (h_o) is determined by the following 4-step procedure:

Step 1: Compute the following two non-dimensional quantities:

(1) $A = \frac{a}{W}\sqrt{\frac{K}{P_o}}$

(2) $B = \frac{W}{b}$

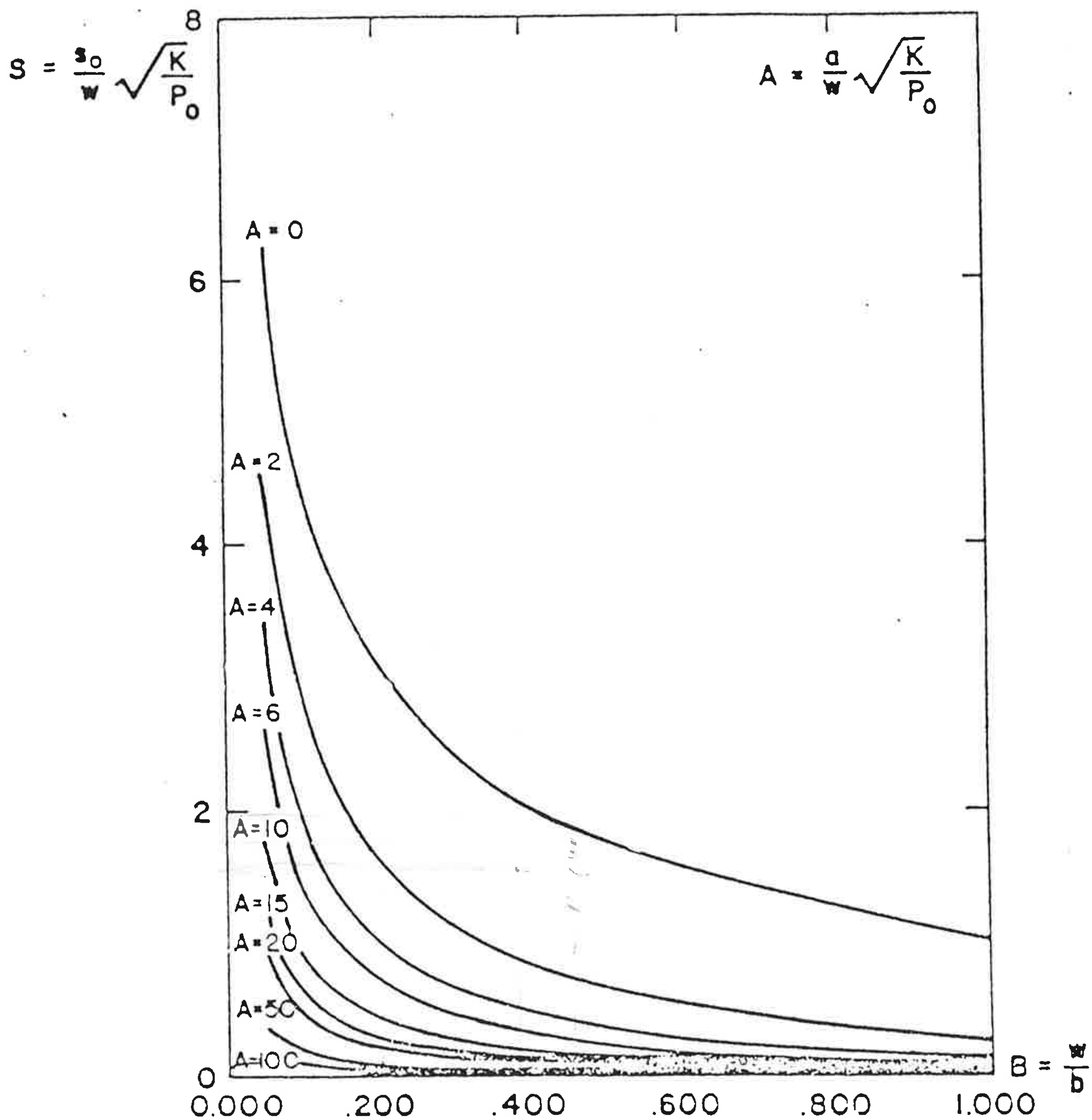


Figure 6. Subsurface drainage design graph.

Source: Small Scale Waste Management Project, 1978

Step 2: With values for A and B, graphically determine the non-dimensional quantity S using Figure 6.

Step 3: Calculate the rise of the groundwater mound (s_o) above the control level (a) as follows:

$$s_o = SW\sqrt{\frac{P_o}{K}}$$

Step 4: Compute the effective separation distance (z) between the disposal point and the maximum groundwater height:

$$z = d - a - s_o$$

This analysis has certain limitations which should be recognized:

(1) Accuracy is expected to be within about 15% (subject to data reliability);

(2) Groundwater movement is projected only in two dimensions. Therefore, the analysis becomes increasingly conservative as the length:width ratio of the disposal field decreases;

(3) Estimates are likely to be conservative where subsurface drainage is to a single lateral boundary outlet. This difficulty can be overcome by solving for lateral flow opposite to the drain using the method described for Case 2. An imaginary line can be constructed through the disposal field as shown in Figure 7. By successively adjusting and computing mound heights at the division line, the combined analyses will converge to an estimate of the position and height of maximum groundwater rise.

Case 4. The case of perched, laterally moving groundwater in sloping terrain is illustrated in Figure 8. A method developed by Bouwer (1976) can be used to roughly approximate groundwater mounding under such conditions.

1. Data Needs

The following input data are required:

W = Width of disposal field in direction of groundwater flow (ft);
I = Wastewater application rate (ft/day);
D = Average thickness of groundwater perpendicular to direction of flow (ft);

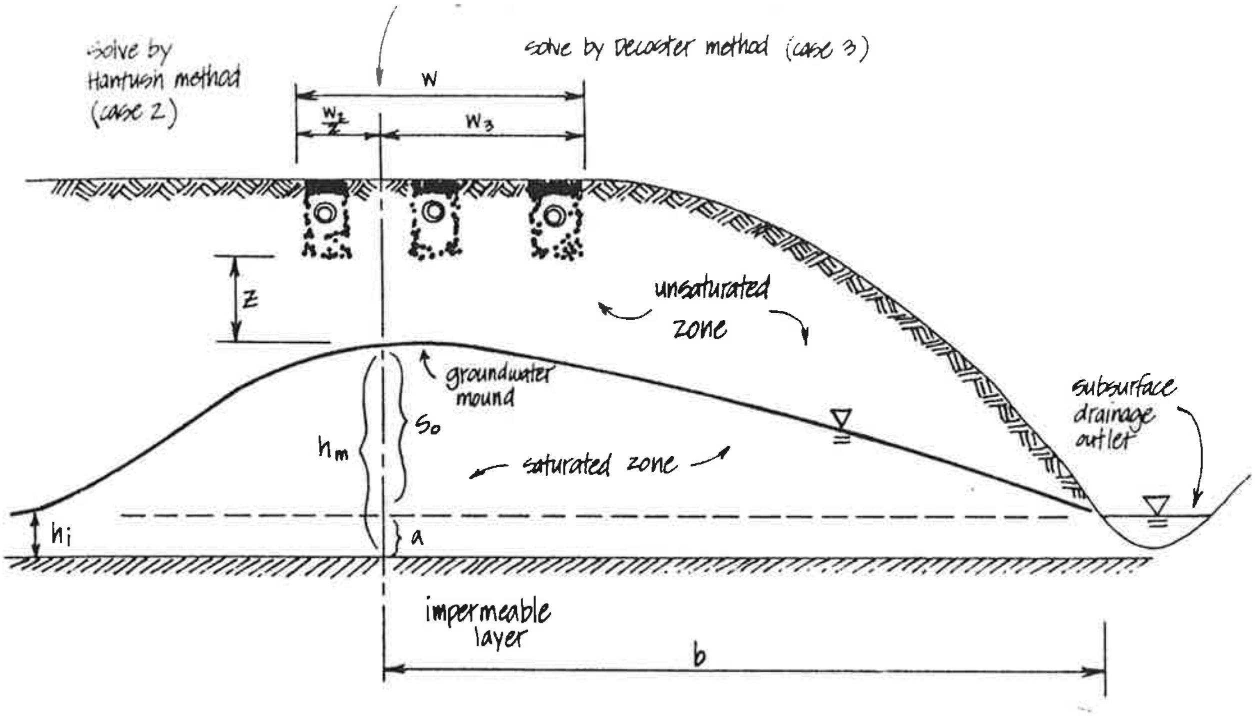


Fig. 7. Combined Application of Case 2 and Case 3 Methodologies

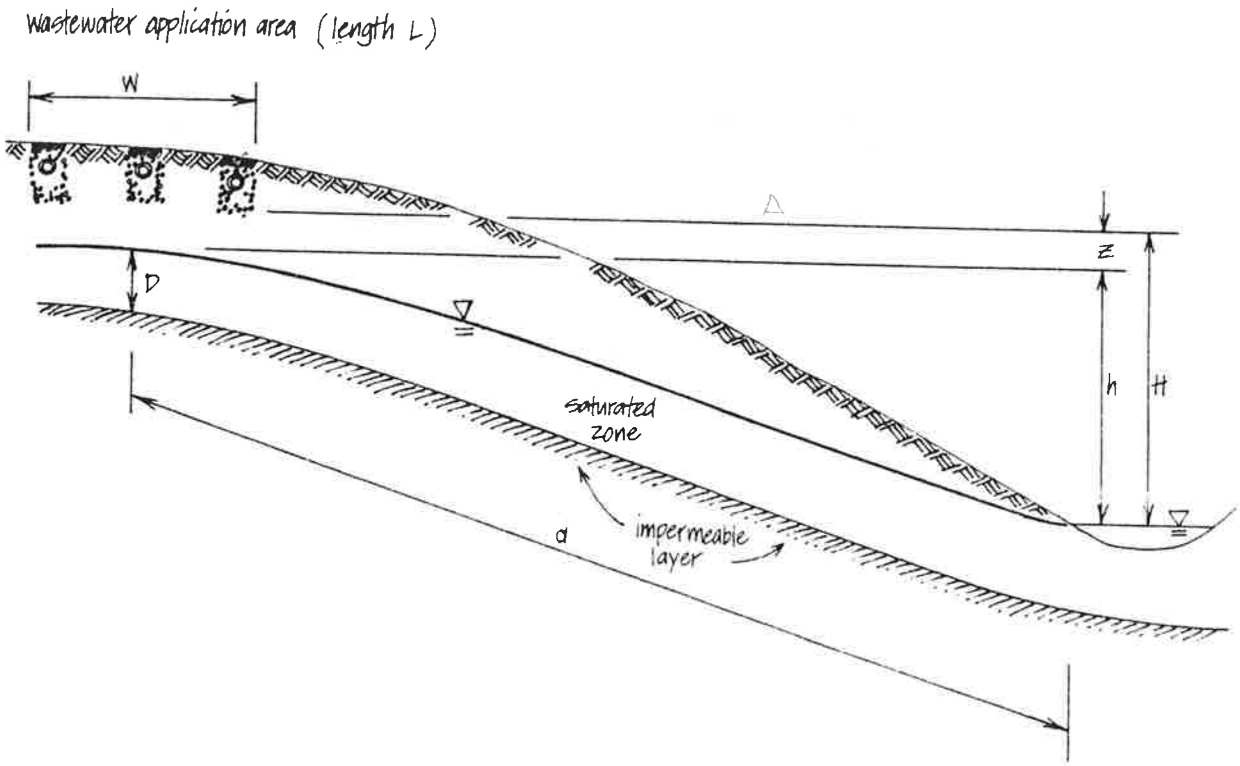


Fig. 8. Groundwater Mounding for Case 4 - Perched Water in Sloping Terrain

d = Lateral flow distance from disposal field to seepage or discharge point (ft);
K = Horizontal hydraulic conductivity (ft/day);
H = Height of the disposal point above the downslope outlet (ft).

2. Analysis

Groundwater mounding is determined by the following 2-step procedure:

Step 1: Compute the maximum groundwater depth (H) above the outlet from the formula:

$$h = \frac{WdI}{KD}$$

Step 2: Compute the effective separation distance (z) between the disposal point and the maximum groundwater height:

$$z = H - h$$

SALT ACCUMULATION

Problem Overview

The accumulation of salts (dissolved solids) in ground and surface waters is a result of (a) leaching of minerals from soils and geologic formations (b) evaporative processes and (c) inputs from waste disposal and other cultural practices. While high salt concentrations are not generally recognized as a widespread water quality problem in the North Coast Region, there are areas where background total dissolved solids (TDS) concentrations in groundwaters are in the range of 400-600 mg/L. In these situations, the added long-term effect from on-site sewage disposal practices may be of concern. In addition, water supplies in many parts of the Region are obtained from relatively small groundwater basins, particularly in the coastal areas. These groundwaters, which rely extensively on local recharge, are affected by changes in watershed conditions, and may be particularly sensitive to waste inputs from on-site sewage disposal practices.

The potential problems from on-site systems are directly related to:

(1) the concentration of salts in domestic wastewaters, and

(2) the fact that dissolved solids are essentially conservative substances, the concentration of which may be reduced only by means of dilution.

Table 3-6. Typical wastewater flow rates from recreational facilities[a]

Facility	Unit	Flow, gallons/unit/day Range	Flow, gallons/unit/day Typical	Flow, liters/unit/day Range	Flow, liters/unit/day Typical
Apartment, resort	Person	50–70	60	190–260	230
Bowling alley	Alley	150–250	200	570–950	760
Cabin, resort	Person	8–50	40	30–190	150
Cafeteria	Customer	1–3	2	4–11	8
	Employee	8–12	10	30–45	38
Camps:					
Pioneer type	Person	15–30	25	57–110	95
Children's, with central toilet/bath	Person	35–50	45	130–190	170
Day, with meals	Person	10–20	15	38–76	57
Day, without meals	Person	10–15	13	38–57	49
Luxury, private bath	Person	75–100	90	280–380	340
Trailer camp	Trailer	75–150	125	280–570	470
Campground-developed	Person	20–40	30	76–150	110
Cocktail lounge	Seat	12–25	20	45–95	76
Coffee Shop	Customer	4–8	6	15–30	23
	Employee	8–12	10	30–45	38
Country club	Guests onsite	60–130	100	230–490	380
	Employee	10–15	13	38–57	49
Dining hall	Meal served	4–10	7	15–38	26
Dormitory/bunkhouse	Person	20–50	40	76–190	150
Fairground	Visitor	1–2	2	4–8	8
Hotel, resort	Person	40–60	50	150–230	190
Picnic park, flush toilets	Visitor	5–10	8	19–38	30
Store, resort	Customer	1–4	3	4–15	11
	Employee	8–12	10	30–45	38
Swimming pool	Customer	5–12	10	19–45	38
	Employee	8–12	10	30–45	38
Theater	Seat	2–4	3	8–15	11
Visitor center	Visitor	4–8	5	15–30	19

[a] Some systems serving more than 20 people might be regulated under USEPA's Class V UIC Program.

Source: Crites and Tchobanoglous, 1998.

pollutants, the strength of residential wastewater fluctuates throughout the day (University of Wisconsin, 1978). For nonresidential establishments, wastewater quality can vary significantly among different types of establishments because of differences in waste-generating sources present, water usage rates, and other factors. There is currently a dearth of useful data on nonresidential wastewater organic strength, which can create a large degree of uncertainty in design if facility-specific data are not available. Some older data (Goldstein and Moberg, 1973; Vogulis, 1978) and some new information exists, but modern organic strengths need to be verified before design given the importance of this aspect of capacity determination.

Wastewater flow and the type of waste generated affect wastewater quality. For typical residential sources peak flows and peak pollutant loading rates do not occur at the same time (Tchobanoglous and Burton, 1991). Though the fluctuation in wastewater quality (see figure 3-5) is similar to the water use patterns illustrated in figure 3-3, the fluctuations in wastewater quality for an individual home are likely to be considerably greater than the multiple-home averages shown in figure 3-5.

Table 3-10. Comparison of flow rates and flush volumes before and after U.S. Energy Policy Act

Fixture	Fixtures installed prior to 1994 in gallons/minute (liters/second)	EPACT requirements (effective January, 1994)	Potential reduction in water used (%)
Kitchen faucet	3.0 gpm (0.19 L/s)	2.5 gpm (0.16 L/s)	16
Lavatory faucets	3.0 gpm (0.19 L/s)	2.5 gpm (0.16 L/s)	16
Showerheads	3.5 gpm (0.22 L/s)	2.5 gpm (0.16 L/s)	28
Toilet (tank type)	3.5 gal (13.2 L)	1.6 gal (6.1 L)	54
Toilet (valve type)	3.5 gal (13.2 L)	1.6 gal[a] (6.1 L)	54
Urinal	3.0 gal (11.4 L)	1.0 gal (3.8 L)	50

Source: Konen, 1995.

Table 3-11. Wastewater flow reduction: water-carriage toilets and systems [a]

Generic type	Description	Application considerations	Operation & maintenance	Water use per event gal (L)	Total flow reduction in gpcd (Lpcd); % of use [b]
Toilets with tank inserts	Displacement devices placed into storage tank of conventional toilet to reduce volume but not height of stored water. Varieties: Plastic bottles, flexible panels, drums, or plastic bags	Device must be compatible with existing toilet and not interfere with flush mechanism Installation by owner Reliability low; failure can result in large flow increase	Frequent post-installation inspections to ensure proper positioning	3.3–3.8 (12.5–14.4)	1.8–3.5 (6.8–13.2) 4%–8%
Water-saving toilets	Variation of conventional flush toilet fixture; similar in appearance and operation. Redesigned flushing rim and priming jet to initiate siphon flush in smaller trapway with less water.	Interchangeable with conventional fixture	Essentially the same as for a conventional unit	1.0–1.6 (3.8–13.2)	5.3–13 (12.1–49.2) 6%–20%
Washdown flush toilets	Flushing uses only water, but substantially less due to washdown flush Varieties: Few Note: Water usage may increase due to multiple flushings	Rough-in for unit may be nonstandard Drain-line slope and lateral-run restrictions Plumber installation advisable	Similar to conventional toilet Cleaning possible	0.8–1.6 (3.0–6.1) (but more frequent flushings possible)	9.4–12.2 (35.6–46.2) 21%–27%
Pressurized-tank toilets	Specially designed toilet tank to pressurize air contained in toilet tank. Upon flushing, compressed air propels water into bowl at increased velocity Varieties: Few	Compatible with most conventional toilet units Increased noise level Water supply pressure of 35–120 psi (180–620 cm Hg) required	Periodic maintenance of compressed air source	2.0–2.5 (7.6–9.5)	6.3–8.0 (23.8–30.3) 14%–18%

[a] Adapted from USEPA, 1992. Compared to conventional toilet usage (4.3 gallons/flush [16.3 liters/flush], 3.5 uses per person per day, and a total daily flow of 45 gallons/person/day [170 liters/person/day]).

[b] gpcd = gallons per capita (person) per day; Lpcd = liters per capita (person) per day.

Appendix H

Noise Data

Environmental Noise Assessment

The Mosaic Project

Alameda County, California

May 21, 2020

Project # 181006

Prepared for:

NorthStar Engineering
111 Mission Ranch Blvd., Suite 100
Chico, CA 95926

Prepared by:

Saxelby Acoustics LLC

Luke Saxelby, INCE Bd. Cert.
Principal Consultant
Board Certified, Institute of Noise Control Engineering (INCE)

(916) 760-8821
www.SaxNoise.com | Luke@SaxNoise.com
915 Highland Pointe Drive, Suite 250
Roseville, CA 95678

INTRODUCTION

Saxelby Acoustics was retained by NorthStar Engineering to perform a noise study for proposed children's camp referred to as "The Mosaic Project." The project is located in Alameda County at 17015 Cull Canyon Road, Castro Valley, CA. The project includes two outdoor activity areas which will operate during daytime (7 a.m. to 10 p.m.) hours. The first outdoor activity area consists of a recreational field for sports and outdoor games. The second outdoor activity area, referred to as the "Campfire Area," consists of a small stage for non-amplified music and performances.

Figure 1 shows the proposed project site plan. **Figure 2** shows an aerial photo of the project site and nearby existing sensitive receptors.

ENVIRONMENTAL SETTING

BACKGROUND INFORMATION ON NOISE

Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

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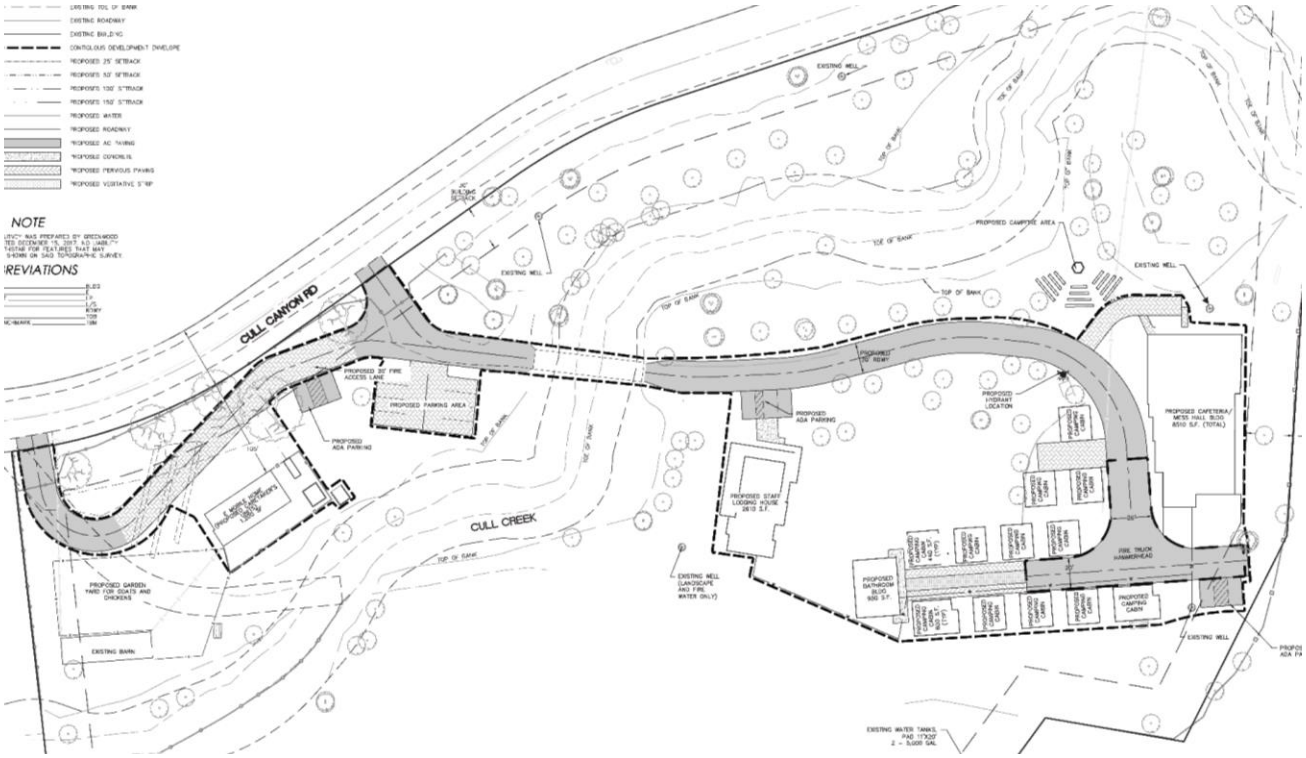
Alameda County, California

Figure 1

Project Site Plan



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MOSAIC
17015 CULL CANYON
CASTRO VALLEY, CALIFORNIA 94546

PROPOSED SITE LAYOUT
MOSAIC

APN Number	Job Number	(24"x36") Scale		Sheet
085-1200-001-16	17-231	1"= 30' Horz.	N/A Vert.	Sheet 2 Of 3

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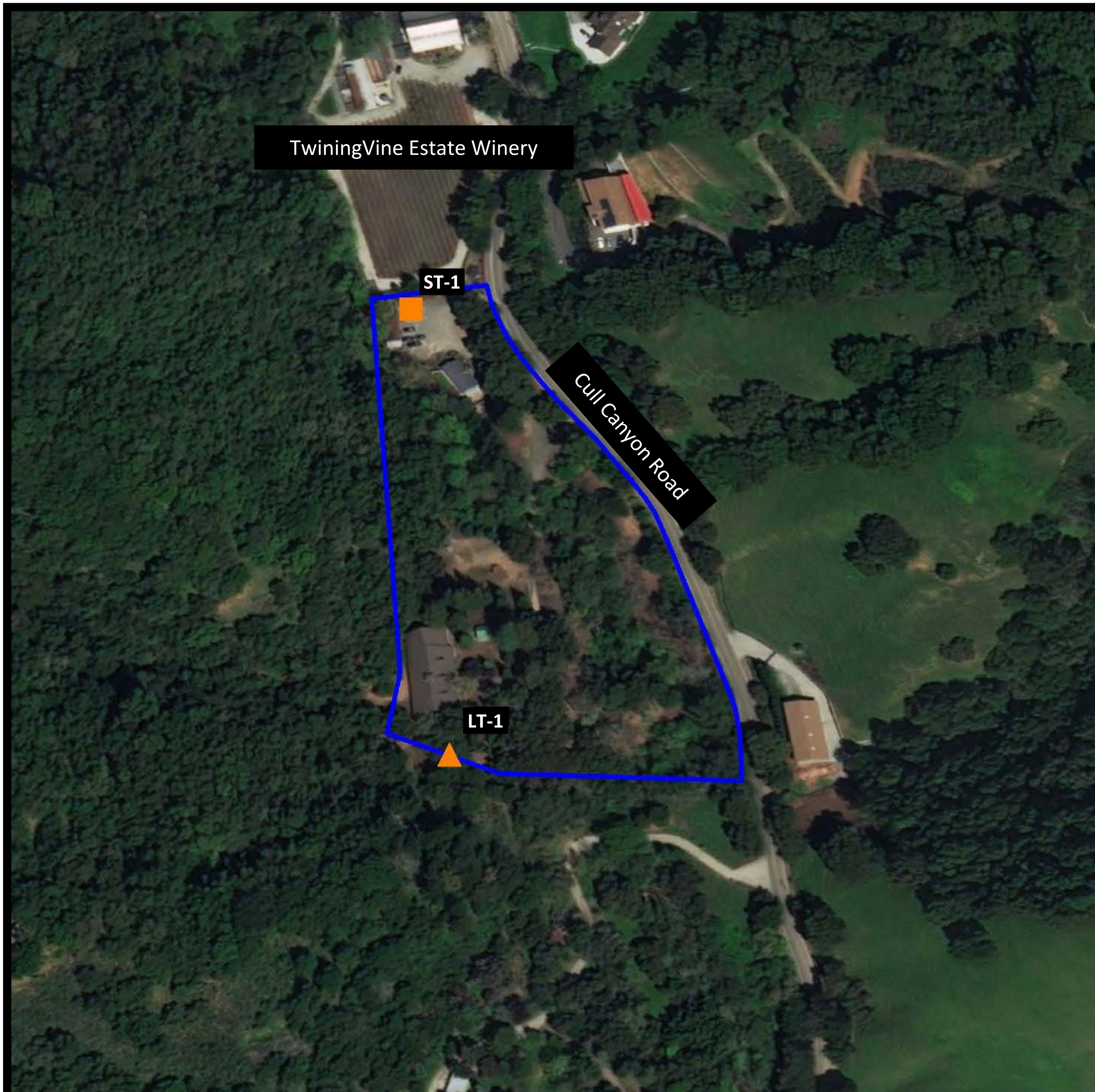

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Figure 2

Noise Measurement Sites

Legend

- Project Site
- Noise Measurement - Long Term
- Noise Measurement - Short Term

25 m 75 m 125 m

Projection: Geographic (Latitude/Longitude) / WGS84 / arc degrees
Rev. Date: 11/15/2018

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The decibel scale is logarithmic, not linear. In other words, two sound levels 10-dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10-dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10-decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. The Community Equivalent Noise Level (CNEL) is similar to L_{dn}, but also includes an evening (7:00 a.m. to 7:00 p.m.) with a +5 dB penalty applied to noise occurring during this timeframe.

Table 1 lists several examples of the noise levels associated with common situations. **Appendix A** provides a summary of acoustical terms used in this report.

Table 1: Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft.)	--100--	
Gas Lawn Mower at 1 m (3 ft.)	--90--	
Diesel Truck at 15 m (50 ft.), at 80 km/hr. (50 mph)	--80--	Food Blender at 1 m (3 ft.) Garbage Disposal at 1 m (3 ft.)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft.)	--70--	Vacuum Cleaner at 3 m (10 ft.)
Commercial Area Heavy Traffic at 90 m (300 ft.)	--60--	Normal Speech at 1 m (3 ft.)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. September, 2013.

EFFECTS OF NOISE ON PEOPLE

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1-dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6-dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING AND FUTURE NOISE AND VIBRATION ENVIRONMENTS

EXISTING NOISE RECEPTORS

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, sensitive land uses include existing single-family residential uses located north, east, and south of the project site.

EXISTING GENERAL AMBIENT NOISE LEVELS

The existing noise environment in the project area is primarily defined by traffic on Cull Canyon Road east of the project site.

To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted a continuous (24-hr.) noise level measurement at one location on the project and a short-term noise level measurement at one location on the project.

Noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey results is provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted Lmax, represents the highest noise level measured. The average value, denoted Leq, represents the energy average of all of the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L50, represents the sound level exceeded 50 percent of the time during the monitoring period.

Larson Davis Laboratories (LDL) model 831 and 812 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with a B&K Model 4230 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

Table 2: Summary of Existing Background Noise Measurement Data

Site	Date	Average Measured Hourly Noise Levels, dBA						
		$CNEL/L_{dn}$	Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm – 7:00 am)		
			L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
LT-1	4/09/20 - 4/10/20	49	45	38	60	42	40	52
ST-1	4/09/20 - 10:00 a.m.	N/A	48	37	63	N/A	N/A	N/A
Source: Saxelby Acoustics – 2020								

REGULATORY CONTEXT

6.60.040 - Exterior noise level standards.

A. It is unlawful for any person at any location within the unincorporated area of the county to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any single- or multiple-family residential, school, hospital, church, public library or commercial properties situated in either the incorporated or unincorporated area to exceed the noise level standards as set forth in Table 6.60.040A or Table 6.60.040B following:

Table 3: Receiving Land Use — Single- or Multiple-Family Residential, School, Hospital, Church or Public Library Properties Noise Level Standards, dB(A) (Table 6.60.040a)

Category	Cumulative Number of Minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Table 4: Receiving Land Use — Commercial Properties Noise Level Standards, dB(A) (Table 6.60.040b)

Category	Cumulative Number of Minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	65	60
2	15	70	65
3	5	75	70
4	1	80	75
5	0	85	80

B. In the event the measured ambient noise level exceeds the applicable noise level standard in any category above, the applicable standard shall be adjusted so as to equal said ambient noise level.

C. Each of the noise level standards specified in Tables 6.60.040A and B shall be reduced by five dB(A) for simple tone noises, noises consisting primarily of speech or music or for recurring impulsive noises.

D. If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be measured, the noise level measured while the source is in operation shall be compared directly to the applicable noise level standards in Table 6.60.040A and Table 6.60.040B.

E. Notwithstanding the noise level standards set forth in this section, the noise level standard applicable to the emission of sound from transformers, regulators, or associated equipment in electrical substations shall be 60 dB(A).

FUTURE TRAFFIC NOISE ENVIRONMENT

Traffic increases associated with the operation of the proposed project are expected to increase traffic noise levels along Cull Canyon Road. Saxelby Acoustics obtained the project traffic study from W-Trans Traffic Engineering Consultants. Existing traffic volumes for Cull Canyon Road were found to be approximately 420 vehicle trips per day. The proposed project is expected to increase traffic by a maximum of 51 vehicle trips per day. Given this increase in traffic volume, a noise level increase of approximately 0.5 dBA is expected. This is below the threshold of perception and will not substantially affect the ambient noise environment at sensitive receptors along Cull Canyon Road.

EVALUATION OF PROJECT NOISE EXPOSURE

Saxelby Acoustics prepared noise contour graphics showing median (L50) and maximum (Lmax) noise contours for the proposed project at both of the proposed outdoor activity areas. Noise contours were prepared using the SoundPLAN noise prediction model. Inputs to the model included sound power levels for noise-generating outdoor activity areas, existing and proposed buildings, topography, terrain type, and locations of sensitive receptors. These predictions are made in accordance with International Organization for Standardization (ISO) standard 9613-2:1996 (Acoustics – Attenuation of sound during propagation outdoors). ISO 9613 is the most commonly used method for calculating exterior noise propagation. Noise levels are predicted at the outdoor activity areas of sensitive receptors according to the requirements of Alameda County for stationary noise sources.

Figures 3 and 4 show the median (L_{50}) and maximum (L_{max}) noise contours for daytime noise at the proposed sports field. **Figures 5 and 6** show the median (L_{50}) and maximum (L_{max}) noise contours for daytime noise at the proposed campfire area. **Table 3** summarizes noise levels at the closest adjacent receptors.

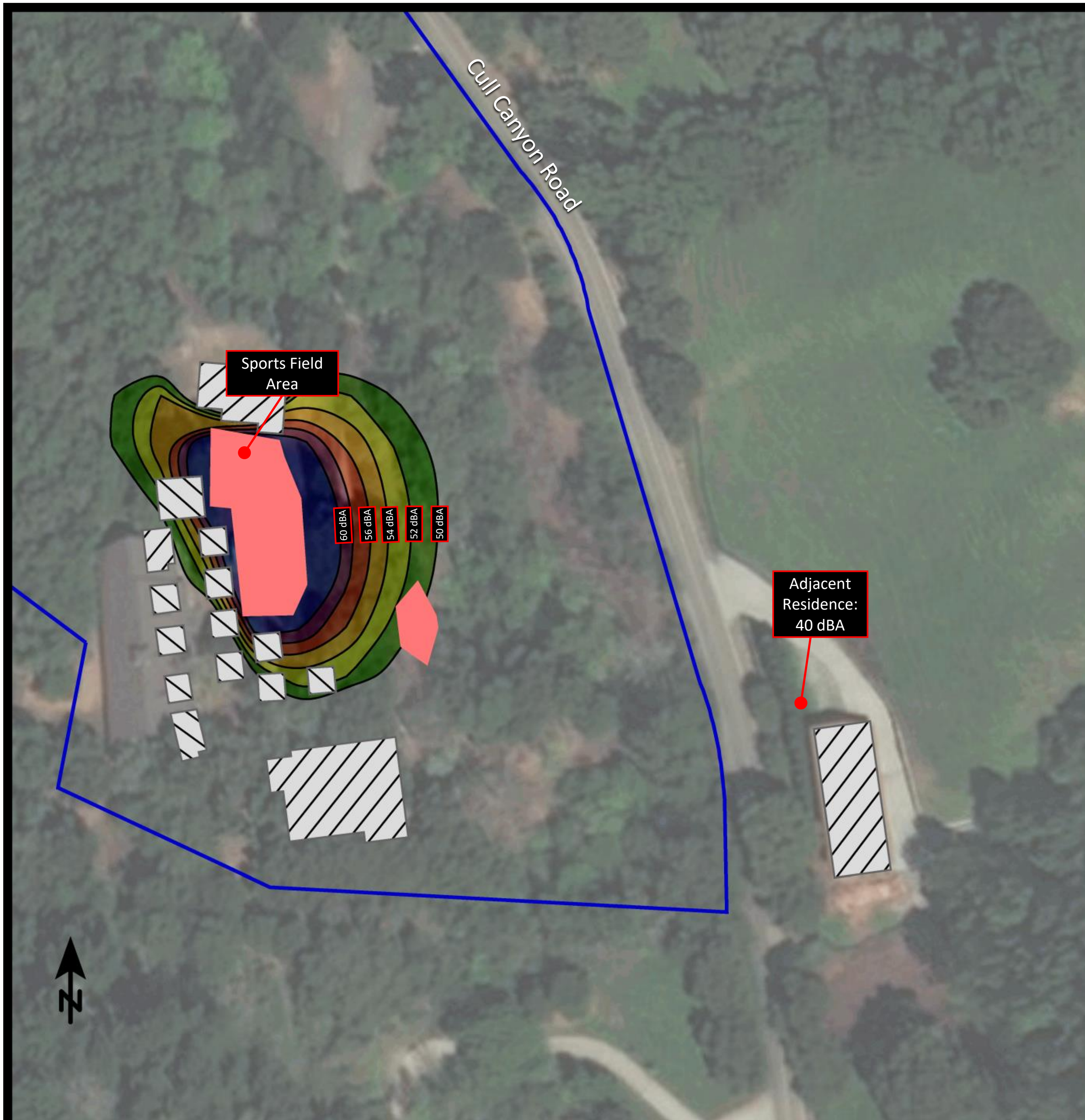

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Figure 3

L50 Outdoor Activity Noise Contours (dBA L_{50})

Signs and symbols

Project Site

Levels in dB(A)

<= 50
50 - 52
52 - 54
54 - 56
56 - 58
58 - 60
> 60

1 : 1219

0 5 10 20 30 40 m

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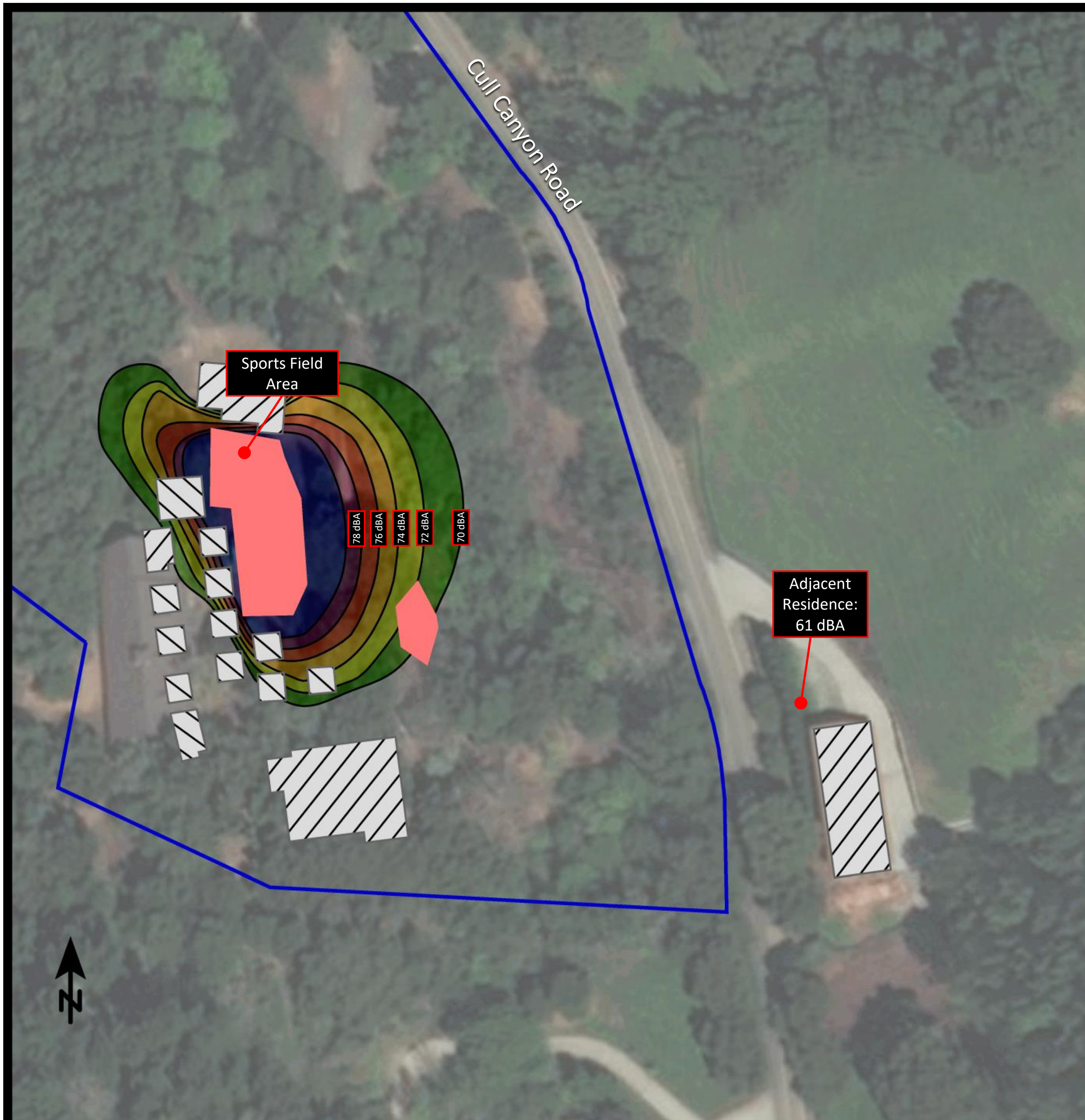

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Figure 4

Lmax Outdoor Activity Noise Contours (dBA L_{max})

Signs and symbols

Project Site

Levels in dB(A)

<= 70
70 - 72
72 - 74
74 - 76
76 - 78
78 - 80
> 80

1 : 1219

0 5 10 20 30 40 m

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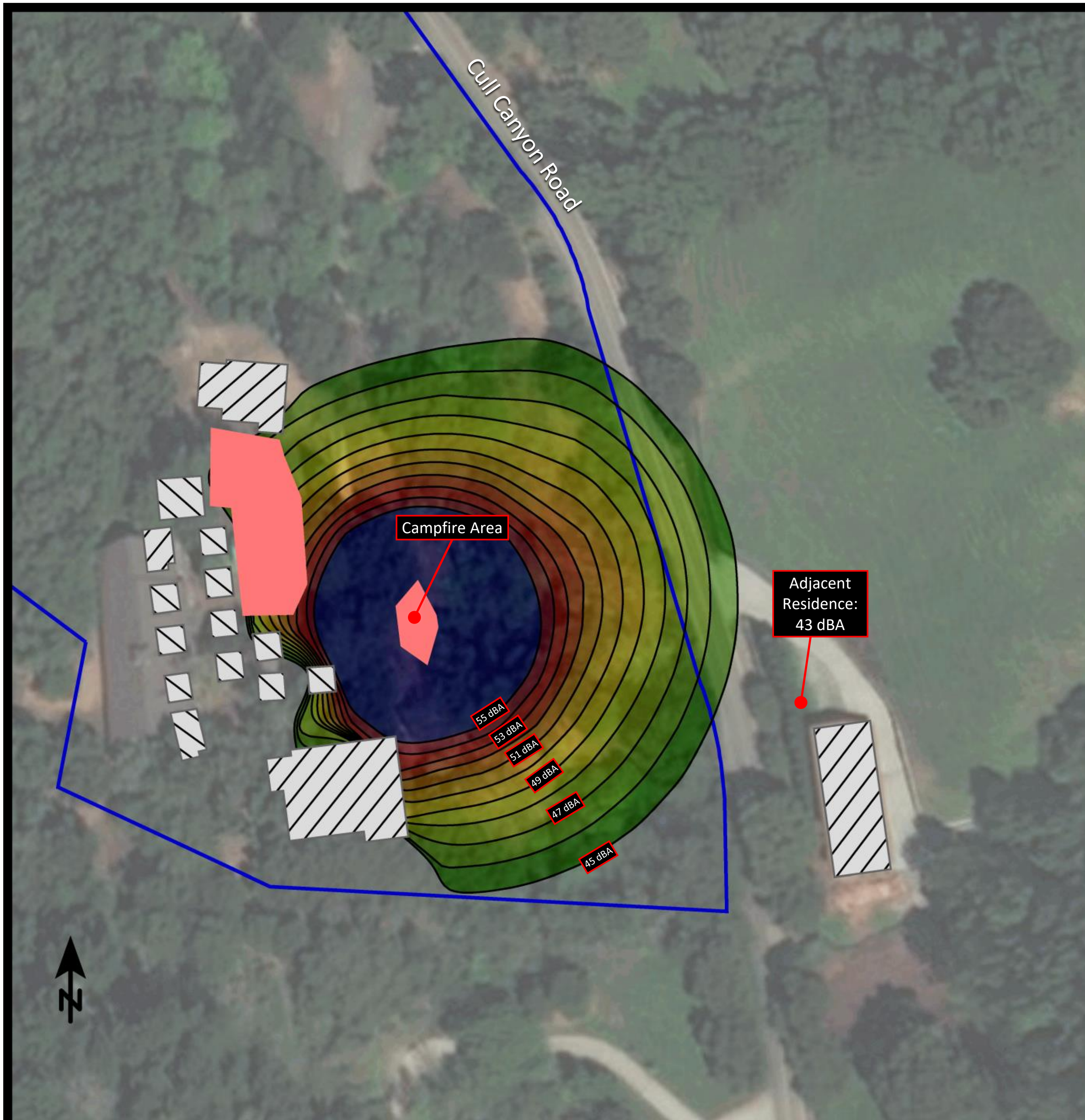

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Figure 5

L50 Campfire Activity Noise Contours (dBA L_{50})

Signs and symbols

Project Site

Levels in dB(A)

	<= 45
	45 - 46
	46 - 47
	47 - 48
	48 - 49
	49 - 50
	50 - 51
	51 - 52
	52 - 53
	53 - 54
	54 - 55
	> 55

1 : 1219

0 5 10 20 30 40 m

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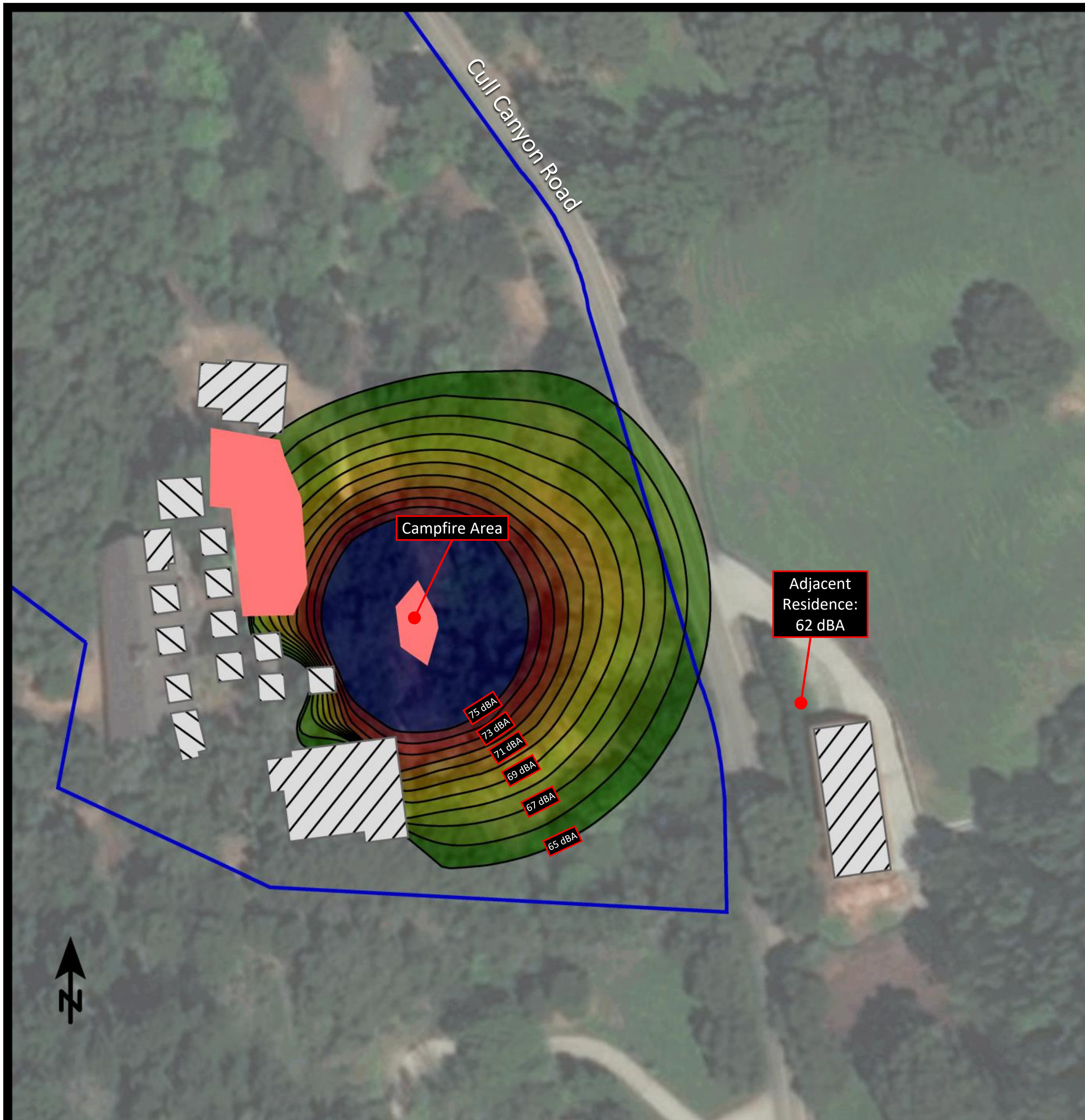

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Figure 6

Lmax Campfire Activity Noise Contours (dBA L_{max})

Signs and symbols

Project Site

Levels in dB(A)

<= 65
65 - 66
66 - 67
67 - 68
68 - 69
69 - 70
70 - 71
71 - 72
72 - 73
73 - 74
74 - 75
> 75

1 : 1219

0 5 10 20 30 40 m

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Based upon the SoundPLAN noise modeling, **Table 3** shows the predicted project noise levels at the adjacent noise-sensitive receptors for the proposed sports field and campfire activity area.

TABLE 3: PROJECT NOISE LEVELS AT ADJACENT RECEPTORS

Activity Area	Time	Predicted Noise Levels	Noise Standard	Complies with Standards?
Sports Field	Day (7 a.m. to 10 p.m.)	40.4 dBA L_{50} 61.4 dBA L_{max}	50 dBA L_{50} 70 dBA L_{max}	Yes
Campfire Area	Day (7 a.m. to 10 p.m.)	42.8 dBA L_{50} 61.8 dBA L_{max}	45 dBA L_{50}* 65 dBA L_{max}*	Yes

**Noise standards are reduced by 5 dBA for noise consisting of music per Alameda County General Plan requirements*

As shown in **Table 3**, the project noise levels are predicted to comply with the Alameda County General Plan Noise Element standards. This conclusion is based upon the following assumptions for project-generated noise:

Activity Area 1 (Sports Field)

- Daytime (7:00 a.m. to 10:00 p.m.) sound levels emanating from the sports field shall not exceed 61 dBA L_{50} and 80 dBA L_{max} at a distance of 50 feet to the east of the sports field boundary.

Activity Area 2 (Campfire Area)

- Daytime (7:00 a.m. to 10:00 p.m.) sound emanating from the campfire activity area shall not exceed 58 dBA L_{50} and 77 dBA L_{max} at a distance of 50 feet to the east of the campfire area as measured from the rear of the campfire area stage.

CONCLUSIONS

The proposed project is predicted to comply with the Alameda County exterior noise standards assuming the following project noise limits at each activity area:

Activity Area 1 (Sports Field)

- Daytime (7:00 a.m. to 10:00 p.m.) sound levels emanating from the sports field shall not exceed 61 dBA L_{50} and 80 dBA L_{max} at a distance of 50 feet to the east of the sports field boundary.

Activity Area 2 (Campfire Area)

- Daytime (7:00 a.m. to 10:00 p.m.) sound emanating from the campfire activity area shall not exceed 58 dBA L_{50} and 77 dBA L_{max} at a distance of 50 feet to the east of the campfire area as measured from the rear of the campfire area stage.

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SoundPLAN. SoundPLAN GmbH. Backnang, Germany. http://www.soundplan.eu/english/

Appendix A: Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
ASTC	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by +5 dBA and nighttime hours weighted by +10 dBA.
DNL	See definition of Ldn.
IIC	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
NIC	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
NNIC	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
RT60	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
SEL	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
SPC	Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

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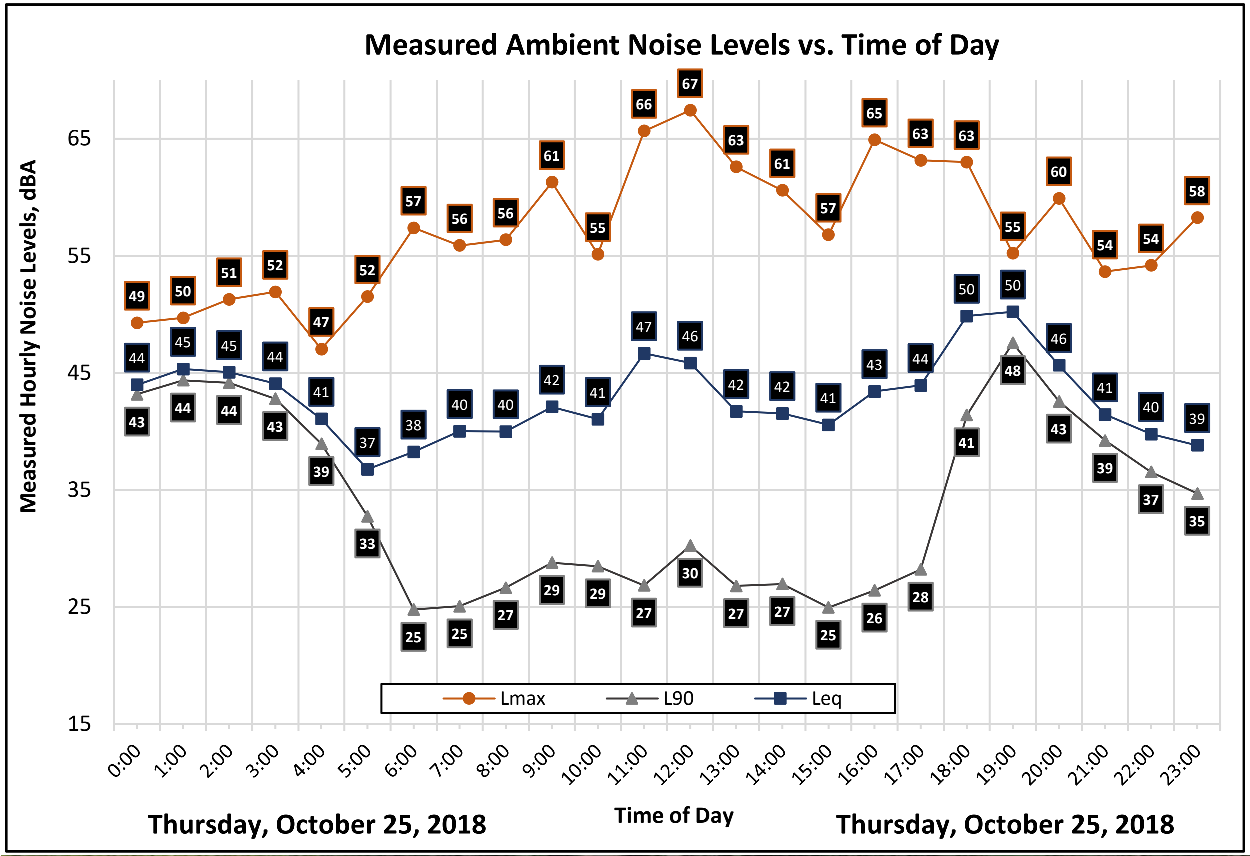
Appendix B1 : Continuous Noise Monitoring Results

Site: LT-1
Project: The Mosaic Project
Location: Southern Project Boundary
Coordinates: 37.7410835°, -122.0552801°
Meter: LDL 812-1
Calibrator: B&K 4230

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Thursday, October 25, 2018	0:00	44	49	44	43
Thursday, October 25, 2018	1:00	45	50	45	44
Thursday, October 25, 2018	2:00	45	51	45	44
Thursday, October 25, 2018	3:00	44	52	44	43
Thursday, October 25, 2018	4:00	41	47	41	39
Thursday, October 25, 2018	5:00	37	52	36	33
Thursday, October 25, 2018	6:00	38	57	29	25
Thursday, October 25, 2018	7:00	40	56	32	25
Thursday, October 25, 2018	8:00	40	56	31	27
Thursday, October 25, 2018	9:00	42	61	34	29
Thursday, October 25, 2018	10:00	41	55	37	29
Thursday, October 25, 2018	11:00	47	66	36	27
Thursday, October 25, 2018	12:00	46	67	36	30
Thursday, October 25, 2018	13:00	42	63	34	27
Thursday, October 25, 2018	14:00	42	61	35	27
Thursday, October 25, 2018	15:00	41	57	33	25
Thursday, October 25, 2018	16:00	43	65	36	26
Thursday, October 25, 2018	17:00	44	63	35	28
Thursday, October 25, 2018	18:00	50	63	49	41
Thursday, October 25, 2018	19:00	50	55	50	48
Thursday, October 25, 2018	20:00	46	60	45	43
Thursday, October 25, 2018	21:00	41	54	41	39
Thursday, October 25, 2018	22:00	40	54	38	37
Thursday, October 25, 2018	23:00	39	58	36	35

Statistics	Leq	Lmax	L50	L90
Day Average	45	60	38	31
Night Average	42	52	40	38
Day Low	40	54	31	25
Day High	50	67	50	48
Night Low	37	47	29	25
Night High	45	58	45	44
Ldn	49	Day %		75
CNEL	50	Night %		25



Appendix B2 : Short Term Noise Monitoring Results

Site: ST-1
Project: The Mosaic Project
Location: Nothern Project Boundary
Coordinates: 37.7431197 -122.0554551°

ter: LDL 831-3
tor: B&K 4230

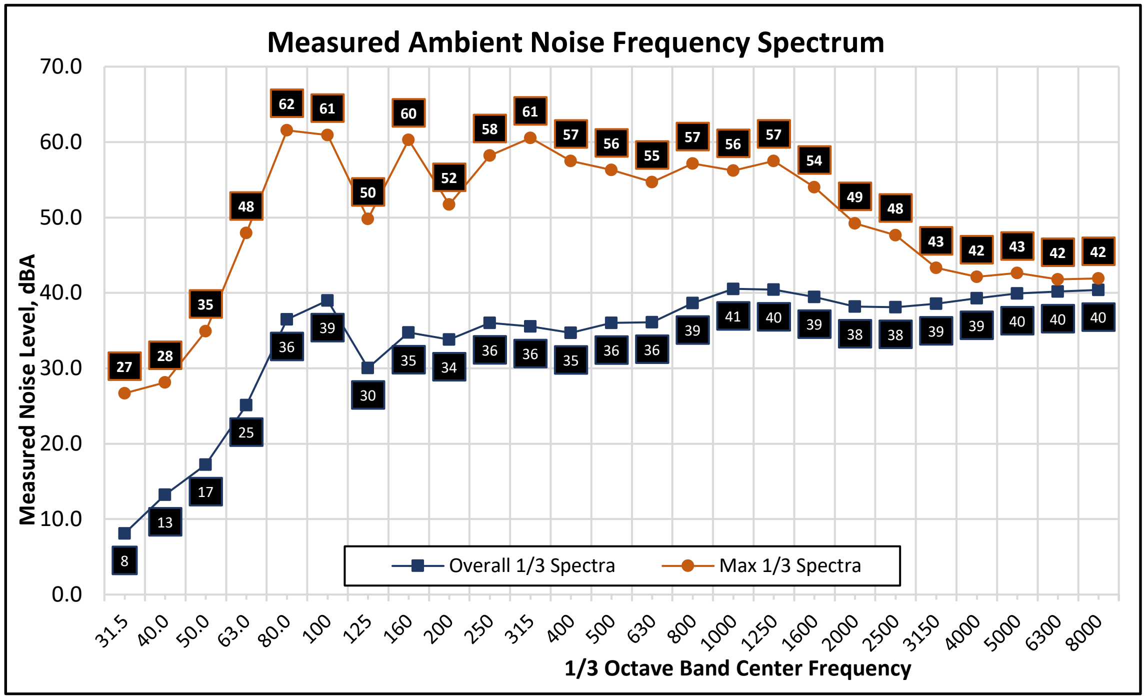
Start: 2018-10-24 14:16:56
Stop: 10/24/2018 14:26:56 PM
SLM: Model 831
Serial: 1329

Measurement Results, dBA

Duration:	0:10
L_{eq}:	48
L_{max}:	63
L_{min}:	25
L_{50}:	37
L_{90}:	28

Notes

Primary noise source is traffic on Cull Canyon Road



Noise Measurement Site

LOCAL REGULATIONS AND STANDARDS

Chapter 6.60 - NOISE

Sections:

6.60.010 - Declaration of policy.

In order to control unnecessary, excessive and annoying noise in the county, it is hereby declared to be the policy of the county to prohibit such noise generated from or by all sources as specified in this chapter. It shall be the policy of the county to maintain quiet in areas which exhibit low noise levels and to implement programs aimed to reduce noise in those areas within the county where noise levels are above acceptable values.

It is determined that certain noise levels are detrimental to the public health, welfare and safety, and are contrary to public interest. Therefore, the Board of Supervisors does ordain and declare that creating, maintaining, causing or allowing to be created, caused or maintained, any noise in a manner prohibited by or not in conformity with the provisions of this chapter, is a public nuisance and shall be punishable as such.

(Prior gen. code 3-107.101)

6.60.020 - Definitions.

"Ambient noise level" means the all encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

"'A' weighted sound level" means the total sound level in decibels of all sound as measured with a sound level meter with a reference pressure of twenty (20) micropascals using the 'A' weighted network (scale) at slow response. The unit of measurement shall be defined as dB(A).

"Church" means any building or portion thereof regularly used by people as a place to worship God and known by those familiar with the neighborhood to be so used.

"Commercial properties" means any building, structure, premise or portion thereof used for wholesale or retail purposes on which the property user or employees are engaged in work for which it is intended that compensation be received for goods or services.

"Construction" means construction, erection, enlargements, alteration, conversion or movement of any building, structures or land together with any scientific surveys associated therewith.

"Cumulative period" means an additive period of time composed of individual time segments which may be continuous or interrupted.

"Decibel (dB)" means a unit for measuring the amplitude of sounds, equal to twenty (20) times the logarithm to the base ten of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) micropascals.

"Director" means the director of environmental health of the county or his duly authorized deputy.

"Dwelling unit" means a single unit providing complete independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking and sanitation.

"Emergency work" means the use of any machinery, equipment, vehicle, manpower or other activity in a short term effort to protect or restore safe conditions in the community, or work by private or public utilities when restoring utility service.

"Hospital" means any building or portion thereof used for the accommodation and medical care of the sick, injured or infirm persons and includes rest homes and nursing homes.

"Impulsive noise" means a noise of short duration usually less than one second and of high intensity with an abrupt onset and rapid decay.

"Intruding noise level" means the total sound level in decibels, created, caused, maintained or originating from an alleged offensive source at a specified location while the alleged offensive source is in operation.

"Noise disturbance" means any sound as judged by any person empowered to enforce this chapter, which (A) endangers or injures the safety or health of human beings or animals, or (B) endangers or injures personal or real property, or (C) annoys or disturbs a reasonable person of normal sensitivity. The factors which shall be considered in determining whether a violation of (C) exists shall include, but not be limited to, the following:

1. The relative sound level of the objectionable noise to the ambient noise;
2. The proximity of the objectionable noise to residential sleeping facilities or public camping facilities;
3. The number of persons affected by the objectionable noise;
4. The day of the week and time of day or night the objectionable noise occurs;
5. The duration of the objectionable noise and its tonal, informational or musical content;
6. Whether the objectionable noise is continuous, recurrent or intermittent;
7. The nature and zoning of the area within which the objectionable noise emanates.

"Person" means a person, firm, association, partnership, joint venture, corporation or any entity, public or private in nature.

"Recreational motor vehicle" means any motor vehicle (as that term is defined in the California Vehicle Code) and shall also include, but not be limited to, motorcycles, go-carts, campers, dune buggies and commercial or noncommercial racing vehicles. A "recreational motor vehicle" does not include a motorboat.

"Residential property" means a parcel of real property which is developed and used either in whole or in part for residential purposes.

"School" means public or private institutions, including vocational schools, conducting regular academic instruction at preschool, kindergarten, elementary, secondary or collegiate levels.

"Simple tone noise" means any sound which is distinctly audible as a single pitch or a set of single pitches as judged by any person empowered to enforce this chapter.

"Sound level meter" means an instrument used for measurement of sound levels, which meets the American National Standard Institute's Standard S14-1971 or most recent revision thereof for Type 1 or Type 2 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

"Sound pressure level" of a sound, in decibels, means twenty (20) times the logarithm to the base ten of the ratio of the pressure of the sound to a reference pressure which is twenty (20) micropascals.

(Prior gen. code §§ 3-107.201—3-107.221)

6.60.030 - Noise measurement criteria.

A. Any noise measurement made pursuant to the provisions of this chapter shall be made with a sound level meter using the 'A' weighted network (scale) at slow meter response. Fast meter response shall be used for an impulsive noise. Calibration of the measurement equipment, utilizing an acoustic calibrator, shall be performed immediately prior to recording any noise date.

B. The exterior noise levels shall be measured at any point on the affected residential property, school, hospital, church, public library or commercial property. Where practical, the microphone shall be positioned three to five feet above the ground and away from reflective surfaces.

(Prior gen. code §§ 3-107.301, 3-107.302)

6.60.040 - Exterior noise level standards.

A. It is unlawful for any person at any location within the unincorporated area of the county to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any single- or multiple-family residential, school, hospital, church, public library or commercial properties situated in either the incorporated or unincorporated area to exceed the noise level standards as set forth in Table 6.60.040A or Table 6.60.040B following:

Table 6.60.040A

RECEIVING LAND USE — SINGLE- OR MULTIPLE-FAMILY RESIDENTIAL, SCHOOL, HOSPITAL, CHURCH OR PUBLIC LIBRARY PROPERTIES

NOISE LEVEL STANDARDS, dB(A)

Category	Cumulative Number of Minutes in any one hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Table 6.60.040B

RECEIVING LAND USE — COMMERCIAL PROPERTIES

NOISE LEVEL STANDARDS, dB(A)

Category	Cumulative Number of Minutes in any one hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.

1	30	65	60
2	15	70	65
3	5	75	70
4	1	80	75
5	0	85	80

B. In the event the measured ambient noise level exceeds the applicable noise level standard in any category above, the applicable standard shall be adjusted so as to equal said ambient noise level.

C. Each of the noise level standards specified in Tables 6.60.040A and B shall be reduced by five dB(A) for simple tone noises, noises consisting primarily of speech or music or for recurring impulsive noises.

D. If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be measured, the noise level measured while the source is in operation shall be compared directly to the applicable noise level standards in Table 6.60.040A and Table 6.60.040B.

E. Notwithstanding the noise level standards set forth in this section, the noise level standard applicable to the emission of sound from transformers, regulators, or associated equipment in electrical substations shall be 60 dB(A).

(Prior gen. code §§ 3-107.401—3-107.405)

6.60.050 - Prohibited noise disturbances.

A. No person shall make or cause to be made any noise disturbance as defined in Section 6.60.020 of this chapter.

B. Notwithstanding any of the provisions of this chapter, the following acts are prohibited within the unincorporated area of the county of Alameda, subject only to the exceptions of Section 6.60.070:

1. Radio, Television Sets, Musical Instruments and Similar Devices. Operating, playing or permitting the operation or playing of any radio, stereo, television set, audio equipment, electronic equipment, drum, musical instrument, or device which produces or reproduces sound at any time of day plainly audible at a distance of fifty (50) feet from such device. This section does not apply to places of public entertainment or to events for which a lawful permit has been obtained, provided that the activities producing sound are being conducted in compliance with the permit. This section does not apply to the operation of sound amplification systems in vehicles to the extent those systems are subject to California Vehicle Code Section 27007.
2. Animals and Birds. The keeping of any animal or bird, as pet or livestock, which causes frequent or continuous noise plainly audible at a distance of fifty (50) feet from such animal. For the purposes of this subsection, the animal noise shall not be deemed a disturbance or nuisance if the noise is in response to a person trespassing or threatening to trespass upon private property in or upon which the animal is situated or if the noise is in response to someone teasing or provoking the animal.

However, any person teasing or provoking the animal noise shall be guilty of a violation of this chapter.

3. Electric/Gas Powered Tools in Residential Areas: Vehicle Maintenance.
   a. Operation or use in residential areas between the hours of seven p.m. and seven a.m. on a weekday or between the hours of seven p.m. and eight a.m. on a weekend, of any electric or gasoline powered leaf blower, sweeper, vacuum, lawn mower, trimmer, edger, hedger or similar tool or device which produces sound which is plainly audible at a distance of fifty (50) feet from such device.
   b. Repairing, rebuilding, modifying or testing any vehicle in residential areas between the hours of seven p.m. and seven a.m., in such a manner as to produce sound which is plainly audible at a distance of fifty (50) feet from the vehicle.
4. Emergency Signaling Devices. The intentional sounding or permitting the sounding outdoors of any fire, burglar, or civil defense alarm, siren, whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing; provided such testing is conducted as follows:
   a. The testing of a stationary emergency signaling device shall not occur before seven a.m. or after seven p.m. Any such testing shall use only the minimum cycle test time, in no case shall such test time exceed sixty (60) seconds.
   b. The testing of the complete emergency signaling system, including the functioning of the signaling device, and the personnel response to the signaling device, shall not occur more than once in each calendar month. Such testing shall not occur before seven a.m. or after ten p.m. The time specified in subsection (B)(4)(a) of this section shall not apply to such complete system testing;
5. Sounding or permitting the sounding of any exterior burglar or fire alarm or any motor vehicle burglar alarm unless such alarm is terminated within fifteen (15) minutes of activation. Pre-existing installations will be allowed a period of ninety (90) days for correction;
6. Stationary Nonemergency Signaling Devices.
   a. Sounding or permitting the sounding of any electronically amplified signal from any stationary bell, chime, siren, whistle, or similar device, intended primarily for nonemergency purposes, from any place, for more than ten seconds in any hourly period,
   b. Churches shall be exempt from the operation of this provision,
   c. Sound sources covered by this provision and not exempted under subsection (B)(6)(b) of this section may be exempted by a variance issued by the director of environmental health;
7. Loading and Unloading. Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of nine p.m. and six a.m. in such a manner as to cause a noise disturbance across a residential real property line or at any time to violate the provisions of Section 6.60.040.
8. Vibration. Operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty (150) feet (forty-six (46) meters) from the source if on a public space or public right-of-way.

C. Notwithstanding the provisions of Section 6.60.040, where the intruding noise source, as measured pursuant to Section 6.60.030, is a residential air conditioning or refrigeration system or associated equipment installed prior to July 1, 1980, the exterior noise level shall not exceed fifty-five (55) dB(A). The exterior noise level shall not exceed fifty (50) dB(A) for such equipment installed after July 1, 1980.

D. "Plainly audible" means any sound that can be detected by a person using his or her unaided hearing faculties. As an example, if the sound source under investigation is a portable or personal vehicular sound amplification or reproduction device, the enforcement officer need not determine the title of a song, specific words, or the artist performing the song. The detection of the rhythmic base component of the music is sufficient to constitute a plainly audible sound.

E. The restrictions contained in Section 6.60.050(B)(1), (2) and (3) shall not apply to:
   1. Activities which are governed by conditional use permits or other permits issued by the county, if those permits expressly regulate or control the amount of noise or sound which may be generated by the activities which are governed by the permit;
   2. Unincorporated areas of the county within the east county area plan; or
   3. Unincorporated areas of the county outside the urban growth boundary, as defined by "Measure D" ("Save Agricultural and Open Space Lands Initiative of 2000").

(Ord. 2005-16 §§ 1-4; prior gen. code §§ 3-107.501—3-107.503)

6.60.060 - Vehicle noise limits.

A. Recreational Motorized Vehicles Operating Off A Public Highway. No person shall operate or cause to be operated any recreational motorized vehicle off a public highway in such a manner as to create a noise disturbance or exceed the standards set forth in Section 6.60.040 of this chapter.

B. Vehicle, Motorboat or Aircraft Repair and Testing. No person shall repair, rebuild, modify or test any vehicle, motorboat, or aircraft in such a manner as to create a noise disturbance or exceed the standards set forth in Section 6.60.040 of this chapter.

(Prior gen. code §§ 3-107.601—3-107.602)

6.60.070 - Special provisions or exceptions.

A. Emergency Exception. The provisions of this chapter shall not apply to:
   1. The emission of sound for the purpose of alerting persons to existence of an emergency; or
   2. The emission of sound in the performance of emergency work.

B. Warning Devices. Warning devices, necessary for the protection of public safety as, for example, police, fire and ambulance sirens and train horns shall be exempted from the provisions of this chapter.

C. Federal or State Preempted Activities. The provisions of this chapter shall not apply to any other activity to the extent regulation thereof has been preempted by state or federal law.

D. Public Health, Welfare and Safety Activities. The provisions of this chapter shall not apply to construction or maintenance and repair operations conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public and to protect the public health, welfare and safety, including, but not limited to street sweeping, debris and limb removal, removal of downed wires, restoring electrical service, repairing traffic signals, unplugging sewers, vacuuming catch basins, repairing of water hydrants and mains, gas lines, oil lines, sewers, storm drains, roads, sidewalks, etc.

E. Construction. The provisions of this chapter shall not apply to noise sources associated with construction, provided said activities do not take place before seven a.m. or after seven p.m. on any day except Saturday or Sunday, or before eight a.m. or after five p.m. on Saturday or Sunday.

F. Maintenance of Residential Property. The provisions of this chapter shall not apply to noise sources associated with the maintenance of residential property provided said activities take place between the hours of seven a.m. and nine p.m. on any day except Saturday or Sunday, or between the hours of nine a.m. and eight p.m. on Saturday or Sunday.

G. Proviso. Notwithstanding the provisions of subsections D, E and F of this section, no exemptions from the provisions at this chapter shall be granted for activities specified in said sections where equipment used for those activities, including mufflers, is not maintained in the condition for which it was designed or intended and thereby unnecessarily increases noise levels so as to cause a noise disturbance or exceed the standards set forth in Section 6.60.040 of this chapter.

(Prior gen. code §§ 3-107.701—3-107.707)

6.60.080 - Zone change.

Prior to the approval of any zone change, general plan amendment, precise development plan, conditional, use permit, zone variance or specific plan; upon request

A. The director shall review the noise impact of the proposed action by identifying existing and projected noise sources and the associated sound levels.
B. The director shall recommend usage of adequate control measures on noise sources identified in subsection A of this section which will be in violation of any provision of this chapter or the noise quality standards of the noise element of the county general plan.

(Prior gen. code § 3-107.801)

6.60.090 - Violations.

A. Any violation of this chapter is an infraction punishable by (1) a fine of one hundred dollars ($100.00) for a first violation; (2) a fine of two hundred dollars ($200.00) for a second violation of this chapter within one year; (3) a fine of five hundred dollars ($500.00) for each additional violation of this chapter within one year.
B. As an additional remedy, the operation or maintenance of any device, instrument, vehicle or machinery in violation of any provision of this chapter, so as to cause a noise disturbance, shall be deemed and is hereby declared to be a public nuisance and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.

(Ord. 2005-16 § 5: prior gen. code §§ 3-107.901—3-107.903)

6.60.100 - Manner of enforcement.

A. The director is directed to enforce the provisions of this chapter except for Section 6.60.050(B)(1), (2) and (3) which shall be enforced by peace officers. The director and peace officers may jointly enforce Sections 6.60.050(A) and 6.60.060 of this chapter.
B. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his duties.

(Ord. 2005-16 § 6: prior gen. code § 3-107.904)

6.60.110 - Variances.

A. The owner or operator of a noise source which the director has determined violates any of the provisions of this chapter may file an application with the director for variance from strict compliance with any particular provision of this chapter where such variance will not result in a hazardous condition or a nuisance and strict compliance would be unreasonable in view of all the circumstances. Said owner or operator shall set forth all actions taken to comply with said provision(s) and the reasons why immediate compliance cannot be achieved. A separate application shall be filed for each noise source; provided, however, that several mobile sources under common ownership or fixed sources under common ownership on a single property may be combined into one application.

Upon receipt of said application and within thirty (30) days thereof, the director shall either approve such request, in whole or in part, or deny the request. In the event the variance is approved, reasonable conditions may be imposed which may include restrictions on noise level, noise duration and operating hours, an approved method of achieving compliance and a time schedule for its implementation.

Factors which the director must consider shall include but not be limited to the following:

1. Uses of property within the area affected by the noise;
2. Factors related to initiating and completing all remedial work;
3. Age and useful life of the existing noise source;
4. The general public interest, welfare and safety;
5. Conditions, policies, or guidelines imposed by other agencies or other commissions including the planning commission conditions and planning commission or ALUC policies and guidelines.

B. Within thirty (30) days following the decision of the director on an application for a variance, the applicant may appeal the decision to the Board of Supervisors for a hearing de novo by filing a notice of appeal with the clerk of the Board of Supervisors. The Board of Supervisors shall either affirm, modify or reverse the decision of the director. Such decision shall be final and shall be based upon the considerations set forth in this section.

(Prior gen. code § 3-107.905)

6.60.120 - Construction.

This chapter shall be liberally construed so as to effectuate its purposes.

(Prior gen. code § 3-107.906)

CONSTRUCTION NOISE MODELING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/24/2022
Case Description: TMP-01

**** Receptor #1 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Demolition	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	89.6	82.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.6	85.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/24/2022
Case Description: TMP-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Site Preparation	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	84.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/24/2022
Case Description: TMP-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Grading	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	84.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/24/2022
Case Description: TMP-01

**** Receptor #1 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Tractor	No	40	84.0		50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Generator	No	50		80.6	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	84.0	82.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/24/2022
Case Description: TMP-01

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Paving	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Pavement Scarafier	No	20		89.5	50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Pavement Scarafier	89.5	82.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.5	84.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/24/2022
Case Description: TMP-01

**** Receptor #1 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Spec Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TMP-01 - Construction Noise Modeling Attenuation Calculations

		Levels in dBA Leq		
Phase	**RCNM Reference Noise Level**	**Residences to North/Northeast**	**Residences to East**	**Residences to South**
Distance in feet	*50*	*640*	*430*	*450*
Demolition	85	63	67	66
Distance in feet	*50*	*160*	*340*	*450*
Site Prep	85	74	68	66
Grading	85	74	68	66
Distance in feet	*50*	*120*	*270*	*280*
Building Construction	83	75	68	68
Architectural Coating	74	66	59	59

Attenuation calculated through Inverse Square Law: Lp(R2) = Lp(R1) - 20Log(R2/R1)

TMP-01 - Vibration Damage Attenuation Calculations

		Levels in in/sec PPV	
Distance in feet	**Vibration Reference Level at *25 feet***	**Residences to Northeast** *190*	
Vibratory Roller	0.21	0.010	
Clam shovel	0.202	0.010	
Hoe Ram	0.089	0.004	
Large Bulldozer	0.089	0.004	
Caisson Drilling	0.089	0.004	
Loaded Trucks	0.076	0.004	
Jackhammer	0.035	0.002	
Small Bulldozer	0.003	0.000	

TMP-01 - Vibration Annoyance Attenuation Calculations

		Levels in VdB
Equipment	**Vibration @ 25 ft**	**Residential to northeast**
Distance in feet		*190*
Clam shovel	94.0	68
Vibratory Roller	94.0	68
Hoe Ram	87.0	61
Large Bulldozer	87.0	61
Caisson Drilling	87.0	61
Loaded Trucks	86.0	60
Jackhammer	79.0	53
Small Bulldozer	58.0	32

APPENDIX I

FOCUSED TRAFFIC STUDY

April 5, 2022

Ms. Sonia Urzua, AICP
Alameda County Community Development Agency
Planning Department
224 West Winton Avenue, RM. 111
Hayward, CA 94544-1215

Focused Traffic Study for the Mosaic Project

Dear Ms. Urzua;

As requested, W-Trans has prepared a focused traffic analysis for the proposed Mosaic Project to be located at 17015 Cull Canyon Road in unincorporated Alameda County (Castro Valley). The purpose of this letter is to evaluate the project's potential traffic impacts, site access and adequacy of parking.

Existing Conditions

The study area consists of Cull Canyon Road, which runs along the frontage of the project site. Cull Canyon Road generally runs north-south and is classified as a local road. Along the project frontage, the road has one ten-foot lane in each direction. The portion of Cull Canyon Road near the project site does not have sidewalks or bike lanes. Machine counts conducted on Cull Canyon Road on Friday, March 8, 2019, and Monday, March 11, 2019 indicate that the roadway is carrying an average of about 210 daily vehicles in both directions, for a total of 420 vehicles per day.

Site Description

The existing site is comprised of a 1,200 square-foot home, 7,500 square-foot garage building, and 970 square-foot barn. The property is served by two driveways on Cull Canyon Road. A gravel parking area is located adjacent to the northern driveway. A gravel roadway connects the various structures on the site as well as the two driveways. Buses and other vehicles would enter the site via the northerly driveway and exit the site from the southerly driveway. Cull Creek runs through the property, generally parallel and west of Cull Canyon Road. An existing 12-foot-wide bridge spans Cull Canyon Creek and leads to a developed area which includes the garage building, paved patio, and driveways with drainage swales. The remainder of the site is steep bay and oak woodlands on an east-facing slope.

Project Description

The proposed project consists of an outdoor program overnight camp for 4th and 5th grade students. Three classes of 4th or 5th grade students (85-100 students maximum) would be transported to the camp by bus from their schools for a five-day, four-night program in nature. Students are anticipated to arrive by bus at 11:30 a.m. Monday morning and depart at 1:30 p.m. Friday afternoon. The Mosaic Project currently operates a program seasonally during the school year with six-week camp sessions from September to October and from late April to June at a different location. The intent is to expand the program from its existing location to the new Cull Canyon site. During initial operation at the new Cull Canyon site the Outdoor Program would continue to operate under the same schedule as the existing program. However, the goal is to expand the program to operate year-round, with more sessions during the school year, thereby serving more students per year.

As proposed, the project would remove the existing garage and construct new structures to provide ten student cabins, two teacher cabins, one residential unit, and one restroom and shower building, and a multi-use building.

The existing home would be converted to a caretaker unit. The existing barn is proposed to remain in place. The proposed project site plan is enclosed.

Vehicles would park in the gravel area adjacent to the driveways. Students would disembark/board buses from the driveway area and walk across the bridge to the lodging area. Only staff service vehicles would use the bridge to access the multipurpose building and facilities on the east side of Cull Creek.

Operational Analysis

Operating conditions along Cull Canyon Road on a typical Monday and Friday were evaluated to capture the highest potential impacts for the proposed project. The Monday period between 10:00 a.m. and 12:00 p.m. reflects conditions during bus drop-off and staff arrival, while the Friday period between 1:00 and 3:00 p.m. reflects bus pick-up and staff departure.

Trip Generation

Trip generation estimates are typically developed using standard rates published by the Institute of Transportation Engineers (ITE) in the most recent edition of the *Trip Generation Manual*. However, standard rates are not applicable to the proposed project since the manual does not specify rates for overnight education or youth camps. Thus, the trip generation potential for the Monday drop-off and Friday pick-up hours was developed based on anticipated staffing, student participants, and teachers present for each weekly camp session.

During operational months of the Mosaic Project, 85 to 100 students are anticipated to attend camp each week. Two to three buses, and occasionally one or two vans/shuttles, will transport all students, teachers, and aids. Occasionally, one to two teachers or aids will travel by personal vehicle.

Mosaic Project staff are anticipated to spend the week while camp is in session living on-site, so would generate no additional trips during the week. It is assumed that staff who drive in a personal vehicle to camp would travel outside of the arrival and departure hours of the students as they would be on-site for set-up prior to student arrival and would remain to clean up and were therefore not included in the peak hour analysis.

The *Highway Capacity Manual* (2010) stipulates that all truck trips shall be converted into passenger car equivalents (PCE) for analyzing capacity. For rolling terrain, one truck or bus should be converted to 2.5 PCE. Applying this equivalency conversion to the three proposed buses would equate to 8 PCE.

During the analysis periods of Monday 10:00 a.m. to 12:00 p.m. and Friday 1:00 p.m. to 3:00 p.m., the site would generate round trips by three buses and two vans as well as either two inbound or two outbound trips by private vehicle. After translating the bus trips to equivalent passenger car trips, the proposed project is anticipated to generate an average of 22 trips on Monday during the drop-off period and Friday during the pick-up period; these new trips represent the increase in traffic associated with the project.

Additionally, one to two deliveries of food and supplies are anticipated throughout the week during the operational months of the camp. These deliveries would occur during off-peak times and as part of a normal delivery route for the supplier, so these trips were not included in the peak hour analysis. Project trips are summarized in Table 1.

Table 1 – Trip Generation Summary								
Persons	**Transportation**	**Maximum Daily Trips**	**Monday Drop-Off Trips**	**In**	**Out**	**Friday Pick-Up Trips**	**In**	**Out**
Students	3 Buses	16*	16	8	8	16	8	8
Students	2 Vans/Shuttles	4	4	2	2	4	2	2
Teachers/Aids	2 Private Vehicles	2	2	2	0	2	0	2
Mosaic Staff**	12 Private Vehicles	24	0	0	0	0	0	0
Delivery**	1 Truck	5**	0	0	0	0	0	0
Total		**51**	**22**	**12**	**10**	**22**	**10**	**12**

Notes: * 1 truck/bus = 2.5 PCE's (Passenger Car Equivalents); ** All staff trips and deliveries were assumed to occur outside peak hour for student arrivals

The project site is expected to generate a peak of 51 daily trips, which is only anticipated to occur on a Monday or Friday. On weekends and Tuesday, Wednesday, and Thursday, less than 10 daily trips are expected.

Recommendation – It is recommended that truck deliveries be scheduled to occur on Tuesday, Wednesday or Thursdays to avoid conflicts with student arrival or departure.

Trip Distribution

The trip distribution was assumed to be 100 percent to/from Cull Canyon Road south of the site. Cull Canyon Road terminates about 3.5 miles north of the project site, and there is limited potential for the project to generate trips to/from the north.

Roadway TIRE Index

The average daily traffic (ADT) volume on Cull Canyon Road near the project site was determined based on machine counts conducted on Friday, March 8 and Monday, March 11, 2019. The volumes used for the analysis represent the average of the two-day count. Roadway segment counts are enclosed.

The potential effect of adding project-related traffic on residential streets near the project site was evaluated based on the Traffic Infusion on Residential Environment (TIRE) index. The TIRE index is a tool that measures the residents' perception of the effect of increasing the ADT on residential streets. TIRE index values range from 0.0 to 5.0 depending on daily traffic volume. An index of 0.0 represents the least infusion of traffic and 5.0 the greatest, and thereby the poorest residential environment. A TIRE index of 3.0 represents the threshold at which the character of a residential street changes. Residential streets with a TIRE index above this mid-range point of 3.0 typically exhibit higher traffic volumes, while streets with a TIRE index below 3.0 are usually more suitable for residential activities. According to this methodology, an impact occurs on the residential street when the difference in index between no project and project conditions is 0.10 or more.

It is estimated that 100 percent of the project-generated traffic would access the project via Cull Canyon Road. This represents 51 trips per day. To change the TIRE index calculation by 0.1 (or greater), 94 daily trips would be necessary. The number of daily trips needed is much higher than the 51 project-generated trips that are anticipated to use Cull Canyon Road.

Finding – The increase of daily traffic on Cull Canyon Road is insufficient to increase the TIRE index by 0.1. Thus, the addition of these trips would result in a less-than-significant impact.

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports, no collisions were reported in the project vicinity from January 1, 2012 through December 31, 2017. Two run-off-the-road collisions occurred during the same time period approximately one mile south of the project site.

Pedestrian Facilities

Given the remoteness of the proposed project site, it is reasonable to assume that all visitors will travel to and from the site by private automobile or bus. Therefore, the project is not anticipated to generate pedestrian traffic.

Finding – Although there are no pedestrian facilities serving the site, pedestrian trips are not expected.

Bicycle Facilities

Within the study area, bicyclists ride in the roadway on Cull Canyon Road. Existing roadway shoulders do not provide adequate access for bicyclists. The *Alameda County Bicycle and Pedestrian Plan for Unincorporated Areas* published in April 2012 does not specify or recommend any future bike lanes in the project vicinity. Visitors are not anticipated to travel to the project site by bicycle.

Finding – Shared use of local streets near the project site will provide adequate access for bicyclists, since visitors are not anticipated to arrive by bicycle.

Transit Facilities

There are no transit facilities serving the site; however, given the nature of the project, no demand is anticipated for the project. Schools sending students to the camp provide bus transportation for students and teachers.

Finding – Although transit facilities do not serve the project site, none are expected to be needed as visitors will arrive solely by a private vehicle (bus or automobile).

Access Analysis

Buses and other vehicles are expected to enter the site via the northerly driveway and exit the site from the southerly driveway. The two driveways are located approximately 240 feet apart on Cull Canyon Road. Vehicles would park on-site in the gravel area adjacent to these driveways.

Sight Distance

Sight distances along Cull Canyon Road at the project driveways were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance at minor street approaches that are a driveway is based on stopping sight distance, which uses the approach travel speeds as the basis for determining the recommended sight distance.

Sight distance at the proposed driveways were field measured as well as reviewed on available online aerial photographs. At the northerly driveway, the clear sight distance is about 420 feet to the north and 460 feet to the south, which is adequate for speeds up to 45 miles per hour and 50 miles per hour, respectively. At the southerly driveway sight lines are about 315 feet to the north and 240 feet to the south, which is adequate for speeds up to

40 miles per hour and 30 miles per hour, respectively. Based on the posted speed limit of 30 miles per hour, the sight distances at both the northerly and southerly driveways are adequate.

Finding – Sight distances for both project driveways are expected to be adequate based on existing conditions.

Site Circulation

On-site circulation was evaluated to determine if the layout would provide adequate circulation and room for vehicles maneuvering through the property. Based on a review of the site plan, the internal drive aisles are expected to provide acceptable circulation for motorized vehicles.

School bus and fire truck turning template analyses were conducted to evaluate whether a 38-foot-long school bus and a 31-foot-long fire truck would be able to enter, maneuver within and exit the site. The enclosed exhibits demonstrate that a school bus and fire truck would have sufficient space to enter from the northerly driveway, maneuver within the project site, and exit from the southerly driveway without striking any permanent fixtures.

Finding – School bus and fire truck access would be adequate since they would be able to enter, exit, and maneuver through the site.

Left-Turn Lane Warrant

The need for a left-turn lane on Cull Canyon Road at the project driveway was evaluated based on criteria contained in the *Intersection Channelization Design Guide*, National Cooperative Highway Research Program (NCHRP) Report No. 279, Transportation Research Board, 1985, as well as an update of the methodology developed by the Washington State Department of Transportation and published in the *Method For Prioritizing Intersection Improvements*, January 1997. The NCHRP report references a methodology developed by M. D. Harmelink that includes equations that can be applied to expected or actual traffic volumes to determine the need for a left-turn pocket based on safety issues.

Under existing conditions with the additional of project-related trips, a left-turn lane is not warranted on Cull Canyon Road at the project driveway during Monday drop-off or Friday pick-up.

Parking

The project would provide a maximum of ten parking spaces at various locations around the site.

The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated parking demand. The maximum number of parking spaces needed on-site would be during the mid-week period, after student drop-off and prior to student pick-up, and does not include the buses or vans than would drop students and staff off and then leave the site. During this time, there would typically be 12 Mosaic Staff on site. Assuming one employee per vehicle, in addition to the two teacher and aid private automobiles, the estimated parking demand would be 14 spaces. The proposed parking supply would have a deficit of four spaces.

If parking demand exceeds parking supply, motorists would be anticipated to park on the shoulder of Cull Canyon Road or park in tandem with other vehicles on-site. Parking on the shoulder of Cull Canyon Road would be expected to limit sight distance, posing a safety issue. Tandem parking could limit circulation and obstruct emergency vehicle access.

The project site plan does not propose any accessible parking spaces. The *ADA Standards for Accessible Design* (2010) sets forth requirements for the minimum number of accessible parking spaces based on the total number of parking spaces provided. For parking facilities with 25 or less parking spaces, one van accessible parking space is required.

Finding –The proposed parking supply for the project would not accommodate the anticipated mid-week parking demand or comply with ADA standards.

Recommendation – It is recommended that the site plan be modified to accommodate 13 parking spaces plus one van accessible parking space, for a total of 14 parking spaces.

Vehicle Miles Traveled (VMT) Evaluation

Senate Bill (SB) 743 established the increase in Vehicle Miles Traveled (VMT) because of a project as the basis for determining transportation impacts of development projects. As of the date of this analysis, Alameda County has not yet established thresholds of significance related to VMT. Thus, the project-related VMT impacts were assessed based on guidance provided by the California Governor's Office of Planning and Research (OPR) in the publication *Transportation Impacts (SB 743) CEQA Guidelines Update and Technical Advisory*, 2018. Guidance provided in this document recommends the use of screening thresholds to quickly identify when a project should be expected to cause a less-than-significant impact in terms of VMT without conducting a detailed study. This document indicates that small projects that generate or attract fewer than 110 trips per day may be assumed to cause a less-than-significant transportation impact.

The proposed project is expected to generate 51 daily trips which satisfies OPR's guidance for consideration as a small project. As a small project, the impact on vehicle miles traveled can be assumed to be less-than-significant.

Finding – The proposed project is anticipated to result in a less-than-significant impact on vehicle miles traveled.

Conclusions and Recommendations

- The proposed project is anticipated to generate an average of the equivalent of 22 peak hour trips (considering buses as equivalent to 2.5 cars) on Monday during the drop-off period and Friday during the pick-up period. At maximum (Mondays and Fridays only), the project is anticipated to generate the equivalent of 51 daily trips. Truck deliveries should be scheduled during midweek to avoid conflicts with drop-off and pick-up activities.

- Per the TIRE index, the addition of project-related trips on Cull Canyon Road is expected to result in a less-than-significant impact.

- Pedestrian, bicycle, and transit facilities are not provided. However, these facilities are deemed unnecessary for the site because visitors and staff are expected to travel by bus and private automobile.

- Sight distance to the north and south of both driveways would be adequate based on the posted speed limit of 30 miles per hour. A left-turn lane at the project driveway is not warranted.

- Maneuverability throughout the site is adequate for school bus drop-off and pick-up, as well as fire truck access.

- The site should provide 14 parking spaces, including one van accessible space, to accommodate demand.

- The proposed project would have a less-than-significant transportation impact on vehicle miles traveled.

We hope this information is adequate to address the potential traffic and parking impacts associated with the proposed project. Thank you for giving W-Trans the opportunity to provide these services. Please call if you have any questions.

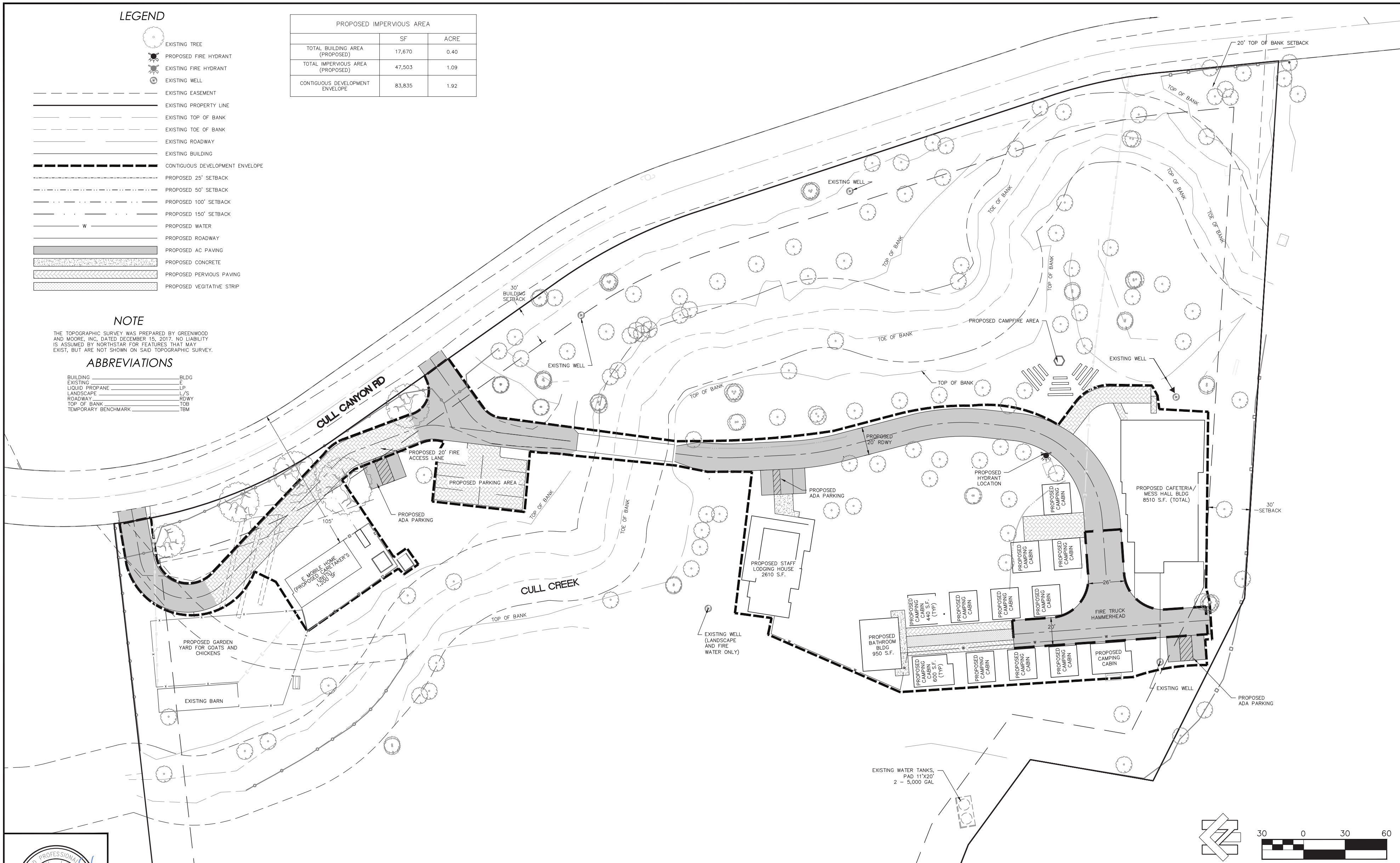
Sincerely,

Kenneth Jeong, PE
Senior Traffic Engineer

Mark Spencer, PE
Senior Principal

MES/kbj/ALX035.L1

Enclosures: Site Plan, Roadway Segment Counts, Site Circulation Diagrams



LEGEND

- EXISTING TREE
- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT
- EXISTING WELL
- EXISTING EASEMENT
- EXISTING PROPERTY LINE
- EXISTING TOP OF BANK
- EXISTING TOE OF BANK
- EXISTING ROADWAY
- EXISTING BUILDING
- CONTIGUOUS DEVELOPMENT ENVELOPE
- PROPOSED 25' SETBACK
- PROPOSED 50' SETBACK
- PROPOSED 100' SETBACK
- PROPOSED 150' SETBACK
- W PROPOSED WATER
- PROPOSED ROADWAY
- PROPOSED AC PAVING
- PROPOSED CONCRETE
- PROPOSED PERVIOUS PAVING
- PROPOSED VEGITATIVE STRIP

PROPOSED IMPERVIOUS AREA		
	SF	ACRE
TOTAL BUILDING AREA (PROPOSED)	17,670	0.40
TOTAL IMPERVIOUS AREA (PROPOSED)	47,503	1.09
CONTIGUOUS DEVELOPMENT ENVELOPE	83,835	1.92

NOTE

THE TOPOGRAPHIC SURVEY WAS PREPARED BY GREENWOOD AND MOORE, INC, DATED DECEMBER 15, 2017. NO LIABILITY IS ASSUMED BY NORTHSTAR FOR FEATURES THAT MAY EXIST, BUT ARE NOT SHOWN ON SAID TOPOGRAPHIC SURVEY.

ABBREVIATIONS

BUILDING	BLDG
EXISTING	E
LIQUID PROPANE	LP
LANDSCAPE	L/S
ROADWAY	RDWY
TOP OF BANK	TOB
TEMPORARY BENCHMARK	TBM

REGISTERED PROFESSIONAL ENGINEER · GARY N. LEN... · MARCH 17, 2020 · CIVIL · STATE OF CALIFORNIA

		Revision	Date	By
Designed:	DJW			
Drawn By:	CNS			
Approved:				
Date:	JULY 2019			

NORTHSTAR ... Designing Solutions
111 MISSION RANCH BLVD. SUITE 100, CHICO, CA 95926
PHONE: (530) 893-1600 www.northstareng.com

MOSAIC
17015 CULL CANYON
CASTRO VALLEY, CALIFORNIA 94546

PROPOSED SITE LAYOUT
MOSAIC

APN Number	Job Number	Scale		Sheet
085-1200-001-16	17-231	(24"x36") 1"= 30' Horz.	N/A Vert.	Sheet 2 Of 3

Volume Report Summary

Location: Cull Canyon Rd S/O 17031 Cull Canyon Rd
Count Direction: Northbound / Southbound
Date Range: 3/8/2019 - 3/14/2019
Site Code: 01

Volume Summary

	NB	SB	Total
Daily Average	209	210	419
Mid-Week Average	#DIV/0!	#DIV/0!	#DIV/0!
AM Peak Average			
PM Peak Average			

Location: **Cull Canyon Rd S/O 17031 Cull Canyon Rd**
Count Date: **3/8/2019**
Site Code: **01**

Time	NB	SB	Total
12:00 AM	1	0	1
1:00 AM	0	0	0
2:00 AM	1	2	3
3:00 AM	0	0	0
4:00 AM	1	0	1
5:00 AM	3	1	4
6:00 AM	2	5	7
7:00 AM	8	**16**	24
8:00 AM	**11**	14	**25**
9:00 AM	7	12	19
10:00 AM	9	**16**	**25**
11:00 AM	10	10	20
12:00 PM	19	15	34
1:00 PM	14	13	27
2:00 PM	19	15	34
3:00 PM	**21**	16	**37**
4:00 PM	12	17	29
5:00 PM	16	**18**	34
6:00 PM	13	14	27
7:00 PM	10	13	23
8:00 PM	9	2	11
9:00 PM	7	3	10
10:00 PM	7	2	9
11:00 PM	0	0	0
Daily Total	**200**	**204**	**404**
Percent	**50%**	**50%**	
AM Peak Hour (8:00 AM - 9:00 AM)	**11**	**14**	**25**
Percent	**44%**	**56%**	
PM Peak Hour (3:00 PM - 4:00 PM)	**21**	**16**	**37**
Percent	**57%**	**43%**	

Note: Peak Hour Based on hourly time of day bins.

Location: Cull Canyon Rd S/O 17031 Cull Canyon Rd
Count Date: 3/11/2019
Site Code: 01

Time	NB	SB	Total
12:00 AM	3	0	3
1:00 AM	1	1	2
2:00 AM	0	0	0
3:00 AM	0	0	0
4:00 AM	0	0	0
5:00 AM	2	3	5
6:00 AM	2	3	5
7:00 AM	8	**16**	24
8:00 AM	8	14	22
9:00 AM	6	13	19
10:00 AM	**12**	10	22
11:00 AM	**12**	13	**25**
12:00 PM	10	18	28
1:00 PM	**27**	15	**42**
2:00 PM	15	18	33
3:00 PM	20	12	32
4:00 PM	25	11	36
5:00 PM	15	**25**	40
6:00 PM	21	14	35
7:00 PM	4	16	20
8:00 PM	11	7	18
9:00 PM	6	1	7
10:00 PM	5	2	7
11:00 PM	5	3	8
Daily Total	**218**	**215**	**433**
Percent	**50%**	**50%**	
AM Peak Hour (10:00 AM - 11:00 AM)	**12**	**13**	**25**
Percent	**48%**	**52%**	
PM Peak Hour (1:00 PM - 2:00 PM)	**27**	**15**	**42**
Percent	**64%**	**36%**	

Note: Peak Hour Based on hourly time of day bins.

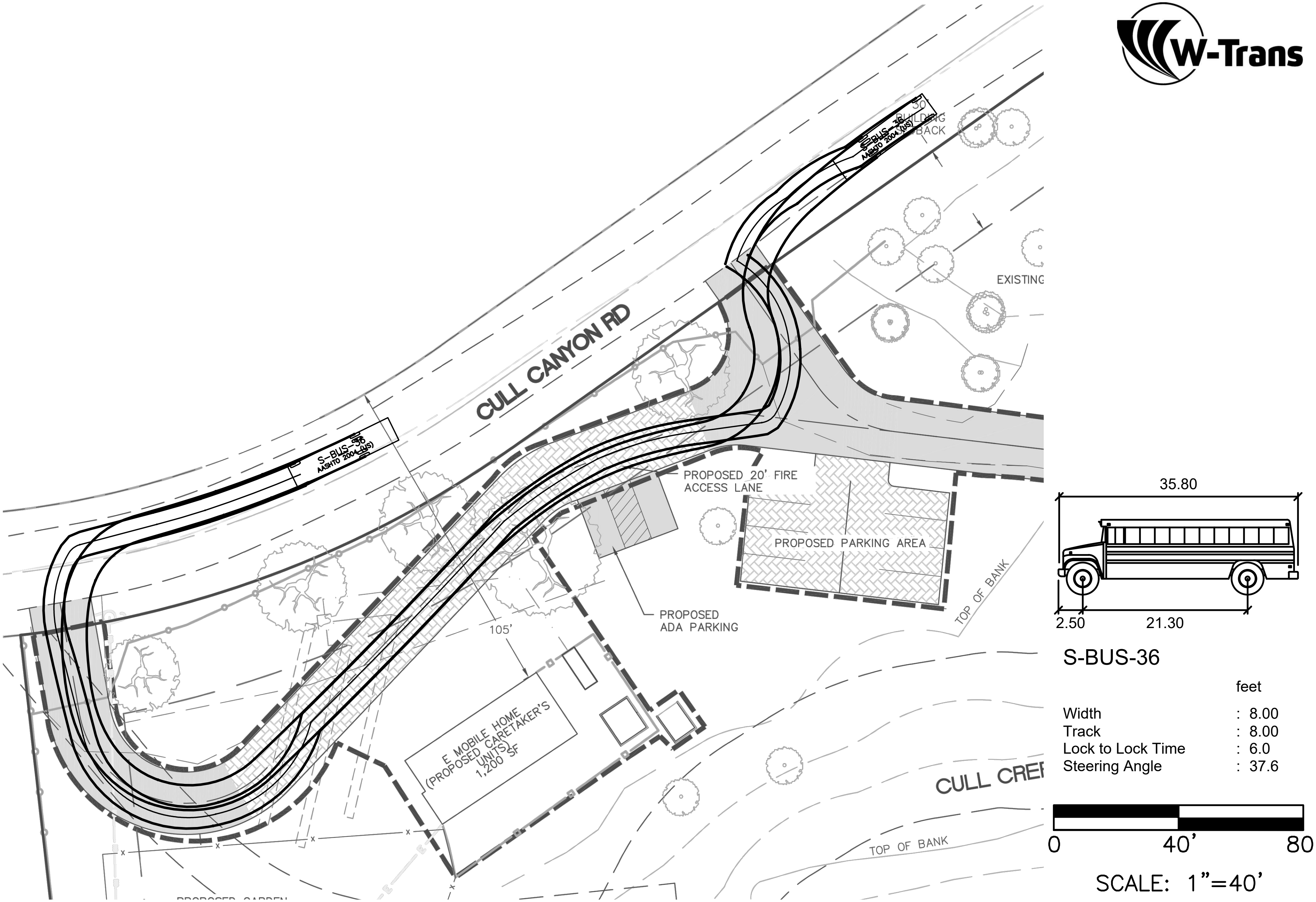
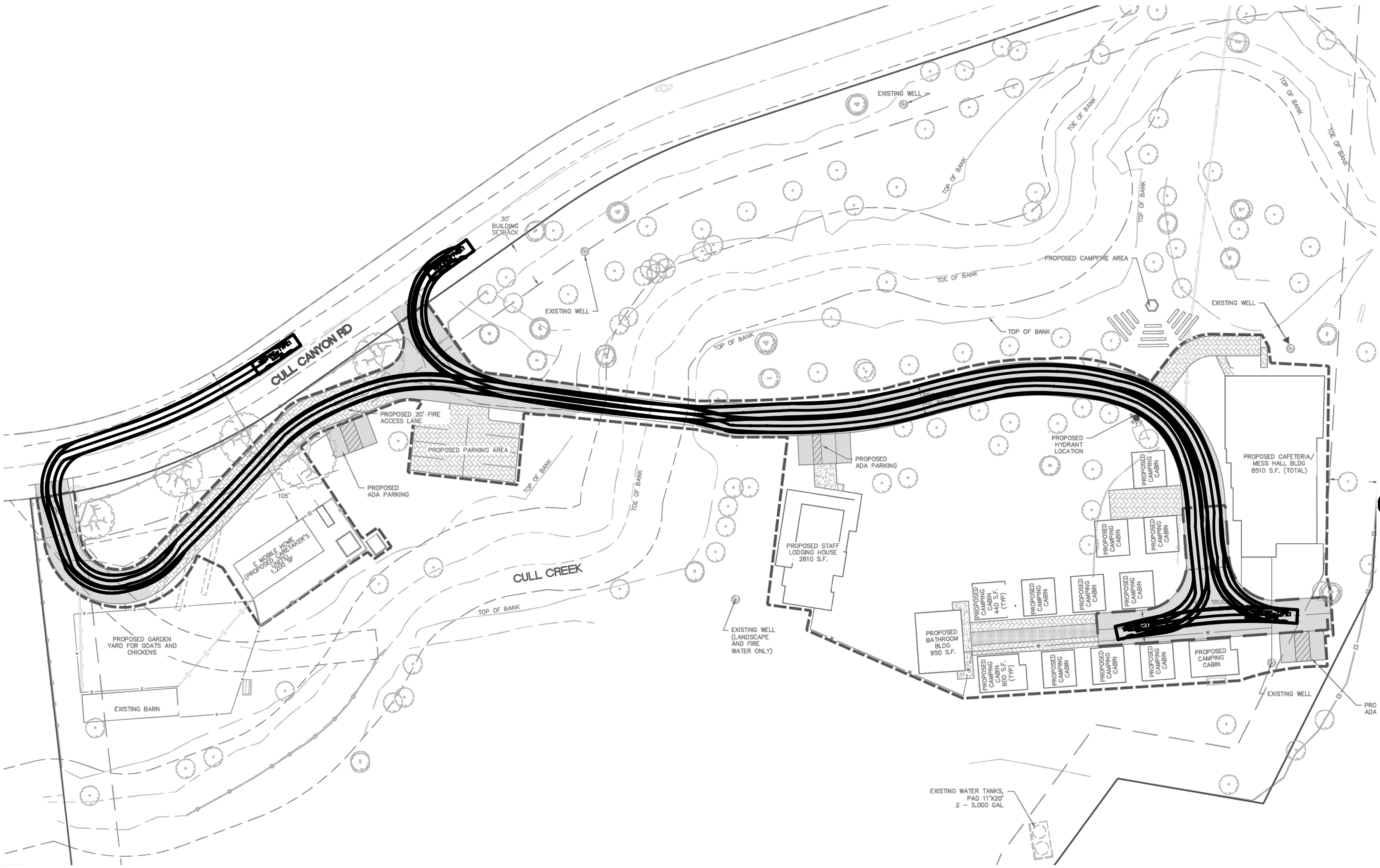
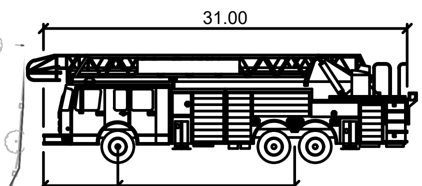


Exhibit #1 – Mosaic Project AutoTURN

W-Trans





WINFIRE-TYPE1

		feet
Width	:	8.20
Track	:	8.20
Lock to Lock Time	:	6.0
Steering Angle	:	26.4

0 100' 200'

SCALE: 1"=100'

Exhibit #2 – Mosaic Project AutoTURN

Appendix J

NAHC Sacred Lands File Search

NATIVE AMERICAN HERITAGE COMMISSION

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

August 31, 2022

Vivian Kha
PlaceWorks

Via Email to: vkha@placeworks.com

Re: The Mosaic Project, Alameda County

Dear Ms. Kha:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Cody.Campagne@nahc.ca.gov.

Sincerely,

Cody Campagne

Cody Campagne
Cultural Resources Analyst

Attachment