SAN BERNARDINO COUNTY
INITIAL STUDY/MITIGATED NEGATIVE DECLARATION
ENVIRONMENTAL CHECKLIST FORM

This form and the descriptive information in the application package constitute the contents of Initial Study pursuant to County Guidelines under Ordinance 3040 and Section 15063 of the State CEQA Guidelines.

PROJECT LABEL:

APNs:	0333-106-15, 0333-106-16	***USGS Quad:***	Lake Arrowhead
Applicant:	Lake Arrowhead Development, LLC 22939 Hawthorne Blvd, Ste 100 Torrance, CA 90505	***T, R, Section:***	T02N R03W SEC 16
Location	North Bay Road at North Shore of the SW end of Lake Arrowhead	***Lat/Long***	34°15'25.164"N, 117°12'4.428"W
Project No:	PROJ-2021-00161	***Land Use Category:***	Low Density Residential (LDR)
Rep:	Andy Minor/Geovironment Consulting	***Zoning Designation:***	Multi-Residential (RM)
Proposal:	A Zoning Amendment from Multi-Residential (RM) to Single Residential 14,000 square foot minimum lot size (RS-14M), and a Tentative Tract Map (TTM) for 41 single family units on 15 acres in the Community of Lake Arrowhead.	***Overlays:***	Fire Safety (FS-1), Landslide Susceptibility (Low-Mod)

PROJECT CONTACT INFORMATION:

Lead agency: County of San Bernardino

Land Use Services Department 385 N. Arrowhead Avenue, 1st Floor San Bernardino, CA 92415-0182

Contact person: Chris Warrick, Planning Supervisor

Phone No: (909) 387-4112 ***Fax No:*** (909) 387-3223

E-mail: Chris.warrick@lus.sbcounty.gov

Applicant's Consultant: Andy Minor
Geovironment Consulting
630 W 7th Street
San Jacinto, CA 92583
(951) 232-1930

PROJECT DESCRIPTION:

Purpose

The purpose of the Initial Study (IS) in support of a Mitigated Negative Declaration (MND), herein referred to as IS/MND, is to identify and adequately mitigate any potentially significant environmental impacts associated with the implementation of the proposed Project in the community of Lake Arrowhead, County of San Bernardino, California. The Project's objective is to subdivide the parcels (Lake Arrowhead Development) with TTM 20480 into 41 single family residential lots.

This IS/MND and its appendices, have been prepared in accordance with the CEQA Statute and the State's Guidelines for Implementation of CEQA for preparation of an IS. This IS, when combined with the Notice of Intent to Adopt an MND, serves as the environmental document for the proposed Project pursuant to the provisions of CEQA (*California Public Resources Code* §21000 et seq.) and the CEQA Guidelines (Title 14, *California Code of Regulations* §15000, et seq.).

Summary

The Project includes a Zoning Amendment from Multiple Residential (RM) to Single Residential 14,000 square foot minimum lot size (RS-14M), and a Tentative Tract Map (TTM 20480) to establish a subdivision of forty-one (41) single family units in three phases. The site currently consists of two (2) parcels with a total of approximately sixteen (16) acres in the community of Lake Arrowhead. Currently the property is assigned Assessor Parcel Numbers: 0333-106-15, and 0333-106-16.

Phase 1 will create a total of seven (7) lots with an average size of 14,000 square feet to be built in between South of White Fir Road; and North of Sugar Pine Road. Average size of the homes would be 3,000 square feet.

Phase 2 will create a total of nine (9) lots with average size of 14,000 Sq ft., to build luxury homes with entry level next to three car garages off Cedarwood and Oakwood Drive / Cedarwood Dr. Average size of the homes would be 4,000 to 5,000 square feet.

Phase 3 will create a total of (25) lots with average size of 14,000 square feet to build luxury homes in between North Bay Road and Sugar Pine Road. A total of six (6) lots will be fronting to North Bay Road and the other nineteen (19) will be built at a higher elevation with lake view.

Surrounding Land Uses and Setting

The Project site is in the western portion of San Bernardino County within the community of Lake Arrowhead. The site is located in the gated community of North Bay at Lake Arrowhead. The surrounding setting consists of moderately dense developed mountainous terrain. The Project site is bordered by residential homes zoned RS-14M and paved roads. The western shoreline of Lake Arrowhead is located approximately 500 feet away from the eastern portion of the site and is zoned FW. Just northeast of the site is San Bernardino County Fire Station 94 zoned RS-14M. Southwest of the site is Blue Jay Village, where the local grocery store, Jensen's Foods is zoned as a CG-SCp. West of the site approximately 0.6 mi away, is Grass Valley Creek and Lake Arrowhead Country Club Golf Course zoned as RC. Northwest of the site is Mary Putnam Henck Intermediate School zoned IN.

Land uses on the Project site and surrounding parcels are governed by the San Bernardino Countywide Plan/Policy Plan, and Development Code. The following table lists the existing land uses and zoning districts. The Countywide Plan Land Use Category for the parcel is Low Density Residential (LDR), and the Zoning Designation is currently Multiple Residential (RM). The

surrounding properties in all directions are listed below in Table 1 and are identified as Single Residential 14,000 sf minimum lot size (RS-14M), and Multiple Residential (RM).

Table 1: Existing Land Use and Land Use Zoning Districts

Location	Existing Land Use	Land Use Category	Zoning Districts
Project Site	Vacant Land	Low Density Residential (LDR)	Multiple Residential (RM)
North	Single Residential, Multiple Residential	Low Density Residential (LDR), Medium Density Residential (MDR)	Single Residential 14,000 sf minimum lot size (RS-14M), Multiple Residential (RM)
South	Single Residential, Multiple Residential	Low Density Residential (LDR), Medium Density Residential (MDR)	Single Residential 14,000 sf minimum lot size (RS-14M), Multiple Residential (RM)
East	Single Residential	Low Density Residential (LDR)	Single Residential 14,000 sf minimum lot size (RS-14M)
West	Multiple Residential	Medium Density Residential (MDR)	Multiple Residential (RM)

Project Site Location, Existing Site Land Uses and Conditions

The Project site is located on the north shore of the southwest portion of Lake Arrowhead along North Bay Road in Lake Arrowhead, California. The 15.95-acre parcel is currently zoned Multiple Residential (RM) and will be required to change the zone to Single Residential 14,000 square foot minimum lot size (RS-14M) to remain consistent with the Countywide Plan/Policy Plan 2020. The Project site consists of steep mountainous slopes of more than 15% with typical mountain vegetation. There are no defined watercourses on the site.

ADDITIONAL APPROVAL REQUIRED BY OTHER PUBLIC AGENCIES

Federal: None.
State of California: None.
County of San Bernardino: Land Use Services Department-Building and Safety, Public Health-Environmental Health Services, Special Districts, and Public Works.
Regional: South Coast Air Quality Management District.
Local: None

N

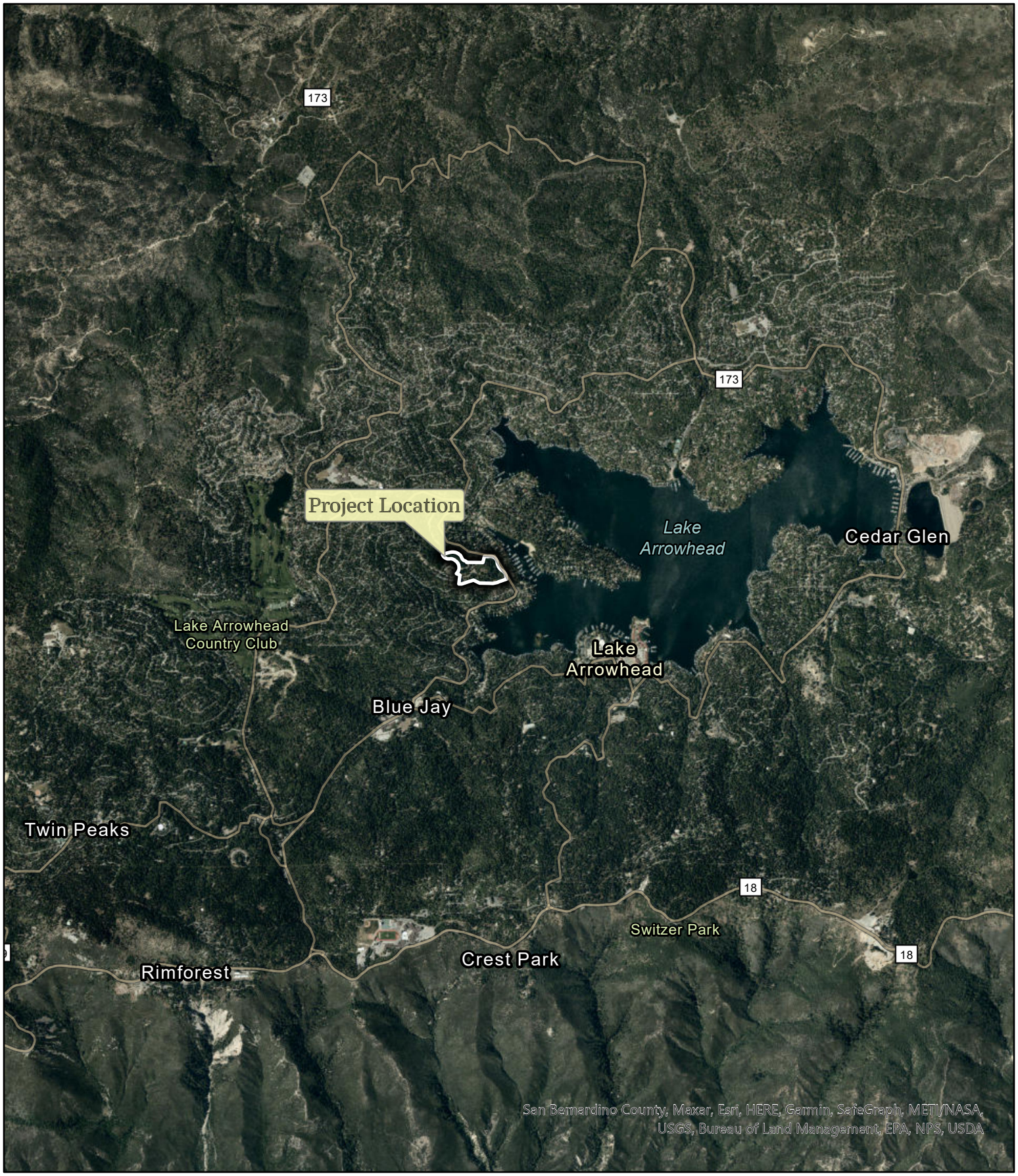
0 1.5 3 6 Miles

Figure 1 - Project Vicinity
Lake Arrowhead Development

N

0 2,000 4,000 8,000 Feet

Figure 2 - Project Location
Lake Arrowhead Development



N

0 130 260 520 Feet

Figure 3 - Project Site Plan
Lake Arrowhead Development

Figure 4 - Site Photos
Lake Arrowhead Development


Photo 1

Photo 2


Photo 3


Photo 4


Photo 5


Photo 6

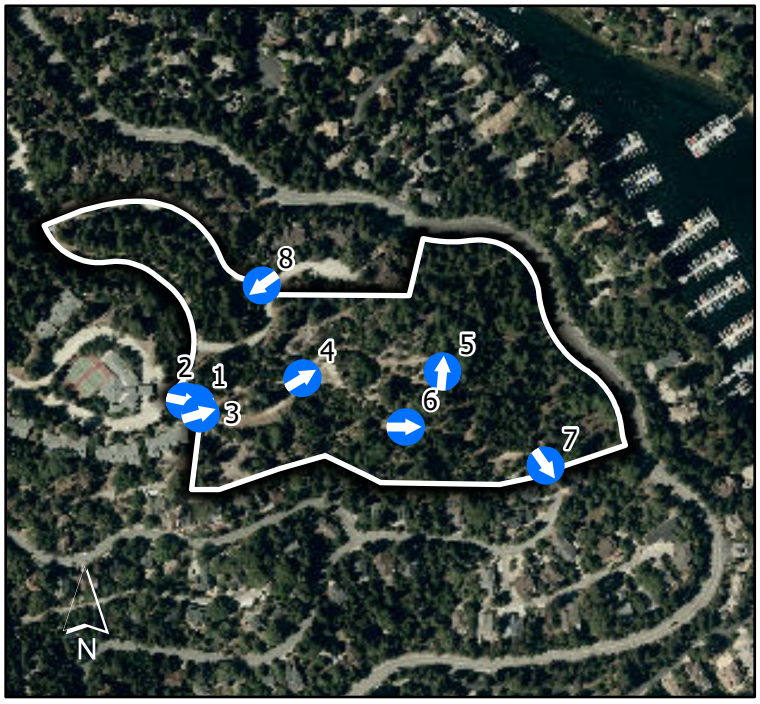


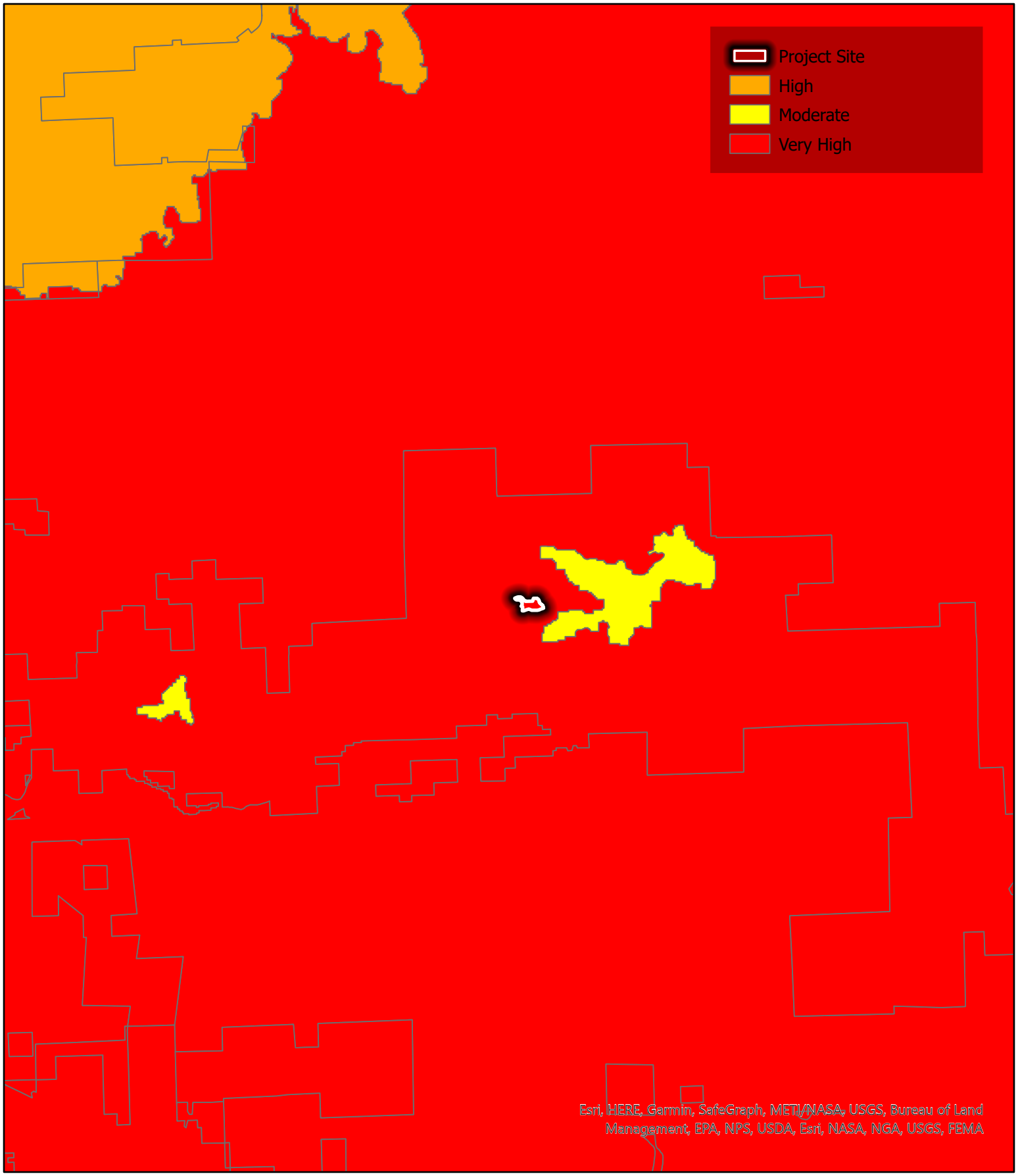

Photo 7


Photo 8

N

0 3,000 6,000 12,000 Feet

Figure 5 - Fire Hazard
Lake Arrowhead Development



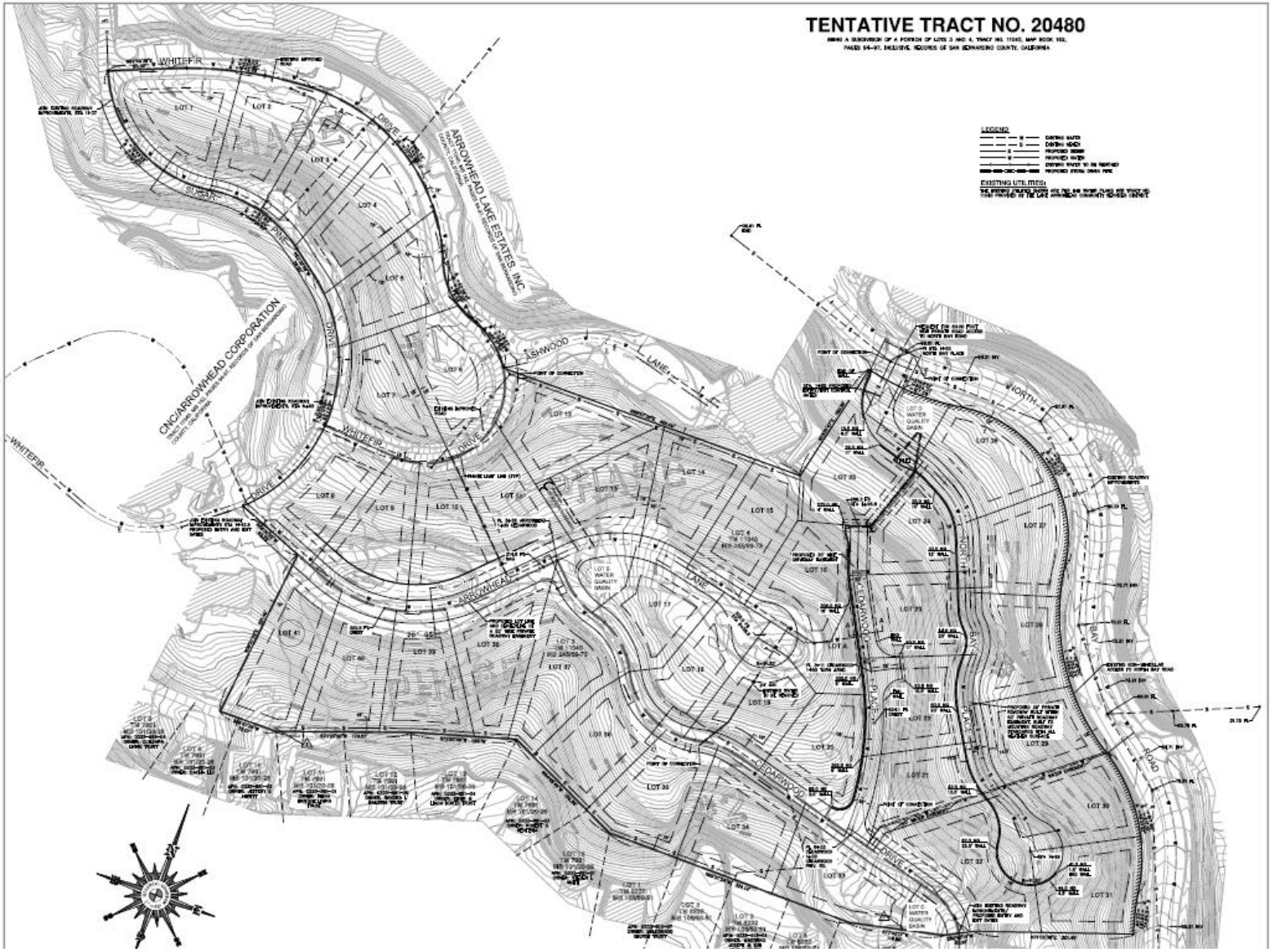


Figure 3 Tentative Tract Map 20480

CONSULTATION WITH CALIFORNIA NATIVE AMERICAN TRIBES

Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentially, etc.?

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

On January 10, 2022 Notices of Opportunity to Consult were sent to six tribes that are traditionally and/or culturally affiliated with the project area or have specifically requested notice for all projects within the County. The tribes included in the notification were the Twenty-Nine Palms Band of Mission Indians, Colorado River Indian Tribes (CRIT), Fort Mojave Indian Tribe (FMIT), Morongo Band of Mission Indians, San Manuel Band of Mission Indians (SMBMI), and the Soboba Band of Luiseno Indians.

EVALUATION FORMAT

This Initial Study is prepared in compliance with the California Environmental Quality Act (CEQA) pursuant to Public Resources Code Section 21000, et seq. and the State CEQA Guidelines (California Code of Regulations Section 15000, et seq.). Specifically, the preparation of an Initial Study is guided by Section 15063 of the State CEQA Guidelines. This format of the study is presented as follows. The project is evaluated based on its effect on 20 major categories of environmental factors. Each factor is reviewed by responding to a series of questions regarding the impact of the project on each element of the overall factor. The Initial Study checklist provides a formatted analysis that provides a determination of the effect of the project on the factor and its elements. The effect of the project is categorized into one of the following four categories of possible determinations:

Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant	No Impact

Substantiation is then provided to justify each determination. One of the four following conclusions is then provided as a summary of the analysis for each of the major environmental factors.

1. **No Impact**: No impacts are identified or anticipated, and no mitigation measures are required.
2. **Less than Significant Impact**: No significant adverse impacts are identified or anticipated, and no mitigation measures are required.
3. **Less than Significant Impact with Mitigation Incorporated**: Possible significant adverse impacts have been identified or anticipated and the following mitigation measures are required as a condition of project approval to reduce these impacts to a level below significant. The required mitigation measures are: (List of mitigation measures)

4. **Potentially Significant Impact**: Significant adverse impacts have been identified or anticipated. An Environmental Impact Report (EIR) is required to evaluate these impacts, which are (List of the impacts requiring analysis within the EIR).

At the end of the analysis the required mitigation measures are restated and categorized as being either self- monitoring or as requiring a Mitigation Monitoring and Reporting Program.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

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

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

DETERMINATION: (To be completed by the Lead Agency)

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

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

ADeLuca Jr — 2/15/2022

Signature: (prepared by Anthony DeLuca, Senior Planner) Date

Chris Warrick — 2/22/2022

Signature:(Chris Warrick, Supervising Planner) Date

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
I.	***AESTHETICS*** – Except as provided in Public Resources Code Section 21099, would the project:				
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b)	Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c)	In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a 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, which will adversely affect day or nighttime views in the area?	☐	☐	☒	☐

SUBSTANTIATION: *(Check ☐ if project is located within the view-shed of any Scenic Route listed in the General Plan):*
San Bernardino County Countywide Plan/Policy Plan 2020*; *Submitted Project Materials

a) **No Impact.** The Project site is in a gated community and mountain terrain area of the unincorporated community of Lake Arrowhead in San Bernardino County at approximately 5,301 feet amsl. The proposed Project would involve the development of 41 residential lots and five lettered lots on approximately 15 acres. The Project's surrounding landscape consists of developed forested areas which limit the view from the site. The Project is not located within the vicinity of any designated scenic vistas, thus would not have a substantial adverse effect on a scenic vista.[1]

b) **No Impact.** The California Scenic Highways and Historic Parkways Program of 1963 was established "to preserve and protect highway corridors located in areas of outstanding natural beauty" from alteration that would diminish the aesthetics value of the adjacent lands. The proposed Project is not located within an officially designated state scenic highway of the California Scenic Highway Mapping System. The nearest state highway, approximately 0.88 miles southeast of the project site, is State Route 138 (Near Silverwood Lake)/Route 18, State Route 138 and is eligible to be listed as a

[1] County of San Bernardino (June 2019). San Bernardino Countywide Plan Draft Environmental Impact Report. Website: http://countywideplan.com/eir/

scenic highway but is not currently designated as a scenic highway.[2] No impacts to scenic resources within a state scenic highway would occur as a result of the Project.

c) **Less than Significant Impact.** The Project site is located within a gated community and is expected to have no public vantage points from outside the gated residential area. Residence along the northwestern boundary of the site have southeastern views of the site. These residences are elevated approximately 190 feet above the project site. Residence along the west and southwestern boundary of the site are elevated approximately 280 ft above the project site. However, the forested surroundings block views of the Project site. Development would have a similar aesthetic to surrounding homes. Development of the proposed Project would not significantly alter the developed character of the site nor adversely impact any scenic views through and across the Project site.

d) **Less than Significant Impact.** The proposed Project would involve the construction of 41 residential lots and five lettered lots. No spotlighting, floodlighting, or glare-producing equipment would be used or installed on the Project area prior to, during or following construction activities. For lighting zones in the mountain and desert regions, San Bernardino County Code of Ordinances § 83.07.040 Glare and Outdoor Lighting – Mountain and Desert Regions requires all projects zoned in residential, commercial, and industrial land use zoning districts. The following standards apply to all structures and freestanding outdoor light fixtures in all land use zoning districts: (1) Maximum Height. Residential pole lighting shall not exceed 12 feet in height; (2) Shielding Requirements. New permitted lighting for new construction, unless exempt in compliance with § 83.07.040 shall be shielded in compliance with the new requirements outlined in Table 83-7 (Shielding Requirements for Outdoor Lighting in the Mountain Region and Desert Regions), in order to preclude light pollution or light trespass on: (A) Adjacent property; (B) Other property within the line of sight (directed or reflected) of the light source; or (C) Members of the public who may be traveling on adjacent roadways or rights-of-way. Compliance with the County's Outdoor Lighting Ordinance would ensure that impacts related to light and glare, resulting from development of the site, are less than significant.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
II.	**AGRICULTURE AND FORESTRY RESOURCES** - In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to				

[2] California Department of Transportation (2021, November). The California Scenic Highway Program. Website: http://www.dot.ca.gov/design/lap/livability/scenic-highways/index.html

	information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c)	Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d)	Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e)	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

SUBSTANTIATION: *(Check ☐ if project is located in the Important Farmlands Overlay):*

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials*; *California Department of Conservation Farmland Mapping and Monitoring Program; Submitted Project Materials

a) **No Impact**. The Project location currently consists of vacant lots zoned as LA/RM multiple residential. Zoned LA/RS-14M and LA/RM, single family and multiple family residential homes surround the Project location.

b) **No Impact**. The Project is located on mountainous terrain approximately 5,301 feet amsl in the mountain region of the unincorporated community of Lake Arrowhead characterized as low density residential 2-5 du/ac max and medium density residential 5-20 du/ac. The Project site is zoned LA/RM for multiple family residence and is not zoned for agricultural use nor in a Williamson Act Contract. No impact to existing zoning for agricultural use or Williamson Act contract should occur as a result of the Project.

c) **No Impact**. The Project site is not zoned as forest or timberland by San Bernardino County or the State of California Department of Conservation. The surrounding area is developed land primarily with single family and multiple family residential developments. The Project would not conflict with existing zoning for, or cause rezoning of, forest land, timberland (as defined by Public Resources Code section 4526) or timberland zoned Timberland Production (as defined by Government Code section 51104(g)). No impact should occur.

d) **No Impact**. The Project site is zoned LA/RM and is not classified as forest land. The forest within the general vicinity of the project has been semi-cleared to provide for housing development. The Project would not require or involve the conversion of forest land to non-forest uses. No impacts to the forest would result.

e) **No Impact.** The proposed Project does not involve the use of farmland or forest land. The Project site is currently vacant, semi-developed 15 acres with paved and unpaved roads running through the site. Forested areas of the site are interspersed. The Project site is zoned LA/RM, multiple family residential. The Project would not involve the conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use. No impact to such resources would occur as a result of development of the Project.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
III.	**AIR QUALITY -** Where available, the significance criteria established by the applicable air quality management district or air pollution control district might be relied upon to make the following determinations. Would the project:				
a)	Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b)	Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c)	Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d)	Result in other emissions (such as those leading to odors adversely affecting a substantial number of people?	☐	☐	☒	☐

SUBSTANTIATION: *(Discuss conformity with the Mojave Desert Air Quality Management Plan, if applicable):*

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **Less than Significant Impact.** The basis for air quality review in the Project area is evaluating consistency with the Air Quality Management Plan (AQMP) regulations, which are designed to bring the South Coast Air Basin (SCAB), including the unincorporated community of Lake Arrowhead, into attainment for all National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). Existing and probable future levels of air quality within the Project area can be identified from the ambient air quality measurements conducted by the South Coast Air Quality Management District (SCAQMD). The SCAQMD in conjunction with the California Air Resources Board (CARB), the SCAG and USEPA prepares and regularly updates an Air Quality Management Plan (AQMP 2016) to set forth an integrated program for achievement of compliance with air quality standards in the Basin.[3]

An ambient air quality standard (AAQS) defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health. The State of California and the federal government have set AAQS for ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter (PM10 and PM2.5) and lead (Pb). The State has also set standards for sulfates (SO4(2-)) and visibility. AAQSs are set to regulate air emissions from stationary and mobile sources to achieve clean air and to protect even the most sensitive individuals in our communities.[4]

The Project would result in short-term air quality impacts over a construction period of three phases comprised of site preparation and grubbing, grading, building construction, paving, and application of architectural coating. Short-term impacts would be related to vehicle/equipment exhaust, fugitive dust, asphalt/concrete slurry, building construction and painting for construction within the approximately 15-acre Project site. Additionally, the proposed Project would be required to comply with the following regulatory rules from the SCAQMD and State of California (State).

<u>SCAQMD rules that are applicable, but not limited to the proposed project:</u>

•Rule 402 Nuisance – Controls the emissions of odors and other air contaminants;
•Rule 403 Fugitive Dust – Controls the emissions of fugitive dust;
•Rules 1108 and 1108.1 Cutback and Emulsified Asphalt – Controls the VOC content in asphalt;
•Rule 1113 Architectural Coatings – Controls the VOC content in paints and solvents; and
•Rule 1143 Paint Thinners – Controls the VOC content in paint thinners.

<u>State of California Code of Regulations (CCR) air quality emission rules that are applicable, but not limited to the proposed project:</u>

•CCR Title 13, Article 4.8, Chapter 9, Section 2449 – In use Off-Road Diesel Vehicles;
•CCR Title 13, Section 2025 – On-Road Diesel Truck Fleets; and
•CCR Title 24 Part 11 – California Green Building Standards.[4]

The Project's criteria pollutant mass air emissions would be below the thresholds of significance for construction and operation. The Project would comply with applicable SCAQMD and CCR rules and requirements. Considering the Project is consistent with the

[3] South Coast Air Quality Management District (2021, November). 2016 Air Quality Management Plan. Retrieved from: http://www.aqmd.gov/home/about/groups-committees/aqmp-advisory-group
[4] South Coast Air Quality Management District (2021, November). SCAQMD Rule Book. Regulation IV – Prohibitions. Retrieved from: http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-ivwebsite

County's existing zoning and growth projections in the General Plan, it would not conflict with or obstruct implementation of the AQMP. Given the nature of the proposed Project, it is anticipated that the project would not have any conflicts with applicable air quality plans in the area; therefore, impacts would be less than significant.

b) **Less than Significant Impact.** The Project consists of the development of 41 residential lots and five lettered lots with three phases of construction planned across 15 acres. The road that runs through the project site has been rough graded, but not yet paved. Short-term emissions that occur are associated with of site preparation and grubbing, grading, building construction, paving, and application of architectural coating. Operational emissions will result from automobile, truck, and other vehicle sources associated with daily trips to and from the Project site. The Project site is located in the SCAB, which is currently designated by the EPA for federal standards (NAAQS) as a non-attainment area for ozone and PM2.5 and by CARB for state standards (CAAQS) as a non-attainment area for ozone, PM10, and PM2.5[5] (Table 2).

Table 2: San Bernardino County Nonattainment Criteria Pollutants

Criteria Pollutant	Location
PM-10 (1987)	San Bernardino Co, CA – (Moderate)
PM-10 (1987)	Trona, CA – (Moderate)
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA – (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA – (Serious)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA – (Serious)
8-Hour Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA – (Severe 15)
8-Hour Ozone (2008)	Los Angeles-South Coast Air Basin, CA – (Extreme)
8-Hour Ozone (2015)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA (Severe 15)
8-Hour Ozone (2015)	Los Angeles-South Coast Air Basin, CA – (Extreme)
Source: U.S. EPA (2021, October 31). Current Nonattainment Counties for All Criteria Pollutants.	

The Project will be below daily threshold because less than five acres per day would be graded or developed. The Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors). The greatest source of emissions is from mobile sources, which travel throughout the local area. Therefore, from an air quality standpoint, the cumulative analysis would extend beyond any local projects and when wind patterns are considered would cover an even larger area. Impacts would be less than significant.

c) **Less than Significant Impact**. Sensitive receptors include a class of receivers considered "sensitive" to environmental factors. By definition sensitive receptors include, but are not limited to, residential uses, hospitals, schools, daycare facilities, elderly housing, and convalescent facilities. The Project site and its surrounding area consists of residential single and multiple family homes. The nearest sensitive receptors are single family residence located approximately 60 feet from the nearest proposed construction area. The

[5] United States Environment Protection Agency (2021, October 31). Current Nonattainment Counties for All Criteria Pollutants. Retrieved from: https://www3.epa.gov/airquality/greenbook/ancl.html

greatest potential for toxic air contaminant emissions would be related to diesel particulate matter (DPM) emissions associated with heavy equipment operations during construction of the proposed Project.[4] According to SCAQMD methodology, health effects from carcinogenic air toxins are usually described in terms of "individual cancer risk". "Individual Cancer Risk" is the likelihood that a person exposed to concentrations of toxic air contaminants over a 70-year lifetime will contract cancer, based on the use of standard risk-assessment methodology. Given the relatively limited number of heavy-duty construction equipment and the short-term construction schedule, the proposed Project would not result in a long-term (i.e., 70 years) substantial source of toxic air contaminant emissions and corresponding individual cancer risk.[3]

In addition, California Code of Regulations Title 13, Article 4.8, Chapter 9, Section 2449 regulates emissions from off-road diesel equipment in California. This regulation limits idling of equipment to no more than five minutes, requires equipment operators to label each piece of equipment and provide annual reports to CARB of their fleet's usage and emissions. This regulation also requires systematic upgrading of the emission Tier level of each fleet. Particulate matter (PM) from diesel exhaust is the predominant toxic air contaminant (TAC) in most areas and according to the California Almanac of Emissions and Air Quality 2013 Edition, prepared by CARB. About 80 percent of the outdoor TAC cancer risk is from diesel exhaust. Some chemicals in diesel exhaust, such as benzene and formaldehyde, have been listed as carcinogens by State Proposition 65 and the Federal Hazardous Air Pollutants program.[3]

The County of San Bernardino Transportation Impact Study Guidelines (July 9, 2019) requires a Transportation Impact Study (TIS) if a project generates 100 or more trips without consideration of pass-by trips during any peak hour. Since the trip generation of the project is less than 100 trips during any peak hour, a TIS should not be required. The VMT/Capita for the project TAZ is 14.4 miles per day, which is less than the average VMT/Capita for the County of 15.94 miles per day. Therefore, the project is located in a low VMT area, and is presumed to have a less than significant impact under the County of San Bernardino VMT thresholds.[6] Due to the nominal number of diesel truck trips that are anticipated to be generated by the proposed Project no mitigation would be required. Therefore, operation of the proposed Project would result in a less than significant exposure of sensitive receptors to substantial pollutant concentrations.

d) **Less than Significant Impact.** Odors are one of the most obvious forms of air pollution to the general public. Odors can present significant problems for both the source and the surrounding community. Although offensive odors seldom cause physical harm, they can cause agitation, anger, and concern to the general public. Most people determine an odor to be offensive (objectionable) if it is sensed longer than the duration of a human breath; typically, two to five seconds.

Potential sources that may emit odors during construction activities include the application of coatings such as, asphalt pavement, paints and solvents and from emissions from diesel equipment. Construction vehicle emissions at the Project site would be short-term, intermittent, and subject to air dispersion. The objectionable odors that may be produced during the construction process would be temporary and would not likely be noticeable for extended periods of time beyond the project site's boundaries. It should also be noted that

[6] Sandipan Bhattacharjee (2021 September 23). Lake Arrowhead – Transportation Assessment Memorandum

any odors that are released from the proposed Project would be anticipated to dissipate to less than significant levels prior to impacting the nearest sensitive receptors.

In addition, the Project would be subject to compliance with SCAQMD's Rule Book Regulation IV – Prohibitions, Rule 402, regarding nuisance, SCAQMD Rule 402 states: "A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which cause, or have a natural tendency to cause, injury or damage to business or property."[4] The Project contractor would be subject to enforcement of said rules. Due to the transitory nature of construction odors, a less than significant impact would occur, and no mitigation would be required.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
IV.	**BIOLOGICAL RESOURCES -** Would the project:				
a)	Have substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?	☐	☐	☐	☒
c)	Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d)	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐

e)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan?	☐	☐	☐	☒

SUBSTANTIATION: *(Check if project is located in the Biological Resources Overlay or contains habitat for any species listed in the California Natural Diversity Database ☐):*

San Bernardino County Countywide Plan/Policy Plan 2020*; *Habitat Assessment, Dugan Biological Services, October 20, 2021; Submitted Project Materials;

a) **Less than Significant Impact**. The 15-acre Project site has been disturbed and native plant cover has been removed from the Project site in previous neighboring development. The forested areas on the property are interspersed among both paved and dirt roads, residential areas, and associated buildings. The property is not listed as an open space corridor or animal migration corridor on the County open space planning maps or the County plans. According to the habitat assessment survey performed by Dugan Biological Services on September 28, 2021 (refer to Appendix A), three sensitive species, the southern rubber boa (Charina umbratica; SRB), San Bernardino flying squirrel (Glaucomys sabrinus californicus; SBFS), and Bald Eagle (Haliaeetus leacocephalus; BAEA), were found to have a low to very low potential of occurrence within the Project vicinity.[7]

The SRB is a state listed threatened species, the SBFS is a state species of special concern, and the BAEA is a state listed endangered species. There were no CNDDB records for SRB found in Lake Arrowhead and the lack of well-developed leaf litter, dry soil conditions, well-maintained grounds, and compacted soils do not meet the preferred mesic environmental conditions favored by SRB. Additionally, the absence of nearby records, poor condition and limited nature of suitable habitats, and significant impacts of the surrounding residential developments and roads, suggest the Project site is highly unlikely to support SRB.[7] SBFS prefer dense conifer forest near riparian habitats, which the Project site does not consist of. The absence of records near the site, the lack of preferred riparian habitats, and the presence of a relatively dense residential infrastructure, suggest it is unlikely that the Project site supports SBFS.[7] Three observation records for BAEA were recorded in the CNDDB records for the Lake Arrowhead quadrangle with the last being in March 2006. However, no recent records were found and there were no signs observed during the Project site visit of BAEA. Considering the distance of the Project from the Lake Arrowhead shoreline, and the lack of both recent and historical observations, the potential for BAEA nesting on the Property is low.[7] Focused surveys for SRB, SBFS, and BAEA are not recommended.

[7] Eric Dugan (2021, October 20). Dugan Biological Services. Habitat Assessment for Southern Rubber Boa, San Bernardino Flying Squirrel, and Bald Eagle at the Lake Arrowhead Development Property (Project), Lake Arrowhead, San Bernardino County, California

No signs of plant or wildlife species listed by the State and/or Federal government as endangered or threatened were identified during the field investigations conducted on October 20, 2021. There is potential for ground-, and shrub-nesting birds to establish nests on the Project site in the future. The Project would have a less than significant effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

b) **No Impact.** Two vegetation community/land cover types were observed within the Project site: disturbed/mixed-conifer and developed. No native plant species or riparian habitat were located within or near the survey area.[7] No impact to any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service would result from the Project. No impacts are expected.

c) **No Impact.** Riparian habitat is associated with areas that become saturated with water from surface or ground-water resources and retain enough water to enable riparian flora and fauna to thrive. No riparian habitat, including wetlands, exists on the Project site.[7] As such, no impact to state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal) through direct removal, filling, hydrological interruption, or other means would result from the Project. No impacts are expected.

d) **Less than Significant Impact.** The Project Site does not occur within or adjacent to a Multiple Species Habitat Conservation Plan (MSHCP) Core, Linkage, Constrained Linkage, or Non-Contiguous Habitat Block and doesn't provide linkage to wildlife corridors, native habitat, or wildlife nursery. The Project site is interspersed with minimally forested land, both paved and dirt roads, residential areas, and associated buildings. According to the habitat assessment survey performed by Dugan Biological Services on September 28, 2021 (refer to Appendix A), the Project site does not consist of any permanent waterbodies that could serve a waypoint for migratory fowl.[7] The Project design includes the use of green infrastructure to deter wildlife movements from being impacted. Thus, less than significant impacts to wildlife species, migratory corridors, and native wildlife nursery sites should occur.

e) **Less than Significant Impact.** The forested areas on the Property are interspersed among both paved and dirt roads, residential areas, and associated buildings. A limited amount of tree clearing is proposed across the 15-acre Project site, which has already included removal of vegetation in prior development processes. Section 88.01.07 (b) of the San Bernardino Development Code states that native trees with a six inch or greater stem diameter or 19 inches in circumference measured 4.5 feet above natural grade level can be removed with an approved Tree or Plan Removal Permit. A less than significant impact would occur to the local policy or ordinance protecting biological resources, such as tree preservation policy or ordinance.

f) **No Impact.** This Project would not conflict with the provisions of an adopted Habitat Conservation Plan, the Lake Arrowhead Community Plan Conservation element, or other approved local, regional, or state habitat conservation plans. The County of San Bernardino has not adopted a Habitat Conservation Plan for the region. There is no

local, regional, or state habitat conservation plan in place within the Project site or vicinity.

The existing Project is consistent with the Lake Arrowhead's Community Plan, Goal LA/CO 1: Preserve the unique environmental features of Lake Arrowhead including native wildlife, vegetation, and scenic vistas. The Project aligns with policy LA/CO 1.5: Provide for the grouping or clustering of residential buildings where this will maximize the opportunity to preserve significant natural resources, natural beauty, or open space without generally increasing the intensity of development otherwise possible.[8] The Project site is currently surrounded by developed single family and multiple family homes. The proposed Project design would include building residential units within the dispersed forested areas of the site and would be consistent with surrounding development to preserve environmental features. No impact would occur.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
V.	**CULTURAL RESOURCES** - Would the project:				
a)	Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☒	☐	☐
b)	Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c)	Disturb any human remains, including those outside of formal cemeteries?	☐	☒	☐	☐

SUBSTANTIATION: (Check if the project is located in the Cultural ☐ or Paleontologic ☐ Resources overlays or cite results of cultural resource review):

San Bernardino County Countywide Plan/Policy Plan 2020; Cultural Resources Study, Brian F. Smith and Associates, Inc. August 24, 2021; Cultural Historical Resources Information System (CHRIS), South Central Coast Information Center, California State University, Fullerton; Submitted Project Materials

a) **Less than Significant with Mitigation Incorporated**. According to §15064.5 of the CEQA Guidelines, generally, a resource is considered "historically significant" by a lead agency if the resource meets the criteria for listing on the California Register of Historical Resources (California Public Resources Code §5024.1, Title 14 CCR §4852) including the following: (A) is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (B) is associated with the lives of persons important in our past; (C) embodies the distinctive characteristics of a

[8] Lake Arrowhead Community Plan Committee (2017, April 12). Lake Arrowhead Community Plan – San Bernardino County. Retrieved from: http://countywideplan.com/lakearrowhead/

type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or (D) has yielded, or may be likely to yield, information important in prehistory or history. A historical resource could be an object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant based on the above-stated criteria, provided the lead agency's determination is supported by substantial evidence in light of the whole record. The Cultural Resource Element of the proposed San Bernardino Countywide Plan provides guidance regarding the conservation of cultural resources. The Project would implement applicable regulatory measures and proposed Countywide Plan polices to avoid impacts to historical resources.

Brain F. Smith and Associates, Inc. (BFSA) performed a Phase I Cultural Resources Assessment of the Project site on August 24, 2021 in accordance with California Environmental Quality Act (CEQA) guidelines. The report includes a records search and literature review, and an archaeological survey of the Project area. BFSA also requested a NAHC SLF records search. BFSA reviewed the following historic sources:

•The NRHP Index
•The Office of Historic Preservation, Archaeological Determinations of Eligibility
•The Office of Historic Preservation, Built Environment Resources Directory
•USGS 1902 Deep Creek, 1956 Lake Arrowhead, and 1971 Lake Arrowhead 1:62,500 scale topographic maps
•Historic aerial photographs (1938, 1952, 1980, and 1994)

The Project Phase 1 Cultural Resource assessment did not indicate any cultural resources within the project. The South-Central Coast Information Center (SCCIC) records search results indicated one single historic road alignment within the one-half mile radius, however no other cultural resources were identified on the subject property itself. The NAHC recommended contacting the San Manuel Band of Mission Indians for additional information.[9] The Phase I assessment did indicate that given the Project's location near freshwater resources, there is potential that buried archaeological deposits exist within the project boundaries that may be impacted by the project. It is recommended that a cultural resources construction monitoring program be implemented during site grading (See Appendix B Section 4.1).[9]

Construction will adhere by the general procedures and protocols to be implemented during construction monitoring when grading.[9] With implementation of Mitigation Measure **CUL-1**, the proposed Project impacts would be reduced to less than significant on any historical resources as defined in §15064.5.

Mitigation Measure

CUL-1: A Monitoring and Treatment Plan that is reflective of the project mitigation ("Cultural Resources" and "Tribal Cultural Resources") shall be completed by the archaeologist and submitted to the Lead Agency for dissemination to the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI). Once all parties review and approve the plan, it shall be adopted by the Lead Agency – the plan must

[9] Brain F. Smith and Associates, Inc. (2021 August, 24). Cultural Resource Study For The Lake Arrowhead Subdivision Project

be adopted prior to permitting for the project. Any and all findings will be subject to the protocol detailed within the Monitoring and Treatment Plan.

Cultural Resources Monitoring Program. To mitigate potential impacts to resources that have been detected, a cultural resources monitoring program is recommended as a condition of approval. The scope of the cultural resources monitoring program is provided in Appendix B Section 4.1

In the event of an archaeological discovery, either historic or prehistoric, the archaeological monitor shall direct the contractor to temporarily divert all soil disturbing activities, including but not limited to, digging, trenching, excavating, or grading activities in the area of discovery and in the area reasonably suspected to overlay adjacent resources. If the discovered resource is associated with the prehistoric Native American occupation of this area, a Native American Cultural Resources Study for the Lake Arrowhead Subdivision Project representative from a local tribe should be contacted to review and participate in the evolution of the discovered resource. The monitor shall immediately notify the Principal Investigator (PI (unless monitor is the PI)) of the discovery, and subsequently the property owner shall be notified of the discovery in order to comply with California Public Resources Code §21083.2(b).

The PI shall immediately notify the lead agency to discuss significance determination and shall also submit a letter indicating whether additional mitigation is required. If the resource is significant, the PI shall submit an Archaeological Data Recovery Program (ADRP) to the lead agency to review and approve. Impacts to significant resources must be mitigated by the implementation of the ADRP before ground-disturbing activities in the area of discovery will be allowed to resume. If the resource is not significant, the PI shall submit a letter to the County of San Bernardino indicating that artifacts will be collected, curated, and documented in the final monitoring report. The letter shall also indicate that no further work is required.

b) **Less than Significant with Mitigation Incorporated.** Results of the review of the survey reports and site records and archaeological site survey provided by BSFA, were found to be negative for the presence of cultural resources. The SCCIC records search indicates that one resource, a historic road alignment, is located within a one-half mile radius of the Project; however, no cultural resources have ever been identified on the Project site.[9] The survey methodology employed during the current investigation followed standard archaeological field procedures and was sufficient to accomplish a thorough assessment of the project. The field methodology employed for the project included walking evenly spaced survey transects set approximately 10 meters apart while visually inspecting ground surface. All potentially sensitive areas where cultural resources might be located were closely inspected. Photographs documenting survey areas and overall survey conditions were taken frequently.[9] The Project area has been vacant and paved and dirt roads were developed between 1952 and 1980. As indicated by the records search for the Project, and given the Project's location near freshwater resources, it was suggested that there is potential that buried archaeological deposits may exist within the Project boundaries that may be impacted by the Project. The Phase I field survey did not result in the identification of any additional historic or prehistoric cultural resources within the Project. A cultural resources construction monitoring program was suggested to be implemented during site grading (See Appendix B Section 4.1). While Project improvements are not anticipated to impact native base rock or native soils that could contain unique archaeological sites deemed significant per

§15064.5 of the CEQA Guidelines, Mitigation Measure **CUL-1** would reduce the potential for impact to less than significant.

c) **Less than Significant with Mitigation Incorporated.** The closest cemetery to the proposed Project alignment is approximately 25 miles southwest of the Project site. Project activity would not impact a cemetery. Though unlikely, Mitigation Measures **CUL-1** and **CUL-2** would reduce impacts to human remains too less than significant.

Mitigation Measure

CUL-2 Human Remains. It is against the law to knowingly mutilate or disinter, disturb or removes any human remains from any location other than a dedicated cemetery without authority of law. If human remains are encountered, pursuant to California Health and Safety Code Section 7050.5, no further disturbance shall occur within 100-feet of the remains until the County of San Bernardino Planning Division and the County Coroner have made the necessary findings as to origin, in accordance with Chapter 10 (commencing with Section 27460) of Part 3 of Division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of Section 27491 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of any death, and the recommendations concerning the treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in Section 5097.98 of the Public Resources Code.

Therefore, potential impacts are identified or anticipated, however, required mitigation measures would reduce impacts to a less than significant level.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
VI.	**ENERGY** – Would the project:				
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?	☐	☐	☐	☒

SUBSTANTIATION: San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **Less than Significant Impact**. Construction and operation of the Project would be subject to energy efficiency regulation, standards and goals included in the 2019 California Energy Code, contained in Part 6 of Title 24 of the California Code Regulations, which the County of San Bernardino has designated and adopted by reference as the Energy Code for the design and installation of energy systems for the

unincorporated area of the County. In addition, the Project would be required to comply with the regulatory rules from the SCAQMD and State of California identified in response a) of Section 5.3 Air Quality that are aimed at reducing unnecessary truck and equipment consumption during Project construction. Project compliance with rules and regulations would reduce to less than significant for potential of environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation.

b) **No Impact.** The Project would be subject to the recent rulemaking updated to the County of San Bernardino County General Plan Renewable Energy and Conservation Element adopted on August 8, 2017 and amended on February 28, 2019. The Project would be subject to the most recent rulemaking updated to Title 24, Building Energy Efficiency Standards. Title 24 efficiency standard for residential and nonresidential new construction and alterations are updated approximately every three years buildings for windows, insulation, lighting, air conditioning systems, water heating, digital controls, escalators, elevators, and other features that reduce energy consumption in houses and business. Since 1978, Title 24 standards have helped protect the environment by reducing more than 250 million metric tons of greenhouse gas emissions (or the equivalent of removing 37 million cars off California roads).[10]

The Project would also be subject to goals and policies in the County of San Bernardino Greenhouse Gas Reduction Plan updated and adopted by board of supervisors on September 21, 2021. In addition, the Project would be subject to energy efficiency regulations such as AB 341 signed on July 1, 2012, requiring all businesses in California that generate four or more cubic yards of waste per week (i.e., the size of a dumpster) to recycle. The Project plans to adhere to all the above requirements for renewable energy or energy efficiency during development and would result in no impacts.

Therefore, no impacts are identified or anticipated, and no mitigation measures are required.

Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
VII. GEOLOGY AND SOILS - Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map Issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐

[10] State of California (2019, April). California Energy Commission. 2016 Building Energy Efficiency Standards

	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 in 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?	☐	☒	☐	☐

SUBSTANTIATION: *(Check ☐ if project is located in the Geologic Hazards Overlay District):* ***San Bernardino County General Plan, 2007; Submitted Project Materials***

San Bernardino County Countywide Plan/Policy Plan 2020; Geotechnical/Geologic Study Report, Hilltop Geotechnical, Inc. November 12, 2021; Submitted Project Materials

a) i-iv) **Less Than Significant with Mitigation Incorporated.** The main purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. It requires any structure for human occupation to be set back at least 50 feet from an active fault. According to the California Geological Survey (CGS), faults are classified as active, potentially active, or inactive. Under Alquist-Priolo Earthquake Fault Zoning Map Act, the State of California defines active faults as faults that have historically produced earthquakes or shown evidence of movement within the past 11,000 years (during the Holocene Epoch). The Project site is situated in an area of active and potentially active faults, as is most of metropolitan southern California. The site is not located within a zone of mandatory study for active faulting per the San Bernardino County Department, San Bernardino County Land Use Plan, General Plan, Geological Hazard Overlays Sheet

FH15 C Lake Arrowhead, Plot Date 03/09/2012, Scale 1:14,400 http://cms.sbcounty.gov/lus/Planning/ZoningOverlayMaps/GeologicHazardMaps.aspx

Hilltop Geotechnical, Inc. performed a Geotechnical/Geological Study Report on November 12, 2021, and found per https://maps.conservation.ca.gov/cgs/fam/, the nearest regionally significant active fault is the San Andrea Fault, which is approximately 6.9 miles to southwest of the site. Another active fault Ord Mountains Fault is approximately 7.8 miles to north of the site. Two late Quaternary faults Arrastre Canyon Fault and Waterman Canyon Fault are approximately 2 miles north and 2.4 miles south of the site, respectively. The northern frontal fault is considered a thrust fault with the nearest surface rupture located approximately 1.25 miles north of the site. In addition, the tunnel ridge fault was located approximately 2 miles northwest of the site. It is anticipated the Project site will endure moderate to strong ground motions from earthquakes on regional and/or nearby causative faults.[11] The Project site isn't located within an Alquist-Priolo (AP) Earthquake Fault Zone and impacts to people or structures, including risk of loss, injury, or death due to rupture of an earthquake fault as a result of the Project would be less than significant.

During the life of the Project, seismic activity associated with active faults can be expected to generate moderate to strong ground shaking at the site. Ground shaking is judged to be the primary hazard most likely to affect the site, based upon proximity to regionally significant active faults, which are mentioned in the above question (a)(i) of Section 5.6.[11] Although the entirety of the County is subject to ground shaking, the Project will be reviewed and approved by County Building and Safety with appropriate seismic standards implemented. Adherence to standards and requirements contained in the building and fire code for the design of the proposed structures will ensure that structures do not collapse during strong ground shaking. As a result, while the potential for ground shaking is evident at the Project site, risk of loss, injury, or death associated with seismic ground-shaking at the Project site is anticipated to be less than significant.

Ground shaking can induce "secondary" seismic hazards such as liquefaction, dynamic densification, and ground rupture, including dynamic settlement (liquefaction and/or dry settlement). Liquefaction describes a phenomenon in which cyclic stresses produced by ground shaking induced excess pore water pressures in the cohesionless soils. These soils may thereby acquire a high degree of mobility leading to damages or deformations. In general, this phenomenon only occurs below the water table, but after liquefaction has developed, it can propagate upward into overlying non-saturated soil as excess pore water pressure. Liquefaction susceptibility under a given earthquake is related to the gradation and relative density characteristics of the soil, the in-situ stresses prior to ground motion, and the depth to the water table, as well as other factors.[11]

The subject site is not located within a designated area as having a liquefaction potential per San Bernardino County Planning Department, San Bernardino County Land Use Plan, General Plan, Geological Hazard Overlays, Sheet FH15 C Lake Arrowhead, Plot Date: 03/09/2010, Scale: 1:14,400 http://cms.sbcounty/lus/Planning/ZoningOverlayMaps/GeologicHazardMaps.aspx

[11] Hilltop Geotechnical, Inc. (2021 November 12). Geotechnical/Geologic Study Report Proposed 15-acre Subdivision for Residential Development APN 0333-106-15 & 16, West of North Bay Road Lake Arrowhead, San Bernardino County, California

Moreover, the bedrock underneath the site is shallow.[11] Therefore, the potential of liquefaction is low. Less than significant impacts from the Project should occur.

Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. A combination of geologic conditions leads to landslide vulnerability, such as high seismic potential; rapid uplift and erosion resulting in steep slopes and deeply incised canyons; highly fractured and folded rock; and rock with inherently weak components such as silt or clay layers. Landslides are often triggered by seismic activity; however, slope failure does not need to be triggered by an earthquake. Strong ground motions can worsen existing unstable slope conditions, particularly if coupled with saturated ground conditions. The subject site is located within a designated low to moderate potential landslide area per San Bernardino County Planning Department, San Bernardino County Land Use Plan, General Plan, Geological Hazard Overlays, Sheet FH22C San Bernardino North, Plot Date: 03/09/2010, Scale: 1,14,400 (http://cms.sbcounty/lus/Planning/ZoningOverlayMaps/GeologicHazardMaps.aspx).

According to the Geotechnical/Geological Study Report performed by Hilltop Geotechnical, Inc., field reconnaissance over the 15 acres did not disclose the presence of older, existing landslides within or near the subject property. Loose boulders were encountered throughout the property should be removed especially in the higher elevation locations. In the vicinity of over-steeped slope areas along the proposed roadways mitigation measures, such as retaining walls or soils nail walls should be taken to prevent potential land sliding.[11] Implementation of Mitigation Measure GEO-1 should reduce the potential for landslide to less than significant as a result of the Project.

Mitigation Measure

GEO-1 Comply with Project Geotechnical/Geological Study Report and Grading Specifications and Grading Plans. The Project shall, with discretionary geotechnical oversight by a qualified professional, comply with the recommendations detailed in the geology report, including but not limited, to site preparation and grading, over excavation/grading office building, new pavement areas, new pavement areas, compacted fills/imported soils, shrinkage and subsidence, foundation design/allowable bearing value, concrete slabs on-grade, special considerations, concrete joint/hardscape areas, concrete curing, lateral earth pressures/ retaining walls/canopy caissons, expansion index/soluble sulfates, seismic consideration, groundwater, tentative pavement design, pavement subgrade/base compaction/drainage, erosion control/drainage/planter areas, Cal/OSHA classification/ temporary excavations/ trench excavations, additional observations and testing/quality control, and final report.

b) **Less than Significant with Mitigation Incorporated.** The Project site is located in the San Bernardino Mountains. The earth materials encountered on the subject site during the field exploration were identified as artificial fill, colluvium, and weather, Monsogranite of City Creek (Kcc). Artificial fill was encountered at two of the eleven borings and Colluvium was encountered at nine of the eleven borings during the Geotechnical/Geological Study that Hilltop Geotechnical, Inc. performed. Hilltop Geotechnical, Inc. found the artificial fill to extend to a maximum depth of approximately 13 feet at the location of boring B-6, which consisted of clayey fine to medium sand, which was greyish brown to blackish brown in color, moist, and medium in consistency. The fill was likely to accommodate the adjacent roadways and apartment buildings (See

Appendix B). Colluvium extended to depths of approximately 21.5 feet from the ground surface or fill bottom and generally consisted of clayey fine to coarse sand with trace of gravel, which was yellow brown, brown, tan to greyish brown in color, moist, and medium dense in consistency. Hilltop Geotechnical, Inc. also found weathered granite bedrock, which was encountered underlying colluvium to depths of approximately 1.5 to 8 feet 10 inches below the existing ground surface (bgs).[11]

Based on the review of the field and laboratory data obtained from eleven (11) exploratory excavations located on the subject property and the engineering analysis Hilltop Geotechnical, Inc. performed, the proposed development is feasible from a geotechnical/geological standpoint, provided the recommendations contained in the report are implemented during the Project design and construction.[11] The Project should not result in substantial soil erosion or the loss of topsoil, however these factors could result during construction from grubbing, grading, and development activity. Recommendations for site grading, foundations, slab support, pavement design, and so forth are presenting in the Geotechnical/Geological Study Report. The procedures for construction related earthwork and excavation are established by local grading ordinances developed by the County of San Bernardino Department of Public Works, Land Development Division. Chapter 83.04 Conditional Grading Compliance from the San Bernardino County, California Code of Ordinances are applicable to the Project. Implementation of Mitigation Measure GEO-1 prior to grading would reduce impacts involving soil erosion or loss of topsoil to less than significant levels.

c) **Less than Significant Impact.** The Project would not be located on a geological unity 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. Eleven exploratory borings (one of which was converted to an infiltration test) and (4) four infiltration test borings on the subject Property. Earth materials encountered on the subject site during the field exploration were identified as artificial fill, colluvium, and weathered, Monsogranite of City Creek (Kcc). Silty sand was encountered at the surface ground of the site during the field exploration performed by Hilltop Geotechnical, Inc. The subsurface soils encountered at shallow depths consisted mostly of silty sand and poorly graded sand. The expansive potential of the sandy soils is low. No groundwater, seepage or wet soil conditions were observed during the soil borings. No thick loose sandy soils underlie the subject site. Settlement of structures induced by seismic event is considered insignificant. The potential for liquefaction is low.[11]

The Project site will be over excavated and recompacted to specifications on the Project grading plans with oversight by a geotechnical consultant. Compliance with the County of San Bernardino Ordinance, recommendations for site grading, foundations, slab support, pavement design provided by the Geotechnical/Geological Study Report, and approved Grading Plans would lessen impacts associated with any potential for unstable geological unit or soil and associated potential for on-off-site landslide, lateral spreading, subsidence, liquefaction, or collapse too less than significant.

d) **Less than Significant Impact.** Expansive soils shrink when dry and swell when wet as a result of a high percentage of clay. Expansion can exert enough pressure to crack sidewalks, driveways, basement floors, pipelines, and even foundations. Silty sand was encountered at the surface ground of the site during the field exploration performed by Hilltop Geotechnical, Inc., which the expansion of potential of the soils were low. The

subsurface soils encountered at shallow depths consisted mostly of silty sand and poorly graded sand. These types of material generally have a low susceptibility to expansion and a low to medium susceptibility to collapse when facing seasonal cycles of saturation/desiccation.[11] The Project design and construction is expected to incorporate the recommendations provided by the Geotechnical/Geological Study Report regarding drainage, moisture content during compaction and other pertinent recommendations for site improvements. The Project impacts would be less than significant.

e) **No Impact.** The Project site earth materials encountered on the field exploration were identified as artificial fill, colluvium, and weathered, Monsogranite of City Creek (Kcc). The subsurface soils encountered at shallow depths consisted mostly of silty sand and poorly graded sand.[11] The Project site would not consist of 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. No impact related to incapability of soil to support the use of septic tanks or alternative wastewater disposal systems would occur.

f) **Less than Significant Impact with Mitigation Incorporated.** The Project site is located in the Mountain Region of San Bernardino County. The Mountain Region consists predominantly of granite bedrock and high-grade metamorphic rocks that have no potential to preserve fossil resources. However, a number of highly sensitive units are present as scattered outcrops. Figure 5.5-2 Paleontological Sensitivity – Mountain Region Map of the Countywide Plan Environmental Impact Report demonstrates the Project site is located in an area with No paleontological sensitivity.[1]

The Geotechnical/Geological Study Report performed by Hilltop Geotechnical, Inc. did not report on findings of any paleontological resource or site or unique geological feature during the field study. The study performed was designed to determine and evaluate the surface and subsurface conditions in the vicinity of the proposed residential development on the subject site.[11] The Project should not directly or indirectly destroy a unique paleontological resource or site or unique geological feature with implementation of Mitigation Measures CULT-1, GEO-1 and GEO-2. Therefore, the proposed Project would have a less than significant impact with mitigation incorporated.

Mitigation Measure

GEO-2 Paleontological Resources. In the event of any fossil discovery, regardless of depth or geologic formation, construction work will halt within a 50-ft. radius of the find until its significance can be determined by a Qualified Paleontologist. Significant fossils will be recovered, prepared to the point of curation, identified by qualified experts, listed in a database to facilitate analysis, and deposited in a designated paleontological curation facility in accordance with the standards of the SVP (2010) and BLM (2009). A repository will be identified, and a curatorial arrangement will be signed prior to collection of the fossils. Although the San Bernardino County Museum is specified as the repository for fossils found in the county in the current General Plan (San Bernardino County Countywide Plan/Policy Plan 2020), the museum may not always be available as a repository. Therefore, any accredited institution may serve as a repository.

Therefore, potential impacts are identified or anticipated, however, required mitigation measures would reduce impacts to a less than significant level.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
VIII.	**GREENHOUSE GAS EMISSIONS –** Would the project:				
a)	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b)	Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

SUBSTANTIATION:
San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **Less than Significant Impact.** Greenhouse gas (GHG), as codified in CEQA Guidelines §15364.5, includes, but is not limited to, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Greenhouse gases are gases that cause and contribute to climate change, commonly referred to as global warming. They vary in potency and are usually measured in tons or million metric tons of carbon dioxide equivalents. Transportation followed by electricity generation and natural gas used in buildings are the largest sources of California's GHG emissions.[12] As legislation like Assembly Bill 32 (California Global Warming Solution Act of 2006), California Senate Bill 97 and Executive Order S-3-05 have brought the requirement for GHG reductions to the forefront of Californian conscientious, GHG reductions have become important through increased vehicle fuel efficiency, building energy efficiency, and increased reliance on renewable energy sources.

San Bernardino County's Greenhouse Gas Emissions Reduction Plan (GHGRP) was adopted on December 6, 2011 and became effective on January 6, 2012. The GHGRP has since been updated and adopted by the board of supervisors on September 21, 2021. The GHGRP Update sets up a greenhouse gas (GHG) reduction target for the year of 2030 and beyond. A project's incremental contribution of GHG emissions will not be considered cumulatively significant if the project is consistent with the adopted GHG plan. All new development is required to quantify the Project's GHG emissions and adopt feasible mitigation to reduce project emissions below a level of significance.[13] A review threshold of 3,000 metric tons of carbon dioxide equivalent to (MTCO2e) per year is used to identify and mitigate Project emissions. Based on a CalEEMod statistical analysis, projects that exceed 53,000 square feet typically generate more than 3,000 MTCO2e.

While the Project IS/MND will be sent to SCAQMD for comment during the public review period of the Project, according to the SCAQMD draft threshold of significance, a cumulative global climate change impact would occur if the GHG emissions created from the on-going operations would exceed 3,000 MTCO2e per year. The proposed

[12] Institute of Local Government (2011, September). Evaluating Greenhouse Gas Emissions as Part of California's Environmental Review Process: A Local Official's Guide.
[13] LSA Associates, Inc. (2021 June). County of San Bernardino Greenhouse Gas Reduction Plan Update.

Project is anticipated to generate GHG emissions from construction equipment and area sources, energy usage, mobile sources, waste disposal and water usage associated with operation activity. The Project's GHG emissions have been calculated with the CalEEMod model based on the construction and operational parameters. Based on the estimated 387 daily trips generation the Project is anticipated to produce and the CalEEMod statistically analysis, the greenhouse gas emissions will be below the San Bernardino County threshold. Estimated total Project construction and operation GHG emissions are presented in Appendix E of the report. Therefore, a less than significant generation of greenhouse gas emissions would occur from development of the proposed project. Impacts would be less than significant.

b) **Less than Significant Impact.** The proposed Project would not conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing GHG emissions. On September 6, 2021, the County of San Bernardino adopted the GHGRP Updated for the purpose of reducing the emissions of greenhouse gases by 2030 and beyond.[13] The proposed Project is consistent with the GHG plan in that CO2 emissions are below the San Bernardino County Threshold of 3,000. Consequently, impacts will be less than significant.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
IX.	**HAZARDS AND HAZARDOUS MATERIALS –** Would the project:				
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d)	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g)	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **Less than Significant Impact.** The Project would involve the construction of 41 residential lots on undeveloped forested land. Construction of the Project would involve the use of equipment, fuel and materials typically associated with construction of houses. The potential for the release of these materials is considered low and, even if a release were to occur it would not result in a significant hazard to the public, surrounding uses, or the environment due to the small quantities of these materials associated with construction and operation. California Code of Divisions, Title 22, Division 4.5 includes necessary information for California Environmental Health Standards for the management of hazardous waste, which the Project would be expected to comply with. Therefore, the proposed Project would have a less than significant impact on the public or the environment as a result of the routine transport, use, or disposal of hazardous materials.

b) **Less than Significant Impact.** The Project would involve the use of concrete asphalt, paint, gasoline, cleaning solvents, etc., during construction and operation, use storage and disposal of which would be required to comply with product labeling and the Department of Environmental Health Services of the County of San Bernardino. As a result, impacts to the public and environment from hazardous materials would be less than significant.

c) **Less than Significant Impact.** The Project site is located approximately 0.35 miles southeast from Mary Putnam Henck Middle Intermediate School. The proposed Project does not involve transporting or emitting acutely hazardous materials that could result in a danger to a nearby school. Impacts resulting from emission of acutely hazardous materials in proximity to a school would be less than significant impact.

d) **No Impact.** The proposed Project is not located on a site included on the Cortese, Hazardous Waste and Substances Site List compiled pursuant to California Government Code §65962.5. www.envirostor.dtsc.ca.gov/public/ or http://geotracker.waterboards.ca.gov accessed on October 25, 2021. No impact would occur.

e) **No Impact.** Based on the Hazards Overlay Maps (Scale 1:14,400) San Bernardino County – Mountain Region FH15B contained in the County of San Bernardino General Plan Zoning & Overlay Maps, the Project site is not 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.[14] The Project site is not located within an Airport Safety Review Area. The closest airports to the Project site are Big bear City Airport approximately 20 miles to the east and Redlands Municipal Airport located approximately 30 miles southeast. No Impact should occur.

f) **No Impact.** The Project site is not expected to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Potholes or other road damage, for example slow emergency response times, increase the risk of loss of human life and damage to property in many emergency situations. However, the Project will include paving the rough graded dirt road that exists through the Project site. The site has adequate access from two or more directions. No impacts would occur.

g) **Less than Significant Impact.** The potential for a severe wildfire to occur is increased if dense vegetation growth and accumulations of dead plant material are present. Weather conditions and steep terrain also increase the hazardous wildfire potential; however, these conditions do not cause wildfires. The Project site is located within a Fire Safety (FS) Overlay District, based on Hazards Overlay Maps contained in the County of San Bernardino General Plan. It is also located in a very high fire hazard severity zone in a state responsibility area (SRA) according to Cal Fire Fire Hazard Severity Zone (FHSZ) Maps.[15] The general area is developed primarily with single family and multiple family housing. The proposed Project in the Fire Safety Overlay District will comply with the requirements of the County Fire Department and shall comply with the current Uniform Fire Code requirements and all applicable statutes, codes, ordinances, and standards (such as use of specific building materials, fuel modification areas, building separations, etc.). These requirements will reduce the risk of fire hazard to below a level of significance. It is anticipated that less than significant impacts should result, and no mitigation measures required.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
X.	**HYDROLOGY AND WATER QUALITY -** Would the project:				
a)	Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐

[14] San Bernardino County (2010) San Bernardino County Land Use Plan Countywide Plan Hazards Overlay Map FH15B. Retrieved from: http://cms.sbcounty.gov/lus/Planning/ZoningOverlayMaps.aspx
[15] CAL Fire (2007, November 7) Fire Hazard Severity Zone Maps, San Bernardino SW Retrieved from: https://osfm.fire.ca.gov/media/6520/fhszs_map62.jpg

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 offsite;	☐	☐	☒	☐
	iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of runoff; or	☐	☐	☒	☐
	iv. impede or redirect flood flows?	☐	☐	☐	☒
d)	In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e)	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **Less than Significant Impact.** The Project is located in the sub-watershed of Willow Creek and is approximately 5,301 feet amsl with some slope but is relatively flat. The site naturally drains southwest, and the proposed Project design would mimic this pattern. Lake Arrowhead is approximately 500 feet southwest of the northeastern portion of the Project. Lake Arrowhead is relatively high quality but requires treatment by filtration and disinfection to meet the State and Federal drinking water regulations. The earth materials encountered on the subject site during the Geotechnical/Geology field exploration were identified as artificial fill, colluvium, and weathered, Monsogranite of City Creek (Kcc). Groundwater was not encountered in the exploratory excavations to the maximum depth explored of approximately 21.5 feet bgs at the boring locations. The subject property is underlain by weathered bedrock. No evidence of onsite springs or seeps were observed during the field study. The study performed by Hilltop Geotechnical, Inc. found that groundwater should not be a factor for Project design or long-term performance and surface water is not considered as a significant factor for the proposed development.[11]

The unincorporated area of Lake Arrowhead adopted the 2020 Urban Water Management Plan (UWMP) on June 22, 2021. Lake Arrowhead Community Services District (LACSD) collects, treats, and disposes of domestic wastewater generated in the general area and currently has 10,700 wastewater connections in its service area. Wastewater drains into the LACSD pipeline network and conveyed to the nearest wastewater treatment plant.[16] The Project would be required to comply with State and local level requirements pertaining to but not limited to, proper site drainage, waste handling and disposal, and buildings and maintenance. As a result, the Project would not result in downstream water pollution (e.g., bacterial indicators, metals nutrients pesticides toxic organic compounds, sediments, trash & debris, oil & grease), sedimentation, and/or flooding. Site development would direct storm water and urban runoff into storm drain inlets in the proposed Project site area.

Furthermore, according to the Land Use Services Building and Safety Division Information Bulletin (IB-0018) a permit shall be required from the Building and Safety Division prior to the installation of a new or replacement sewage disposal system. Section 33.0618 of San Bernardino Code of Ordinances requires underground street utility locations for water and sewer mains to conform to the standards contained in the most recent edition of the State Road Department publication entitled Standards Specifications, Drawings 310 and 311, and the State Department of Health Services bulletin entitled "Required Separation Between Water Mains and Sanitary Sewers." The necessary permits will be obtained, and the sewage design does not conflict with this specific code and should not lead to significant impacts to water quality or groundwater quality during construction.

Potential short-term surface water quality impacts related to Project construction activities include runoff of loose soils and/or construction wastes and fuels that could potentially percolate into the ground or runoff onto the street. However, the Project would be required to comply with Section 402 of the Clean Water Act, which requires the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for construction impacts to 1 acre or more. The Project would direct runoff and stormflow into water quality basins as detailed in the Water Quality Management Plan (WQMP) and the Storm Water Pollution Prevention Plan (SWPP). Impacts to surface and groundwater quality should be less than significant with mitigation incorporated.

b) **Less than Significant Impact**. The Project would not substantially deplete groundwater supplies or interfere substantially with ground water recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. Groundwater was not encountered in the exploratory excavations to the maximum depth explored of approximately 21.5 feet bgs. The subject property is underlain by weathered bedrock. No evidence of onsite springs or seeps were observed during the field study, however the potential does exist during the following periods of heavy precipitation, snow melt, or prolonged landscape irrigation.[11] The project is served by an existing water purveyor LACSD with sufficient capacity in the existing water system to serve the needs of this project. The Project is not anticipated to alter or deplete groundwater supplies or interfere with groundwater recharge such that there

[16] Lake Arrowhead Community Services District Staff (2021 June, 22). Lake Arrowhead Community Services District 2020 Urban Water Management Plan. Website: 2020 Urban Water Management Plan | Lake Arrowhead Community Services District (lakearrowheadcsd.com)

would be a net deficit in aquifer volume or a lowering of the local groundwater table level. Impacts to ground water levels will be less than significant.

c) **Less than Significant Impact.** Based on the Project's Water Quality Management Plan (WQMP), the Storm Water Pollution Prevention Plan (SWPP), and Geotechnical Report prepared by Hilltop Geotechnical, implementation of the proposed Project would not result in substantial erosion or siltation on- or off-site.

i. No streams or rivers exists on or adjacent to the Project site. Urban runoff and stormwater flow would not impact existing drainage on the site or surrounding area, in the form of onsite or offsite flooding, ponding, diversion, etc. The Project would direct runoff and stormflow into water quality basins as detailed in the WQMP and SWPP. The Project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river in the manner which would result in substantial erosion or siltation on- or offsite. A less than significant impact would occur.

ii. No stream or river exists on the Project site. Urban runoff and stormflow would be captured in Project's water quality basins and detained and treated at one of two wastewater treatment locations within the unincorporated area of Lake Arrowhead. The Project would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite.

iii. While the Project would result in an increase in impervious surface for development of the proposed Project, the Project would not increase impervious surfaces and/or nuisance and storm flows such that flows could not be accommodated by the existing storm drain system. Impacts from Project runoff water which could 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 would be less than significant. The Project would not result in runoff that would exceed the capacity of existing or planned storm water drainage systems or result in downstream water pollution (e.g., pathogens, sedimentation, metals, hydrocarbons, nitrates).

iv. The Project site would not place any structure within a 100-year flood hazard area structures that could impede or redirect flood flows, because the site is not within an identified FEMA designated flood hazard area.[14] No impacts should occur.

d) **No Impact.** The nearest open water feature to the Project is Lake Arrowhead located approximately 500 feet to the east. The Project is not located in any flood hazard, tsunami, or seiche zones recognized by County of San Bernardino and therefore the Project would not risk release of pollutants due to Project inundation.[14] No impact would occur.

e) **Less than Significant Impact.** The Project site is situated within the Lake Arrowhead Community Services District (LACSD), which currently implements rules and regulations related to water quality and recently adopted the 2020 Urban Water Management plan on June 22, 2021.[16] The project is not expected to conflict with or obstruct implementation of this water management plan as it would adhere to all

requirements listed. Less than significant impact from the result of the Project is expected.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XI.	**LAND USE AND PLANNING** - Would the project:				
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?	☐	☐	☐	☒

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **No Impact.** The Project's general area is zoned for single and multiple residential housing. Other zoning districts in the vicinity include Institutional (IN) and Floodway (FW) for Lake Arrowhead. The Project would result in development of 41 residential homes within a gated community that is mostly developed and is zoned as single residential. The project would not physically divide an established community and therefore, should have no impact.

b) **No Impact**. The Project includes no components that would cause a significant impact to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. The Zoning Amendment included in this proposal, to change the zoning designation from Multiple Residential (RM) to Single Residential 14,00 sf minimum lot size (RS-14M) is necessary for the site to be in compliance with the Countywide Plan land use category of Low Density Residential (LDR).The unincorporated area of Lake Arrowhead Community Plan (LACP) guides the future use and development of land within the LACP in a manner that preserves the character and independent identity of the individual communities. Any new or future development within the gated community where the proposed Project site is located will be consistent with the existing theme and no impact should result.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XII.	**MINERAL RESOURCES** - Would the project:				
a)	Result in the loss of availability of a known mineral resource that will be of value to the region and the residents of the state?	☐	☐	☐	☒
b)	Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

SUBSTANTIATION: *(Check ☐ if project is located within the Mineral Resource Zone Overlay):*

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **No Impact.** The Project site is located within MRZ 3, which has not been defined as a significant resource area. Mining would not be compatible with the area's current and future land uses. No mineral resource reserves exist on the Project site or vicinity. No impact would occur.

b) **No Impact.** No locally important mineral recovery site exists on the Project site or vicinity. The County of San Bernardino General Plan does not identify any locally important mineral resources in the area. The Project would not result in the loss of availability of a mineral recovery site identified in a local general plan, specific plan, or other land use plan. No impact would occur.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XIII.	**NOISE** - Would the project result in:				
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 applicable standards of other agencies?	☐	☐	☒	☐
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 two miles of a public airport or public use airport, would the Project expose people residing or working in the project area to excessive noise levels?

SUBSTANTIATION: *(Check if the project is located in the Noise Hazard Overlay District ☐ or is subject to severe noise levels according to the General Plan Noise Element ☐):*

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **Less than Significant Impact**. The Project would result in short-term construction noise associated with construction labor and operation of vehicles and construction equipment during site preparation, grading, building, paving, and painting. Long term use of the new development would result in increased population to the small, gated community, but a significant amount of noise increase is not expected.

The County of San Bernardino ambient noise standards in residentially zoned property from stationary noise sources is 55 dB(A) between the hours of 7am to 10pm and drops to 45 dB(A) from 10pm to 7am (Table 3). The County Municipal Code, Section 83.01.080 (c)(2) prohibits persons to operate or cause to operate a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated to exceed any of the following categories:

(A)The noise standard for the receiving land use as specified in Subsection B (Noise-impacted areas) for a cumulative period of more than 30 minutes in any hour.

(B)The noise standard plus 5 dB(A) for a cumulative period of more than 15 minutes in an hour.

(C)The noise standard plus 10 dB(A) for a cumulative period of more than five minutes in an hour.

(D)The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

(E)The noise standard plus 20 dB(A) for any period of time.

Table 3. Noise Standards for Stationary Sources		
Affected Land Uses (Receiving Noise)	**7:00 a.m. – 10:00 p.m. Leq**	**10:00 p.m. – 7:00 a.m. Leq**
Residential	55 dB(A)	45 dB (A)
Professional Services	55 dB (A)	55 dB (A)
Other Commercial	60 dB (A)	60 dB (A)
Industrial	70 dB (A)	70 dB (A)
Leq = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically one, eight or 24 hours.		
dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter		

de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.
Ldn = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10:00 p.m. to 7:00 a.m.). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.
Source: San Bernardino County (2021 November). San Bernardino County Municipal Code Section 83.01.080 Noise, Table 83-2

Exempt noise according to the County Development Code, Section 83.01.080 (g)(3), includes: (1) Motor vehicles not under the control of commercial or industrial use; (2) Emergency equipment, vehicles, and devices; (3) Temporary construction, maintenance, repair, or demolition activities between 7:00Am and 7:00pm, except Sundays and Federal Holidays. Construction activities will abide by the County's Development Code to mitigate potential noise impacts.

The Project isn't expected to result in 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 applicable standards of other agencies. Impacts are anticipated to be less than significant.

b) **Less than Significant Impact.** Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. Construction activity can result in varying degrees of ground vibration, depending on the equipment used on the site. Construction vibration may be noticeable at land uses within 100 feet of the source but is expected to be very short term and would not result in structural damage.

The threshold at which there may be a risk of architectural damage to normal houses with plastered walls and ceilings is 0.20 peak particle velocity inch per second (PPV). Primary sources of vibration during construction would be from bulldozers and vibratory rollers. A vibratory roller could produce a PPV of 0.21 at 25 feet and a large bulldozer could produce up to 0.089 PPV at 25 feet. There are no sensitive receptors within 25 feet of the Project site. Construction related vibration is not expected to result in significant impacts. A few heavy trucks can be expected to visit the Project site to deliver supplies on a regular basis. These trucks would not be anticipated to exceed 0.10 in/sec PPV at 10 feet (Caltrans 2013). Predicted operational related vibration levels at the nearest off-site structures, which are located in excess of 25 feet from the traveled roadway segments, would not be anticipated to exceed even the most conservative threshold of 0.2 inch/second PPV.[17]
San Bernardino County Code of Ordinances Section 83.01.090 Vibration states the following:

(c) Exempt Vibrations. The following sources of vibration shall be exempt from the regulations of this Section:

(1) Motor vehicles not under the control of the subject use.

[17] California Department of Transportation (2013, September). Transportation and Construction Vibration Guidance Manual. Division of Environmental Analysis.

(2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

Construction related vibration is not expected to result in significant impacts and be in compliance with San Bernardino County Code of Ordinances Section 83.01.090 (c)(2). Impacts involving vibration or ground borne noise are anticipated to be less than significant.

c) **Less than Significant Impact**. The Project is located within a single residential and multiple residential zoned area. The nearest private airstrips are Big Bear City Airport approximately 20 miles to the east, and Redlands Municipal Airport located approximately 30 miles southeast of the Project site. The Project site is not located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or a public use airport. The Project would not expose people residing or working in the project area to excessive levels. The Project would not result in noise impacts within an airport overlay zone. Impacts would be less than significant.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XIV.	**POPULATION AND HOUSING** - Would the project:				
a)	Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b)	Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials.

a) **Less than Significant Impact.** The proposed Project would involve the development of 41 residential lots on approximately 15 acres. The exiting dirt road that runs through the Project is planned to be paved during the construction phase. The Project would not require any roadway or infrastructure improvements other than those required to solely serve the Project site. The Project site is currently zoned LA/RM. According to the County's General Plan Housing Element, land use district Multiple Residential (RM) primary purpose are to provide areas for mutliple-family homes and complementary

uses, and to discourage incompatible non-residential uses.[18] The Zoning Amendment to Single Residential 14,00 sf minimum lot size (RS-14M) included in this Project is necessary for the site to be in compliance with the Countywide Plan land use category of Low Density Residential (LDR). The proposed Project will then be consistent with the goals and policies contained in the land use element and other chapters of the Countywide Plan/Policy Plan 2020. Population growth from the Project is anticipated to be accommodated by the County's existing long-range planning projections. The Project is not expected to induce substantial unplanned population growth in an area, either directly or indirectly. The proposed Project would result in a less than significant impact on population growth.

b) **No Impact.** The Project site is surrounding by single and multiple family homes and is in a gated residential community. The Countywide Plan/Policy Plan Housing Element identifies goals, policies, actions, and programs to meet the County's Mountain Region housing requirements for the years 2013-2021.[18] Table 4 lists the County's six Mountain Region policies for meeting housing demands in the City of Lake Arrowhead. Goal M/H-1 states, encourage a diversity of housing products that respect and complement the topography, character, and lifestyle of the Mountain Region.[8]

Table 4. San Bernardino County Countywide Plan Housing Element 2013-2021

Policies	Definitions
M/H-1.1	Regulate the density, mass, and height of residential development in hillside areas in order to reduce fire hazards, prevent erosion, preserve natural viewsheds, and maintain the forest character of the Mountain Region.
M/H-1.2	Require architecture and outside facades of residential development that are in keeping with the mountain character; use natural woods, wood composite materials, and masonry as much as practicable.
M/H-1.3	Ensure that development standards for single family homes result in building sizes that are limited to site and scale that are compatible with existing development and the character of the Mountain Region
M/H-1.4	Use the planned development permit or other discretionary reviews to regulate the density and configuration of residential development along the shores of all mountain lakes or on slopes to protect their scenic qualities.
M/H-1.5	Encourage the grouping or clustering of residential buildings where this will maximize the opportunity to preserve significant natural resources, natural beauty, or open space within the density limits of the underlying zone.
M/H-1.6	Enforce appropriate operation standards, maintenance standards, and permitting procedures for the establishment and maintenance of short-term private home rentals in the Mountain Region.

Source: County of San Bernardino (2014, January). General Plan 2013-2021 Housing Element.

The Project would not result in any changes to existing zoning or land use designations that would increase population or affect housing projections from that identified in County's General Plan. The Project encourages grouping of residential building to maximize the opportunity to preserve open space elsewhere. The proposed development will look similar to the surrounding neighborhood and keep with the mountain character. The Project doesn't involve displacement of existing people or housing. No impact is anticipated.

[18] San Bernardino County Land Use Services Division (2014, January 28). County of San Bernardino 2013-2021 Housing Element. Retrieved from: https://cms.sbcounty.gov/lus/Planning/GeneralPlan.aspx

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XV. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire Protection?	☐	☐	☐	☒
Police Protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other Public Facilities?	☐	☐	☐	☒

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **No Impact.** Operation of the Project isn't anticipated to have any impacts on parks, schools or public libraries since the Project wouldn't result in substantial population growth in the area. The Project's impact to police and fire response time will be related to the Project's accessibility. As the project would comply with emergency vehicle access and traffic circulation design standards and guidelines outlined in the County of San Bernardino General Policy Plan.[19] The Project isn't anticipated to result in a deterioration of response times by police and fire.

The proposed Project would not induce an appreciable increase in population or create structures that would result in a significant increased need for any of the public service facilities listed in Table 5 below, including but not limited to, fire protection, police protection, schools, parks, or other public facilities.

Table 5. Examples of Public Services Facilities

Public Service	**Location in or near Lake Arrowhead**	**Distance from Project site**
Fire Station	27470 N Bay Rd, Lake Arrowhead	~0.60 miles northeast
Police Department	26010 CA-189, Twin Peaks	~3.90 miles southwest
Public Library	27235 CA-189,	~1.80 miles southwest

[19] San Bernardino County (2020 October). San Bernardino County Policy Plan 2020. Retrieved from: https://cms.sbcounty.gov/lus/Planning/GeneralPlan.aspx

	Blue Jay	
City Park	29100 Hospital Rd, Lake Arrowhead	~4.10 miles northeast
Schools	730 Rhine Rd, Lake Arrowhead	~0.71 miles northwest
Note: "~" = approximately Source: City Website and Google Earth, 2019		

The Project would be accommodated by existing long-range planning for government facilities in the County of San Bernardino. The Project does not involve the construction of new or altered government buildings and no impact to need for new government facilities is anticipated as a result of the Project.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XVI.	**RECREATION**				
a)	Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility will occur or be accelerated?	☐	☐	☐	☒
b)	Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **No Impact.** No public parks exist near the Project. The North Bay at Lake Arrowhead gated community where the Project site is located includes a neighborhood private park approximately 70 feet to the west of the Project. The private park supports the gated community and is not expected to experience substantial physical deterioration of the facility. Substantial physical deterioration of any other nearby facility would not occur or be accelerated from the Project. No impacts to park facilities would occur as a result of the Project.

b) **No Impact.** The Project does not include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse effect on the environment. No impact would occur.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XVII.	**TRANSPORTATION** – Would the project:				
a)	Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒
b)	Would the project 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?	☐	☐	☐	☒

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **No Impact.** The Project is situated within a gated community that will provide access to construction vehicles through their northern entrance. Primary access to the Project site is from State Route 189 to North Bay Rd. The roadways that will be most affected by the Project are North Bay Rd, Sugar Pine Dr, and State Route 189. State Route 189 is classified as a Major Arterial Highway. No existing bus routes travel through the immediate Project area. County projects are required to complete a transportation impact study (TIS), in addition to VMT assessment for development projects, to demonstrate consistency with the General Plan and in accordance to recent CEQA legislation such as Senate Bill 743 (SB 743). The Transportation & Mobility Element updated October 2020 reflects the Countywide Plan and its goals (Table 6) and policies related to traffic.

Table 6. Transportation & Mobility Element Goals – San Bernardino County	
Goal TM-1 Roadway Capacity	Unincorporated areas served by roads with capacity that is adequate for residents, businesses, tourists, and emergency services.
Goal TM-2 Road Design Standards	Roads designed and built to standards in the unincorporated areas that reflect the rural, suburban, and urban context as well as the regional (valley, mountain, and desert) context.
Goal TM-3 Vehicle Miles Traveled	A pattern of development and transportation system that minimizes vehicle miles traveled.

Goal TM-4 Complete Streets, Transit, and Active Transportation	On- and off-street improvements that provide functional alternatives to private car usage and promote active transportation in mobility focus areas.
Goal TM-5 Goods Movement	A road, rail, and air transportation system that supports the logistics industry and minimizes congestion in unincorporated areas.
Goal TM-6 Airports	A network of local and regional airports that meet regional and local aviation needs.

The County Congestion Management Program (CMP) level of service (LOS) standard requires all CMP segments to operate at LOS E or better. Level of Service E are roadways at or near capacity levels of comfort and convenience.[20] The Project would not conflict with existing applicable plans, policies, or programs for public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities and no impact to such facilities would result from the Project.

b) **Less than Significant Impact.** The Project site is accessible by way of State Route 189 to North Bay Rd and Sugar Pine Dr., all one lane roads. The deployment of construction trucks and equipment on the freeway and/or local arterials and collectors during construction would result in a slight increase in traffic during the construction period. It is assumed that off-road equipment would be delivered by vendors and staged near the Project site. In general, daily construction vehicle trips would be short-term and have a relatively small impact on daily traffic generation in the area. In addition, through traffic on roadways in the construction areas would be maintained at all times during construction.

Table 7. Project Trip Generation

		A.M. Peak Hour			P.M. Peak Hour			
Land Use: Single-Family Residential	**Units**	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**Daily**
Trip Generation Rates[1]		0.19	0.56	0.74	0.62	0.37	0.99	9.44
Trip Generation	41 DU	8	22	30	26	15	41	387

Notes: DU = Dwelling Unit
[1]Trip generation based on rates for Land Use 210 - "Single-Family Detached Housing" from Institute of Transportation Engineers' (ITE) Trip Generation (10th Edition)

Source: Sandipan Bhattacharjee (2021, September 23). Lake Arrowhead – Transportation Assessment Memorandum

Table 7 shows the calculation of the Project trip generation. As shown in Table 9, the proposed Project is forecast to generate 30 trips in the a.m. peak hour, 41 trips in the p.m. peak hour, and 387 daily trips.[6]

Table 8. VMT Screening Analysis

TAZ	Homebased VMT/Capita	County Average Homebased VMT/Capita	Difference	%Greater (+) or Lower (-)	Low VMT Area

[20] Southern California Association of Governments (2020 September 3). Transportation System Congestion Management Program. Retrieved from: https://www.gosbcta.com/wp-content/uploads/2019/10/2016-Congestion-Management-Plan-.pdf

53,866,201	14.4	15.94	-1.54	-9.7%	Yes
Source: SBCTA VMT Screening Tool; Sandipan Bhattacharjee (2021, September 23). Lake Arrowhead – Transportation Assessment Memorandum					

Table 8 shows the Project zone has an average home-based VMT of 14.4 miles while the County has an average of 15.94 miles and the VMT for the Project TAZ is 9.7% lower than the County average VMT. The proposed Project is located in a low VMT area and qualifies for this exemption. The Project is screened out and anticipated to have less than a significant impact on VMT. Since the trip generation of the Project is less than 100 trips during any peak hour, it is not recommended that a Transportation Impact Study (TIS) be required.[6] The Project would not conflict and should be consistent with CEQA Guidelines §15064.3, subdivision (b). A less than significant impact to traffic circulation during construction and operation is anticipated.

c) **No Impact.** The Project design plans will be designed and engineered in compliance with the County of San Bernardino engineering and construction regulations, policies, procedures, and standards. The Project does not include or require any off-site improvements. The Project would be consistent with the surrounding land uses. No impact would occur.

d) **No Impact.** Project access and circulation would accommodate emergency fire trucks, police units, and ambulance/paramedic vehicles from North Bay Rd accessible by State Route 189. Project circulation would require review and approval by the City Traffic Engineer. All access lanes will meet the County requirements pursuant to the Uniform Building and Fire Code to ensure adequate emergency access throughout the project site. Moreover, the County Fire Department and Sheriff Station are located within close proximity to the Project site. No impact will occur.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XVIII.	**TRIBAL CULTURAL RESOURCES**				
a)	Would the Project 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 Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource	☐	☒	☐	☐

Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

SUBSTANTIATION:

San Bernardino County Countywide Plan/Policy Plan 2020; Cultural Resources Study, Brian F. Smith and Associates, Inc. August 24, 2021; Cultural Historical Resources Information System (CHRIS), South Central Coast Information Center, California State University, Fullerton; Submitted Project Materials

a) **Less than Significant Impact with Mitigation.** Assembly Bill (AB) 52 requires Lead Agencies consult with Native American tribes on the Native American Heritage Commission List to determine whether the tribes believe unique archaeological sites might exist on the proposed Project site. Initiation of consultation is required prior to public review of a Project CEQA document. Notification involves a letter with a brief project description, location, lead agency contact information, and statement that the tribe has 30 days to request consultation. The lead agency must begin consultation within 30 days of receipt of tribal request. Public agencies, when feasible, are required to avoid damages to Tribal Cultural Resources (TCR): a site feature, place, cultural landscape, sacred place or object, which is of cultural value to a Tribe; and is either on or eligible for the California Historic Register or a local historic register; or the lead agency, at its discretion, chooses to treat the resource as a TCR (Public Resources Code [PRC] 21074 (a)(1)(A)-(B)).

Brain F. Smith and Associates, Inc. contacted the Native American Heritage Commission (NAHC) in August 2021 for a review of the Sacred Lands File (SLF), to determine if any known Native American cultural properties (e.g., traditional use or gathering areas, places of religious or sacred activity) are present within or adjacent to the Project area. The NAHC found positive results in the vicinity of the project site; however, the Phase I survey did not identify any cultural resources withing the project boundary.

On January 10, 2022 Notices of Opportunity to Consult were sent to six tribes that are traditionally and/or culturally affiliated with the project area, or have specifically requested notice for all projects within the County. The tribes included in the notification were the Twenty-Nine Palms Band of Mission Indians, Colorado River Indian Tribes (CRIT), Fort Mojave Indian Tribe (FMIT), Morongo Band of Mission Indians, San Manuel Band of Mission Indians (SMBMI), and the Soboba Band of Luiseno Indians. Being culturally affiliated with the area, the SMBMI responded to the Project proposal with the recommended mitigation measures below.

b) **Less than Significant Impact with Mitigation.** As identified in response Section 5.18 a) above, results from the NAHC were found to be positive for the presence of Native American sacred sites or locations of ceremonial importance. The NAHC recommended contacting the San Manuel band of Indians for additional information.[9]

Mitigation Measures

TCR-1: If a pre-contact cultural resource is discovered during archaeological presence/absence testing, the discovery shall be properly recorded and then reburied *in situ.* A research design shall be developed by the archaeologist that shall include a plan to evaluate the resource for significance under CEQA criteria. Representatives from the San Manuel Band of Mission Indians Cultural Resources Department

(SMBMI), the archaeologist/applicant, and the Lead Agency shall confer regarding the research design, as well as any testing efforts needed to delineate the resource boundary. Following the completion of evaluation efforts, all parties shall confer regarding the archaeological significance of the resource, its potential as a Tribal Cultural Resource (TCR), avoidance (or other appropriate treatment) of the discovered resource, and the potential need for construction monitoring during project implementation. Should any significant resource and/or TCR not be a candidate for avoidance or preservation in place, and the removal of the resource(s) is necessary to mitigate impacts, the research design shall include a comprehensive discussion of sampling strategies, resource processing, analysis, and reporting protocols/obligations. Removal of any cultural resource(s) shall be conducted with the presence of a Tribal monitor representing the Tribe, unless otherwise decided by SMBMI. All plans for analysis shall be reviewed and approved by the applicant and SMBMI prior to implementation, and all removed material shall be temporarily curated on-site. It is the preference of SMBMI that removed cultural material be reburied as close to the original find location as possible. However, should reburial within/near the original find location during project implementation not be feasible, then a reburial location for future reburial shall be decided upon by SMBMI, the landowner, and the Lead Agency, and all finds shall be reburied within this location. Additionally, in this case, reburial shall not occur until all ground-disturbing activities associated with the project have been completed, all monitoring has ceased, all cataloguing and basic recordation of cultural resources have been completed, and a final monitoring report has been issued to Lead Agency, CHRIS, and SMBMI. All reburials are subject to a reburial agreement that shall be developed between the landowner and SMBMI outlining the determined reburial process/location and shall include measures and provisions to protect the reburial area from any future impacts (vis a vis project plans, conservation/preservation easements, etc.).

Should it occur that avoidance, preservation in place, and on-site reburial are not an option for treatment, the landowner shall relinquish all ownership and rights to this material and confer with SMBMI to identify an American Association of Museums (AAM)-accredited facility within the County that can accession the materials into their permanent collections and provide for the proper care of these objects in accordance with the 1993 CA Curation Guidelines. A curation agreement with an appropriate qualified repository shall be developed between the landowner and museum that legally and physically transfers the collections and associated records to the facility. This agreement shall stipulate the payment of fees necessary for permanent curation of the collections and associated records and the obligation of the Project developer/applicant to pay for those fees.

All draft records/reports containing the significance and treatment findings and data recovery results shall be prepared by the archaeologist and submitted to the Lead Agency and SMBMI for their review and comment. After approval from all parties, the final reports and site/isolate records are to be submitted to the local CHRIS Information Center, the Lead Agency, and SMBMI.

TCR-2: In the event that any human remains are discovered within the project area, ground disturbing activities shall be suspended 100 feet around the resource(s) and an Environmentally Sensitive Area (ESA) physical demarcation/barrier constructed. The on-site lead/foreman shall then immediately who shall notify SMBMI, the applicant/developer, and the Lead Agency. The Lead Agency and the applicant/developer shall then immediately contact the County Coroner regarding the

discovery. If the Coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, the Coroner shall ensure that notification is provided to the NAHC within twenty-four (24) hours of the determination, as required by California Health and Safety Code § 7050.5 (c). The NAHC-identified Most Likely Descendant (MLD), shall be allowed, under California Public Resources Code § 5097.98 (a), to (1) inspect the site of the discovery and (2) make determinations as to how the human remains and funerary objects shall be treated and disposed of with appropriate dignity. The MLD, Lead Agency, and landowner agree to discuss in good faith what constitutes "appropriate dignity" as that term is used in the applicable statutes. The MLD shall complete its inspection and make recommendations within forty-eight (48) hours of the site visit, as required by California Public Resources Code § 5097.98.

Reburial of human remains and/or funerary objects (those artifacts associated with any human remains or funerary rites) shall be accomplished in compliance with the California Public Resources Code § 5097.98 (a) and (b). The MLD in consultation with the landowner, shall make the final discretionary determination regarding the appropriate disposition and treatment of human remains and funerary objects. All parties are aware that the MLD may wish to rebury the human remains and associated funerary objects on or near the site of their discovery, in an area that shall not be subject to future subsurface disturbances. The applicant/developer/landowner should accommodate on-site reburial in a location mutually agreed upon by the Parties.

It is understood by all Parties that unless otherwise required by law, the site of any reburial of Native American human remains or cultural artifacts shall not be disclosed and shall not be governed by public disclosure requirements of the California Public Records Act. The Coroner, parties, and Lead Agencies, will be asked to withhold public disclosure information related to such reburial, pursuant to the specific exemption set forth in California Government Code § 6254 (r).

Therefore, potential impacts are identified or anticipated, however, required mitigation measures would reduce impacts to a less than significant level.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XIX.	**UTILITIES AND SERVICE SYSTEMS -** Would the project:				
a)	Require or result in the relocation or construction of new or expanded water, wastewater treatment or 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?	☐	☐	☐	☒

SUBSTANTIATION:

County of San Bernardino Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **Less than Significant Impact.** The proposed Project includes construction of 41 residential lots and five lettered lots on 15 acres. It is anticipated Project demands would be met by existing local utility infrastructure with construction of utility tie-ins to the Project site and payment of required connection fees and design approval by the Project Engineer.

Table 9. Utility Purveyors and Services

Purveyor	Type of Service
Lake Arrowhead Water Service District	Water, sewer, recycled water
Verizon	Telephone
Southern California Edison	Electric
Southern California Gas Company	Natural gas
Mountain Disposal Service	Solid waste disposal
Frontier	Cable television and internet

Source: San Bernardino County (2019, June) San Bernardino Countywide General Plan Draft EIR.

Water services would be provided by the Lake Arrowhead Community Services District (LACSD) upon completion of fringe annexation.[16] Other utility purveyors and services are listed in Table 9. Environmental impacts associated with tie-ins to existing utilities for the proposed Project are anticipated to be less than significant.

b) **Less than Significant Impact.** The LACSD provides water and wastewater services to the Lake Arrowhead area and surrounding communities. The district currently has approximately 1,841 acre-feet (AF) of reliable potable water available. It is a combination of surface water from Lake Arrowhead, groundwater from wells in Grass Valley, and imported water from the Crestline Lake Arrowhead Water Association (CLAWA). CLAWA provides water supply to the City of Lake Arrowhead. CLAWA is a wholesale water purveyor selling water to approximately 25 smaller water purveyors in the area. CLAWA distributes water from the State Water project and pumps that water from Lake

Silverwood. CLAWA's boundary area is approximately 50,000 acre-feet per year from the State Water Project. The peak year usage is at 3.00 acre-feet. CLAWA utilized 52 percent of their total water capacity. In that CLAWA has excess capacity to serve residents in the Lake Arrowhead Community Plan District. LACSD is anticipated to maintain adequate water supplies to service the Project during normal, dry, and multiple dry years through expansion of its water reclamation facilities, conservation practices, and efficiency.[16] The Project would not require or result in the construction of new, or expansion of existing water treatment facilities. Impacts from the Project would be less than significant.

c) **No Impact.** Construction of the Project might require use of an on-site port-a-potty during the construction period that could be serviced by a rental company in that line of business (e.g. United Rental). If a port-a-potty is provided by the Project contractor, the service provider would handle disposal at the local wastewater treatment facility. LACSD provides both water and wastewater treatment for Projects in the City of Lake Arrowhead. Approximately 70 percent if the available sewer connections have been used within the Lake Arrowhead Community Plan with 30 percent remaining.[16] However, it is not expected that the Project will burden the existing ability of LACSD to treat wastewater. Development projects will be required to pay for and/or install upgrades to trunk sewer lines and other service lines in order to complete the necessary upgrades for the Project. No impacts would result.

d) **Less than Significant Impact.** The Project would generate some amount of construction and operation waste. Mountain Disposal Services serves Crestline - Running Spring - Lake Arrowhead. A solid waste management plan will be required by San Bernardino County Solid Waste Management Division (SWMD) which will ensure compliance with any regulations regarding the disposal of any solid waste generated by the future construction of the site. The proposed Project would have a less than significant impact on landfills.

e) **No Impact.** The Proposed project would comply with all pertinent federal, state, and local statutes and regulations related to solid waste and includes no policy or design feature that would conflict with implementation of such requirements. State law requires local jurisdictions divert at least fifty percent of solid waste from landfills through conservation, recycling, and composting. Like all California communities, the City of Lake Arrowhead community is required to comply with State regulations. No impacts are anticipated related to solid waste regulations as a result of the Project.

Therefore, no significant adverse impacts are identified or anticipated, and no mitigation measures are required.

Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XX. WILDFIRE: If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒

b)	Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c)	Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water resources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d)	Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

SUBSTANTIATION:

County of San Bernardino Countywide Plan/Policy Plan 2020; Submitted Project Materials

a) **No Impact.** The proposed Project site is located in a SRA or land classified as very high FHSZ.15 The potential for a severe wildfire to occur is increased if dense vegetation growth and accumulations of dead plant material are present. The Project site is not located in a Fire Safety Boundary according to the County's Countywide Plan Hazard Overlays map FH15B – Mountain Region.[14] The Project vicinity is developed single and multiple family homes. Weather conditions and steep terrain also increase the hazardous wildfire potential; however, the Project site and surrounding area is devoid of high-density vegetation. Human error, arson, high-voltage lines, vehicles, and lightning are the primary causes of wildfires.

As mentioned in Section 5.9 Hazards and Hazardous Materials (h) the Project site is not expected to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. The proposed Project in the Fire Safety Overlay District will comply with the requirements of the County Fire Department and shall comply with the current Uniform Fire Code requirements and all applicable statutes, codes, ordinances, and standards (such as use of specific building materials, fuel modification areas, building separations, etc.). The site has adequate access from two or more directions. It is anticipated that fire and police services would be able to adequately service the Project in an emergency. A less than significant impact related to very high fire risk is anticipated as a result of the Project.

b) **No Impact**. As discussed in response a) above, the Project is located in a very high FHSZ and in a SRA. To reduce the impact of exposure to wildfire risks the County of San Bernardino Municipal Code Division 3, Chapter 3, Section 23.0304 Mountain Area Fire Hazard Abatement (d) states when neighboring persons or properties are especially vulnerable to the effects of fire, including, but not limited to schools, hospitals, mobile home parks, residential occupancies, it is the responsibility of the property owner to adhere to the provisions of this section when flammable vegetation stands within 100 feet, measured on the ground, of all neighboring structures. Additional clearance may be required at the discretion of the County Fire Chief/Fire Warden or their designee on buildings listed above that may be used as evacuation

centers, medical facilities and/or places of public gatherings and/or critical infrastructure. The proposed Project in the Fire Safety Overlay District will comply with the requirements of the County Fire Department and shall comply with the current Uniform Fire Code requirements and all applicable statutes, codes, ordinances, and standards (such as use of specific building materials, fuel modification areas, building separations, etc.). The Project would not, due to slope, prevailing winds, and other factors, exacerbate wildlife risks, and thereby expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildlife.

c) **No Impact**. As discussed in response a) above, the Project is located in a very high FHSZ and in a SRA. The proposed Project in the Fire Safety Overlay District will comply with the requirements of the County Fire Department and shall comply with the current Uniform Fire Code requirements and all applicable statutes, codes, ordinances, and standards (such as use of specific building materials, fuel modification areas, building separations, etc.). The Project would not require the installation or maintenance of associated infrastructure that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment. No impact would result.

d) **No Impact**. As discussed in response a) above, the Project is located in a very high FHSZ and in a SRA. Policy HZ 1.1 and HZ 1.2 require new subdivisions and developments either be built outside of debris flow hazard areas or debris flow hazards must be mitigated for new developments. Furthermore, each project would be required to conduct a geotechnical investigation of its site that would assess existing landslide susceptibility and impacts of proposed grading and construction on landslide hazard and provide any needed recommendations to minimize landslide hazards. All projects will also implement the Wildfire SRA Fire Safe Regulations' basic wildland fire protection standards and the FHA program shall enforce the fire hazard requirements outlined in San Bernardino County Code Sections 23.0301 to 23.0319.[19]

As discussed in Section 5.7 Geology and Soils and the Hilltop Geotechnical, Inc. Geotechnical/Geology Study Report found the Project area to have low susceptibility of flooding or landslides. The proposed Project in the Fire Safety Overlay District will comply with the requirements of the County Fire Department and shall comply with the current Uniform Fire Code requirements and all applicable statutes, codes, ordinances, and standards (such as use of specific building materials, fuel modification areas, building separations, etc.). The Project would not expose people or structure to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, as a result of runoff, post-fire slope instability, or drainage changes. No impact would result.

	Issues	*Potentially Significant Impact*	*Less than Significant with Mitigation Incorporated*	*Less than Significant*	*No Impact*
XXI.	**MANDATORY FINDINGS OF SIGNIFICANCE:**				
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 would cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

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a) **Less than Significant with Mitigation Incorporated.** As discussed in Section 5.4 Biological Resources, Section 5.5 Cultural Resources, and Section 5.7 Geology and Soils and Section 5.18 Tribal Cultural Resources with implementation of Mitigation Measures CUL-1, CUL-2, GEO-1, GEO-2, TCR-1, and TCR-2, impacts from the Project would be reduced to a less than significant level, and as a result, would not result in any significant Project or cumulative environmental impacts to biological or cultural resources. The short- and long-term effects associated with the Project would not be considered cumulatively considerable.

b) **Less than Significant Impact.** As discussed in the preceding responses to Section 5.1 through Section 5.20, this Project would not result in any significant Project of cumulative environmental impacts. The short-term and long-term effects associated with Project would not be considered cumulatively considerable.

c) **Less than Significant Impact.** As discussed in the preceding responses to the entire list of impact questions, the Project would not result in any significant environmental impacts to persons. Sufficient construction control measures have been identified to reduce short term construction impacts to a level of less than significant. Compliance with the existing federal, state, and local regulations, along with standards design criteria, would ensure that the proposed Project does not directly or indirectly cause a substantial adverse effect on human beings.

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Appendix A
Biological Assessment Report

Habitat Assessment

To: Mr. Jesse Wright, California Retail Properties Corp, (CRPC)
From: Eric Dugan, Ph.D., Dugan Biological Services (DBS)
Report Date: 10/20/2021
Subject: Results of Habitat Assessment for Southern Rubber Boa, San Bernardino Flying Squirrel, and Bald Eagle at the Lake Arrowhead Development Property (Project), Lake Arrowhead, San Bernardino County, California

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Mr. Wright,

This report presents the results of a habitat assessment for the southern rubber boa (*Charina umbratica;* SRB), San Bernardino flying squirrel (*Glaucomys sabrinus californicus;* SBFS), and Bald Eagle (*Haliaeetus leacocephalus;* BAEA) at the Lake Arrowhead Development Property in Lake Arrowhead, San Bernardino County, California. The SRB is a state listed threatened species, the SBFS is a state species of special concern, and the BE is a state listed endangered species. All three of these species are known to inhabit the San Bernardino Mountains. Habitat assessments for all three species have been requested as part of the California Environmental Quality Act (CEQA) review process associated with the Project.

Species Biology

Southern Rubber Boa

The SRB is a small fossorial boa species endemic to California, typically found between 5,000 and 8,000 feet elevation (Stewart, 1988). The species distribution is limited to several disjunct populations in the San Bernardino and San Jacinto Mountain ranges (Stebbins, 2012). In the San Bernardino Mountains, most known localities occur between Twin peaks and Green Valley (Stewart, 1988). Elsewhere, large tracts of seemingly suitable habitat appear to remain unoccupied by the species. The SRB is currently listed as threated in California, and does not have federal protection status (CDFW, 2021a).

In the San Bernardino Mountains, SRB occupies oak-conifer and mixed-conifer forests (Stewart, 1988). Dominant vegetation at known locations include big berry manzanita (*Arctostaphylos glauca*), black oak (*Quercus kelloggii*), Jeffrey pine (*Pinus jeffreyi*), incense cedar (*Callocedrus decurrens*), ponderosa pine

(*P. ponderosa*), and sugar pine (*P. lambertiana)*. Southern rubber boa inhabits rock outcroppings, grassy fields, riparian corridors, and forested slopes (Stewart, 1988). Subterranean retreats including fallen logs, rocky cavities, and leaf litter are among preferred microhabitats (Stebbins, 2012). Surface activity is limited to brief periods of suitable soil and climactic conditions in the spring and summer seasons respectively (Keasler, 1981). Due to their fossorial and nocturnal habitats, SRB are rarely observed above ground. Small rodents and lizards are preferred prey. Mating occurs in the spring, with young being born in late summer and early fall (Stebbins, 2012).

San Bernardino Flying Squirrel

The SBFS is a small grey squirrel, closely related to the Northern flying squirrel (*Glaucomys subrinus*). It is restricted to the San Bernardino Mountains between 5,200 and 8,500 feet (Williams, 1986). The SBFS is currently listed as a state species of special concern, and does not have federal protection status (CDFW, 2021a).

Primarily associated with mixed conifer forests, SBFS prefers areas containing stands of white fir (*Abies concolor*) and black oak (*Q. kelloggii*) adjacent to riparian corridors (Williams et al., 1992). Strictly nocturnal, they retreat during the day into cavities created by woodpeckers and tree snags (Ingles, 1965). The SBFS builds nests and raise young in selected cavities. Foraging, dispersal, feeding, nesting building, and mating occur after sunset. A well-developed webbed membrane connecting the 4 limbs allows these small squirrels to glide short distances between trees (Jameson and Peeters, 1988). Diet varies between seasons, with fungi the primary food source during summer months, whereas seeds, nuts, small mammals, small birds, and lichen are consumed in other seasons (Jameson and Peeters, 1988).

Bald Eagle

The BAEA is a large raptor found across the United States (Sibley, 2000). Adult BAEA are easily identified by their large size and characteristic white head and white tail. Bald eagle numbers dropped significantly in the late 1970's due to factors associated with anthropogenic uses of DDT (CDFW, 2021c). Although population numbers across the United States have recovered nicely, the BAEA is currently listed as endangered under the California Endangered Species Act (CDFW, 2021a).

Typically associated with water bodies of water, BAEA inhabit coastline, river, pond, and lake ecosystems (Sibley, 2000). Bald eagles hunt from perches near water or from a soar. Prey items including fish, small mammals, and birds are taken while in flight (Sibley, 2000). Bald eagles typically breed and nest in forested areas adjacent to large bodies of water (CDFW, 2021c). Potential nesting habitat in the San Bernardino Mountains includes the margins of Big

Bear Lake and Lake Arrowhead. Nests are built by both adults, and are typically placed below the crown of a large coniferous tree near a water feature (CDFW, 2021c). Nests may be used and rebuilt for multiple years, resulting in some reaching massive sizes. In southern California, breeding occurs from late winter to early spring, with egg laying occurring in spring (CDFW, 2021c).

Existing Conditions

The Lake Arrowhead Development Property is located in an area of moderately-dense developed lands. The Property is situated immediately southwest of the intersection of Peninsula Drive and North Bay Road, both paved public roads. A San Bernardino County Fire Department fire station lies to the northeast of the Property. Residential areas and paved public roads surround the Property on all sides. The western shoreline of Lake Arrowhead (Meadow Bay) is located approximately 0.2 miles east of the eastern portion of the Property.

The site consists largely of a developed property with scattered cabins, residential developments, time share properties, maintenance buildings, and a clubhouse on site. The clubhouse includes a lobby, fish pond, gymnasium, conference rooms, a large parking lot, and two tennis courts. The maintenance buildings are associated with several storage bins, equipment storage sites, and various material piles. Paved roads provide access to the residential units, clubhouse, and maintenance facilities. Numerous well-developed and maintained dirt roads and walking paths provide access throughout the Property.

The forested areas on the Property are interspersed among both paved and dirt roads, residential areas, and associated buildings. Dominant vegetation on the Property includes *A. glauca, C. decurrens*, *P. jeffreyi*, *P. lambertiana, P. ponderosa*, and *Q. kelloggii*. Recent drought conditions and site maintenance have limited the understory and annual growth found on site. Large areas of the understory were cleared and removed during the previous site development. Dirt roads and walking trails on the Property have been maintained and remain free of native vegetation. Downed logs and areas of leaf litter were observed on site. However, due to the dry conditions on the Property, these features were in poor condition as noted by dry soil conditions. Native rock features including individual boulders and larger rock outcroppings were noted on site. The conditions of these features ranged from heavily impacted to intact.

Methods

DBS reviewed relative observation records of BAEA, SRB, and SBFS. Records were reviewed to evaluate the status, habitat requirements, and life histories of all three species. The review included the California Natural Diversity Data Base (CDFW, 2021b, San Bernardino North, Harrison Mountain, Keller Peak,

Butler Peak; Silverwood Lake, and Lake Arrowhead 7.5-minute series USGS quadrangles), DBS observation records and field notes, selected peer-reviewed publications, and other pertinent published accounts. The site visit and references listed above were used to help determine the likelihood of SRB, SBFS, and BAEA occurring on the Property.

On September 28, 2021, Dr. Eric A. Dugan conducted a site-visit of the Property. The site-visit consisted of a pedestrian survey of the entire site. This included existing dirt trails, dirt roads, and native habitat features. Areas that represented potentially suitable habitat for SRB, SBFS, and BAEA were evaluated based on habitat preferences, habitat quality, and species-specific requirements. Weather conditions during the survey were excellent, consisting of clear skies, cool temperatures (61 F), and calm winds (1-4 mph).

Results

Southern Rubber Boa

Twenty-four records of SRB were found in the CNDDB (CDFW, 2021b). Seventeen were in the Harrison Mountain, six in the Keller Peak, and one in the Butler Peak quadrangles respectively. No SRB records were found for the Lake Arrowhead quadrangle (CDFW, 2021b) in which the Property is located. Due to conservation concerns, the CNDDB records for SRB are suppressed, thus preventing any effort to determine their proximity to the Property. Generally speaking, known records of SRB are limited to suitable habitats located south and southeast of the Property (CDFW, 2021b).

A large portion of the Property is developed and does not support SRB habitat. Residential neighborhoods are found in close proximity to the forested areas on site. Naturally occurring rocky habitats consisting of both intact and heavily impacted rock outcroppings represented the best potential SRB habitat on site. These rocky features were limited in nature, isolated from each other, adjacent to developed lands, and located between dirt and paved roads. A review of the proposed development maps and plans, indicated the intact rock outcrops will be avoided and left in place. The forest understory consisted largely of open ground and cleared habitats unsuitable for SRB. The lack of well-developed leaf litter, dry soil conditions, well-maintained grounds, and compacted soils do not meet the preferred mesic environmental conditions favored by SRB (Keasler, 1982).

Additionally, the existing residential neighborhoods and associated paved public roads represent low-quality potential SRB habitat. Local vehicle traffic, domestic pets, and anthropogenic mortality all represent significant threats to survival to SRB on or near the Property. The absence of nearby records, poor condition and limited nature of suitable habitats, and significant impacts of the

surrounding residential developments and roads, suggest the Project site is highly unlikely to support SRB.

San Bernardino Flying Squirrel

Five records of SBFS were documented in the CNDDB (CDFW, 2021b). Three of the records were in the San Bernardino North quadrangle, and 1 in each of the Harrison and Keller Peak quadrangles. No SBFS records were found for the Lake Arrowhead quadrangle in which the Property is located. All five of the CNDDB records were in quadrangles located south of the Property (CDFW, 2021b), suggesting suitable and occupied habitats are near but not present on the site.

Distributed widely in the San Bernardino Mountains, SBFS prefer dense coniferous forest near riparian habitats. The Project site does not contain well-developed riparian habitats preferred by the species. The nocturnal and secretive habits of SBFS could result in it going undetected in some areas. However, the absence of records near the site, the lack of preferred riparian habitats, and the presence of a relatively dense residential infrastructure, suggest it is unlikely that the Project site supports SBFS.

Bald Eagle

Five records of BAEA were documented in the CNDDB (2021). Three of the observations were in the Lake Arrowhead quadrangle, in the general vicinity of the Project. The most recent of those observations was from March 2006, and consisted of wintering birds observed foraging in the general area. No recent records of an active BAEA nest were found during the review.

Bald Eagle was not observed on or near the Property during the site visit. Although the site visit was conducted outside of the species' nesting season, a search of the large coniferous trees revealed no signs of previously used inactive BAEA nests. Considering the distance of the Project from the Lake Arrowhead shoreline, and the lack of both recent and historical observations, the potential for BAEA nesting on the Property is low.

Conclusions

A review of both historic and current records did not find any observations of SRB, SBFS, and BAEA on the Property. The site visit confirmed the Property represents low-quality habitat all three species. Although historic site records for BAEA in the general area of Lake Arrowhead were located in the CNDDB search, evidence of BAEA nesting near the Property was not found.

The Arrowhead Development Property is an existing residential property located within a larger and more extensive montane community. Paved pubic roads and other residential features surround the property. As detailed above,

the likelihood of SRB, SBFS, and BAEA occurring on the Property is unlikely. Following a detailed review of historical data for each species, and the negative findings of the site visit, focused surveys for SRB, SBFS, and BAEA are not recommended.

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Photo 1. Paved road providing access to residential sites, the club house, and maintenance buildings.

Photo 2. Dirt access road in the central portion of the site..

Photo 3. Existing dirt road providing access into the central portion of the Property.

Photo 4. Open area maintained free of debris, lacking rock and understory.

Appendix B
Phase I Cultural Resources Assessment

CULTURAL RESOURCES STUDY FOR THE LAKE ARROWHEAD SUBDIVISION PROJECT

LAKE ARROWHEAD, SAN BERNARDINO COUNTY, CALIFORNIA

APNs 0333-106-15 and -16

Lead Agency:

County of San Bernardino
385 North Arrowhead Avenue
San Bernardino, California 92415

Preparer:

Brian F. Smith and Associates, Inc.
14010 Poway Road, Suite A
Poway, California 92064

Signature

Project Proponent:

Lilburn Corporation
1905 Business Center Drive
San Bernardino, California 92408

August 24, 2021

Archaeological Database Information

Authors:	Jillian L.H. Conroy and Brian F. Smith, M.A.
Consulting Firm:	Brian F. Smith and Associates, Inc. 14010 Poway Road, Suite A Poway, California 92064 (858) 679-8218
Client/Project Proponent:	Lilburn Corporation 1905 Business Center Drive San Bernardino, California 92408
Report Date:	August 24, 2021
Report Title:	Cultural Resources Study for the Lake Arrowhead Subdivision Project, Lake Arrowhead, San Bernardino County, California
Type of Study:	Phase I Cultural Resources Survey
USGS Quadrangle:	Section 16, Township 2 North, Range 3 West of the *Lake Arrowhead, California* (7.5-minute) USGS Quadrangle
Acreage:	15.95 acres
Key Words:	Survey; no cultural resources identified; *Lake Arrowhead* USGS Quadrangle; archaeological monitoring of grading recommended.

Table of Contents

List of Appendices

**Deleted for public review and bound separately in the Confidential Appendix*

List of Figures

List of Plates

1.0 INTRODUCTION

1.1 Project Description

The archaeological survey program for the Lake Arrowhead Subdivision Project was conducted in order to comply with CEQA and County of San Bernardino environmental compliance procedures. The 15.95-acre project is located at the northeast corner of Sugar Pine Road and Rock Knoll Court, south of Meadow Bay in the Lake Arrowhead community of San Bernardino County (APNs 0333-106-15 and -16) (Figure 1.1–1). The project is situated within Section 16, Township 2 North, Range 3 West of the USGS 7.5-minute *Lake Arrowhead* Quadrangle (Figure 1.1–2). The project proposes the construction of a residential subdivision (Figure 1.1–3). The decision to request this investigation was based upon cultural resource sensitivity of the locality as suggested by known site density and predictive modeling. Sensitivity for cultural resources in a given area is usually indicated by known settlement patterns, which in southwestern San Bernardino County were focused around freshwater resources and a food supply.

1.2 Environmental Setting

The Lake Arrowhead Subdivision Project is generally situated in the southern edge of the Transverse Ranges Province. The mountains and their subparallel valleys run almost perpendicular in contrast to most of the mountain ranges in California. The mountains of the Transverse Ranges Province are some of the fastest growing in the world because of a turn in the San Andreas Fault Zone. The Transverse Ranges Province includes the Little San Bernardino Mountains to the east, which can be traced westward through the San Bernardino, San Gabriel, and Santa Monica mountains and continuing west through Ventura and southern Santa Barbara County. The Los Angeles Basin and the Santa Catalina, Santa Barbara, San Clemente, and San Nicholas islands also make up this province.

Lake Arrowhead is located in the San Bernardino Mountains approximately 12 miles northeast of the city of San Bernardino. The lake sits at an elevation of 5,114 feet above mean sea level (AMSL) in San Bernardino County. The primary water source for the lake is Little Bear Creek, a tributary of the much larger Deep Creek. The west-east orientation of the Transverse Ranges makes for significant differences between the vegetation communities of the southern and northern aspects. The south slopes, more impacted by both drought and marine air, are dominated by shrubland: from coastal sage scrub grading to lower and upper chaparral. Above that, the "yellow-pine" forest features a mix of species such as Jeffrey pine, white fir, sugar pine and incense-cedar. The Yellow Pine Forest plant community in southern California is found at higher elevations. Elevations within the project itself range from approximately 5,190 to 5,340 feet AMSL.

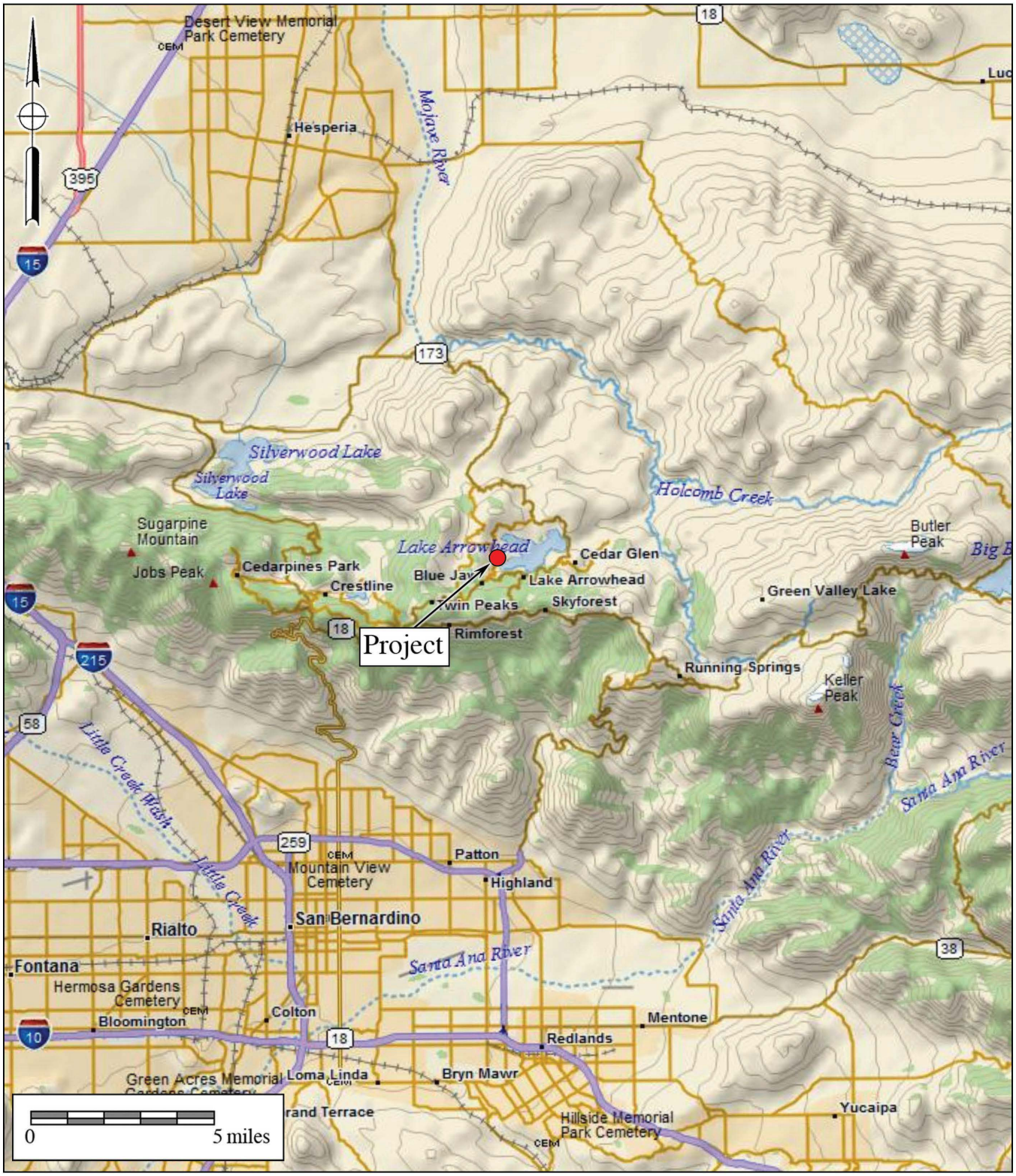

Figure 1.1–1

General Location Map

The Lake Arrowhead Subdivision Project

DeLorme (1:250,000)

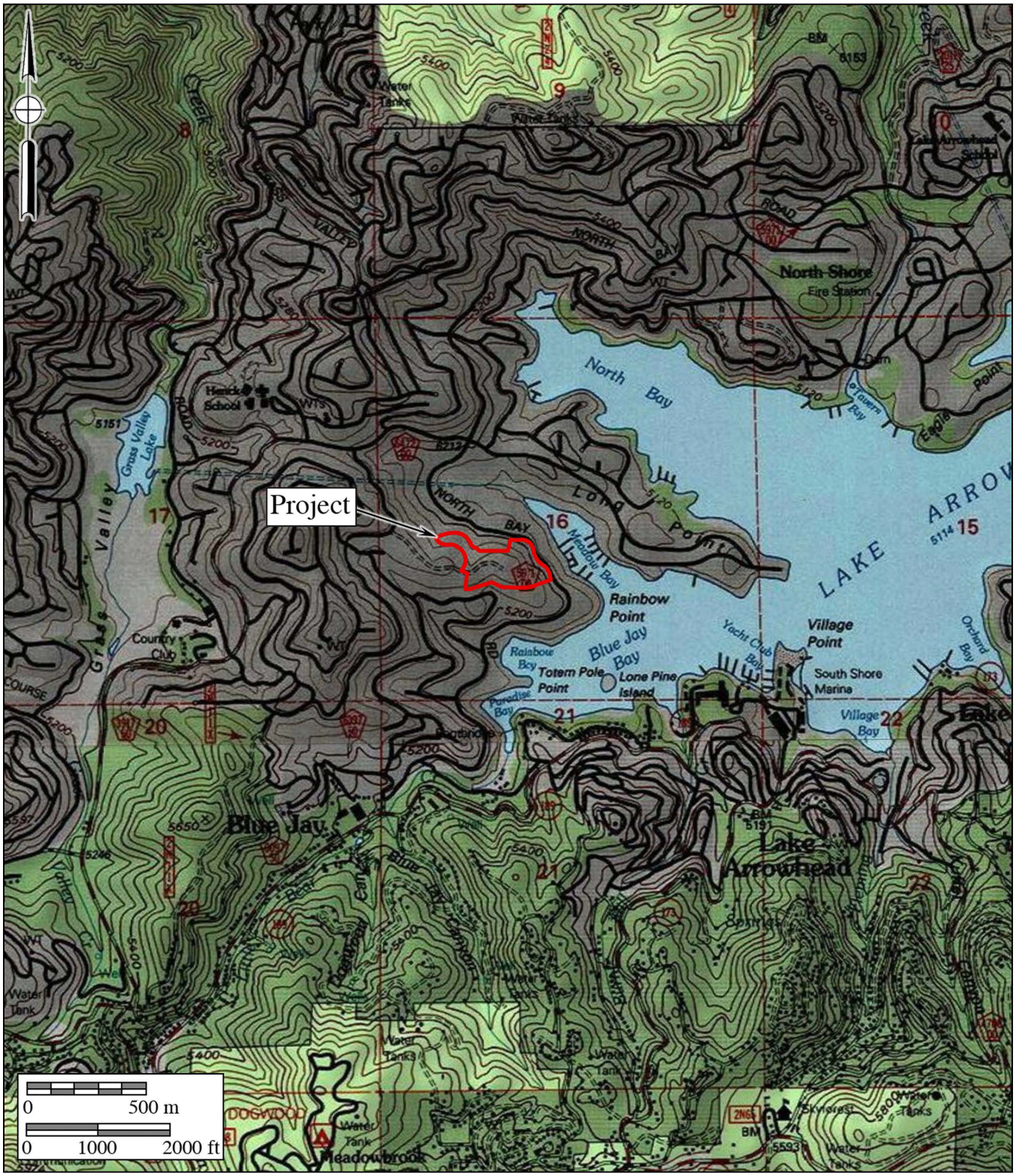

Figure 1.1–2

Project Location Map

The Lake Arrowhead Subdivision Project

USGS *Lake Arrowhead* and *Harrison Mountain* Quadrangles (7.5-minute series)

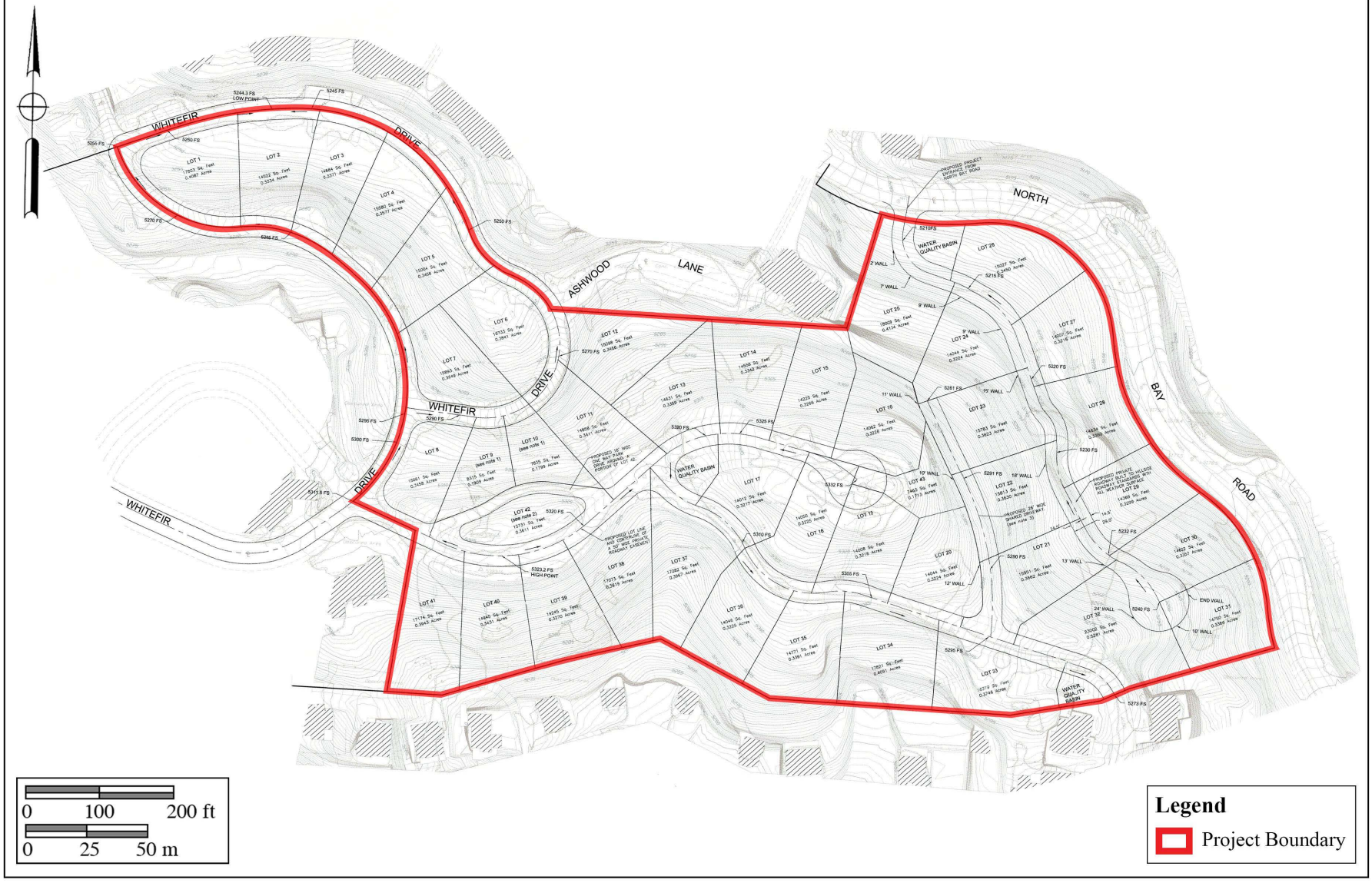

Figure 1.1–3

Preliminary Site Plan

The Lake Arrowhead Subdivision Project

1.3 Cultural Setting

1.3.1 Prehistoric Period

Paleo Indian, Archaic Period Milling Stone Horizon, and the Late Prehistoric Shoshonean groups are the three general cultural periods represented in San Bernardino County. The following discussion of the cultural history of San Bernardino County references the San Dieguito Complex, Encinitas Tradition, Milling Stone Horizon, La Jolla Complex, Pauma Complex, and San Luis Rey Complex, since these culture sequences have been used to describe archaeological manifestations in the region. The Late Prehistoric component in San Bernardino County was represented by the Cahuilla, Serrano, and potentially the Vanyume Indians.

Absolute chronological information, where possible, will be incorporated into this discussion to examine the effectiveness of continuing to use these terms interchangeably. Reference will be made to the geological framework that divides the culture chronology of the area into four segments: late Pleistocene (20,000 to 10,000 years before the present [YBP]), early Holocene (10,000 to 6,650 YBP), middle Holocene (6,650 to 3,350 YBP), and late Holocene (3,350 to 200 YBP).

Paleo Indian Period (Late Pleistocene: 11,500 to circa 9,000 YBP)

The Paleo Indian Period is associated with the terminus of the late Pleistocene (12,000 to 10,000 YBP). The environment during the late Pleistocene was cool and moist, which allowed for glaciation in the mountains and the formation of deep, pluvial lakes in the deserts and basin lands (Moratto 1984). However, by the terminus of the late Pleistocene, the climate became warmer, which caused the glaciers to melt, sea levels to rise, greater coastal erosion, large lakes to recede and evaporate, extinction of Pleistocene megafauna, and major vegetation changes (Moratto 1984; Martin 1967, 1973; Fagan 1991). The coastal shoreline at 10,000 YBP, depending upon the particular area of the coast, was near the 30-meter isobath, or two to six kilometers further west than its present location (Masters 1983).

Paleo Indians were likely attracted to multiple habitat types, including mountains, marshlands, estuaries, and lakeshores. These people likely subsisted using a more generalized hunting, gathering, and collecting adaptation while utilizing a variety of resources including birds, mollusks, and both large and small mammals (Erlandson and Colten 1991; Moratto 1984; Moss and Erlandson 1995).

Archaic Period (Early and Middle Holocene: circa 9000 to 1300 YBP)

The Archaic Period of prehistory begins with the onset of the Holocene around 9,000 YBP. The transition from the Pleistocene to the Holocene was a period of major environmental change throughout North America (Antevs 1953; Van Devender and Spaulding 1979). The general warming trend caused sea levels to rise, lakes to evaporate, and drainage patterns to change. In southern California, the general climate at the beginning of the early Holocene was marked by cool/moist periods and an increase in warm/dry periods and sea levels. The coastal shoreline at

8,000 YBP, depending upon the particular area of the coast, was near the 20-meter isobath, or one to four kilometers further west than its present location (Masters 1983).

The rising sea level during the early Holocene created rocky shorelines and bays along the coast by flooding valley floors and eroding the coastline (Curray 1965; Inman 1983). Shorelines were primarily rocky with small littoral cells, as sediments were deposited at bay edges but rarely discharged into the ocean (Reddy 2000). These bays eventually evolved into lagoons and estuaries, which provided a rich habitat for mollusks and fish. The warming trend and rising sea levels generally continued until the late Holocene (4,000 to 3,500 YBP).

At the beginning of the late Holocene, sea levels stabilized, rocky shores declined, lagoons filled with sediment, and sandy beaches became established (Gallegos 1985; Inman 1983; Masters 1994; Miller 1966; Warren and Pavesic 1963). Many former lagoons became saltwater marshes surrounded by coastal sage scrub by the late Holocene (Gallegos 2002). The sedimentation of the lagoons was significant in that it had profound effects on the types of resources available to prehistoric peoples. Habitat was lost for certain large mollusks, namely *Chione* and *Argopecten,* but habitat was gained for other small mollusks, particularly *Donax* (Gallegos 1985; Reddy 2000). The changing lagoon habitats resulted in the decline of larger shellfish, loss of drinking water, and loss of Torrey Pine nuts, causing a major depopulation of the coast as people shifted inland to reliable freshwater sources and intensified their exploitation of terrestrial small game and plants, including acorns (originally proposed by Rogers 1929; Gallegos 2002).

The Archaic Period in southern California is associated with several different cultures, complexes, traditions, periods, and horizons, including San Dieguito, La Jolla, Encinitas, Milling Stone, Pauma, and Intermediate.

Late Prehistoric Period (Late Holocene: 1,300 YBP to 1790)

Around approximately 1,350 YBP, a Shoshonean-speaking group from the Great Basin region moved into San Bernardino County, marking the transition to the Late Prehistoric Period. This period has been characterized by higher population densities and elaborations in social, political, and technological systems. Economic systems diversified and intensified during this period, with the continued elaboration of trade networks, the use of shell-bead currency, and the appearance of more labor-intensive, yet effective, technological innovations. Technological developments during this period included the introduction of the bow and arrow between A.D. 400 and 600 and the introduction of ceramics. Atlatl darts were replaced by smaller arrow darts, including the Cottonwood series points. Other hallmarks of the Late Prehistoric Period include extensive trade networks as far reaching as the Colorado River Basin and cremation of the dead.

Protohistoric Period (Late Holocene: 1790 to Present)

Prior to the arrival of the Spanish missionaries, the San Bernardino area was inhabited by the Cahuilla, Serrano, and potentially the Vanyume Indians. The territory of the Vanyume was covered by small and relatively sparse populations focused primarily along the Mojave River,

north of the Serrano and southeast of the Kawaiisu. It is believed that the southwestern extent of their territory went as far as Cajon Pass and portions of Hesperia. Bean and Smith (1978) noted that it was uncertain if the Vanyume spoke a dialect of Serrano or a separate Takic-based language. However, King and Blackburn (1978) suggest that the Vanyume and other Kitanemuk speakers once occupied most of Antelope Valley. In contrast to the Serrano, the Vanyume maintained friendly social relations with the Mohave and Chemehuevi to the east and northeast (Kroeber 1976). As with the majority of California native populations, Vanyume populations were decimated around the 1820s by placement in Spanish missions and asistencias. It is believed that by 1900, the Vanyume had become extinct (Bean and Smith 1978). However, given the settlement patterns reported for the Vanyume, it is more probable that the population was dispersed rather than completely wiped out.

At the time of Spanish contact in the sixteenth century, the Cahuilla occupied territory that included the San Bernardino Mountains, Orocopia Mountain, and the Chocolate Mountains to the west, Salton Sea and Borrego Springs to the south, Palomar Mountain and Lake Mathews to the west, and the Santa Ana River to the north. The Cahuilla are a Takic-speaking people closely related to their Gabrielino and Luiseño neighbors, although relations with the Gabrielino were more intense than with the Luiseño. They differ from the Luiseño and Gabrielino in that their religion is more similar to the Mohave tribes of the eastern deserts than the Chingichngish cult of the Luiseño and Gabrielino. The following is a summary of ethnographic data regarding this group (Bean 1978; Kroeber 1976).

Cahuilla villages were typically permanent and located on low terraces within canyons in proximity to water sources. These locations proved to be rich in food resources and afforded protection from prevailing winds. Villages had areas that were publicly owned as well as areas that were privately owned by clans, families, or individuals. Each village was associated with a particular lineage and series of sacred sites that included unique petroglyphs and pictographs. Villages were occupied throughout the year; however, during a several-week period in the fall, most of the village members relocated to mountain oak groves to take part in acorn harvesting (Bean 1978; Kroeber 1976).

The Serrano and Vanyume, however, were primarily hunters and gatherers. Individual family dwellings were likely circular, domed structures. Vegetal staples varied with locality; acorns and piñon nuts were found in the foothills, and mesquite, yucca roots, cacti fruits, and piñon nuts were found in or near the desert regions. Diets were supplemented with other roots, bulbs, shoots, and seeds (Heizer 1978). Deer, mountain sheep, antelopes, rabbits, and other small rodents were among the principal food packages. Various game birds, especially quail, were also hunted. The bow and arrow were used for large game, while smaller game and birds were killed with curved throwing sticks, traps, and snares. Occasionally, game was hunted communally, often during mourning ceremonies (Benedict 1924; Drucker 1937; Heizer 1978). In general, manufactured goods included baskets, some pottery, rabbit-skin blankets, awls, arrow straighteners, sinew-backed bows, arrows, fire drills, stone pipes, musical instruments (rattles,

rasps, whistles, bull-roarers, and flutes), feathered costumes, mats, bags, storage pouches, and nets (Heizer 1978). Food acquisition and processing required the manufacture of additional items such as knives, stone or bone scrapers, pottery trays and bowls, bone or horn spoons, and stirrers. Mortars, made of either stone or wood, and metates were also manufactured (Strong 1971; Drucker 1937; Benedict 1924).

Much like the Vanyume, the Serrano suffered large population decreases during the early 1800s. While the missionaries are credited with developing the first stable water supply in the area by diverting water from Mill Creek into a zanja that terminated at the Asistencia de Mission San Gabriel on Barton Road, the task was completed through labor provided by the Serrano. The zanja, known as the Mill Creek Zanja, is located in Redlands, California. It has been listed on the National Register of Historic Places (NRHP) since 1976.

1.3.2 Historic Period

Traditionally, the history of the state of California has been divided into three general periods: the Spanish Period (1769 to 1821), the Mexican Period (1822 to 1846), and the American Period (1848 to present) (Caughey 1970). The American Period is often further subdivided into additional phases: the nineteenth century (1848 to 1900), the early twentieth century (1900 to 1950), and the Modern Period (1950 to present). From an archaeological standpoint, all of these phases can be referred to together as the Ethnohistoric Period. This provides a valuable tool for archaeologists, as ethnohistory is directly concerned with the study of indigenous or non-Western peoples from a combined historical/anthropological viewpoint, which employs written documents, oral narrative, material culture, and ethnographic data for analysis.

European exploration along the California coast began in 1542 with the landing of Juan Rodriguez Cabrillo and his men at San Diego Bay. Sixty years after the Cabrillo expeditions, an expedition under Sebastian Viscaíno made an extensive and thorough exploration of the Pacific coast. Although the voyage did not extend beyond the northern limits of the Cabrillo track, Viscaíno had the most lasting effect upon the nomenclature of the coast. Many of his place names have survived, whereas practically every one of the names created by Cabrillo have faded from use. For instance, Cabrillo named the first (now) United States port he stopped at “San Miguel”; 60 years later, Viscaíno changed it to “San Diego” (Rolle 1969). The early European voyages observed Native Americans living in villages along the coast but did not make any substantial, long-lasting impact. At the time of contact, the Luiseño population was estimated to have ranged from 4,000 to as many as 10,000 individuals (Bean and Shipek 1978; Kroeber 1976).

The historic background of the project area began with the Spanish colonization of Alta California. The first Spanish colonizing expedition reached southern California in 1769 with the intention of converting and civilizing the indigenous populations, as well as expanding the knowledge of and access to new resources in the region (Brigandi 1998). As a result, by the late eighteenth century, a large portion of southern California was overseen by Mission San Luis Rey (San Diego County), Mission San Juan Capistrano (Orange County), and Mission San Gabriel

(Los Angeles County), who began colonizing the region and surrounding areas (Chapman 1921).

Native Californians may have first coalesced with Europeans around 1769 when the first Spanish mission was established in San Diego. In 1771, Friar Francisco Graces first searched the Californian desert for potential mission sites. Interactions between local tribes and Franciscan priests occurred by 1774 when Juan Bautista De Anza made an exploration of Alta California.

Serrano contact with the Europeans may have occurred as early as 1771 or 1772, but it was not until approximately 1819 that the Spanish directly influenced the culture. The Spanish established asistencias in San Bernardino, Pala, and Santa Ysabel. Between the founding of the asistencia and secularization in 1834, most of the Serranos in the San Bernardino Mountains were removed to the nearby missions (Beattie and Beattie 1951:366) while the Cahuilla maintained a high level of autonomy from Spain (Bean 1978).

Each mission gained power through the support of a large, subjugated Native American workforce. As the missions grew, livestock holdings increased and became increasingly vulnerable to theft. In order to protect their interests, the southern California missions began to expand inland to try and provide additional security (Beattie and Beattie 1939; Caughey 1970). In order to meet their needs, the Spaniards embarked upon a formal expedition in 1806 to find potential locations within what is now the San Bernardino Valley. As a result, by 1810, Father Francisco Dumetz of Mission San Gabriel had succeeded in establishing a religious site, or capilla, at a Cahuilla rancheria called Guachama (Beattie and Beattie 1939). San Bernardino Valley received its name from this site, which was dedicated to San Bernardino de Siena by Father Dumetz. The Guachama rancheria was located in present-day Bryn Mawr in San Bernardino County.

These early colonization efforts were followed by the establishment of estancias at Puente (circa 1816) and San Bernardino (circa 1819) near Guachama (Beattie and Beattie 1939). These efforts were soon mirrored by the Spaniards from Mission San Luis Rey, who in turn established a presence in what is now Lake Elsinore, Temecula, and Murrieta (Chapman 1921). The indigenous groups who occupied these lands were recruited by missionaries, converted, and put to work in the missions (Pourade 1961). Throughout this period, the Native American populations were decimated by introduced diseases, a drastic shift in diet resulting in poor nutrition, and social conflicts due to the introduction of an entirely new social order (Cook 1976).

Mexico achieved independence from Spain in 1822 and became a federal republic in 1824. As a result, both Baja and Alta California became classified as territories (Rolle 1969). Shortly thereafter, the Mexican Republic sought to grant large tracts of private land to its citizens to begin to encourage immigration to California and to establish its presence in the region. Part of the establishment of power and control included the desecularization of the missions circa 1832. These same missions were also located on some of the most fertile land in California and, as a result, were considered highly valuable. The resulting land grants, known as “ranchos,” covered expansive portions of California and by 1846, more than 600 land grants had been issued by the Mexican government. Rancho Jurupa was the first rancho to be established and was issued to Juan

Bandini in 1838. Although Bandini primarily resided in San Diego, Rancho Jurupa was located in what is now Riverside County (Pourade 1963). A review of Riverside County place names quickly illustrates that many of the ranchos in Riverside County lent their names to present-day locations, including Jurupa, El Rincon, La Sierra, El Sobrante de San Jacinto, La Laguna (Lake Elsinore), Santa Rosa, Temecula, Pauba, San Jacinto Nuevo y Potrero, and San Jacinto Viejo (Gunther 1984). As was typical of many ranchos, these were all located in the valley environments within western Riverside County.

The treatment of Native Americans grew worse during the Rancho Period. Most of the Native Americans were forced off of their land or put to work on the now privately-owned ranchos, most often as slave labor. In light of the brutal ranchos, the degree to which Native Americans had become dependent upon the mission system is evident when, in 1838, a group of Native Americans from Mission San Luis Rey petitioned government officials in San Diego to relieve suffering at the hands of the rancheros:

> We have suffered incalculable losses, for some of which we are in part to be blamed for because many of us have abandoned the Mission … We plead and beseech you … to grant us a Rev. Father for this place. We have been accustomed to the Rev. Fathers and to their manner of managing the duties. We labored under their intelligent directions, and we were obedient to the Fathers according to the regulations, because we considered it as good for us. (Brigandi 1998:21)

Native American culture had been disrupted to the point where they could no longer rely upon prehistoric subsistence and social patterns. Not only does this illustrate how dependent the Native Americans had become upon the missionaries, but it also indicates a marked contrast in the way the Spanish treated the Native Americans as compared to the Mexican and United States ranchers. Spanish colonialism (missions) is based upon utilizing human resources while integrating them into their society. The ranchers, both Mexican and American, did not accept Native Americans into their social order and used them specifically for the extraction of labor, resources, and profit. Rather than being incorporated, they were either subjugated or exterminated (Cook 1976).

In 1846, war erupted between Mexico and the United States. In 1848, with the signing of the Treaty of Guadalupe Hidalgo, the region was annexed as a territory of the United States, and in 1850, California became a state. These events generated a steady flow of settlers into the area, including gold miners, entrepreneurs, health-seekers, speculators, politicians, adventurers, seekers of religious freedom, and individuals desiring to create utopian colonies. As the non-native population increased through immigration, the indigenous population rapidly declined from the high morbidity of European diseases, low birth rates, and conflict and violence. California became a state in 1850 and was divided into 21 counties. The dwindling native populations were eventually displaced into reservations after California became a state.

By the late 1880s and early 1890s, there was growing discontent between San Bernardino and Riverside, its neighbor 10 miles to the south, due to differences in opinion concerning religion, morality, the Civil War, politics, and fierce competition to attract settlers. After a series of instances in which charges were claimed about unfair use of tax monies to the benefit of only the city of San Bernardino, several people from Riverside decided to investigate the possibility of a new county. In May of 1893, voters living within portions of San Bernardino County (to the north) and San Diego County (to the south) approved the formation of Riverside County. Early business opportunities were linked to the agriculture industry, but commerce, construction, manufacturing, transportation, and tourism also provided a healthy local economy.

A Brief History of the Lake Arrowhead Area

The name Lake Arrowhead derives from its arrowhead formation on the south slope of the mountain foothills next to Waterman Canyon. Between 1890 and 1921, three Ohio businessmen formed the Arrowhead Reservoir Company (ARC), which was committed to establishing a vast irrigation system to provide the county with an accessible water supply. Their plan was to construct several reservoirs, one of which was in Little Bear Valley (now Lake Arrowhead). After the completion of the dam, by 1921, the ARC holdings were sold and incorporated as Arrowhead Lake Company (ALC). Under the ALC, Little Bear Lake was renamed Lake Arrowhead and was revolutionized into a premier destination resort in southern California (Page and Turnbull 2019).

In 1946, the Los Angeles Turf Club purchased the lake and the surrounding properties (University of California, Los Angeles [UCLA] Bruin Woods 2021). The Los Angeles Turf Club donated several acres of land to multiple organizations, including the "Boy Scouts, Girl Scouts, San Bernardino County, churches, and Sister of St. Joseph of Orange," and donated the North Shore Tavern building to the University of California Regents (Lake Arrowhead Communities Chamber of Commerce [CCC] 2021). The Turf Club sold their Lake Arrowhead holdings to three developers from Los Angeles in 1960, who later formed the Lake Arrowhead Development Company and began subdividing 18 residential tract developments in Arrowhead Woods (Lake Arrowhead CCC 2021).

Ownership of the lake and surrounding area changed several times until 1973, when the state of California declared the existing dam in Lake Arrowhead to be seismically unsafe and demanded that the water level be lowered 70 feet. However:

> … the domestic water supply would have been severely affected, the lake would have been rendered unusable for recreation and property values would have plummeted. The surrounding Arrowhead Woods property owners rallied to save their lake. Together, they formed an association called Arrowhead Lake Association [ALA], and purchased the lake from Boise Cascade [then-owners of the Lake Arrowhead properties]. With the slogan "Give A Dam", they issued a $7 million bond to build a new, far more secure dam just downstream from the

> original, and thereby saved the lake; its water now preserved solely for domestic use and creation. (ALA 2021)

Today, almost all of the privately-owned land surrounding the lake has been subdivided for residential uses, most of which lie within the Arrowhead Woods community. Lake Arrowhead serves as a popular recreation area for tourists and maintains a year-round population of 12,424, according to the 2010 census (Lake Arrowhead CCC 2021).

1.4 Results of the Archaeological Records Search

An archaeological records search for a one-half-mile radius around the project was conducted by BFSA at the SCCIC at CSU Fullerton on August 4, 2021. Due to the limitations imposed by the evolving circumstances related to the COVID-19 pandemic, records search access has become limited with delays for the foreseeable future. Therefore, as of the date of this report, the archaeological records search results are pending from the SCCIC at CSU Fullerton. An updated report will be provided to the County of San Bernardino once such data is available.

In addition, BFSA reviewed the following historic sources:

- The NRHP Index
- The Office of Historic Preservation, Archaeological Determinations of Eligibility
- The Office of Historic Preservation, Built Environment Resources Directory
- USGS 1902 *Deep Creek*, 1956 *Lake Arrowhead*, and 1971 *Lake Arrowhead* 1:62,500 scale topographic maps
- Historic aerial photographs (1938, 1952, 1980, and 1994)

These sources did not indicate the presence of any additional archaeological resources within the project. However, the absence of positive results does not necessarily indicate the absence of historic resources.

BFSA also requested a NAHC SLF records search. To date, BFSA has not received a response from the NAHC SLF. All correspondence is provided in Appendix C.

1.5 Applicable Regulations

Resource importance is assigned to districts, sites, buildings, structures, and objects that possess exceptional value or quality illustrating or interpreting the heritage of San Bernardino County in history, architecture, archaeology, engineering, and culture. A number of criteria are used in demonstrating resource importance. Specifically, the criteria outlined in CEQA, provide the guidance for making such a determination. The following sections detail the criteria that a resource must meet in order to be determined important.

1.5.1 California Environmental Quality Act

According to CEQA (§15064.5a), the term "historical resource" includes the following:

1) A resource listed in or determined to be eligible by the State Historical Resources Commission for listing in the CRHR (Public Resources Code SS5024.1, Title 14 CCR. Section 4850 et seq.).
2) A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the Public Resources Code or identified as significant in an historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3) Any object, building, structure, site, area, place, record, or manuscript, which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the CRHR (Public Resources Code SS5024.1, Title 14, Section 4852) including the following:

    a) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
    b) Is associated with the lives of persons important in our past;
    c) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
    d) Has yielded, or may be likely to yield, information important in prehistory or history.

4) The fact that a resource is not listed in, or determined eligible for listing in the CRHR, not included in a local register of historical resources (pursuant to Section 5020.1[k] of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in Section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code Section 5020.1(j) or 5024.1.

According to CEQA (§15064.5b), a project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant

effect on the environment. CEQA defines a substantial adverse change as:

1) Substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.
2) The significance of an historical resource is materially impaired when a project:

    a) Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in the CRHR; or
    b) Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to Section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or,
    c) Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the CRHR as determined by a lead agency for purposes of CEQA.

Section 15064.5(c) of CEQA applies to effects on archaeological sites and contains the following additional provisions regarding archaeological sites:

1) When a project will impact an archaeological site, a lead agency shall first determine whether the site is an historical resource, as defined in subsection (a).
2) If a lead agency determines that the archaeological site is an historical resource, it shall refer to the provisions of Section 21084.1 of the Public Resources Code, Section 15126.4 of the guidelines, and the limits contained in Section 21083.2 of the Public Resources Code do not apply.
3) If an archaeological site does not meet the criteria defined in subsection (a), but does meet the definition of a unique archaeological resource in Section 21083.2 of the Public Resources Code, the site shall be treated in accordance with the provisions of Section 21083.2. The time and cost limitations described in Public Resources Code Section 21083.2 (c-f) do not apply to surveys and site evaluation activities intended to determine whether the project location contains unique archaeological resources.
4) If an archaeological resource is neither a unique archaeological nor historical resource,

the effects of the project on those resources shall not be considered a significant effect on the environment. It shall be sufficient that both the resource and the effect on it are noted in the Initial Study or Environmental Impact Report, if one is prepared to address impacts on other resources, but they need not be considered further in the CEQA process.

Section 15064.5 (d) and (e) contain additional provisions regarding human remains. Regarding Native American human remains, paragraph (d) states:

(d) When an initial study identifies the existence of, or the probable likelihood of, Native American human remains within the project, a lead agency shall work with the appropriate Native Americans as identified by the NAHC as provided in Public Resources Code SS5097.98. The applicant may develop an agreement for treating or disposing of, with appropriate dignity, the human remains and any items associated with Native American burials with the appropriate Native Americans as identified by the NAHC. Action implementing such an agreement is exempt from:

1) The general prohibition on disinterring, disturbing, or removing human remains from any location other than a dedicated cemetery (Health and Safety Code Section 7050.5).
2) The requirements of CEQA and the Coastal Act.

2.0 RESEARCH DESIGN

The primary goal of the research design is to attempt to understand the way in which humans have used the land and resources within the project through time, as well as to aid in the determination of resource significance. For the current project, the study area under investigation is southwestern San Bernardino County. The scope of work for the cultural resources study conducted for the Lake Arrowhead Subdivision Project included the survey of a 15.95-acre study area. Given the area involved and the presence of nearby archaeological sites, the research design for this project was focused upon realistic study options. Since the main objective of the investigation was to identify the presence of and potential impacts to cultural resources, the goal here is not necessarily to answer wide-reaching theories regarding the development of early southern California, but to investigate the role and importance of identified resources. Nevertheless, the assessment of the significance of a resource must take into consideration a variety of factors, as well as the ability of a resource to address regional research topics and issues.

Although elementary resource evaluation programs are limited in terms of the amount of information available, several specific research questions were developed that could be used to guide the initial investigations of any observed cultural resources. The following research questions consider the small size and location of the project discussed above.

Research Questions:

- Can located cultural resources be associated with a specific time period, population, or individual?
- Do the types of any located cultural resources allow a site activity/function to be determined from a preliminary investigation? What are the site activities? What is the site function? What resources were exploited?
- How do located sites compare to others reported from different surveys conducted in the area?
- How do located sites fit existing models of settlement and subsistence for mountainous environments of the region?

Data Needs

At the survey level, the principal research objective is a generalized investigation of changing settlement patterns in both the prehistoric and historic periods within the study area. The overall goal is to understand settlement and resource procurement patterns of the project occupants. Therefore, adequate information on site function, context, and chronology from an archaeological perspective is essential for the investigation. The fieldwork and archival research were undertaken with the following primary research goals in mind:

1) To identify cultural resources occurring within the project;

2) To determine, if possible, site type and function, context of the resource(s), and chronological placement of each cultural resource identified;
3) To place each cultural resource identified within a regional perspective; and
4) To provide recommendations for the treatment of each cultural resources identified.

3.0 ANALYSIS OF PROJECT EFFECTS

The cultural resources study of the project site consisted of an institutional records search, archival research, an intensive cultural resource survey of the entire 15.95-acre study area, and the preparation of this technical report. This study was conducted in conformance with Section 21083.2 of the California Public Resources Code, and CEQA. Statutory requirements of CEQA (Section 15064.5) were followed for the identification and evaluation of resources. Specific definitions for archaeological resource type(s) used in this report are those established by the State Historic Preservation Office (SHPO 1995).

3.1 Survey Methods

The survey methodology employed during the current investigation followed standard archaeological field procedures and was sufficient to accomplish a thorough assessment of the project. The field methodology employed for the project included walking evenly spaced survey transects set approximately 10 meters apart while visually inspecting the ground surface. All potentially sensitive areas where cultural resources might be located were closely inspected. Photographs documenting survey areas and overall survey conditions were taken frequently.

3.2 Results of the Field Survey

Staff archaeologist David Grabski conducted the archaeological survey for the Lake Arrowhead Subdivision Project on August 16, 2021. The archaeological survey was an intensive reconnaissance consisting of a series of survey transects across the project. Most of the project was accessible, except for the steep slopes along the northern and southern boundaries (Plates 3.2–1 to 3.2–4). The property is covered in native trees and contains a few dirt roads and one paved road. According to aerial imagery, the property has been largely undisturbed, except for the development of the dirt roads across the southern half of the property, the dirt road along the northwest boundary, and the paved road (White Fir Drive) across the northwest portion of the property and along the northwest boundary. Piles of concrete rubble, metal fragments, and car parts were observed in the middle portion of the project, and fire hydrants are present along the dirt roads. Additional disturbance to the property could have been a result of the adjacent single and multiple-family housing developments, which surround the property, or construction of North Bay Road, which runs along the northeast boundary of the property. Bedrock outcrops and boulders were noted throughout the property, some of which were pushed aside for the development of the dirt roads, but no evidence of prehistoric occupation was observed. The survey did not result in the identification of any additional historic or prehistoric cultural resources within the project.

Plate 3.2–1: Overview of the southwest portion of the project, facing east.

Plate 3.2–2: Overview of the northeast portion of the property, showing the sloped terrain, facing southwest.

Plate 3.2–3: Overview of the piles of concrete rubble in the center of the project, facing north.

Plate 3.2–4: Overview of a dirt road, fire hydrant, and water feature in the northwest corner of the project, facing east.

4.0 MANAGEMENT CONSIDERATIONS – MITIGATION MEASURES AND DESIGN CONSIDERATIONS

The Phase I archaeological assessment for the Lake Arrowhead Subdivision Project was negative for the presence of cultural resources. As stated previously, ground visibility within the subject property was generally good, with exception of the paved road in the northwest portion of the property. Aerial photographs indicate that the property has remained undisturbed, with exception to the paved and dirt roads in and around the property, which were developed between 1952 and 1980. As indicated by the records search for the project, and given the project's location near freshwater resources, however, there is a potential that buried archaeological deposits exist within the project boundaries that may be impacted by the project. Therefore, it is recommended that a cultural resources construction monitoring program be implemented during site grading. The cultural resources monitoring program recommended as a condition of approval for this property is presented in Section 4.1.

4.1 Cultural Resources Monitoring Program

The proposed development of the Lake Arrowhead Subdivision Project may encounter unrecorded cultural deposits or features. To mitigate for potential impacts to resources that have not been detected, a cultural resources monitoring program is recommended as a condition of approval. The scope of the cultural resources monitoring program is provided below:

General Procedures and Protocols to Be Implemented During Construction Monitoring During Grading

A. Monitor(s) Shall Be Present During Grading/Excavation/Trenching
   1. The archaeological monitor shall be present for the initial clearing of the property and then periodically as determined by the project archaeologist.
   2. The principal investigator (PI) may submit a detailed letter to the County of San Bernardino during earthwork to inform the County of a modification to the monitoring program when field conditions require a chance in monitoring status, including suspension of monitoring if it is determined that no further monitoring is needed.

B. Discovery Notification Process
   1. In the event of an archaeological discovery, either historic or prehistoric, the archaeological monitor shall direct the contractor to temporarily divert all soil-disturbing activities, including but not limited to, digging, trenching, excavating, or grading activities in the area of discovery and in the area reasonably suspected to overlay adjacent resources. If the discovered resource is associated with the prehistoric Native American occupation of this area, a Native American

representative from a local tribe should be contacted to review and participate in the evolution of the discovered resource.

2. The monitor shall immediately notify the PI (unless monitor is the PI) of the discovery, and subsequently the property owner shall be notified of the discovery.

C. Determination of Significance

1. The PI shall evaluate the significance of the resource. If human remains are involved, follow protocol in Section D, below.

    a. The PI shall immediately notify the lead agency to discuss significance determination and shall also submit a letter indicating whether additional mitigation is required.
    b. If the resource is significant, the PI shall submit an Archaeological Data Recovery Program (ADRP) to the lead agency to review and approve. Impacts to significant resources must be mitigated by the implementation of the ADRP before ground-disturbing activities in the area of discovery will be allowed to resume.
    c. If the resource is not significant, the PI shall submit a letter to the County of San Bernardino indicating that artifacts will be collected, curated, and documented in the final monitoring report. The letter shall also indicate that no further work is required.

D. Discovery of Human Remains

If human remains are discovered, work shall halt in that area until a determination can be made regarding the provenance of the human remains, and the following procedures as set forth in CEQA Section 15064.5(e), the California Public Resources Code (Sec. 5097.98), and the State Health and Safety Code (Sec. 7050.5) shall be undertaken:

I. Notification
    1. The archaeological monitor shall notify the PI, if the monitor is not qualified as a PI.
    2. The PI shall notify the medical examiner after consultation with the lead agency, either in person or via telephone.

II. Isolate discovery site
    1. Work shall be directed away from the location of the discovery and any nearby area reasonably suspected to overlay adjacent human remains until a determination can be made by the medical examiner in consultation with the PI concerning the provenance of the remains.

2. The medical examiner, in consultation with the PI, will determine the need for a field examination to determine the provenance.
3. If a field examination is not warranted, the medical examiner will determine, with input from the PI, if the remains are or are most likely to be of Native American origin.

III. If human remains **ARE** determined to be Native American

1. The medical examiner will notify the NAHC within 24 hours. By law, **ONLY** the medical examiner can make this call.
2. The NAHC will immediately identify the person or persons determined to be the Most Likely Descendent (MLD) and provide contact information.
3. The MLD will contact the PI within 24 hours or sooner after the medical examiner has completed coordination to begin the consultation process in accordance with CEQA Section 15064.5(e), the California Public Resources, and the State Health and Safety Code.
4. The MLD will have 48 hours to make recommendations to the property owner or representative for the treatment or disposition with proper dignity of the human remains and associated grave goods.
5. Disposition of Native American human remains will be determined between the MLD and the PI, and, if:

    a. The NAHC is unable to identify the MLD, OR the MLD failed to make a recommendation within 48 hours after being notified by the NAHC; OR
    b. The landowner or authorized representative rejects the recommendation of the MLD and mediation in accordance with Public Resources Code 5097.94 (k) by the NAHC fails to provide measures acceptable to the landowner; THEN
    c. Upon the discovery of multiple Native American human remains during a ground-disturbing land development activity, the landowner may agree that additional conferral with descendants is necessary to consider culturally appropriate treatment of multiple Native American human remains. Culturally appropriate treatment of such a discovery may be ascertained from review of the site utilizing cultural and archaeological standards. Where the parties are unable to agree upon the appropriate treatment measures, the human remains and grave goods buried with the Native American human remains shall be reinterred with appropriate dignity.

IV. If human remains are **NOT** Native American

1. The PI shall contact the medical examiner and notify them of the historic-era context of the burial.
2. The medical examiner will determine the appropriate course of action with the PI and lead agency staff (Public Resources Code 5097.98).
3. If the remains are of historic origin, they shall be appropriately removed and conveyed to the lead agency. The decision for internment of the human remains shall be made in consultation with the lead agency, the applicant/landowner, and any known descendant group.

Post-Construction

A. Preparation and Submittal of Draft Monitoring Report

1. The PI shall submit to the County a draft monitoring report (even if negative) prepared in accordance with the agency guidelines, which describes the results, analysis, and conclusions of all phases of the archaeological monitoring program (with appropriate graphics).

    a. For significant archaeological resources encountered during monitoring, the ADRP shall be included in the draft monitoring report.
    b. Recording sites with the State of California Department of Parks and Recreation (DPR) shall be the responsibility of the PI, including recording (on the appropriate forms-DPR 523 A/B) any significant or potentially significant resources encountered during the archaeological monitoring program.

2. The PI shall submit a revised draft monitoring report to the County for approval, including any changes or clarifications requested by the County.

B. Handling of Artifacts

1. The PI shall be responsible for ensuring that all cultural remains collected are cleaned and cataloged.
2. The PI shall be responsible for ensuring that all artifacts are analyzed to identify function and chronology as they relate to the history of the area; that faunal material is identified as to species; and that specialty studies are completed, as appropriate.
3. The cost for curation is the responsibility of the property owner.

C. Curation of Artifacts

1. Any artifacts recovered from the project shall be curated in an approved facility, such as the Western Science Center. Native American artifacts may be repatriated to a local tribal representative.

D. Final Monitoring Report(s)
   1. The PI shall submit the approved final monitoring report to the County and any interested parties.

5.0 LIST OF PREPARERS AND ORGANIZATIONS CONTACTED

The archaeological survey program for the Lake Arrowhead Subdivision Project was directed by Principal Investigator Brian F. Smith. The archaeological fieldwork was conducted by staff archaeologist David Grabski. The report text was prepared by Jillian L.H. Conroy and Brian F. Smith. Report graphics were provided by Jillian Conroy. Technical editing and report production were conducted by Courtney McNair. The archaeological records search was requested from the SCCIC at CSU Fullerton.

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APPENDIX A

Resumes of Key Personnel

Brian F. Smith, MA

Owner, Principal Investigator

Brian F. Smith and Associates, Inc.
14010 Poway Road • Suite A •
Phone: (858) 679-8218 • Fax: (858) 679-9896 • E-Mail: bsmith@bfsa-ca.com

Education

Master of Arts, History, University of San Diego, California **1982**

Bachelor of Arts, History, and Anthropology, University of San Diego, California **1975**

Professional Memberships

Society for California Archaeology

Experience

Principal Investigator **1977–Present**
Brian F. Smith and Associates, Inc. **Poway, California**

Brian F. Smith is the owner and principal historical and archaeological consultant for Brian F. Smith and Associates. Over the past 32 years, he has conducted over 2,500 cultural resource studies in California, Arizona, Nevada, Montana, and Texas. These studies include every possible aspect of archaeology from literature searches and large-scale surveys to intensive data recovery excavations. Reports prepared by Mr. Smith have been submitted to all facets of local, state, and federal review agencies, including the US Army Corps of Engineers, the Bureau of Land Management, the Bureau of Reclamation, the Department of Defense, and the Department of Homeland Security. In addition, Mr. Smith has conducted studies for utility companies (Sempra Energy) and state highway departments (CalTrans).

Professional Accomplishments

These selected major professional accomplishments represent research efforts that have added significantly to the body of knowledge concerning the prehistoric life ways of cultures once present in the Southern California area and historic settlement since the late 18th century. Mr. Smith has been principal investigator on the following select projects, except where noted.

Downtown San Diego Mitigation and Monitoring Reporting Programs: Large numbers of downtown San Diego mitigation and monitoring projects, some of which included Broadway Block (2019), 915 Grape Street (2019), 1919 Pacific Highway (2018), Moxy Hotel (2018), Makers Quarter Block D (2017), Ballpark Village (2017), 460 16th Street (2017), Kettner and Ash (2017), Bayside Fire Station (2017), Pinnacle on the Park (2017), IDEA1 (2016), Blue Sky San Diego (2016), Pacific Gate (2016), Pendry Hotel (2015), Cisterra Sempra Office Tower (2014), 15th and Island (2014), Park and G (2014), Comm 22 (2014), 7th and F Street Parking (2013), Ariel Suites (2013), 13th and Marker (2012), Strata (2008), Hotel Indigo (2008), Lofts at 707 10th Avenue Project (2007), Breeza (2007), Bayside at the Embarcadero (2007), Aria (2007), Icon (2007), Vantage Pointe (2007), Aperture (2007), Sapphire Tower (2007), Lofts at 655 Sixth Avenue (2007), Metrowork (2007), The Legend (2006), The Mark (2006), Smart Corner (2006), Lofts at 677 7th Avenue (2005), Aloft on Cortez Hill (2005), Front and Beech Apartments (2003), Bella Via Condominiums (2003), Acqua Vista Residential Tower (2003), Northblock Lofts (2003), Westin Park Place Hotel (2001), Parkloft

Apartment Complex (2001), Renaissance Park (2001), and Laurel Bay Apartments (2001).

1900 and 1912 Spindrift Drive: An extensive data recovery and mitigation monitoring program at the Spindrift Site, an important prehistoric archaeological habitation site stretching across the La Jolla area. The project resulted in the discovery of over 20,000 artifacts and nearly 100,000 grams of bulk faunal remains and marine shell, indicating a substantial occupation area (2013-2014).

Emerald Acres: Archaeological survey and testing program of 14 archaeological sites across 333 acres in the Winchester area of Riverside County (2000-2018).

San Diego Airport Development Project: An extensive historic assessment of multiple buildings at the San Diego International Airport and included the preparation of Historic American Buildings Survey documentation to preserve significant elements of the airport prior to demolition (2017-2018).

Citracado Parkway Extension: A still-ongoing project in the city of Escondido to mitigate impacts to an important archaeological occupation site. Various archaeological studies have been conducted by BFSA resulting in the identification of a significant cultural deposit within the project area.

Westin Hotel and Timeshare (Grand Pacific Resorts): Data recovery and mitigation monitoring program in the city of Carlsbad consisted of the excavation of 176 one-square-meter archaeological data recovery units which produced thousands of prehistoric artifacts and ecofacts, and resulted in the preservation of a significant prehistoric habitation site. The artifacts recovered from the site presented important new data about the prehistory of the region and Native American occupation in the area (2017).

Citracado Business Park West: An archaeological survey and testing program at a significant prehistoric archaeological site and historic building assessment for a 17-acre project in the city of Escondido. The project resulted in the identification of 82 bedrock milling features, two previously recorded loci and two additional and distinct loci, and approximately 2,000 artifacts (2018).

The Everly Subdivision Project: Data recovery and mitigation monitoring program in the city of El Cajon resulted in the identification of a significant prehistoric occupation site from both the Late Prehistoric and Archaic Periods, as well as producing historic artifacts that correspond to the use of the property since 1886. The project produced an unprecedented quantity of artifacts in comparison to the area encompassed by the site, but lacked characteristics that typically reflect intense occupation, indicating that the site was used intensively for food processing (2014-2015).

Ballpark Village: A mitigation and monitoring program within three city blocks in the East Village area of San Diego resulting in the discovery of a significant historic deposit. Nearly 5,000 historic artifacts and over 500,000 grams of bulk historic building fragments, food waste, and other materials representing an occupation period between 1880 and 1917 were recovered (2015-2017).

Archaeology at the Padres Ballpark: Involved the analysis of historic resources within a seven-block area of the "East Village" area of San Diego, where occupation spanned a period from the 1870s to the 1940s. Over a period of two years, BFSA recovered over 200,000 artifacts and hundreds of pounds of metal, construction debris, unidentified broken glass, and wood. Collectively, the Ballpark Project and the other downtown mitigation and monitoring projects represent the largest historical archaeological program anywhere in the country in the past decade (2000-2007).

4S Ranch Archaeological and Historical Cultural Resources Study: Data recovery program consisted of the excavation of over 2,000 square meters of archaeological deposits that produced over one million artifacts, containing primarily prehistoric materials. The archaeological program at 4S Ranch is the largest archaeological study ever undertaken in the San Diego County area and has produced data that has exceeded expectations regarding the resolution of long-standing research questions and regional prehistoric settlement patterns.

Charles H. Brown Site: Attracted international attention to the discovery of evidence of the antiquity of man in North America. Site located in Mission Valley, in the city of San Diego.

Del Mar Man Site: Study of the now famous Early Man Site in Del Mar, California, for the San Diego Science Foundation and the San Diego Museum of Man, under the direction of Dr. Spencer Rogers and Dr. James R. Moriarty.

Old Town State Park Projects: Consulting Historical Archaeologist. Projects completed in the Old Town State Park involved development of individual lots for commercial enterprises. The projects completed in Old Town include Archaeological and Historical Site Assessment for the Great Wall Cafe (1992), Archaeological Study for the Old Town Commercial Project (1991), and Cultural Resources Site Survey at the Old San Diego Inn (1988).

Site W-20, Del Mar, California: A two-year-long investigation of a major prehistoric site in the Del Mar area of the city of San Diego. This research effort documented the earliest practice of religious/ceremonial activities in San Diego County (circa 6,000 years ago), facilitated the projection of major non-material aspects of the La Jolla Complex, and revealed the pattern of civilization at this site over a continuous period of 5,000 years. The report for the investigation included over 600 pages, with nearly 500,000 words of text, illustrations, maps, and photographs documenting this major study.

City of San Diego Reclaimed Water Distribution System: A cultural resource study of nearly 400 miles of pipeline in the city and county of San Diego.

Master Environmental Assessment Project, City of Poway: Conducted for the City of Poway to produce a complete inventory of all recorded historic and prehistoric properties within the city. The information was used in conjunction with the City's General Plan Update to produce a map matrix of the city showing areas of high, moderate, and low potential for the presence of cultural resources. The effort also included the development of the City's Cultural Resource Guidelines, which were adopted as City policy.

Draft of the City of Carlsbad Historical and Archaeological Guidelines: Contracted by the City of Carlsbad to produce the draft of the City's historical and archaeological guidelines for use by the Planning Department of the City.

The Mid-Bayfront Project for the City of Chula Vista: Involved a large expanse of undeveloped agricultural land situated between the railroad and San Diego Bay in the northwestern portion of the city. The study included the analysis of some potentially historic features and numerous prehistoric

Cultural Resources Survey and Test of Sites Within the Proposed Development of the Audie Murphy Ranch, Riverside County, California: Project manager/director of the investigation of 1,113.4 acres and 43 sites, both prehistoric and historic—included project coordination; direction of field crews; evaluation of sites for significance based on County of Riverside and CEQA guidelines; assessment of cupule, pictograph, and rock shelter sites, co-authoring of cultural resources project report. February- September 2002.

Cultural Resources Evaluation of Sites Within the Proposed Development of the Otay Ranch Village 13 Project, San Diego County, California: Project manager/director of the investigation of 1,947 acres and 76 sites, both prehistoric and historic—included project coordination and budgeting; direction of field crews; assessment of sites for significance based on County of San Diego and CEQA guidelines; co-authoring of cultural resources project report. May-November 2002.

Cultural Resources Survey for the Remote Video Surveillance Project, El Centro Sector, Imperial County: Project manager/director for a survey of 29 individual sites near the U.S./Mexico Border for proposed video surveillance camera locations associated with the San Diego Border barrier Project—project coordination and budgeting; direction of field crews; site identification and recordation; assessment of

potential impacts to cultural resources; meeting and coordinating with U.S. Army Corps of Engineers, U.S. Border Patrol, and other government agencies involved; co-authoring of cultural resources project report. January, February, and July 2002.

Cultural Resources Survey and Test of Sites Within the Proposed Development of the Menifee West GPA, Riverside County, California: Project manager/director of the investigation of nine sites, both prehistoric and historic—included project coordination and budgeting; direction of field crews; assessment of sites for significance based on County of Riverside and CEQA guidelines; historic research; co-authoring of cultural resources project report. January-March 2002.

Mitigation of An Archaic Cultural Resource for the Eastlake III Woods Project for the City of Chula Vista, California: Project archaeologist/ director—included direction of field crews; development and completion of data recovery program including collection of material for specialized faunal and botanical analyses; assessment of sites for significance based on CEQA guidelines; management of artifact collections cataloging and curation; data synthesis; co-authoring of cultural resources project report, in prep. September 2001-March 2002.

Cultural Resources Survey and Test of Sites Within the Proposed French Valley Specific Plan/EIR, Riverside County, California: Project manager/director of the investigation of two prehistoric and three historic sites—included project coordination and budgeting; survey of project area; Native American consultation; direction of field crews; assessment of sites for significance based on CEQA guidelines; cultural resources project report in prep. July-August 2000.

Cultural Resources Survey and Test of Sites Within the Proposed Lawson Valley Project, San Diego County, California: Project manager/director of the investigation of 28 prehistoric and two historic sites—included project coordination; direction of field crews; assessment of sites for significance based on CEQA guidelines; cultural resources project report in prep. July-August 2000.

Cultural Resource Survey and Geotechnical Monitoring for the Mohyi Residence Project, La Jolla, California: Project manager/director of the investigation of a single-dwelling parcel—included project coordination; field survey; assessment of parcel for potentially buried cultural deposits; monitoring of geotechnichal borings; authoring of cultural resources project report. Brian F. Smith and Associates, San Diego, California. June 2000.

Enhanced Cultural Resource Survey and Evaluation for the Prewitt/Schmucker/Cavadias Project, La Jolla, California: Project manager/director of the investigation of a single-dwelling parcel—included project coordination; direction of field crews; assessment of parcel for potentially buried cultural deposits; authoring of cultural resources project report. June 2000.

Cultural Resources Survey and Test of Sites Within the Proposed Development of the Menifee Ranch, Riverside County, California: Project manager/director of the investigation of one prehistoric and five historic sites—included project coordination and budgeting; direction of field crews; feature recordation; historic structure assessments; assessment of sites for significance based on CEQA guidelines; historic research; co-authoring of cultural resources project report. February-June 2000.

Salvage Mitigation of a Portion of the San Diego Presidio Identified During Water Pipe Construction for the City of San Diego, California: Project archaeologist/director—included direction of field crews; development and completion of data recovery program; management of artifact collections cataloging and curation; data synthesis and authoring of cultural resources project report in prep. April 2000.

Enhanced Cultural Resource Survey and Evaluation for the Tyrian 3 Project, La Jolla, California: Project manager/director of the investigation of a single-dwelling parcel—included project coordination; assessment of parcel for potentially buried cultural deposits; authoring of cultural resources project report. April 2000.

Enhanced Cultural Resource Survey and Evaluation for the Lamont 5 Project, Pacific Beach, California: Project manager/director of the investigation of a single-dwelling parcel—included project coordination; assessment of parcel for potentially buried cultural deposits; authoring of cultural resources project report. April 2000.

Enhanced Cultural Resource Survey and Evaluation for the Reiss Residence Project, La Jolla, California: Project manager/director of the investigation of a single-dwelling parcel—included project coordination; assessment of parcel for potentially buried cultural deposits; authoring of cultural resources project report. March-April 2000.

Salvage Mitigation of a Portion of Site SDM-W-95 (CA-SDI-211) for the Poinsettia Shores Santalina Development Project and Caltrans, Carlsbad, California: Project achaeologist/ director—included direction of field crews; development and completion of data recovery program; management of artifact collections cataloging and curation; data synthesis and authoring of cultural resources project report in prep. December 1999-January 2000.

Survey and Testing of Two Prehistoric Cultural Resources for the Airway Truck Parking Project, Otay Mesa, California: Project archaeologist/director—included direction of field crews; development and completion of testing recovery program; assessment of site for significance based on CEQA guidelines; authoring of cultural resources project report, in prep. December 1999-January 2000.

Cultural Resources Phase I and II Investigations for the Tin Can Hill Segment of the Immigration and Naturalization Services Triple Fence Project Along the International Border, San Diego County, California: Project manager/director for a survey and testing of a prehistoric quarry site along the border—NRHP eligibility assessment; project coordination and budgeting; direction of field crews; feature recordation; meeting and coordinating with U.S. Army Corps of Engineers; co-authoring of cultural resources project report. December 1999-January 2000.

Mitigation of a Prehistoric Cultural Resource for the Westview High School Project for the City of San Diego, California: Project archaeologist/ director—included direction of field crews; development and completion of data recovery program including collection of material for specialized faunal and botanical analyses; assessment of sites for significance based on CEQA guidelines; management of artifact collections cataloging and curation; data synthesis; co-authoring of cultural resources project report, in prep. October 1999-January 2000.

Mitigation of a Prehistoric Cultural Resource for the Otay Ranch SPA-One West Project for the City of Chula Vista, California: Project archaeologist/director—included direction of field crews; development of data recovery program; management of artifact collections cataloging and curation; assessment of site for significance based on CEQA guidelines; data synthesis; authoring of cultural resources project report, in prep. September 1999-January 2000.

Monitoring of Grading for the Herschel Place Project, La Jolla, California: Project archaeologist/ monitor—included monitoring of grading activities associated with the development of a single- dwelling parcel. September 1999.

Survey and Testing of a Historic Resource for the Osterkamp Development Project, Valley Center, California: Project archaeologist/ director—included direction of field crews; development and completion of data recovery program; budget development; assessment of site for significance based on CEQA guidelines; management of artifact collections cataloging and curation; data synthesis; authoring of cultural resources project report. July-August 1999.

Survey and Testing of a Prehistoric Cultural Resource for the Proposed College Boulevard Alignment Project, Carlsbad, California: Project manager/director —included direction of field crews; development and completion of testing recovery program; assessment of site for significance based on CEQA guidelines; management of artifact collections cataloging and curation; data synthesis;

authoring of cultural resources project report, in prep. July-August 1999.

Survey and Evaluation of Cultural Resources for the Palomar Christian Conference Center Project, Palomar Mountain, California: Project archaeologist—included direction of field crews; assessment of sites for significance based on CEQA guidelines; management of artifact collections cataloging and curation; data synthesis; authoring of cultural resources project report. July-August 1999.

Survey and Evaluation of Cultural Resources at the Village 2 High School Site, Otay Ranch, City of Chula Vista, California: Project manager/director —management of artifact collections cataloging and curation; assessment of site for significance based on CEQA guidelines; data synthesis; authoring of cultural resources project report. July 1999.

Cultural Resources Phase I, II, and III Investigations for the Immigration and Naturalization Services Triple Fence Project Along the International Border, San Diego County, California: Project manager/director for the survey, testing, and mitigation of sites along border—supervision of multiple field crews, NRHP eligibility assessments, Native American consultation, contribution to Environmental Assessment document, lithic and marine shell analysis, authoring of cultural resources project report. August 1997- January 2000.

Phase I, II, and II Investigations for the Scripps Poway Parkway East Project, Poway California: Project archaeologist/project director—included recordation and assessment of multicomponent prehistoric and historic sites; direction of Phase II and III investigations; direction of laboratory analyses including prehistoric and historic collections; curation of collections; data synthesis; coauthorship of final cultural resources report. February 1994; March-September 1994; September-December 1995.

Archaeological Evaluation of Cultural Resources Within the Proposed Corridor for the San Elijo Water Reclamation System Project, San Elijo, California: Project manager/director —test excavations; direction of artifact identification and analysis; graphics production; coauthorship of final cultural resources report. December 1994-July 1995.

Evaluation of Cultural Resources for the Environmental Impact Report for the Rose Canyon Trunk Sewer Project, San Diego, California: Project manager/Director —direction of test excavations; identification and analysis of prehistoric and historic artifact collections; data synthesis; co-authorship of final cultural resources report, San Diego, California. June 1991-March 1992.

Reports/Papers

Author, coauthor, or contributor to over 2,500 cultural resources management publications, a selection of which are presented below.

2019 Final Archaeological Data Recovery and Mitigation Monitoring Program for the Westin Hotel and Timeshare Project, City of Carlsbad, California.

2019 A Phase I and II Cultural Resources Assessment for the Jack Rabbit Trail Logistics Center Project, City of Beaumont, Riverside County, California.

2019 A Section 106 (NHPA) Historic Resources Study for the Altair Project, City of Temecula, California.

2019 Phase II Cultural Resource Study for the McElwain Project, City of Murrieta, California.

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2019 A Cultural Resources Assessment for TR 37177, City of Riverside, Riverside County, California.

2019 Cultural Resources Monitoring Report for the Westlake Project (TM 33267), City of Lake Elsinore, Riverside County, California.

2019 A Phase I Cultural Resources Survey for the Go Fresh Gas Project, Perris, California.

2019 Cultural Resources Monitoring Report for the South Milliken Distribution Center Project, City of Eastvale, Riverside County, California.

2019 A Class III Section 106 (NHPA) Study for the Perris Valley Storm Drain Channel Widening Project, Perris, Riverside County, California.

2019 A Section 106 (NHPA) Historic Resources Study for the Twin Channel Project, City of San Bernardino, San Bernardino County, California.

2019 A Class III Archaeological Study for the Tuscany Valley (TM 33725) Project National Historic Preservation Act Section 106 Compliance, Lake Elsinore, Riverside County, California.

2019 A Phase I Cultural Resources Survey for the IPT Perris DC III Western/Nandina Project, Perris, California.

2019 A Phase I Cultural Resources Assessment for the Menifee Gateway Project, City of Menifee, Riverside County, California.

2019 Results of Archaeological Monitoring at the Atwell Phase 1A Project (formerly Butterfield Specific Plan), City of Banning, Riverside County, California.

2019 A Phase I Cultural Resource Study for the Eastvale Self Storage Project, Eastvale, California.

2019 A Phase I Cultural Resources Survey Report for the Commercial/Retail NWC Mountain and Lake Streets Project, City of Lake Elsinore, Riverside County, California.

2019 A Phase I Cultural Resources Assessment for the Anza Baptist Church Project, Riverside County, California.

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2018 Mitigation Monitoring Report for the Stedman Residence Project, 9030 La Jolla Shores Lane, La Jolla, California 92037.

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2018 A Phase I and II Cultural Resources Assessment for the Emerald Acres Project, Winchester, Riverside County.

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2017 Mitigation Monitoring Program for the Ballpark Village Project, City of San Diego.

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2014 Cultural Resources Study for the Estates at Del Mar Project, City of Del Mar, San Diego, California (TTM 14-001).

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2013 Cultural Resources Survey Report for the Renda Residence Project, 9521 La Jolla Farms Road, La Jolla, California.

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2001 An Archaeological Report for the Mitigation, Monitoring, and Reporting Program at the Water and Sewer Group Job 530A, Old Town San Diego. Brian F. Smith and Associates, San Diego, California.

2001 A Cultural Resources Impact Survey for the High Desert Water District Recharge Site 6 Project, Yucca Valley. Brian F. Smith and Associates, San Diego, California.

2001 Archaeological Mitigation of Impacts to Prehistoric Site SDI-13,864 at the Otay Ranch SPA-One West Project. Brian F. Smith and Associates, San Diego, California.

2001 A Cultural Resources Survey and Site Evaluations at the Stewart Subdivision Project, Moreno Valley, County of San Diego. Brian F. Smith and Associates, San Diego, California.

2000 An Archaeological/Historical Study for the French Valley Specific Plan/EIR, French Valley, County of Riverside. Brian F. Smith and Associates, San Diego, California.

2000 Results of an Archaeological Survey and the Evaluation of Cultural Resources at The TPM#24003–Lawson Valley Project. Brian F. Smith and Associates, San Diego, California.

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2000 An Archaeological/Historical Study for the Menifee Ranch Project. Brian F. Smith and Associates, San Diego, California.

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2000 Enhanced Cultural Resource Survey and Evaluation for the Lamont 5 Project. Brian F. Smith and Associates, San Diego, California.

2000 Salvage Excavations at Site SDM-W-95 (CA-SDI-211) for the Poinsettia Shores Santalina Development Project, Carlsbad, California. Brian F. Smith and Associates, San Diego, California.

2000 Enhanced Cultural Resource Survey and Evaluation for the Reiss Residence Project, La Jolla, California. Brian F. Smith and Associates, San Diego, California.

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1999 An Archaeological Survey of the Home Creek Village Project, 4600 Block of Home Avenue, San Diego, California. Brian F. Smith and Associates, San Diego, California.

1999 An Archaeological Survey for the Sgobassi Lot Split, San Diego County, California. Brian F. Smith and Associates, San Diego, California.

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1999 An Archaeological/Historical Survey and Evaluation of a Cultural Resource for The Osterkamp Development Project, Valley Center, California. Brian F. Smith and Associates, San Diego, California.

1999 An Archaeological Survey and Evaluation of Cultural Resources for the Palomar Christian Conference Center Project, Palomar Mountain, California. Brian F. Smith and Associates, San Diego, California.

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1999 Results of an Archaeological Evaluation for the Anthony's Pizza Acquisition Project in Ocean Beach, City of San Diego (with L. Pierson and B. Smith). Brian F. Smith and Associates, San Diego, California.

1996 An Archaeological Testing Program for the Scripps Poway Parkway East Project. Brian F. Smith and Associates, San Diego, California.

1995 Results of a Cultural Resources Study for the 4S Ranch. Brian F. Smith and Associates, San Diego, California.

1995 Results of an Archaeological Evaluation of Cultural Resources Within the Proposed Corridor for the San Elijo Water Reclamation System. Brian F. Smith and Associates, San Diego, California.

1994 Results of the Cultural Resources Mitigation Programs at Sites SDI-11,044/H and SDI-12,038 at the Salt Creek Ranch Project. Brian F. Smith and Associates, San Diego, California.

1993 Results of an Archaeological Survey and Evaluation of Cultural Resources at the Stallion Oaks Ranch Project. Brian F. Smith and Associates, San Diego, California.

1992 Results of an Archaeological Survey and the Evaluation of Cultural Resources at the Ely Lot Split Project. Brian F. Smith and Associates, San Diego, California.

1991 The Results of an Archaeological Study for the Walton Development Group Project. Brian F. Smith and Associates, San Diego, California.

APPENDIX B

Archaeological Records Search

(Deleted for Public Review; Bound Separately)

APPENDIX C

NAHC Sacred Lands File Search

(Deleted for Public Review; Bound Separately)

Appendix C
Geotechnical/Geology Study Report

GEOTECHNICAL/GEOLOGIC STUDY REPORT
PROPOSED 15-ACRE SUBDIVISION FOR RESIDENTIAL DEVELOPMENT
APN 0333-106-15 & 16,
WEST OF NORTH BAY ROAD
LAKE ARROWHEAD
SAN BERNARDINO COUNTY, CALIFORNIA

PROJECT NO.: 1407-1-21
REPORT NO.: 1

NOVEMBER 12, 2021

SUBMITTED TO:

LAKE ARROWHEAD DEVELOPEMENT, LLC
22939 HAWTHORNE BLVD, SUITE 100
TORRANCE, CA 90505

PREPARED BY:

HILLTOP GEOTECHNICAL, INC.
786 SOUTH GIFFORD AVENUE
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November 12, 2021

Lake Arrowhead Developement, LLC
22939 Hawthorne Blvd, Suite 100 Torrance,
CA 90505

Project No.: 1407-1-21
Report No.: 1

Attention: Mr. Jesse Wright, CEO

Subject: **Geotechnical / Geologic Study Report, Proposed 15-Acre Subdivision for Residential Development, APN 0333-106-15 & 16, West of North Bay Road, City of Lake Arrowhead, San Bernardino County, California.**

References: 1. **Hillwig-Goodrow, Inc.,** September 15, 2021, *Tentative Tract No. 20480, Proposed Tract Map, File No. 1007-01, Sheet No. 1-2 of 2 Sheet.*

2. **Technical References** - See Appendix 'B'

Mr. Wright:

According to your request, we have completed a preliminary geotechnical / geologic study for design and construction of the proposed residential development at the 15-acre site. We are presenting, herein, our findings and recommendations.

The findings of this study indicate that the project site is suitable for the proposed development provided the recommendations presented in the attached report are incorporated into design of the project and implemented during construction of the project.

Copies of this report should be forwarded to the other consultants for the project (i.e., Civil Engineer, Architect, Structural Engineer, etc.) as needed to implement the recommendations presented. This report should be saved for submittal, and the other required documentation to the appropriate agency having jurisdiction over the project for review and permitting purposes.

If you have any questions after reviewing the findings and recommendations contained in the attached report, please do not hesitate to contact this office. This opportunity to be of professional service is sincerely appreciated.

Respectfully Submitted,
HILLTOP GEOTECHNICAL, INC.

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STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SHAOFU CHEN
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Distribution: (1) Addressee Via Email
Mr. Jessie Wright (jessie@enterglobe.com)

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GEOTECHNICAL/GEOLOGIC REPORT
A PROPOSED 15-ACRE SUBDIVISION FOR
RESIDENTIAL DEVELOPMENT
APN 0333-106-15 AND 16
WEST OF NORTH BAY ROAD
CITY OF LAKE ARROWHEAD
SAN BERNARDINO COUNTY, CALIFORNIA

PROJECT NO.: 1407-1-21
REPORT NO.: 1

NOVEMBER 12, 2021

INTRODUCTION

AUTHORIZATION

This report presents results of the preliminary geotechnical / geologic study conducted on the subject site for the proposed 15-acre subdivision for residential development to be located west of North Bay Road, City of Lake Arrowhead, APN 0333-106-15 and 16. The general location of the subject site is indicated on the 'Site Location Map' Figure No. 1.

Authorization to perform this study was in the form of an email notification to proceed to **Hilltop Geotechnical, Inc. (HGI)** (Geotechnical / Geologic Consultant) from **Mr. Jesse Wright** (Client), in reference to HGI Proposal Number: P21123R Dated September 30th, 2021.

PURPOSE AND SCOPE OF STUDY

The scope of work performed for this study was designed to determine and evaluate the surface and subsurface conditions in the vicinity of the proposed residential development on the subject site with respect to geotechnical characteristics, including potential geologic hazards that may affect the development of the site, and to provide geotechnical recommendations and criteria for use in the design and construction of the proposed development. The scope of work included the following:

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Source: Copied from USGS Topo Map-
Lake Arrowhead Quadrangle 2012

HILLTOP GEOTECHNICAL
INCORPORATED

SITE LOCATION MAP

APN 0333-106-15 &16, North Bay Road, Lake Arrowhead, CA

By: MC	Date: 10/2021
Project No.: 1407-1-21	**Figure 1**

- A review of locally and easily available published and unpublished soil reports and data for the project area.

- Telephone conversations with the client and/or representatives of the client.

- Site reconnaissance.

- A review of the laboratory testing of selected earth material samples considered representative of the surface and subsurface conditions which were performed to determine the engineering properties and characteristics.

- Determine seismic classification of the site to meet the requirements of the 2019 California Building Code (CBC), effective on January 1, 2020.

- Engineering analysis of field and laboratory data to provide a basis for geotechnical updated conclusions and recommendations regarding site grading and foundation, floor slab, retaining wall, pavement, design parameters, and so forth.

- Preparation of this report to present the geotechnical conclusions and recommendations for the proposed site development.

This report presents our conclusions and/or recommendations regarding.

- The geologic setting of the site.

- Potential geologic hazards (including landslides, seismicity, faulting, liquefaction potential, etc.).

- General surface and subsurface earth conditions.

- Presence and effect of expansive, collapsible, and compressible earth materials.

- Groundwater conditions within the depth of our subsurface study.
- Excavation characteristics of the on-site earth materials.
- Characteristics and compaction requirements of proposed fill and backfill materials.
- Recommendations and guide specifications for earthwork.
- Seismic design parameters for structural design purposes.
- Types and depths of foundations.
- Allowable bearing pressure and lateral resistance for foundations.
- Estimated total and differential settlements.
- Preliminary corrosion potential evaluation for concrete and buried metal in direct contact with the on-site earth materials.
- Temporary and permanent cut and fill slope recommendations.
- Utility trench excavation and backfill recommendations.
- Slope maintenance and protection recommendations.
- Preliminary pavement recommendations.

The scope of work performed for this report did not include any testing of earth materials or groundwater for environmental purposes, an environmental assessment of the property, or opinions relating to the possibility of surface or subsurface contamination by hazardous or toxic substances.

This geotechnical report was prepared for the exclusive use of **California Retail Properties Corporation,** and their other consultants for specific application to the subject tract in accordance with generally accepted standards of the geotechnical profession and generally accepted geotechnical (soil and foundation) engineering principles and practices at the time this update report was prepared. Other warranties, implied or expressed, are not made. Although reasonable effort

has been made to obtain information regarding geotechnical / geologic and subsurface conditions of the site, limitations exist with respect to knowledge of unknown regional or localized off-site conditions that may have an impact at the site. The conclusions and recommendations presented in this report are valid as of the date of this report. However, changes in conditions of a property can occur with passage of time, whether they are due to natural processes or to works of man on this and/or adjacent properties.

If conditions are observed or information becomes available during the design and construction process that are not reflected in this report, **HGI**, as the Geotechnical / Geologic Consultant of record for the project, should be notified so that supplemental evaluations can be performed and the conclusions and recommendations presented in this report can be verified or modified in writing, as necessary. Changes in applicable or appropriate standards of care in the geologic / geotechnical professions occur, whether they result from legislation or the broadening of knowledge and experience. Accordingly, the conclusions and recommendations presented in this report may be invalidated, wholly or in part, by changes outside the influence of the project Geotechnical / Geologic Consultant which occur in the future.

PREVIOUS SITE STUDIES

No previous geotechnical and/or geological studies for the subject site are known to have been performed or were made available for review at the time of this study, if any had been performed.

PROJECT DESCRIPTION / PROPOSED DEVELOPMENT

As part of our study, we have discussed the project with Mr. Jesse Wright of **California Retail Properties Corporation** (Client). We also have been provided with Reference No. 1, *Tentative Tract No. 20480, Proposed Tract Map*, and easements noted on the cover letter for this report. According to the tentative

tract map, 41 lots are proposed with the addition of six new streets and four water quality basins.

The above project description and assumptions were used as the basis for the field exploration, laboratory testing program, the engineering analysis, and the conclusions and recommendations presented in this report. **HGI** should be notified if structures, foundation loads, grading, and/or details other than those represented herein are proposed for final development of the site so a review can be performed, a supplemental evaluation made, and revised recommendations submitted, if required.

FIELD EXPLORATION AND LABORATORY TESTING

The field study performed for this report included a visual reconnaissance of existing surface conditions of the subject site and surrounding area. A study of the property's subsurface condition was performed to evaluate underlying earth strata and the presence of groundwater. Surface and subsurface conditions were explored on October 12th and 13th, 2021.

The subsurface exploration consisted of excavating (11) eleven exploratory borings (one of which was converted to an infiltration test) and (4) four infiltration test borings on the subject property. Due to the sloping topographic nature of the site five (5) of the borings/infiltration tests were hand augured with the remaining drilled via a drill rig. The approximate locations of the exploratory excavations are shown on the 'Exploratory Excavation Location Plan,' Plate No. 1, presented in Appendix 'A.' The exploratory excavations were observed and logged by a representative of **HGI**. Earth materials encountered in the exploratory excavations were visually described in the field in general accordance with the current Unified Soils Classification System (USCS), ASTM D2488, visual-manual procedures, as illustrated on the attached, simplified 'Subsurface Exploration Legend,' Plate No. 2, presented in Appendix 'A.' The results are presented on

the 'Subsurface Exploration Log,' Plate Nos. 3 through 13, presented in Appendix 'A.' A more detailed explanation of the field study which was performed for this report is presented in Appendix 'A.'

Relatively undisturbed ring samples and representative bulk samples of on-site fill and natural earth materials were collected during the field exploration and returned to the laboratory for testing. Laboratory tests were conducted to evaluate the index and engineering properties of on-site earth materials and included in-situ dry density and moisture content tests, corrosivity tests, consolidation tests, modified proctor test, and direct shear tests. A more detailed explanation of laboratory tests performed for this study and test results are presented in Appendix 'A,' Plate Nos. 14 through 18.

FINDINGS

SITE DESCRIPTION

The subject property is irregular in shape as shown on the Reference No. 1 'Proposed Tract Map' noted on the first page of the cover letter for this report. The subject property is located west of North Bay Road in the City of Lake Arrowhead (APNs: 0333-106-15 and 16), San Bernardino County, California.

The subject property is bounded by North Bay Road to the east, by residential properties to the north and south, and by Sugar Pine Drive (White Fir Drive) to the west as shown on the Reference No. 1 'Proposed Tract Map' noted on the first page of the cover letter for this report. The surface of the site was heavily wooded with pine trees, oak trees, weeds, and manzanita bushes.

At the time of the field study, buildings or other type structures were not present on the site. Throughout the property loose boulders were observed in addition to randomly located piles of miscellaneous construction debris including concrete, rebar, and masonry block. Due to the steep nature of the lots, drilling on the site was limited to areas that were accessible by vehicle. In areas not accessible by

vehicles, the borings were hand augured. It was notes on the northwest portion of the property, proposed sugar drive, was blocked by construction debris and was non-accessible at the time of the field study. Utilities consisting of electric, telephone, gas, sewer, water, as well as other unknown underground and overhead lines, were observed to be present on the site and adjacent to the site. Waterlines throughout the property were clearly marked on site during the time of the field exploration.

ENGINEERING GEOLOGIC ANALYSIS

Regional Geologic Setting

The subject site is located within the San Bernardino Mountains. The San Bernardino Mountains, the San Gabriel Mountains, and other ranges extending toward the west and east are portions of the Transverse Ranges Geomorphic Province, a nearly 300-mile-long belt of folded, faulted, and uplifted rocks of diverse lithologies. The east-west orientation of the Transverse Ranges markedly contrasts with the generally northwest-trending, structural grain of surrounding areas of California. The presence and orientation of these ranges are generally attributed to north-south directed compression and crustal shortening related to complications within the geometry of the San Andreas transform fault system. These complications are reflected in the kinematics of faults that bound virtually all sides of the San Bernardino Mountains block, faults that include right- and left-lateral strike-slip, normal, and reverse-slip displacements.

Basement rocks in the San Bernardino Mountains are similar to those observed in the Mojave Desert areas to the north and consist of Triassic through Cretaceous granitoid rocks of various compositions that have intruded prebatholithic orthogneiss (Proterozoic) and Late Proterozoic to Paleozoic metasedimentary rocks. The layered metasedimentary units consist of quartzites, marbles, pelitic schists, and gneisses, and are stratigraphic equivalents to widespread, marine sedimentary rocks in the eastern Mojave Desert and Great Basin regions. Deformed and undeformed suites of Mesozoic

plutonic rocks predominate in the western San Bernardino Mountains. Least-common rock types around the margins of the range include banded and layered Mesozoic metasediments and several Tertiary sedimentary units, usually located within fault-bounded slivers and blocks.

Locally, the Lake Arrowhead area lies within the Northern Block of the San Bernardino Mountains, a broad plateau with relatively gentle highland topography. This area of Lake Arrowhead is underlain by Mesozoic-aged, Monzogranite of City Creek basement rock. Geology of the subject property and surrounding area is graphically depicted on the 'Regional Geologic Map,' Figure No. 2.

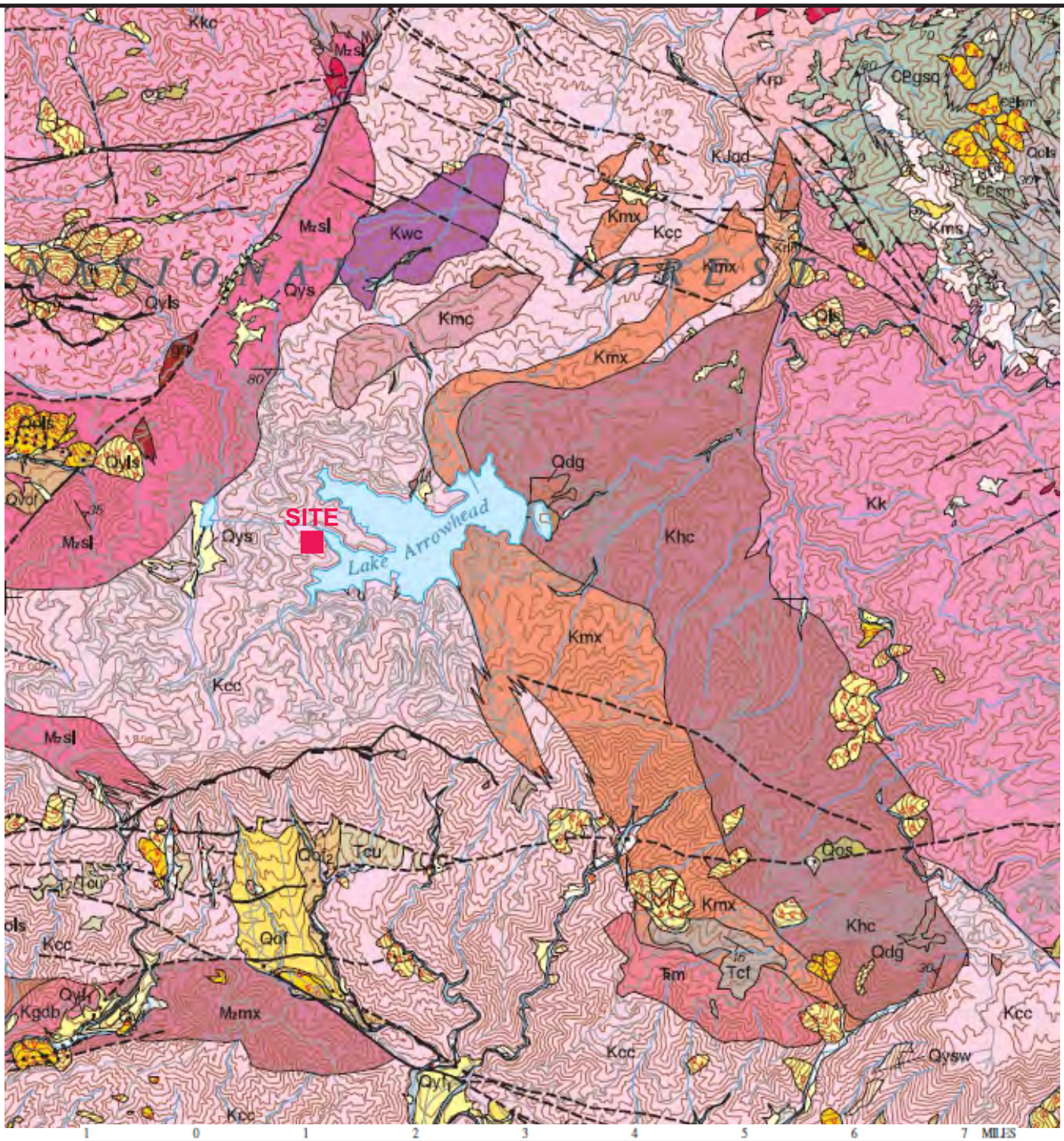
Local Subsurface Conditions

Earth Materials Description:

Presented as follows are brief descriptions of the earth materials encountered in the exploratory excavations. More detailed descriptions of encountered earth materials are presented on the 'Subsurface Exploration Logs,' Plate Nos. 3 and 13, presented in Appendix 'A' of this report. The earth material strata, as shown on the logs, represent conditions at the actual exploratory excavation locations. Other variations may occur beyond and/or between the excavations. Lines of demarcation between earth materials on the logs represented the approximate boundary between the material types; however, the transition may be gradual.

The earth materials encountered on the subject site during the field exploration were identified as artificial fill, colluvium, and weathered, Monsogranite of City Creek (Kcc).

Artificial fill was encountered at two borings of the eleven borings. The artificial fill extended to a maximum depth of approximately 13 feet at the location of boring B-6. The fill was likely to accommodate the adjacent roadways and apartment buildings. The artificial fill in the exploratory excavations and generally consisted of clayey fine to medium sand, which was greyish brown to



Legend

- MzsI — MzsI Mixed granitic rocks of Silverwood Lake (Mesozoic)
- Khc — Khc - Granodiorite of Hook Creek (Cretaceous).
- Kcc — Kcc - Monsogranite of City Creek (Cretaceous).
- Kmx — Kmx - Mixed Granitic Rocks of Heaps Peak (Cretaceous).

Source: Copied from USGS: Geologic Map of The San Bernardino and Santa Ana 30'X60' Quadrangle, Sheet 1 of 4, Version 1.0, by D.M. Morton, F.K., Miller, Open File Report: 2006-1217, Scale 1:100,00

HILLTOP GEOTECHNICAL INCORPORATED

REGIONAL GEOLOGIC MAP

APN 0333-106-15 &16, North Bay Road, Lake Arrowhead, CA

By: MC	Date: 10/2021
Project No.: 1407-1-21	**Figure 2**

blackish brown in color, moist, and medium in consistency.

Ccolluvium was encountered at nine of eleven boring locations. The colluvium extended to depths of approximately 21.5 feet from the ground surfaces or fill bottom and generally consisted of clayey fine to coarse sand with trace of gravel, which was yellow brown, brown, tan to greyish brown in color, moist, and medium dense in consistency.

Weathered granitic bedrock was encountered underlying colluvium to depths of approximately 1.5 to 8 feet 10 inches below the existing ground surface (bgs). The bedrock was generally highly to moderately weathered at the deeper depths. The weathered bedrock was yellow brown to orange brown and slightly dry to moist with variations in the amount of micas present.

Groundwater

Groundwater was not encountered in the exploratory excavations to the maximum depth explored of approximately 21.5 feet bgs at the boring locations at the time the field exploration was performed for this report.

The subject property is underlain by weathered bedrock. No evidence of onsite springs or seeps was observed during the field study performed for this report. Though no groundwater was encountered during the field exploration performed for this report, a potential does exist that seeps and springs could occur during and following periods of heavy precipitation, snow melt, or prolonged landscape irrigation. Based on anticipated lot grading and the inferred groundwater depths, groundwater should not be a factor for project design or long-term performance.

Surface Water

Surface water was not observed on the subject site at the time the field exploration was performed for this report. Moreover, the subject site is not within a designated flood zone. Therefore, surface water is not considered as a significant factor for the proposed development.

Site Variations

Based on results of our subsurface exploration and experience, variations in the continuity and nature of surface and subsurface conditions should be anticipated. Due to uncertainty involved in the nature and depositional characteristics of earth materials at the site, care should be exercised in extrapolating or interpolating subsurface conditions between and beyond the exploratory excavation locations.

Groundwater level measurements were made in the exploratory excavations at times and under conditions stated on the boring logs. These data have been reviewed and interpretations made in the text in other sections of this report. However, it should be noted that fluctuations in levels of groundwater, springs, and/or perched water may occur due to variations in precipitation, temperature, and other factors.

Faulting and Regional Seismicity

The site is situated in an area of active and potentially active faults, as is most of metropolitan southern California. Active faults present a variety of potential risks to structures, the most common of which are strong ground shaking, dynamic densification, liquefaction, mass wasting, and surface rupture at the fault plane. Generally speaking, the following four (4) factors are the principal determinants of seismic risk at a given location:

- Distance to seismogenically capable faults.
- The maximum or "characteristic" magnitude earthquake for a capable fault.
- Seismic recurrence interval, in turn related to tectonic slip rates.
- Nature of earth materials underlying the site.

Surface rupture represents the primary potential hazard to structures built in an active fault zone. The site is not located within a zone of mandatory study for active faulting per the **San Bernardino County Planning Department**, *San Bernardino County Land Use Plan, GENERAL PLAN, Geologic Hazard Overlays*,

Sheet FH15 C Lake Arrowhead, Plot Date: 03/09/2010, Scale: 1:14,400 (http://cms.sbcounty.gov/lus/Planning/ZoningOverlay Maps/GeologicHazardMaps.aspx).

The most recent, large earthquake that occurred in close proximity to the subject property was the June 28, 1992 Big Bear earthquake. The epicenter of this quake was located approximately 22 miles east-southeast of the subject property at Latitude: 34.2030° North, Longitude: 116.8270° West. The Big Bear quake had a measured magnitude of 6.7, had no surface rupture, and is believed to have occurred on a blind thrust fault, the exact location and geometry of which currently are unknown. Several aftershocks also were centered very near the epicenter, including a magnitude 5.6 aftershock.

Ground shaking is judged to be the primary hazard most likely to affect the site, based upon proximity to regionally significant active faults. Per https://maps.conservation.ca.gov/cgs/fam/, the nearest regionally significant active fault is the San Andrea Fault, which is approximately 6.9 miles to southwest of the site. Another active fault Ord Mountains Fault is approximately 7.8 miles to north of the site. Two late Quaternary faults Arrastre Canyon Fault and Waterman Canyon Fault are approximately 2 miles north and 2.4 miles south of the site, respectively. The northern frontal fault is considered a thrust fault with the nearest surface rupture located approximately 1.25 miles north of the site. In addition the tunnel ridge fault was located approximately 2 miles northwest of the site.

Secondary Seismic Hazards

Secondary hazards include induced landsliding or mass wasting, liquefaction, flooding (from ruptured tanks and reservoirs, surface oscillations in larger lakes, or seismic sea waves), and subsidence as a result of soil densification.

Landslide: The subject site is located within a designated low to moderate potential landslide area per **San Bernardino County Planning Department**,

San Bernardino County Land Use Plan, GENERAL PLAN, Geologic Hazard Overlays, Sheet FH22C San Bernardino North, Plot Date: 03/09/2010, Scale: 1:14,400(http://cms.sbcounty/lus/Planning/ZoningOverlayMaps/GeologicHazard Maps.aspx).

Field reconnaissance over the 15 acres did not disclose the presence of older, existing landslides within or near the subject property. Loose boulders were encountered throughout the property should be removed especially in the higher elevation locations. In the vicinity of over-steepened slope areas along the proposed roadways mitigation measures, such as retaining walls or soils nail walls should be taken to prevent potential land sliding.

Liquefaction: Liquefaction describes a phenomenon in which cyclic stresses produced by ground shaking induced excess pore water pressures in the cohesionless soils. These soils may thereby acquire a high degree of mobility leading to damages or deformations. In general, this phenomenon only occurs below the water table, but after liquefaction has developed, it can propagate upward into overlying non-saturated soil as excess pore water pressure. Liquefaction susceptibility under a given earthquake is related to the gradation and relative density characteristics of the soil, the in-situ stresses prior to ground motion, and the depth to the water table, as well as other factors.

The subject site is not located within a designated area as having a liquefaction potential per **San Bernardino County Planning Department**, *San Bernardino County Land Use Plan, GENERAL PLAN, Geologic Hazard Overlays*, Sheet FH15 C Lake Arrowhead, Plot Date: 03/09/2010, Scale: 1:14,400 (http://cms.sbcounty/lus/Planning/ZoningOverlayMaps/GeologicHazardMaps.aspx). Moreover, the bedrock underneath the site is shallow. Therefore, the potential of liquefaction is low.

Seismically Induced Subsidence: Loose sandy soils subjected to moderate to strong ground shaking can experience settlement. Experience from the Northridge Earthquake indicates that structural distress can result from such seismic settlement due to thick loose sandy soils. Based upon the findings of this investigation, no thick loose sandy soils underlie the subject site; and the proposed structures will be supported on bedrock or compacted fill, settlement of structures induced by seismic event is considered insignificant.

Seiching: Seiching involves an enclosed body of water oscillating due to ground shaking, usually following an earthquake. Lakes and water towers are typical bodies of water affected by seiching. However, the site does not appear to be within the influence of large bodies of water and, as such, seiching should not be considered a geologic hazard for the development of the subject site.

Tsunamis: Because of the inland geographic location of the site, tsunamis are not considered a geologic hazard for the development of the subject site.

Lurching: Lurching is a phenomenon in which ground cracking and/or secondary faulting occurs as a result of ground shaking. Generally, lurching primarily occurs in the immediate vicinity of faulting or steep slope areas. No known active or potential active faults pass through or by the subject site or its immediate vicinity, and granitic bedrock is shallow at the subject site as well as the footings of proposed structures will be founded into bedrock or compacted fill; therefore, the likelihood for lurching to impact the site is considered to be low.

OTHER GEOLOGIC HAZARDS

Flooding

The subject site is not located within a designated area as having a flooding potential per **San Bernardino County Planning Department**, *San Bernardino County Land Use Plan, GENERAL PLAN, Hazard Overlays*, Sheet FH15 B Harrison Mountain, Plot Date: 03/09/2010, Scale: 1:14,400 (http://www.sbcounty.gov/Uploads/lus/HazMaps/FH15B_20100309.pdf).

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

The conclusions and recommendations presented in this report are in part based on information provided to this firm, the results of the field and laboratory data obtained from (11) eleven exploratory excavations located on the subject property, experience gained from work conducted by this firm on projects within the general vicinity of the subject site, the project description and assumptions presented in the 'Project Description / Proposed Development' section of this report, engineering analyses, and professional judgement. Based on a review of the field and laboratory data and the engineering analysis, the proposed development is feasible from a geotechnical / geologic standpoint, provided the recommendations contained in this report are implemented during the project design and construction.

Recommendations for site grading, foundations, slab support, pavement design, and so forth, are presented in the subsequent sections.

SITE PREPARATION RECOMMENDATIONS

General

The grading recommendations presented in this report are intended for: 1) the rework of unsuitable, near-surface, documented fill materials to construct an engineered building pad and satisfactory foundation support for exterior hardscape (i.e., sidewalks, patios) and pavement; and 2) the use of foundation systems and concrete slabs cast on-grade designed for the proposed structures.

If hardscape and pavement subgrade earth materials are prepared at the time of grading of the building sites, and the improvements are not constructed immediately, additional observations and testing of the subgrade earth material will have to be performed to locate areas which may have been damaged by construction traffic, construction activities, and/or seasonal wetting and drying. The additional observations and testing should be performed before placing aggregate base material, Hot Mix Asphalt (HMA) concrete, and/or Portland Cement concrete (PCC) in those areas.

The following recommendations may need to be modified and/or supplemented during grading as field conditions dictate.

Any additional grading should be performed in accordance with the recommendations presented in this report. We recommend that **HGI**, as the Geotechnical Engineer / Geologist of Record, be retained by the developer of the proposed project to observe the excavation and grading operations, foundation preparation, and to test the compacted fill and utility trench backfill. A pre-grading conference should be held at the site with representatives of the developer, the grading contractor, the City of Lake Arrowhead, the Civil Engineer, and a representative of **HGI** (the Geotechnical / Geologic Consultant) in attendance. Special grading procedures and/or concerns can be addressed at that time.

Earthwork observation services allow the testing of only a small percentage of the fill placed at the site. Contractual arrangements with the grading contractor by the project developer should contain the provision that he is responsible for excavating, placing, and compacting fill in accordance with the recommendations presented in this report and the approved project grading plans and specifications. Observation by the project Geotechnical / Geologic Consultant and/or his representatives during grading should not relieve the grading contractor of his responsibility to perform the work in accordance with the recommendations presented in this report and the approved project plans and specifications.

The following recommendations may need to be modified and/or supplemented during grading as field conditions require.

Clearing and Grubbing

Any debris, grasses, weeds, and other deleterious materials should be removed from the proposed lot pads, exterior hardscape and pavement areas and areas to receive structural fill, before grading is performed. Any organic material and miscellaneous / debris should be legally disposed of off-site. Any highly organic soils encountered should be stripped and stockpiled for use on finished grades in landscape areas or

exported from the site. Disking or mixing of organic material into the earth materials proposed to be used as structural fill should **not** be permitted. Trees, bushes, etc. and their roots should be completely removed, ensuring that 95 percent or more of the root systems are extracted.

Excavation Characteristics

Since granitic rocks are shallow at the subject site, excavation and trenching within the subject property to the depths anticipated for the proposed development may need special earth-moving equipment to accomplish the proposed grading. It is anticipated that significant amount of oversized rock material (i.e., 3 inches in greatest dimension) will be generated during any removal, and the replacement process within the near-surface man-made fills may require special handling during the development of the site.

Suitability of On-Site Materials as Fill

In general, the on-site earth materials present below any topsoil and/or highly organic materials are considered satisfactory for reuse as fill. Fill materials should be free of significant amounts of organic materials and/or debris and should not contain rocks or clumps greater than 3 inches in maximum dimension. It is noted that the in-situ moisture contents of the near-surface fill materials on the subject site will be below the optimum moisture content for the on-site materials. It is anticipated that some moisture will have to be added to the near-surface, on-site earth materials if they are to be used as compacted fill material in the near future.

Removal and Recompaction

Uncontrolled or undocumented fills and/or unsuitable, loose, or disturbed near-surface colluvial earth material in proposed areas which will support structural fills, structures (i.e., buildings, decorative block walls, retaining walls, trash enclosure walls, etc.), fill slopes, exterior hardscape (i.e., sidewalks, patios, curb / gutters, etc.), and pavement should be prepared in accordance with the following recommendations for grading in such areas.

Grading recommendations are provided herein for the lots as follows:

- Based on our field investigation and test data, it is our opinion that the undocumented fill and loose natives will not, in their present condition, provide uniform or adequate support for the proposed structures. Those earth materials on the site are recommended to be over-excavated and re-compacted. Because of site conditions, it will be necessary to remove at least the upper 4 feet of existing soils in areas to be graded for the proposed building pads. A relative compaction of 85 percent or greater for native soils If 85 percent relative compaction for native soils is not present, the over excavation should be deepened until a minimum of 85 percent relative compaction for native soils is present. Moreover, the depth of the over excavation within the perimeter of the proposed lots for the structures should be to a uniform elevation throughout the limits of the structures. It is noted that fill placed to construct slopes and/or support sidewalks, patios, retaining walls, block walls, driveways, and pavement are considered to be structural fill.

- Where a cut / fill transition zone extends through a proposed building pad area, a compacted mat of fill will have to be constructed under the building area to prevent differential settlement between the two (2) dissimilar materials. This mat should be constructed by over excavating the materials in the cut portion of the pad to a distance outside the proposed building limits of 4.0 feet or to the depth of the over excavation below the finish pad grade, whichever is greater. The over excavation should extend to a depth of 4.0 feet below the pad elevation or to a minimum depth of 0.5 times the depth of the deepest fill within the building pad, whichever is greater.

- In a total cut building pad for the proposed structures, over excavation and recompaction is recommended to be performed to a depth of 4.0 feet below the proposed cut pad elevation. This will provide a uniformly compacted building pad for support of the structures.

- In the proposed exterior hardscape (i.e., sidewalks, patio slabs, etc.), and pavement areas where structural fill will not be placed or cuts are proposed, the existing near-surface earth materials need only be processed to a depth of 6.0 to 12 inches below existing site grades or proposed subgrade elevation, whichever is deeper unless old, undocumented fill materials are encountered at exposed grades. If undocumented fills are encountered, they will need to be over-excavated and properly compacted fill replaced to achieve proposed grades.

- Due to the collapsible nature of the near-surface earth materials on the subject site, if over excavation and replacement is not performed under the exterior concrete slabs, hardscape, pavement, curb / gutters, etc., there is a risk of settlement and vertical differential movement if the subgrade earth materials are allowed to become saturated. Therefore, proper drainage should be established away from such improvements and minimal precipitation, or irrigation water allowed to percolate into the earth materials adjacent to the exterior concrete hardscape, pavement, curbs / gutters, etc.

- Additional over-excavation will need to be performed in areas where the exposed subgrade cannot be properly processed and recompacted per the following recommendations presented in this section of this report.

- In landscape or non-structural fill areas where non-structural fill will be placed, over-excavation will not need to be performed prior to placing non-structural fill materials. Proposed fill slopes are structural fills and do not fall under this provision. Any non-structural fill areas should be clearly designated on the project grading and/or site plan by the Civil Engineer or Architect.

· The limits of over-excavation for the building pads should extend to a distance of 4.0 feet or a minimum of 2 feet beneath the finish pad grade for the structure, whichever is greater. The over-excavation limit should laterally extend to a minimum of 4.0 feet beyond outlines of the proposed building footprints on the lots.

- Where existing grade is at a slope steeper than one unit vertical in five units horizontal (20-percent slope) and the depth of the fill exceeds 5 feet benching should be provided. A key should be provided that is at least 10 feet in width and 2 feet into competent bedrock.

- The limits of processing or over-excavation for exterior hardscape, curb / gutter, and pavement areas should extend to a distance of 2.0 feet beyond the edge of the exterior hardscape, curb / gutter, or pavement, or to the depth of the over-excavation beneath the finish subgrade elevation, whichever is greater.

- In areas where over-excavation cannot be performed to the required distance beyond the foundations, (i.e., perimeter project block walls, retaining walls, etc.) along property lines, the foundations should be deepened to extend through the loose, near-surface earth materials and be founded to a minimum depth of 1.0 foot into competent bedrock, which should be verified by the project Geotechnical/Geological consultant or his representative.

· It is noted that localized areas, once exposed, may warrant additional over-excavation for the removal of existing undocumented fills, loose, near-surface earth material, porous, moisture sensitive colluvial earth materials, and subsurface obstructions and/or debris which may be associated with the past usage of the site may not have been located during the field study performed for this report. Actual depths of removals and the competency of the exposed over excavation bottoms should be determined by the project Geotechnical/Geologic Consultant and/or his representative during grading

operations at the time they are exposed and before scarification and recompaction or the placement of fill.

- The exposed over-excavation bottom surfaces should be scarified to a depth of 6.0 to 12 inches, brought to optimum moisture content within 3.0 percent of optimum moisture content, and compacted to 90 percent or greater relative compaction before placement of fill. In landscape and non-structural fill areas, the scarified and moisture conditioned earth materials need only be compacted to 85 percent or greater relative compaction prior to placing fill. Maximum dry density and optimum moisture content for compacted materials should be determined according to current ASTM D1557 procedures. The scarification and recompaction of the exposed over excavation bottoms in earth materials may be deleted upon approval by the project Geotechnical/Geologic Consultant, and/or his representative when in-place density test results in the undisturbed earth materials indicate a relative compaction of 90 percent or greater.

Import Material

Import fill should be 'Non-Expansive' as defined in Section 1803.5.3, 'Expansive Soil,' in the 2019 CBC (i.e., Expansion Index ≤ 20) and as determined by current ASTM D4829 procedures and have strength parameters equivalent to or greater than the on-site earth materials. Import fill material should be approved by the project Geotechnical / Geologic Consultant prior to it being brought on-site.

Fill Placement Requirements

Fill material, whether on-site material or import, should be approved by the project Geotechnical / Geologic Consultant and/or his representative before placement. If fill material is needed, the fill should be free from vegetation, organic material, debris, and oversize material (i.e., 3 inches in maximum dimension). Approved fill material should be placed in horizontal lifts not-to-exceed 6.0 to 12 inches in compacted thickness or in thicknesses the grading contractor can demonstrate that

he can achieve adequate compaction and watered or aerated to obtain optimum moisture content within 3.0 percent of optimum moisture content. Each lift should be spread evenly and should be thoroughly mixed to ensure uniformity of earth material moisture. Fill soils should be compacted to 90 percent or greater relative compaction. Maximum dry density and optimum moisture content for compacted materials should be determined in accordance with current ASTM D1557 procedures.

Over-excavation and Compaction Equipment

Since the granitic rocks were at shallow depths underneath the subject site, deep over-excavation in the bedrock may need a special cut equipment. The contractor should be familiar with the special equipment used for the over-excavation in moderately weathered granitic rocks prior to bidding this project.

It is anticipated that the compaction equipment to be used for the project will include a combination of rubber-tired, track-mounted, sheepsfoot, and/or vibratory rollers to achieve compaction. Compaction by rubber-tired or track-mounted equipment, by itself may not be sufficient. Adequate water trucks, water pulls, and/or other appropriate equipment should be available to provide sufficient moisture and dust control. The actual selection of equipment and compaction procedures are the responsibility of the contractor performing the work and should be such that uniform compaction of the fill is achieved.

Shrinkage, Bulking, and Subsidence

There will be a material loss due to the clearing and grubbing operations. The following values are exclusive of losses due to clearing, grubbing, tree root removal, or the removal of other subsurface features and may vary due to differing conditions within the project boundaries and the limitations of this study.

Volumetric shrinkage of the near-surface earth materials (i.e., undocumented fill and near-surface colluvium) on the subject site that are excavated and replaced

as controlled, compacted fill should be anticipated. It is estimated that the average shrinkage of the near-surface earth materials within the upper 6.0 feet of the site which will be removed and replaced will be approximately 14 to 21 percent, based on fill volumes when compacted to 90 to 95 percent of the maximum dry density for the earth material type based on current ASTM D1557 procedures. For example, a 14 percent shrinkage factor would mean that it would take 1.14 cubic yards of excavated material to make 1.0 cubic yard of compacted fill at 90 percent relative compaction. A higher relative compaction would mean a larger shrinkage value. Any oversize rock removal and export will also result in additional shrinkage.

A subsidence factor (loss of elevation due to compaction of existing undocumented fill and/or the near-surface colluvial earth materials in-place) of 0.13 to 0.17 foot per foot of compacted earth material should be used in areas where the existing earth materials are compacted in-place to 90 to 95 percent relative compaction and to a depth of 12 inches.

Subsidence of the site due to settlement from the placement of less than 10 feet of fill (not including the depth of over-excavation and replacement) during the planned grading operation is expected to be minimal.

Although the above values are only approximate, they represent the recommended estimate of some of the respective factors to be used to calculate lost volume that will occur during grading.

Abandonment of Existing Underground Lines

Abandonment of existing underground irrigation, utility, or pipelines, if present within the zone of construction, should be performed by either excavating the lines and filling in the excavations with documented, properly compacted fill or by filling the lines with a low strength sand / aggregate / cement slurry mixture. Filled lines should not be permitted closer than 3.0 feet below the bottom of proposed footings and/or concrete slabs on-grade. The lines should be cut off at a

distance of 5.0 feet or greater from the area of construction. The ends of the lines should be plugged with 5.0 feet or more of concrete exhibiting minimal shrinkage characteristics to prevent water or fluid migration into or from the lines. Capping of the lines may also be needed if the lines are subject to line pressures. The slurry should consist of a fluid, workable mixture of sand, aggregate, cement, and water. Plugs should be placed at the ends of the line prior to filing with the slurry mixture. Cement should be Portland cement conforming to current ASTM C150 specifications. Water used for the slurry mixture should be free of oil, salts, and other impurities which would have an adverse effect on the quality of the slurry. Aggregate, if used in the slurry, mixture should meet the following gradation or a suitable equivalent:

SIEVE SIZE	PERCENT PASSING
1.5"	100
1.0"	80-100
3/4"	60-100
3/8"	50-100
No. 4	40-80
No. 100	10-40

The sand, aggregate, cement, and water should be proportioned either by weight or by volume. Each cubic yard of slurry should not contain less than 188 pounds (2.0 sacks) of cement. Water content should be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed. The slurry should be placed within 1.0 hour of mixing. The contractor should take precautions so that voids within the line to be abandoned are completely filled with slurry.

Local ordinances relative to abandonment of underground irrigation, utility, or pipelines, if more restrictive, supersede the above recommendations.

Cut Slopes

Cut slope may be needed to generate the proposed building pads, access driveway, and planned street. Based on site earth conditions, cut slope should be no steeper than 1H:1V (Horizontal to Vertical) in bedrock and no steeper than 2H:1V in colluvial soils. Any cut slope steeper than the recommended slope ratios should be retained by retaining structures such as soil nail wall, etc. Since the grading plan was not available at the time we performed the geotechnical investigation, the cut slope details were unknown. If any cut slope is steeper than the recommended slope ratios, the slope stability analyses should be conducted. The additional recommendations will be provided for the over-steeped slope.

Fill Slopes

Finish fill slopes should not be inclined steeper than 2H:1V (Horizontal to Vertical). Fill slope surfaces should be compacted to 90 percent relative compaction to the face of the finished slope. Over-excavation beneath proposed fill slopes should be performed in accordance with the recommendations presented in previous sections of this report. Fill slopes should be constructed in a skillful manner so that they are positioned at the design orientations and slope ratio. Achieving a uniform slope surface by subsequent thin wedge filling should be avoided. Add-on correction to a fill slope should be conducted under the observation and recommendations of the project Geotechnical/Geologic Consultant. The proposed add-on correction procedures should be submitted in writing by the contractor before commencement of corrective grading and reviewed by the project Geotechnical / Geologic Consultant. Compacted fill slopes should be back rolled with appropriate equipment for the type of earth material being used during fill placement, at intervals not exceeding 2.0 feet in vertical height. As an alternative to the bankrolling of the fill slopes, over-filling of the slopes will be considered acceptable and preferred. The fill slope should be constructed by over-filling with compacted fill to a distance of 3.0 feet or greater horizontally, and then trimmed back to expose the dense inner core of the slope surface. Fill slopes steeper than 3H:1V are moderately susceptible to erosion due to the low cohesion parameters of the earth materials.

Loose Material on Slope Face

The grading contractor should take care to avoid spillage of loose material down the face of slopes during grading and during drainage terrace and down drain construction. Fine grading operations for benches and down drains should not deposit loose trimmed earth materials on the finished slope surfaces.

Slope Protection

Permanent slope maintenance and protection measures, as presented in the subsequent 'Slope Maintenance and Protection Recommendations' section of this report, should be initiated as soon as practicable after completion of cut and/or fill slope construction. Fill slopes and cut slopes in undocumented fill and colluvial materials steeper than 3:1 (Horizontal to Vertical) are moderately susceptible to erosion due to the low cohesion parameters of the earth materials. The plant mix, method of application, and maintenance requirements are subject to the approval of a registered Landscape Architect or other qualified landscape professional. Construction delays, climate or weather conditions, and plant growth rates may be such that additional short-term non-plant erosion management measures may be needed. Examples include matting, netting, plastic sheets, deep staking (5.0 feet or deeper), and so on.

Protection of Work

During the grading process and prior to the completion of construction of permanent drainage controls, it is the responsibility of the grading contractor to provide good drainage and prevent ponding of water and damage to the in-progress or finished work on the site and/or to adjoining properties.

Observation and Testing

During grading, observation, and testing should be conducted by the project Geotechnical / Geologic Consultant and/or his representatives to verify that the grading is being performed according to the recommendations presented in this report. The project Geotechnical / Geologic Consultant and/or his representative

should observe and test the over excavation bottoms and the placement of fill and should take tests to verify the moisture content, density, uniformity, and degree of compaction obtained. The contractor should notify the project Geotechnical / Geologic Consultant when clean out and/or over excavation bottoms are ready for observation and prior to scarification and recompaction. Typically, one (1) in-place density test should be performed for every 2.0 vertical feet of fill material. Or one (1) test for every 500 cubic yards of fill, which ever requires the greater number of tests. In-place density and moisture content tests should be performed during the placement of the fill materials during the grading operations in general accordance with the following current ASTM test procedures:

- Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) - ASTM D6938.
- Test Method for Density and Unit Weight of Soil in Place by Sand Cone Method - ASTM D1556.
- Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock - ASTM D2216.
- Method for Determination of Water (Moisture) Content of Soil by Direct Heating Method - ASTM D4959.
- Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method - ASTM D4643.

Where testing demonstrates insufficient density, additional compaction effort, with the adjustment of the moisture content when needed, should be applied until retesting shows that satisfactory relative compaction has been obtained. The results of observations and testing services should be presented in a formal 'Geotechnical Report of Grading' following completion of the grading operations. Grading operations undertaken at the site without the project Geotechnical / Geologic Consultant and/or his representative present may result in exclusions of the affected areas from the grading report for the project. The presence of the project

Geotechnical / Geologic Consultant and/or his representative will be for the purpose of providing observations and field testing and will not include supervision or directing of the actual work of the contractor or the contractor's employees or agents. Neither the presence and/or the non-presence of the project Geotechnical / Geologic Consultant and/or his field representative nor the field observations and testing will excuse the contractor for defects discovered in the contractor's work. If **HGI** does not perform the observation and testing of the earthwork for the project and is replaced as Geotechnical / Geologic Consultant of record for the project, the work on the project should be stopped until the replacement Geotechnical / Geologic Consultant has reviewed the previous reports and work performed for the project, agreed in writing to accept the recommendations and prior work performed by **HGI** for the subject project, or has performed their own studies and submitted their revised recommendations.

Earth Material Expansion Potential

Silty sand was encountered at the surface ground of the site during our field exploration, which is considered that the expansion potential of the soils was low. Upon completion of grading for the building pad areas, near-surface samples should be obtained for expansion potential testing to verify the preliminary expansion test results and the foundation / slab-on-grade recommendations presented in this report.

Earth Material Corrosion Potential

The preliminary corrosion potential of the on-site earth material is discussed in the subsequent corrosion recommendation sections of this report. Upon completion of grading for the building pad areas, near-surface samples should be obtained for corrosion potential testing to verify the preliminary chemical test results and the recommendations presented in this report for protection of concrete and bare metal which will be in direct contact with the on-site earth materials.

SEISMIC DESIGN PARAMETERS

Based on the field investigation, the California 2019 Building Code (CBC), and ASCE/SEI 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7-16), the site could be designated as **Site Class "D"** per Table 20.3-1 of ASCE 7-16. The occupancy risk category can be designated as II. Other required seismic design parameters can be obtained from Section 1613 of the 2019 CBC or could be obtained from the California Structural Engineers Association website: ***https://seismicmaps.org/*** below by entering the coordinates of the project site, the computer outputs are summarized in the following table:

Spectral Response Accelerations S_{MS} and S_{M1}	
Ss = 1.974 g, S_{MS} = Fa x Ss	S_1 = 0.751 g, S_{M1} = Fv x S_1
Site Class D: Fa = 1.0, Fv = 1.7	
Period (Sec.)	Sa (g)
0.2	1.974 (S_{MS}, Site Class D)
1.0	1.277 (S_{M1}, Site Class D)

Design Spectral Response Accelerations S_{DS} and S_{D1}	
S_{DS} = 2/3 x S_{MS}	S_{D1} = 2/3 x S_{M1}
PGA=0.839g, F_{PGA}=1.1, PGA_M=0.923g	
Period (Sec.)	Sa(g)
0.2	1.316 (S_{DS}, Site Class D)
1.0	0.851 (S_{D1}, Site Class D)
Seismic Design Category: E	

Site Coordinates: Longitude: W-117.201396° Latitude: N34.256727°

*Based on F_v of 1.7. See Section 11.4.8 of ASCE 7-16 for calculation requirements

FOUNDATION DESIGN RECOMMENDATIONS

Structure and Foundation Setback from Slopes

The placement of building and structures on or adjacent to slopes steeper than three horizontals to one vertical should be in accordance with Section 1808.7 of 2019 California Building Code (2019 CBC). The building clearance from ascending slopes

should meet a minimum setback requirement regulated in Section 1808.7.1 of 2019 CBC, which is 1/2 H but not need exceed 15 feet nor less than 5 feet horizontally from the toe of slope to the building. H represents the slope height. Foundation setbacks from descending slope surface should meet the minimum requirement regulated in Section 1808.7.2 of 2019 CBC, which is 1/3 H but not need exceed 40 feet nor less than a minimum of five feet horizontally from footing bottom to slope surface.

The proposed structures may be supported by shallow foundations and/or deep foundation provided that the Code required foundation setback be met.

Shallow Foundation

Pad and continuous footings can be designed to support the proposed structures provided that the Code required foundation setback adjacent to the descending slope be met. Pad footings should have a minimum width of 24 inches. Continuous footings should be designed for a minimum of 12 inches in width for one-story building, a minimum of 15 inches in width for two-story building, and a minimum of 18 inches in width for three-story building. The bottoms of all footings should be at least 24 inches below the lowest adjacent grades and embedded into the compacted fill or competent bedrock. A net vertical bearing value of 2,000 pounds per square feet (psf) can be used for design of the footings. A one-third increase in the bearing value can be used when considering wind or seismic loads.

The continuous footings should be reinforced with at least two # 4 bars near top and bottom or other reinforcement as determined by the Structural Engineer. Due to the potential seismic differential settlement, we recommend that any isolated footings be tied up to the continuous footings using grade beams. The grade beams should be designed as bearing elements, like the footings.

Minor fence wall footings or planter footings should have a minimum of 18 inches in width. The bottom of footings should be located at least 12 inches below the lowest adjacent grades and embedded into the compacted fill or competent bedrock. A net

vertical bearing value of 1,500 psf can be used to design the footings. A one-third increase in the bearing value may be used when considering wind or seismic loads.

Lateral Design

Lateral load resistance may be derived from passive resistance along the vertical sides of the foundations, friction acting at the base of the foundations, or a combination of the two. A coefficient of friction of 0.30 can be used between the footings and the compacted fill or competent bedrock. The passive resistance of level compacted fill or competent bedrock in direct contact with the footings can be assumed to be equal to the pressure developed by a fluid with a density of 300 pounds per cubic feet (pcf), to a maximum pressure of 3,000 pcf. A one-third increase in the passive value may be used for wind or seismic loads. The frictional resistance and the passive resistance of the soils may be combined provided that the passive resistance is reduced by one third.

Deep Foundation

Caissons may be needed to support the proposed structures in order to meet the Code required foundation setback. Caissons should be designed for a minimum of 24 inches in diameter and extended a minimum of five feet into competent bedrock and meet the Code required slope foundation setback, whichever is deeper. The caissons can be designed for a skin friction of 500 psf in competent bedrock. These caissons on the slope should be designed for additional creep forces of 1,000 psf per linear foot for those caissons in contact section with topsoil against soil creep. All caissons should be tied with grade beams of two feet wide and two feet deep. The bearing capacity can be increased by one third when considering short duration of wind or seismic loads.

A lateral bearing of 500 psf per additional foot of depth, to a maximum of 5,000 psf per foot of depth, can be used to resist lateral loads for competent bedrock. The point of fixity may be assumed at two feet below the surface of bedrock.

Foundations for the proposed structure and/or retaining walls on slopes that are steeper than 10H:1V (Horizontal to Vertical) (10 percent slope) should be designed in accordance with the provisions of Section 1809.3, 'Stepped Footings,' in the 2019 CBC. The top surface of the footings should be level or should be stepped so that both the top and bottom of such foundations are in accordance with the provisions in Section 1809.3 in the 2019 CBC. The stepped foundation should be suitably reinforced and designed by a qualified Civil or Structural Engineer.

Estimated Settlement

Based on the results of our analyses and provided that our recommendations in preceding sections of this report are followed, we estimate that the total static settlement of isolated and/or continuous footings under sustained loads will be on the order of ¾ inch for the anticipated maximum structural loads. The maximum static differential settlement, over a horizontal distance of 30 feet, should be on the order of ½ inch for similarly loaded footings. The seismic differential settlement is expected to be on the order of ¾ inch over a horizontal distance of 30 feet.

FLOOR-ON-GRADE

Concrete slab-on-grade should consist of a nominal thickness of 4 inches concrete and contain as a minimum No. 4 bars spaced a maximum of 16 inches on centers, in both directions. Thicker slabs and additional reinforcement may be required depending on the floor loads and the structural requirements as determined by the Structural Engineer.

The subgrade preparations should follow the recommendations provide in the Grading Section above. It is recommended that the compacted subgrade be moistened prior to placement of the vapor retarder.

Moisture Sensitive Floor Covering

Water vapor transmitted through floor slabs is a common cause of floor covering problems. In areas where moisture-sensitive floor coverings (such as tile, hardwood floors, linoleum, or carpeting) are planned, a vapor retarder should be installed

below the concrete slabs to reduce excess vapor transmission through the slab.

The function of the recommended relatively impermeable membrane (vapor retarder) is to reduce the amount of soil moisture or water vapor that is transmitted through the floor slab. The membrane should be 10-mil thick, Class A, and care should be taken to preserve the continuity and integrity of the membrane beneath the floor slab. The vapor retarder should conform to ASTM E1745. The vapor retarder should be installed in strict conformance with the manufacture recommendations.

If a capillary break is used, at least 4 inches of free draining crushed rock, with no more than 2 percent passing the No. 200 sieve, should be placed below the vapor retarder. The crushed rock should be vibrated in place to achieve the compaction required by the project specifications. The gradation for the free draining capillary break material should conform to the requirements for No. 4 Concrete Aggregates as specified in Section 200-1.4 of the Standard Specifications for Public Works Construction (Greenbook) or approved equivalent.

RETAINING WALLS

Retaining walls may be required to accommodate the proposed driveway and/or as a part of the building stem walls. Retaining walls should have a minimum of 18 inches in width. The bottom of footings should be located at least 24 inches below the lowest adjacent grades and embedded into the compacted fill or competent bedrock. A net vertical bearing value of 2,000 psf can be used for design of the footings. The pressure behind retaining walls depends primarily on the allowable wall movement, wall inclination, type of backfill materials, backfill slopes, surcharge, and drainage. Determination of whether the active or at-rest condition is appropriate for design will depend on the flexibility of the walls. Walls that are free to rotate at least 0.002 radians at the top (deflection at the top of the wall of at least 0.002 x H, where H is the unbalanced wall height) can be designed for active conditions. The recommended active and at-rest pressures for the site soil retaining backfill up to 6 feet in height are presented in the following table.

Table 1 - Earth Pressures for Retaining Walls

Wall Movement	Backfill Condition	Equivalent Fluid Pressure (onsite silty and poorly graded sand) (pcf)
Free to Deflect	Level	40
	2:1	62
Restrained	Level	60
	2:1	82

The above lateral earth pressures do not include the effects of surcharge (e.g. traffic, footings, hydrostatic pressure) or compaction. Any surcharge (live, including traffic, or dead load) located within a 1:1 plane drawn upward from the base of the excavation should be added to the lateral earth pressures. The lateral pressure addition of a uniform surcharge load located immediately behind walls may be calculated by multiplying the surcharge by 0.33 for cantilevered walls and 0.5 for restrained walls.

DYNAMIC (SEISMIC) EARTH PRESSURE

The increase in lateral earth pressure on any retaining wall higher than 6 feet from earthquake loading may be estimated using the Mononobe-Okabe method as described by Seed and Whitman (1970). Based on the theory, the total active pressure can be divided into static and dynamic components. The total earth active pressure could be divided into static and dynamic components. For the proposed project, lateral earth seismic increment as equivalent fluid pressure can be taken as:

$\gamma_{seismic} = 3/4 * K_h * \gamma_s = 3/4 * 0.308 * 125 = 29$ pcf (for level backfill)

or = 42 pcf (for 2:1 backslope)

Where, $K_h = 1/2x2/3xPGAm$, PGAm=0.923g,

γ_s=125 pcf

Seismic loading can be distributed as an inverted triangle from top to bottom of retained earth. The centroid of the dynamic lateral force increase should be applied at a distance of 2/3H above the base of the wall, where H represents retained earth height. To estimate the total (static and dynamic) lateral forces, the dynamic lateral force increase may be added to the active pressure. For dynamic conditions, the safety factor for sliding and overturning may be reduced to 1.1.

A drainage system should be provided behind the walls to reduce the potential for development of hydrostatic pressure. If a drainage system is not installed, the walls should be designed to resist the hydrostatic pressure in addition to the earth pressure.

Retaining walls should be properly drained and waterproofed. Except for the upper 2 feet, the backfill immediately behind retaining walls (minimum horizontal distance of 12 inches) should consist of free-draining ¾-inch crushed rock wrapped with filter fabric. A 4-inch diameter perforated PVC pipe, placed perforations down at the bottom of the crushed rock backfill, leading to a suitable gravity outlet should be installed.

The retaining wall footings may be designed per lateral resistance parameters provided in the Foundation Design Recommendation above.

SOIL EXPANSIVITY

The subsurface soils encountered at shallow depths consist mostly of silty sand and poorly graded sand. These types of material generally have a low susceptibility to expansion and a low to medium susceptibility to collapse when facing seasonal cycles of saturation/desiccation. Consequently, the recommendations provided in this report regarding drainage, moisture content during compaction and other pertinent recommendations for site improvements should be incorporated into the design and construction.

CORROSION POTENTIAL EVALUATION

The recommendations for corrosion protection should be verified at the completion of grading of the building pads on the subject tracts. Bulk samples of the near surface, on-site earth materials should be obtained during the grading operations to evaluate the potential for corrosivity. A preliminary corrosion potential evaluation was performed for bulk samples obtained from our field exploration. The corrosivity test results are presented in Appendix 'A' of this report.

Concrete Corrosion

The corrosion potential of the onsite materials to steel and buried concrete was preliminarily evaluated. Laboratory testing was performed on a selected soil samples to evaluate pH, minimum resistivity, chloride, and soluble sulfate content. The test results are presented in Appendix A, Plate No. 14.

These tests are only an indicator of soil corrosivity for the samples tested. Other soils found on site may be more, less, or of a similar corrosive nature. Imported fill materials should be tested to confirm their corrosion potential. Based on the minimum resistivity results from the soil tested, some of the near-surface site soils are mildly corrosive towards buried ferrous metals. The soluble sulfate concentration of 0.000006 percent indicates that the potential of sulfate attack on concrete in contact with the onsite soils is "negligible" based on ACI 318-14 Tables 19.3.1.1 and 19.3.2.1. Cement Type I or II may be used in the concrete. Maximum water-cement ratios are not specified for the sulfate concentrations; however, the Structural Engineer should select a type of concrete with appropriate strength. The soluble chloride concentration of 11 ppm can be considered negligible for concrete per ACI 318-14 Tables 19.3.2.1. pH value measured in the soil samples were 5.52; and the resistivity value measured in the soil samples was 25,808 ohms-cm. The soil corrosion on the site is considered moderate. Further interpretation of the corrosivity test results, including the resistivity value, and providing corrosion design and construction recommendations are the purview of corrosion specialists/consultants.

PRELIMINARY PAVEMENT RECOMMENDATIONS

The following are preliminary recommendations for the structural pavement sections for the proposed streets for the subject development. The Hot Mix Asphalt (HMA) pavement sections have been determined in general accordance with current **California Department of Transportation (CALTRANS)** design procedures and are based on an assumed Traffic Index (TI) of 5.5 for a 20-year design life and a R-Value of 62 based on the laboratory test results.

Portland Cement Concrete (PCC) pavement sections are based on an equivalent structural number as the recommended HMA pavement sections and a compressive strength of 2,500 psi or greater at 28 days for the concrete.

The preliminary recommendations for the pavement sections should consist of the following:

RECOMMENDED PAVEMENT SECTIONS			
Site Area	**Traffic Index***	**Subgrade R-Value****	**Pavement Section**
Residential Streets.	≤5.5	62	3.0" Hot Mix Asphaltic Concrete (HMA) over 4.0" Aggregate Base (AB) or 4" PCC @ 2,500 psi over properly prepared subgrade.
* Traffic Index was assumed for the project. ** R-Value was assumed for the project.			

It is noted that the California guidelines for a minimum pavement section for residential streets is 4.0" HMA over 4.0" AB for a Traffic Index (TI) of 5.5. The City minimum guidelines may override the above pavement recommendations without prior City review and approval.

The pavement section for individual lot driveways should be according to current City of Lake Arrowhead, California standards.

HMA concrete pavement materials should be as specified in the current CALTRANS 'Asphalt Pavement Standards', or an equivalent substitute. Aggregate base should conform to Class II Material as specified in current CALTRANS 'Standard Specifications'.

Portland Cement Concrete sections are based on a compressive strength of 2,500 psi or greater at 28 days for the concrete. Higher strength design for the concrete can permit thinner pavement sections. Lower strength design for the concrete will require thicker pavement sections. Joints (longitudinal, transverse, construction, and expansion), jointing arrangement, joint type, pavement and/or joint reinforcing, as well as drainage, crowning, finishing, and curing of PCC pavement should be in accordance with current Portland Cement Association (PCA) recommendations.

The subgrade earth material, including utility trench backfill, should be compacted to 90 percent or greater relative compaction to a depth of 1.0 foot or greater below the finish pavement subgrade elevation. The aggregate base material should be compacted to 95 percent or greater relative compaction. If asphaltic concrete and/or PCC pavement is placed directly on subgrade, the upper 6.0 inches of the subgrade should be compacted to 95 percent or greater relative compaction. Maximum dry density and optimum moisture content for subgrade and aggregate base materials should be determined according to current California Test 216 procedures. The asphalt concrete pavement should be densified to 95 percent or greater of the density obtained by current California Test 304 and 308 procedures (Hveem compacted laboratory samples).

Where HMA pavement abuts concrete aprons, drives, walks, or curb and gutter sections, a thickened edge transition zone is recommended for the HMA section to minimize the effects of impact loading as vehicles transition from PCC paving to HMA paving. This thickened edge should consist of an increased thickness of

2.0 inches for parking areas and 4.0 inches for areas of heavy truck usage. This thickened edge should extend to a distance of 3.0 feet or greater from the edge of pavement and then gradually taper back to the design pavement thickness. If pavement subgrade earth materials are prepared at the time of grading of the building site and the areas are not paved immediately, additional observations and testing will have to be performed before placing aggregate base material, asphaltic concrete, or PCC pavement to locate areas that may have been damaged by construction traffic, construction activities, and/or seasonal wetting and drying. In the proposed pavement areas, earth material samples should be obtained at the time the subgrade is graded for Resistance (R-Value) testing according to current California Test 301 procedures to verify the pavement design recommendations.

Because the full design thickness of the HMA concrete is frequently not placed prior to construction traffic being allowed to use the streets in a development or the parking lots, rutting and pavement failures can occur prior to project completion. To reduce this occurrence, it is recommended that either the full-design pavement section be placed prior to use by the construction traffic, or a higher Traffic Index (TI) be specified where construction traffic will use the pavement.

Surface water infiltration beneath pavements could significantly reduce the pavement design life. To limit the need for additional long-term maintenance of the pavement or pre-mature failure, it would be beneficial to protect at-grade pavements from landscape water infiltration by means of a concrete cutoff wall, deepened curbs, or equivalent. Pavement cut-off barriers should be considered where pavement areas are located downslope of any landscape areas that are to be irrigated. The cut-off barrier should extend to a depth of at least 4.0 inches below the pavement section aggregate base material.

Due to the collapsible nature of some of the near-surface earth materials on the subject site, if over excavation and replacement is not performed under the pavement areas, there is a risk of settlement and vertical differential movement of the pavement, curbs / gutters, etc. if the subgrade earth materials are allowed to become saturated. Therefore, proper drainage should be established away from such improvements and minimal precipitation, or irrigation water allowed to percolate into the earth materials adjacent to the pavement, curbs / gutters, etc.

Gradation is not the only quality guidelines for aggregate base material. The longevity and performance of pavements utilizing aggregate base material for support is dependent upon the quality of the material which composes the aggregate base. CALTRANS specifications do not specifically exclude the use of material other than a natural, crushed rock and rock dust for Class II Aggregate Base material as the Standard Specifications for Public Works Construction (current Edition of the 'Greenbrook'), does for Crushed Aggregate Base material. Often times, reclaimed Portland Cement concrete, Hot Mix Asphalt concrete, lean concrete base, and cement treated base are crushed, combined with broken stone, crushed gravel, natural rough surfaced gravel, and sand, and graded to produce a Class II Aggregate Base material per CALTRANS gradation specifications. Bricks, concrete masonry units, tile, glass, ceramics, porcelain, wood, plastic, metal, etc. **are not** an acceptable reclaimed material for use in a Class II Aggregate Base material. The aggregate base material should be tested prior to delivery to the subject project site for the following quality requirements per the current, appropriate CALTRANS test procedures:

TEST	TEST METHOD NO.	QUALITY REQUIREMENT	
		OPERATING RANGE	CONTRACT COMPLIANCE
Resistance (R-Value)	Calif. Test 301	--	78 Minimum

TEST	TEST METHOD NO.	QUALITY REQUIREMENT	
		OPERATING RANGE	CONTRACT COMPLIANCE
Sand Equivalent	Calif. Test 217	25 Minimum	22 Minimum
Durability Index	Calif. Test 229	--	35 Minimum

If a reclaimed material or a pit run aggregate is proposed for use on the project as a 'Greenbook' Crushed Miscellaneous Base (CMB), the materials should be tested for the following quality requirements prior to delivery to the subject project, per the current 'Greenbook,' and appropriate procedures as well as the required gradation and other requirements:

TEST	TEST METHOD NO.	QUALITY REQUIREMENT
Resistance (R-Value)	Calif. Test 301	78 Minimum[1]
Sand Equivalent	Calif. Test 217	35 Minimum
Percent Wear[2] 100 Revolutions 500 Revolutions	ASTM C131	 15 Maximum 52 Maximum

1. R-Value requirement may be waived if Sand Equivalent is 40 or more.
2. The percentage wear requirements may be waived if the material has a minimum Durability Index of 40 in accordance with CALTRANS Test Method 229.

A 'Greenbook' CMB may contain broken or crushed asphalt concrete or Portland Cement concrete and may contain crushed aggregate base or other rock

materials. The CMB may contain no more than 3.0 percent brick retained on the # 4 sieve by dry weight of the total sample.

Samples of the proposed aggregate base using reclaimed material should be sampled from the manufacturer's stockpiles and tested prior to delivery to the project site. The samples should be obtained at a time as near the delivery to the project as possible but would allow enough time to complete the testing and report the results before delivery to the site. Samples should again be obtained and tested for quality compliance from the materials delivered to the project. In addition, per the current CALTRANS 'Standard Specifications', an aggregate grading and Sand Equivalent test shall not represent more than 500 cubic yards or one (1) day production if less than 500 cubic yards.

Concrete gutters should be provided at flow lines in paved areas. Pavements should be sloped to permit rapid and unimpaired flow of runoff water. In addition, paved areas should be protected from moisture migration and ponding from adjacent water sources. Saturation of aggregate base and/or subgrade materials could result in pavement failure and/or premature maintenance. The gutter material and construction methods should conform to the current standards of the City of Lake Arrowhead, California.

POST-GRADING CRITERIA

Earth materials generated from the excavation of foundations, utility trenches, swimming pools and/or spas, etc., to be used on-site, should be moisture conditioned to optimum moisture content to 3.0 percent within optimum moisture content and compacted to 90 percent or greater of the maximum dry density for the material type as determined by current ASTM D1557 procedures when it is to be placed under floor slabs, under hardscape areas, and/or in paved areas. The placement of the excess material should not alter positive drainage away from structures and/or off the lot and should not change the distance from the weep screed on the structure to the finished adjacent earth material grade per the

'Finish Surface Drainage Recommendations' presented in a subsequent section of this report, the project plans, and or the 2019 CBC.

SLOPE MAINTENANCE AND PROTECTION & RECOMMENDATIONS

Although the design and construction of slopes are planned to create slopes that possess stability against mass rotational failure, surficial slumping, creep, and pop-outs, certain factors are beyond the influence of the project Geotechnical / Geologic Consultant. Earth material slopes are subject to some erosion when subjected to sustained water application. To reduce long term erosion, the following recommendations for slope protection and maintenance should be considered when planning, designing, and implementing slope erosion methods:

- Surface water should not be allowed to flow over the on-site natural or proposed man-made slopes other than incidental rainfall and irrigation. Alterations of manufactured or natural slopes, terraces, top of slope berms, and/or pad gradients should not be allowed that will prevent pad and roof run-off from the structures from being expediently directed to approved disposal areas and away from the tops of slopes.

- Surface drainage should be positively maintained from the rear yard, through the side yards, and to the street or storm drain in a non-erosive manner.

- Top of slope berms should be constructed and compacted as part of finish grading of the lots and should be maintained by the individual lot owners and/or homeowners association. The recommended drainage patterns should be established at the time of finish grading and maintained throughout the life of the proposed development.
- Concentrated surface waters entering the subject lots from off-site sources should be collected and directed to a permanent drainage system.

- The individual lot owners and/or homeowners association are responsible for the maintenance and cleaning of the interceptor ditches, drainage terraces, down drains and other drainage devices that have been installed to promote slope stability.

- It is recommended that slopes be planted with light-weight ground cover, shrubs and trees that possess deep (5.0 feet or greater), dense root structures that require minimal of irrigation (drought resistance). It should be the responsibility of the Landscape Architect or other suitably qualified individual to provide such plants initially and of the individual lot owners and/or homeowners association to maintain such planting. Alteration of the planting scheme is at the individual lot owner's and/or homeowners association risk.

- If automatic sprinkler systems are installed their use should be adjusted to account for natural rainfall.

- The individual lot owners and/or homeowners association should establish a program for the elimination of burrowing animals. This should be an on-going program to protect slope stability.

- The individual lot owners and/or homeowners association should observe the lot drainage during heavy precipitation periods as this is often when trouble occurs. Problems such as gullying, or ponding should be corrected as soon as practicable.

- High moisture content in slope earth materials is a major factor in slope erosion and slope failures. Therefore, precautions should be taken to minimize earth material saturation. Leakage from pools, waterlines, irrigation systems, etc. or bypassing of clogged drains should be promptly repaired.

The above guidelines are provided to mitigate slope maintenance and protection problems and should be included in information packets to individual home buyers and/or homeowners association, when applicable, by the project developer. The above guidelines are general maintenance and design procedures but may be superseded under specific direction of a licensed Landscape Architect or other suitably qualified individual.

UTILITY TRENCH RECOMMENDATIONS

Utility trenches within the zone of influence of foundations or under building floor slabs, exterior hardscape, and/or pavement areas should be backfilled with documented, compacted earth material. Utility trenches within the building pad and extending to a distance of 5.0 feet beyond the building exterior footings should be backfilled with on-site or similar earth material. Where interior or exterior utility trenches are proposed to pass beneath or parallel to building, retaining wall, and/or decorative concrete block perimeter wall footings, the bottom of the trench should not be located below a 1H:1V (Horizontal to Vertical) plane projected downward from the outside bottom edge of the adjacent footing unless the utility lines are designed for the footing surcharge loads.

Trench Excavation

It is recommended that utility trench excavations be designed and constructed in accordance with current OSHA regulations. These regulations provide trench sloping and shoring design parameters for trenches up to 20 feet in vertical depth based on a description and field verification of the earth material types encountered. Trenches over 20 feet in vertical depth should be designed by the Contractor's Engineer based on site specific geotechnical analyses. For planning purposes, we recommend that the following OSHA earth material type designations and temporary slope inclinations be used:

EARTH MATERIAL	OSHA SOIL TYPE*	TEMPORARY SLOPE INCLINATION (H:V)**
Undocumented Fill	C	1.5:1
Compacted Fill	C	1.5:1
Colluvium	C	1.5:1

* Type 'C': Cohesive soils with an unconfined compressive strength of 0.5 tsf or less: or Granular soils including sands, gravels, loamy, clayey, or silty sands, etc.

** Steepest allowable slopes for excavations less than 20 feet in vertical height. Slopes for excavations greater than 20 feet in vertical height should be designed by a Registered Professional Engineer with experience in Geotechnical Consulting and Soil Mechanics.

Excavations of less than 5.0 feet in depth may also be subject to collapse due to water, vibrations, previously disturbed earth materials, or other factors, and may require protection for workers such as temporary slopes, shoring, or a shielding protective system. The excavations should be observed by a qualified, competent individual (as defined in the current OSHA regulations) looking for signs of potential cave-ins on a daily basis before start of work on an as-needed basis throughout the work shifts, and after every rainstorm or other hazard-increasing occurrence.

Surcharge loads (e.g., spoil piles, earthmoving equipment, trucks) should not be allowed within a horizontal distance measured from the top of the excavation slope equivalent to 1.5 times the vertical depth of the excavation in compacted fill or alluvial materials. Excavations should be initially observed by the project Geotechnical / Geologic Consultant and/or his representative to verify the recommendations presented or to make additional recommendations to maintain stability and safety. Moisture variations, differences in the cohesive or cementation characteristics, or changes in the coarseness of the deposits may require slope flattening or, conversely, permit steepening upon review and appropriate testing by the project Geotechnical / Geologic Consultant and/or his representative. The

excavations should be observed by a qualified, competent person (as defined in the current OSHA regulations) looking for signs of potential problems on a daily basis before start of work, as needed throughout the work shifts, and after every rainstorm or other hazard-increasing occurrence. Deep utility trenches may experience caving, which will require special considerations to stabilize the walls and expedite trenching operations. Surface drainage should be controlled along the top of the construction slopes to preclude erosion of the slope face. If excavations are to be left open for long periods, the slopes should be sprayed with a protective compound and/or covered to minimize drying out, raveling, and/or erosion of the slopes.

Utility Line Foundation Preparation

If the utility trench excavation bottom is in material that is not suitable for support of the utility pipe, the material should be removed to a minimum depth of 1.0 foot below the bottom of the pipe and replaced with concrete slurry, sand, or crushed gravel meeting the following appropriate gradation limits.

SIEVE SIZE	CRUSHED ROCK OR GRAVEL (PERCENT PASSING)
1"	100
3/4"	90-100
½"	30-60
3/8"	0-20
No. 4	0-5

SIEVE SIZE	SAND (PERCENT PASSING)
3/8"	100
No. 4	75-100
No. 30	12-50
No. 100	5-20
No. 200	0-15

Most of the granular native earth materials encountered on the subject site are not expected to meet the above granular earth material criteria.

We recommend where the bottom of the pipe foundation excavation is loose or soft, the foundation earth materials be removed to firm materials as determined by the Engineer. This condition would likely only apply where fill underlies the pipe in localized areas along a utility alignment. If firm material is not encountered within 24 inches of the bottom of the pipe zone, the contractor may then elect to stabilize the trench bottom with 24 inches of crushed rock as described above. Alternately, soft, or loose material may be excavated to firm earth material and the over excavation replaced with select earth material.

The bottom of the utility trench excavation should be proof compacted to 90 percent or greater relative compaction prior to placement of compacted fill. Maximum dry density and optimum moisture content for compacted materials should be determined according to current ASTM D1557 procedures.

Prior to placement of trench slurry or crushed rock, the bottom need only be cleaned of loose materials created by the excavation process. Where the bottom of the trench contains rocks or hard objects protruding above a depth of 6.0 inches below the pipe bottom, such objects should be removed or broken, and any resulting cavities filled to produce a smooth surface.

Bedding Requirements

It is recommended that the pipe be bedded on either clean sand, gravel, crushed rock, or any approved suitable material in order to provide a smooth, firm, and uniform foundation for the pipe. The pipe bedding material, thickness, shaping, and placement should satisfy the design requirements as determined by the design Civil Engineer and/or in accordance with the latest version of the 'Greenbook'. The majority of the manmade fills and alluvial soils on the subject site may not be suitable to be used as bedding and pipe zone backfill materials depending upon the bedding and pipe zone backfill specifications required by the project designer and/or the agency having jurisdiction over the utility line.

Trench Zone Backfill

The excavated earth materials from the trench may be used as backfill in the trench zone unless more restrictive specifications are required by the design engineer or the permitting agency. The trench backfill material should consist of approved earth materials free of trash debris, vegetation, or other deleterious matter, and oversize particles (i.e., 12 inches in maximum dimension). Trench zone backfill should be compacted to 90 percent or greater relative compaction. Maximum density and optimum moisture content for compacted materials should be determined according to current ASTM D1557 procedures.

Trench backfill material should be placed in a lift thickness appropriate for the type of backfill material and compaction equipment used. Backfill material should be brought to optimum moisture content to 3.0 percent within optimum moisture content and compacted to 90 percent or greater relative compaction by mechanical means. Jetting or flooding of the backfill material will **not** be considered a satisfactory method for compaction. Maximum dry density and optimum moisture content for backfill material should be determined according to current ASTM D1557 procedures.

FINISH SURFACE DRAINAGE RECOMMENDATIONS

Positive drainage should be established away from the tops of slopes, the exterior walls of structures, the back of retaining walls, trash enclosure walls, decorative concrete block walls, and so forth. Finish surface gradients in unpaved areas should be provided next to tops of slopes and buildings to guide surface water away from foundations, hardscape, pavement, and from flowing over the tops of slopes. The surface water should be directed toward adequate drainage facilities. Ponding of surface water should not be allowed next to structures or on pavements. Design criteria for completing lot drainage away from structures and off the property should be determined by the project Structural Engineer designing the foundations and slabs, in conjunction with the project Civil Engineer designing the precise grading for lot drainage, respectively, in accordance with the 2019 CBC and/or the current City of Lake Arrowhead, California codes and ordinances and the earth material types and expansion characteristics for the earth materials contained in this report. Finished landscaped and hardscape or pavement grades adjacent to the proposed structures should maintain a vertical distance below the bottom elevation of the weep screed per the 2019 CBC and/or the current City of Lake Arrowhead codes and ordinances. Landscape plants with high water needs and trees should be planted at a distance away from the structure equivalent to, or greater than, the width of the canopy of the mature tree or 6.0 feet, whichever is greater. Downspouts from roof drains should discharge to a permanent all-weather surface which slopes away from the structure. Downspouts from roof drains should not discharge into planter areas immediately adjacent to the building, unless there is positive drainage out of the planter and away from the structure, in accordance with the recommendations of the project foundation and slab designer and/or the project Civil Engineer designing the precise grades for the lot drainage.

PLANTER RECOMMENDATIONS

Planters around the perimeter of the structures should be designed so that adequate drainage is maintained, and minimal irrigation water is allowed to percolate into the earth materials underling the building. This should include enclosed or trapped

planter areas that are created as a result of sidewalks. Planters with solid bottoms, independent of the underlying earth material, are recommended within a distance of 6.0 feet from the building. The planters should drain directly onto surrounding paved areas or into a designed subdrain system. If planters are raised above the surrounding finished grades, or are placed against the building structure, the interior walls of the planter should be waterproofed.

LIMITATIONS

REVIEW, OBSERVATION, AND TESTING

The recommendations presented in this report are contingent upon review of final plans and specifications for the project by **HGI**. The project Geotechnical / Geologic Consultant should review and verify in writing the compliance of the final grading plan and the final foundation plans with the recommendations presented in this report.

It is recommended that **HGI** be retained to provide continuous Geotechnical / Geologic Consulting services during the earthwork operations (i.e., rough grading, utility trench backfill, subgrade preparation for slabs-on-grade, and pavement areas, finish grading) and foundation installation process. This is to observe compliance with the design concepts, specifications, and recommendations, and to allow for design changes in the event that subsurface conditions differ from those anticipated prior to start of construction. If **HGI** is replaced as Geotechnical / Geologic Consultant of record for the project, the work on the project should be stopped until the replacement Geotechnical / Geologic Consultant has reviewed the previous reports and work performed for the project, agreed in writing to accept the recommendations and prior work performed by **HGI** for the subject project, or has submitted their revised recommendations.

UNIFORMITY OF CONDITIONS

The recommendations and opinions expressed in this report reflect HGI's understanding of the project requirements based on an evaluation of subsurface earth material conditions encountered at the subsurface exploration locations and the assumption that earth material conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the foundations may be influenced by undisclosed or unforeseen variations in earth material conditions that may occur in intermediate and unexplored areas. Any unusual conditions not covered in this report that may be encountered during site development should be brought to the attention of **HGI** so that we may make modifications, if necessary.

CHANGE IN SCOPE

HGI should be advised of any changes in the project scope of proposed site grading so that it may be determined if recommendations contained herein are valid. This should be verified in writing or modified by a written addendum.

TIME LIMITATIONS

The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they be due to natural processes or the work of man on this or adjacent properties. In addition, changes in the State-of-the-Art and/or government codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a period of two (2) years without a review by **HGI** verifying the validity of the conclusions and recommendations.

PROFESSIONAL STANDARD

In the performance of our professional services, we comply with the standard of care and skill ordinarily exercised under similar circumstances by members of the geologic / geotechnical professions currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the locations where our surveys and exploratory excavations

were made, and that our data, interpretations, and recommendations are based solely on information obtained by us. We will be responsible for those data, interpretations, and recommendations, but should not be responsible for interpretations by others of the information presented and/or developed. Our services consist of professional consultation and observation only, and other warranties, expressed or implied, are not made or intended in connection with work performed by **HGI** or by the proposal for consulting or other services or by the furnishing of oral or written reports or findings.

CLIENT'S RESPONSIBILITY

It is the responsibility of the client and/or the client's representatives to ensure that information and recommendations contained herein are brought to the attention of the Engineers and Architect for the project and incorporated into project plans and specifications. It is further their responsibility to take measures so that the contractor and his subcontractors carry out such recommendations during construction.

APPENDIX A

FIELD EXPLORATION

The field study performed for this report included a visual reconnaissance of existing surface conditions of the subject site and surrounding area. Site observations were conducted on October 12 and 13, 2021 by a representative of **HGI**.

A study of the property's subsurface condition was performed to evaluate underlying earth strata and the presence of groundwater. Ten (10) exploratory borings and one additional infiltration boring were performed on the subject site on October 12 and 13, 2021. Locations of the exploratory excavations were determined in the field by sighting from the adjacent existing streets, adjacent structures, and topographic features as shown on the Reference No. 1, 'Rough Grading Plan,' noted on the first page of the cover letter for this report. Approximate locations of the exploratory excavations are denoted on the 'Exploratory Excavation Location Plan,' Plate No. 1, presented in this Appendix. Approximate elevations at the locations of the exploratory excavations were determined by interpolation to the closest 1.0 foot from a 1.0-foot contour interval topographic plot of the site (Reference No. 1 noted on the first page of the cover letter for this report). Locations and elevations of the exploratory excavations should be considered accurate only to the degree implied by the method used in determining them.

The exploratory borings were performed by using a truck-mounted drill rig equipped with 8-inch outside-diameter, hollow-stem augers. The exploratory excavations were explored to depths ranging from approximately 2 to 21.5 feet below existing ground surface at the excavation locations. Bulk and relatively undisturbed samples of encountered earth materials were obtained at various depths in the exploratory excavations and returned to our laboratory for testing and verification of field classifications. Bulk samples were obtained from cuttings developed during the excavation process and represent a mixture of earth

materials within the depth indicated on the logs. Relatively undisturbed samples of encountered earth materials were obtained by driving a thin-walled, steel sampler lined with 1-inch high, 2.416-inch inside diameter brass rings. The sampler was driven with successive drops of a 140-pound weight having a free fall of approximately 30 inches. Blow counts for each successive 6.0 inches of penetration, or fraction thereof, are shown on the 'Subsurface Exploration Log,' Plate Nos. 3 through 13, presented in this Appendix. Ring samples were retained in close-fitting moisture-proof containers and returned to our laboratory for testing.

Groundwater observations were made during, and at the completion of the excavation process and are noted on the 'Subsurface Exploration Log' presented in this Appendix, if encountered.

The exploratory excavations were logged by a representative of **HGI** for earth materials and subsurface conditions encountered. Earth materials encountered in the exploratory excavations were visually described in the field in general accordance with the current Unified Soils Classification System (USCS), ASTM D2488, visual-manual procedures, as illustrated on the attached, simplified 'Subsurface Exploration Legend,' Plate No. 2, presented in this Appendix. The visual textural description, color of the earth material at natural moisture content, apparent moisture condition of the earth materials, and apparent relative density or consistency of the earth materials, etc., were recorded on the field logs. The 'Relative Density' of granular soils (SP, SW, SM, SC, GP, GW, GM, GC) is given as very loose, loose, medium dense, dense, or very dense and is based on the number of blows to drive the sampler 1.0 foot or fraction thereof. The 'Consistency' of silts or clays (ML, CL, MH, CH) is given as very soft, soft, medium stiff, stiff, very stiff, or hard and is also based on the number of blows to drive the sampler 1.0 foot or fraction thereof. The field log for each excavation contains factual information and interpretation of earth material conditions between samples. The 'Subsurface Exploration Log' presented in this Appendix represent

our interpretation of the field log contents and results of laboratory observations and tests performed on samples obtained in the field from the exploratory excavations.

The exploratory boring excavations were backfilled with excavated earth materials and with reasonable effort to restore the areas to their initial condition before leaving the site. In an area as small and deep as a boring excavation, consolidation, and subsidence of backfill earth material may result in time, causing a depression of the excavation areas. The client is advised to observe exploratory excavation areas periodically and, when needed, backfill noted depressions.

LABORATORY TESTING PROGRAM

Laboratory tests were performed on selected, relatively undisturbed ring and bulk samples obtained from exploratory excavations during the field study. Tests were performed in general accordance with generally accepted American Society for Testing and Materials (ASTM), State of California - Department of Transportation (CALTRANS), Environmental Protection Agency (EPA) or other suitable test methods or procedures. The remaining samples obtained during the field study will be discarded 30 days after the date of this report. This office should be notified immediately if retention of samples will be needed beyond 30 days. A brief description of the tests performed is presented below:

CLASSIFICATION

The field classification of earth material materials encountered in the exploratory excavations was verified in the laboratory in general accordance with the current Unified Soils Classification System, ASTM D2488, 'Standard Practice for Determination and Identification of Soils (Visual-Manual Procedures).' The final classification is shown on the 'Subsurface Exploration Log,' Plate Nos. 3 through 13, presented in this Appendix.

IN-SITU MOISTURE CONTENT AND DRY DENSITY

The in-situ moisture content and dry density were determined in general accordance with current ASTM D2216 (Moisture Content) and D2937 (Drive Cylinder) procedures, respectively, for selected undisturbed samples obtained. This information was an aid to classification and permitted recognition of variations in material consistency with depth. The dry density is determined in pounds per cubic foot and the moisture content is determined as a percentage of the oven dry weight of the earth material. Test results are shown on the 'Subsurface Exploration Log,' Plate Nos. 3 through 13, presented in this Appendix.

CHEMICAL AND ELECTRICAL RESISTIVITY TESTS

The concentration of soluble chloride, pH, as well as other chemical constituents and the minimum electrical resistivity were determined for a selected sample of near-surface earth material. The pH test was performed in general accordance with current EPA 9045C procedures. The test results are summarized in the 'Summary of Laboratory Test Results,' Plate No. 14, presented in this Appendix.

EXPANSION TEST

A laboratory expansion test was performed on a selected sample of near-surface earth material in general accordance with the current ASTM D4829 procedures. In this testing procedure, a remolded sample is compacted in two (2) layers in a 4-inch inside diameter mold to a total compacted thickness of approximately 1.0 inch by using a 5.5-pound weight dropping 12 inches and with 15 blows per layer. The sample should be compacted at saturation between 48 and 52 percent. After remolding, the sample is confined under a pressure of 144 pounds per square foot (psf) and allowed to soak for 24 hours. The resulting volume change due to the increase in moisture content within the sample is recorded and the Expansion Index (EI) calculated. The test results are summarized in the 'Summary of Laboratory Test Results,' Plate No. 14, presented in this Appendix.

RESISTANCE (R-VALUE) TEST

A resistance (R-Value) test was performed on a selected sample of near-surface earth material that is anticipated to comprise the subgrade for proposed pavement areas. This test procedure measures the ability of earth materials and aggregate materials to resist lateral deformation under saturated conditions and applied vertical wheel loads. The R-Value is used in developing parameters for structural pavement sections. The R-Value is determined based on the following separate measurements:

- The exudation pressure test determines the thickness cover or pavement structure required to prevent plastic deformation of the soil under imposed wheel loads.
- The expansion pressure test determines the pavement thickness or weight of cover required to withstand the expansion pressure of the soil.

Testing was performed in general accordance with current California Test 301 procedures. The test results are summarized in the 'Summary of Laboratory Test Results,' Plate No. 14, presented in this Appendix.

MAXIMUM DRY DENSITY / OPTIMUM MOISTURE CONTENT RELATIONSHIP TEST

A maximum dry density / optimum moisture content relationship determination was performed on a sample of near-surface earth material in general accordance with current ASTM D1557 procedures using a 4-inch diameter mold. Samples were prepared at various moisture contents and compacted in five (5) layers using a 10-pound weight dropping 18 inches and with 25 blows per layer. A plot of the compacted dry density versus the moisture content of the specimens was constructed and the maximum dry density and optimum moisture content determined from the plot. The test results are summarized in the 'Maximum Dry Density / Optimum Moisture Content Relationship Test Results,' Plate No. 15, presented in this Appendix.

DIRECT SHEAR TEST

Direct shear tests were performed on selected in-situ samples of near-surface earth material obtained from the borings in general accordance with current ASTM D3080 procedures. The shear machine is of the constant strain type. The shear machine is designed to receive a 1-inch high, 2.416-inch diameter ring sample. Three (3) specimens from each of the selected in-situ earth material samples were tested. Specimens from the in-situ sample were sheared at various pressures normal to the face of the specimens. The specimens were tested in a submerged condition. The peak and ultimate shear stresses were plotted verses the normal confining stresses to determine the shear strength (cohesion and angle of internal friction). The test results are summarized in this Appendix, Plate Nos. 16 through 18.


TENTATIVE TRACT NO. 20480
BEING A SUBDIVISION OF A PORTION OF
LOTS 3 AND 4, TRACT NO. 11040, MAP BOOK
162, PAGES 94-97, INCLUSIVE, RECORDS OF
SAN BERNARDINO COUNTY, CALIFORNIA
HGI Legend
B-11
Approximate Boring Location
P-4
Approximate Infiltration Location
*Note: Areas with this symbol identified as loose boulders and/or constrcution debris
Exploratory Excavation Location Plan
By: AH
Date: 11/2021
Project No.: 1407-1-21.1
Plate No.: 1
WHITEFIR DRIVE
SUGAR PINE DRIVE
ASHWOOD LANE
LARCH LANE
CEDARWOOD DRIVE
WRIGHT WAY
PINYON PLACE
NORTH BAY ROAD
WHITEFIR
LOT 1
17803 Sq. Feet
0.4087 Acres
LOT 2
14522 Sq. Feet
0.3334 Acres
LOT 3
14684 Sq. Feet
0.3371 Acres
LOT 4
15580 Sq. Feet
0.3577 Acres
LOT 5
15064 Sq. Feet
0.3458 Acres
LOT 6
16733 Sq. Feet
0.3841 Acres
LOT 7
15893 Sq. Feet
0.3649 Acres
LOT 8
15061 Sq. Feet
0.3458 Acres
LOT 9
10017 Sq. Feet
0.2300 Acres
LOT 10
10095 Sq. Feet
0.2318 Acres
LOT 11
14858 Sq. Feet
0.3411 Acres
LOT 12
15098 Sq. Feet
0.3466 Acres
LOT 13
14631 Sq. Feet
0.3359 Acres
LOT 14
14556 Sq. Feet
0.3342 Acres
LOT 15
14225 Sq. Feet
0.3266 Acres
LOT 16
14405 Sq. Feet
0.3307 Acres
LOT 17
14012 Sq. Feet
0.3217 Acres
LOT 18
14050 Sq. Feet
0.3225 Acres
LOT 19
14008 Sq. Feet
0.3216 Acres
LOT 20
14044 Sq. Feet
0.3224 Acres
LOT 21
15951 Sq. Feet
0.3662 Acres
LOT 22
15813 Sq. Feet
0.3630 Acres
LOT 23
15782 Sq. Feet
0.3623 Acres
LOT 24
14483 Sq. Feet
0.3325 Acres
LOT 25
17228 Sq. Feet
0.3955 Acres
LOT 26
15027 Sq. Feet
0.3450 Acres
LOT 27
14007 Sq. Feet
0.3216 Acres
LOT 28
14634 Sq. Feet
0.3360 Acres
LOT 29
14369 Sq. Feet
0.3299 Acres
LOT 30
14622 Sq. Feet
0.3357 Acres
LOT 31
14750 Sq. Feet
0.3386 Acres
LOT 32
23002 Sq. Feet
0.5281 Acres
LOT 33
16319 Sq. Feet
0.3746 Acres
LOT 34
17821 Sq. Feet
0.4091 Acres
LOT 35
14771 Sq. Feet
0.3391 Acres
LOT 36
14046 Sq. Feet
0.3225 Acres
LOT 37
17282 Sq. Feet
0.3967 Acres
LOT 38
17073 Sq. Feet
0.3919 Acres
LOT 39
14245 Sq. Feet
0.3270 Acres
LOT 40
14945 Sq. Feet
0.3431 Acres
LOT 41
17174 Sq. Feet
0.3943 Acres
LOT A
11770 Sq. Feet
0.2702 Acres
LOT B
7463 Sq. Feet
0.1713 Acres
LOT C
WATER
QUALITY BASIN
LOT D
WATER
QUALITY
BASIN
LOT E
WATER
QUALITY BASIN
Bouldery
Constuction Debris
No Entrance
PROPOSED PROJECT
ENTRANCE FROM
NORTH BAY ROAD
PROPOSED 30' PRIVATE
ROADWAY BUILT TO
HILLSIDE ROADWAY
STANDARDS WITH ALL
WEATHER SURFACE
PROPOSED 20' WIDE
SHARED DRIVEWAY
SAG POINT
1 inch = 40 ft.

An Original Map Product Contains An Embossed Seal In This Area

Revisions:				
No.	Date:	By:	Description:	Approved:

Designed: | Drawn: | Checked: ACH

Seal: PROFESSIONAL LAND SURVEYOR, ALAN C. HILLWIG, No. 5137, EXP. 6-30-23, STATE OF CALIFORNIA

Prepared under the Supervision of:

PROFESSIONAL LAND SURVEYOR — DATE
LICENSE NO. 5137
REGISTRATION EXPIRES: 6-30-23

HILLWIG - GOODROW, INC.
Land Surveying · GPS Surveys · Aerial Mapping
31407 Outer Highway 10 • Redlands, CA 92373 • (909) 794-2673

Scale: 1" = 40'
BENCHMARK:
Date: 9/15/2021

TENTATIVE TRACT NO. 20480
PROPOSED TRACT MAP
PREPARED FOR:
JESSE WRIGHT
CALIFORNIA RETAIL PROP. CORP.
22939 HAWTHORNE BLVD SUITE 100
TORRANCE, CA 90505

F.N. | For: | F.B.

Sheet No. 1 OF 2 SHEET
FILE NO. 1007-01

SUBSURFACE EXPLORATION LEGEND

UNIFIED SOIL CLASSIFICATION SYSTEM
Visual-Manual Procedure (ASTM D2488-09a)

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
Coarse-Grained Soils* (More than 50 % Retained on No. 200 Sieve)	Gravels (50 % or more of Coarse Fraction Retained on No. 4 Sieve)	Clean Gravels	GW	Well Graded Gravels and Gravel-Sand Mixtures, Little or no Fines
			GP	Poorly Graded Gravels and Gravel-Sand Mixtures, Little or no Fines
		Gravels with Fines	GM	Silty Gravels, Gravel-Sand-Silt Mixtures**
			GC	Clayey Gravel, Gravel-Sand-Clay Mixtures**
	Sands (More than 50 % of Coarse Fraction Passes No. 4 Sieve)	Clean Sands	SW	Well Graded Sands and Gravely Sands, Little or no Fines
			SP	Poorly Graded Sands and Gravelly Sands, Little or no Fines
		Sands with Fines	SM	Silty Sands, Sand-Silt Mixtures**
			SC	Clayey Sands, Sand-Clay Mixtures**
Fine Grained Soils* (50 % or more Passes No. 200 Sieve)	Silts and Clays (Liquid Limits 50 % or less)		ML	Inorganic Silts, Sandy Silts, Rock Flour
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
			OL	Organic Silts and Organic silty Clays of Low Plasticity
	Silts and Clays (Liquid Limits Greater than 50 %)		MH	Inorganic Silts, Micaceous or Diatomaceous silts, Plastic Silts
			CH	Inorganic Clays of High Plasticity, Fat Clays
			OH	Organic Clays of Medium to High Plasticity
Highly Organic Soils			PT	Peat, Muck, or Other Highly Organic Soils

* Based on material passing the 3-inch sieve.

** More than 12% passing the No. 200 sieve; 5% to 12% passing No. 200 sieve requires use of duel symbols (i.e., SP-SM., GP-GM, SP-SC, GP-GC, etc.); Border line classifications are designated as CH/Cl, GM/SM, SP/SW, etc.

CONSISTENCY / RELATIVE DENSITY

Reference: 'Foundation Engineering', Peck, Hansen, Thornburn, 2nd Edition.

Standard Penetration Test
Granular Soils

Penetration Resistance, N, (Blows / Foot)	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

Standard Penetration Test
Cohesive Soils

Penetration Resistance, N, (Blows / Foot)	Consistency	Unconfined Compressive Strength, (Tons / Sq. Ft.)
		< 0.25
< 2	Very Soft	0.25 - 0.5
2 - 4	Soft	0.5 - 1.0
5 - 8	Firm (Medium Stiff)	1.0 - 2.0
9 - 15	Stiff	2.0 - 4.0
16 - 30	Very Stiff	> 4.0
> 31	Hard	

U.S. Standard Sieve Size 12" 3" 3/4" #4 #10 #40 #200

Unified Soil Classification Designation	Boulders	Cobbles	Gravel		Sand			Silt and Clay
			Coarse	Fine	Coarse	Medium	Fine	

Moisture Condition

Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible moisture.
Wet	Visible free water, usually below the water table.

Material Quantity

Trace	< 5 %
Few	5 - 10%
Little	15 - 25%
Some	30 - 45 %
Mostly	50-100%

Other Symbols

C - Core Sample
S - SPT Sample
B - Bulk Sample
CK - Chunk Sample
R - Ring Sample
N - Nuclear Gauge Test
∇ - Water Table

HILLTOP GEOTECHNICAL INCORPORATED

SUBSURFACE EXPLORATION LOG
BORING NO. B-1

Project Name: California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead

Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hollow-Stem Auger	Drive Wt.:	140 lbs.	Elevation:	± 5293
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	5.5'

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
1	R	50/4.5"	SM		4.1	Col		COLLUVIUM Silty fine to coarse sand; Pale brown; Moist; Dense.
2						Kcc		MONSOGRANITE OF CITY CREEK: Granitic rock, highly weathered to moderately wehatered; Pale brown to yellow brown, trace micas.
3	S	40 50/5"			0.7			
4								Rock fragments up to 6" in longest diameter;
5	R	50/5.5"			1.6			
6								Bottom of boring 5.5 feet. No groundwater encountered. Backfilled with excavated material.
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 3

SUBSURFACE EXPLORATION LOG
BORING NO. B-2

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hollow-Stem Auger	Drive Wt.:	140 lbs.	Elevation:	± 5308
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	8'10"

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
1	S/R	13 15 18	SC		10.6	Col		COLLUVIUM: Clayey fine to medium sand, trace coarse; Yellow brown; Moist; Medium dense.
3	R	7 9 10		90.0	7.3	Kcc		MONSOGRANITE OF CITY CREEK: Granitic rock, highly to moderately weathered; Yellow brown; Moist, broke down into clayey fine to mediunm sand.
5	S	2 2 2			5.9			
8	R	6 36 50/4"		99.8	3.7			
9								Bottom of boring 8 feet 10 inches. No groundwater encountered. Backfilled with excavated materials.

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 4

SUBSURFACE EXPLORATION LOG
BORING NO. B-3

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	LG
Type of Rig:	Hollow-Stem Auger	Drive Wt.:	140 lbs.	Elevation:	± 5331
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	6.5

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
	R	13	SC			Col		COLLUVIUM:
1		22				Kcc		Clayey fine to coarse sand; Yellow brown; Moist; Medium dense.
		27						MONSOGRANITE OF CITY CREEK:
2								Micaceous; Highly weathered; Yellow brown; Moist; Dense.
3	S	21						
		22						
4		33			4.6			
5								
	R	18						
6		35						
		37		90.8	5.6			
7								Bottom of boring 6.5 feet.
8								No groundwater encountered.
9								Backfilled with excavated materials.
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								Bottom of boring 6.5'.
21								No groundwater encountered.
22								Backfilled with excavated materials
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 5

SUBSURFACE EXPLORATION LOG
BORING NO. B-4

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hollow-Stem Auger	Drive Wt.:	140 lbs.	Elevation:	± 5327
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	6.5

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
1	S/B	12 17 18	SC			Col		COLLUVIUM: Clayey fine to medium sand, some bark; Dark brown; Moist; Medium dense.
2						Kcc		MONSOGRANITE OF CITY CREEK: Granitic basement rock, highly weathered; Tan; Moist; Dense.
3	R	12 30 50/4"						
4								
5	S	11 14 14						
6								
7								Bottom of boring 6.5 feet. No groundwater encountered. Backfilled with excavated materials.
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 6

SUBSURFACE EXPLORATION LOG
BORING NO. B-5

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	LG
Type of Rig:	Hollow-Stem Auger	Drive Wt.:	140 lbs.	Elevation:	± 5324
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	5'4"

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
	R	24	SC			Col		COLLUVIUM:
1		50/6"						Clayey fine to medium sand; Orangish brown; Moist; Dense.
						Kcc		MONSOGRANITE OF CITY CREEK:
2								Granitic basement rock; Highly weathered; Gray brown; Moist;
3	S	11						
		14						
4		22			6.3			
5	R	50/4"		90.8	5.6			
6								Bottom of boring 5 feet 4 inches.
7								No groundwater encountered.
8								Backfilled with excavated materials.
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 7

SUBSURFACE EXPLORATION LOG
BORING NO. B-6

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hollow-Stem Auger	Drive Wt.:	140 lbs.	Elevation:	± 5253
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	21.5'

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
0	R/B	8	SC			Af		ARTIFICIAL FILL:
1		35						Clayey fine to medium sand; Gray brown; Moist; Dense.
		37						
2								
3	S	7						Blackish brown.
		8						
4		10			14.5			
5	R	13						
		16						
6		18						
7								
8	S	9						
		5						
9		18			15.2			
10			CL					Clay with a little fine to coarse sand, micaceous; Dark brown;
	R	7						Moist; Stiff.
11		11						
		13		93.9	22.9			
12								
13			SC/CL			Col		COLLUVIUM:
14								Clayey little fine to medium sand, some micaceous; Orange
15	S	2						brown; Very Moist; Loose.
		2						
16		3			22.5			
17								
18								
19								
20	R	7						
		12						
21		16		98.1	24.1			
22								Bottom of boring 21.5 feet.
								No groundwater encountered.
23								Backfilled with excavated materials.
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 8

SUBSURFACE EXPLORATION LOG
BORING NO. B-7

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hand Auger	Drive Wt.:	28 lbs.	Elevation:	± 5208
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	4'

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
								Dense pine needle cover 3.9" thick.
1			SM			Col		COLLUVIUM: Silty fine to coarse sand, trace gravel, trace roots; Brown; Moist; Loose to medium dense.
2						Kcc		MONSOGRANITE OF CITY CREEK: Decomposed bedrock broken into silty fine to coarse sand, trace gravel; Light brown; Moist; Medium dense to dense.
3								
4	R	100/5"						Bottom of boring 4 feet. No groundwater encountered. Backfilled with excavated materials after infiltration testing.
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 9

SUBSURFACE EXPLORATION LOG
BORING NO. B-8

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hand Auger	Drive Wt.:	28 lbs.	Elevation:	± 5250
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	2'

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
1			SM			Col		COLLUVIUM: Silty fine to coarse sanD, trace gravel, trace roots, pine needles; Light brown; Moist; Loose.
2	R					Kcc		MONSOGRANITE OF CITY CREEK: Granite, highly weahtered; Tan; Moist.
3								Bottom of boring 2 feet. No groundwater encountered. Backfilled with excavated materials.
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 10

SUBSURFACE EXPLORATION LOG
BORING NO. B-9

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hand Auger	Drive Wt.:	28 lbs.	Elevation:	± 5213
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	3.5

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
1			SC			Col		COLLUVIUM: Clayey fine to coarse sand, trace gravel, trace roots, vegetation on surface; Brown; Moist; Loose.
2								
3	R			95.4	3.4	Kcc		MONSOGRANITE OF CITY CREEK: Granitic rock; Highly weahterd; Yellow brown; Very Moist.
4								Bottom of boring 3.5 feet. No groundwater encountered. Backfilled with excavated materials
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 11

SUBSURFACE EXPLORATION LOG
BORING NO. B-10

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hand Auger	Drive Wt.:	28 lbs.	Elevation:	± 5285
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	3'

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
			SM			Af		ARTIFICIAL FILL: Silty fine to coarse sand, trace gravel, vegetation on surface; Brown; Moist; Medium dense.
1								
2	R	100/6"		88.5	7.4			MONSOGRANITE OF CITY CREEK: Decomposed granitic rock broken to silty fine to coarse sand, highly weathered; Brown; Moist; Medium dense.
3								Bottom of boring 3 feet. No groundwater encountered. Backfilled with excavated materials.
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 12

SUBSURFACE EXPLORATION LOG
BORING NO. B-11

HILLTOP GEOTECHNICAL INCORPORATED

Project Name:	California Retail Properties, 15 Acre Subdivision TTM 2048 Lake Arrowhead				
Project No.	1407-01.1	Date:	10/12/2021	Logged By:	AH
Type of Rig:	Hollow-Stem Auger	Drive Wt.:	140 lbs.	Elevation:	±
Drill Hole Dia.:	8 in.	Drop:	30 in.	Depth of Boring (ft.):	1.5

Depth (ft.)	Sample Type	Penetration Resistance	Soil Classification	Dry Density (lb/ft3)	Moisture Content (%)	Lithology	Groundwater	Description
			SC			Col		COLLUVIUM: Clayey fine to coarse sand, trace gravel, vegetation; Brown; Moist; Medium dense.
1	R			89.8	6.4	Kcc		MONSOGRANITE OF CITY CREEK: Decomposition at 8" broken to silty fine to coarse sand, highly weathered; Brown; Moist; Medium dense.
2								Bottom of boring 1.5 feet. No groundwater encountered. Backfilled with excavated materials
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

S - SPT Sample R - Ring Sample B - Bulk Sample N - Nuclear Gauge Test D - Disturbed Sample

N.R. - No Recovery

Plate No. 13

SUMMARY OF LABORATORY TEST RESULTS

15-ACRE SUBDIVISION, LAKE ARROWHEAD, CALIFORNIA

EXPANSION INDEX TEST RESULTS (ASTM D4829 Test Method)

SAMPLE NO.	MOISTURE CONTENT PRIOR TO TEST (to 0.1%)	DRY DENSITY PRIOR TO TEST (to 0.1 pcf)	SATURATION PRIOR TO TEST (to 0.1% between 48% & 52%)*	MOISTURE CONTENT AFTER TEST (to 0.1%)	EXPANSION INDEX	EXPANSION POTENTIAL **
B-6, 0-5'	10.2	107.9	49.0	18.3	18	Non-Expansive

* Assumes a 2.70 Specific Gravity for the earth material.
** As defined in Section 1803.5.3, 'Expansive Soil,' in the 2019 California Building Code (CBC) (i.e., Non-Expansive: EI ≤20; Expansive: EI >20).

CHEMICAL / MINIMUM ELECTRICAL RESISTIVITY TEST RESULTS

SAMPLE	RESISTIVITY Minimum (ohm-cm)	pH*	SULFIDE	CHLORIDE (ppm)**	SOLUBLE SULFATE (%)**
B-4, 0-5'	25,808	5.52	Neg.***	11	0.0006

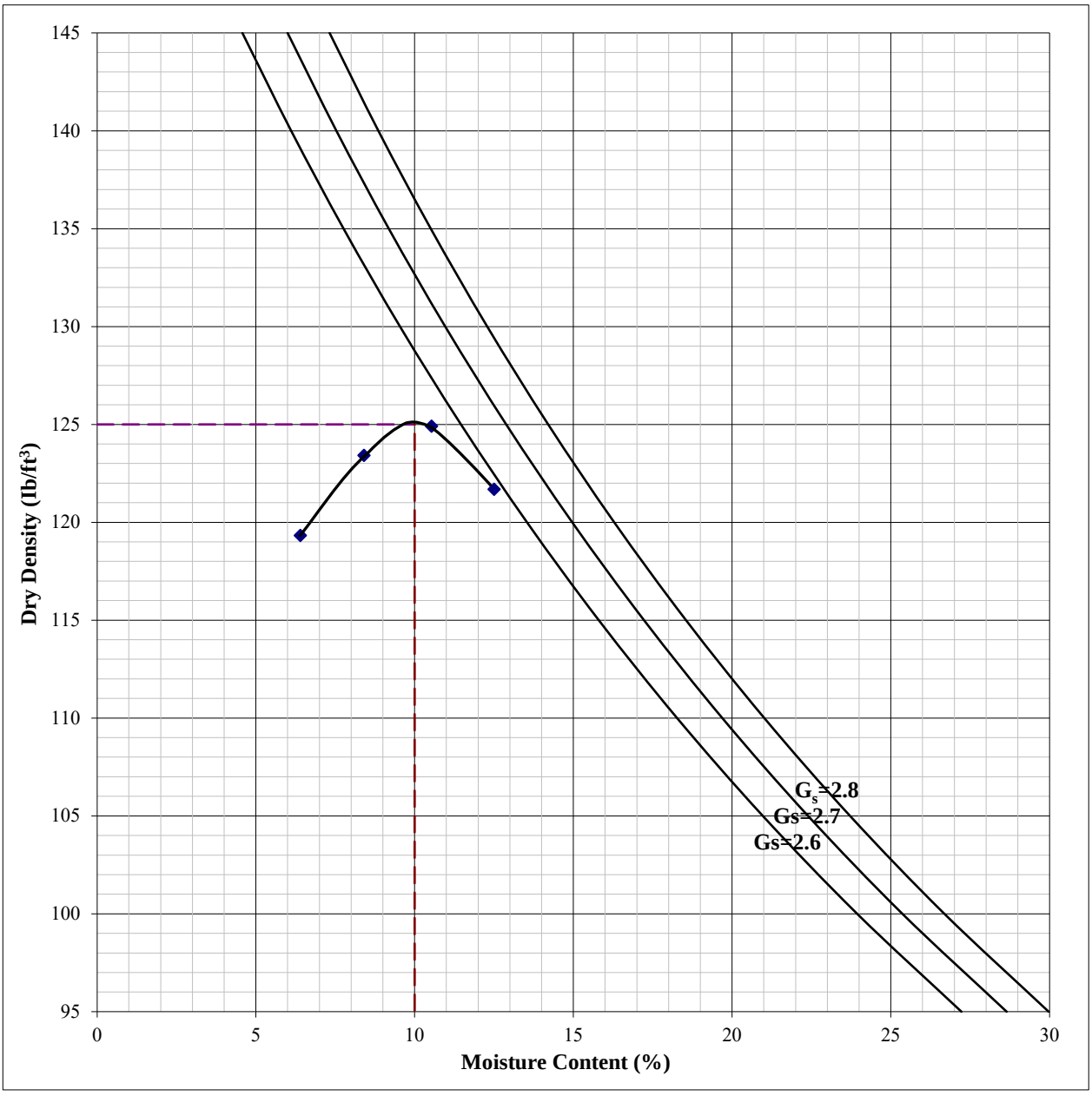
* Test performed by **A & R Laboratories** in accordance with EPA8045C procedures.
** Test performed by **A & R Laboratories** in accordance with EPA 300.0 test procedures.
*** Neg. - Negative.

RESISTANCE (R-VALUE) TEST RESULTS (California Test 301 Procedures)

SAMPLE	EARTH MATERIAL DESCRIPTION	R-VALUE	
		BY EXUDATION PRESSURE AT 300 psi	BY EXPANSION PRESSURE
B-4, 0-5'	Clayey fine to medium sand, (SC)	63	62 @ TI = 5.5

NA - Not applicable at Traffic Index (TI) noted.
NA - Not applicable. Sample did not expand during test procedure.

Plate No. 14

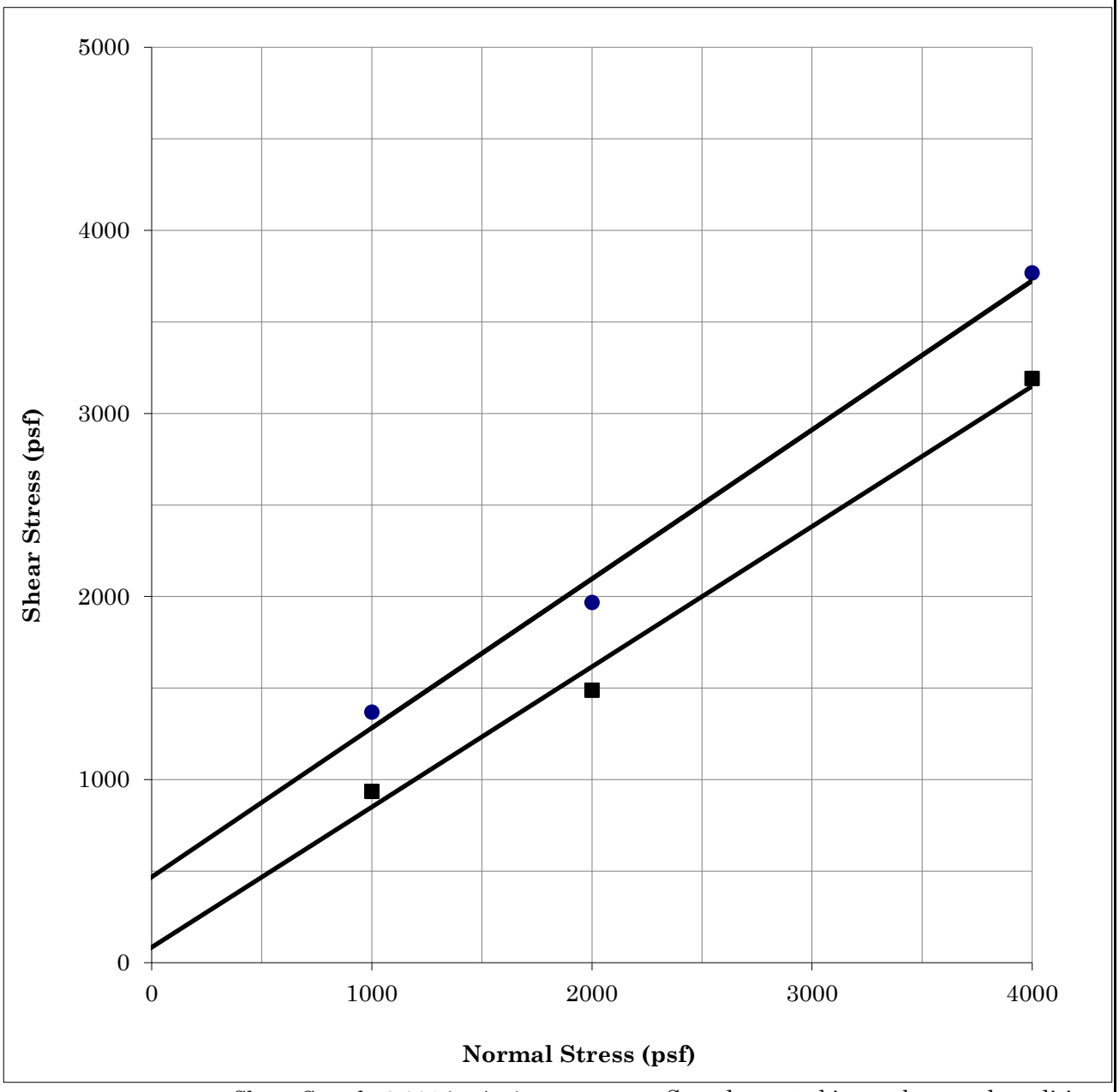


Maximum Dry Density (lb/ft^3)	125.0
Optimum Moisture Content (%)	10.0
Procedure	B

HILLTOP GEOTECHNICAL INCORPORATED

MAXIMUM DRY DENSITY / OPTIMUM MOISTURE CONTENT RELATIONSHIP TEST RESULTS (ASTM D1557 Test Method)

SAMPLE: B-6, 0-5'			
SOIL DESCRIPTION:	Clayey fine to medium sand, trace coarse sand, a little gravel (SC)		
BY: MC		DATE:	10/26/2021
JOB NO.: 1407-1-21.1		PLATE NO.:	15



Shear Speed: 0.001 in. / min. Samples tested in a submerged condition.

Average In-Situ Dry Density (pcf)	108.6
Average In-Situ Moisture Content	7.6
Saturated Moisture Content	19.9

Peak •	Cohesion	468 psf
	Internal Friction Angle	39 degrees
Ultimate ■	Cohesion	84 psf
	Internal Friction Angle	37 degrees
Residual	Cohesion	
	Internal Friction Angle	

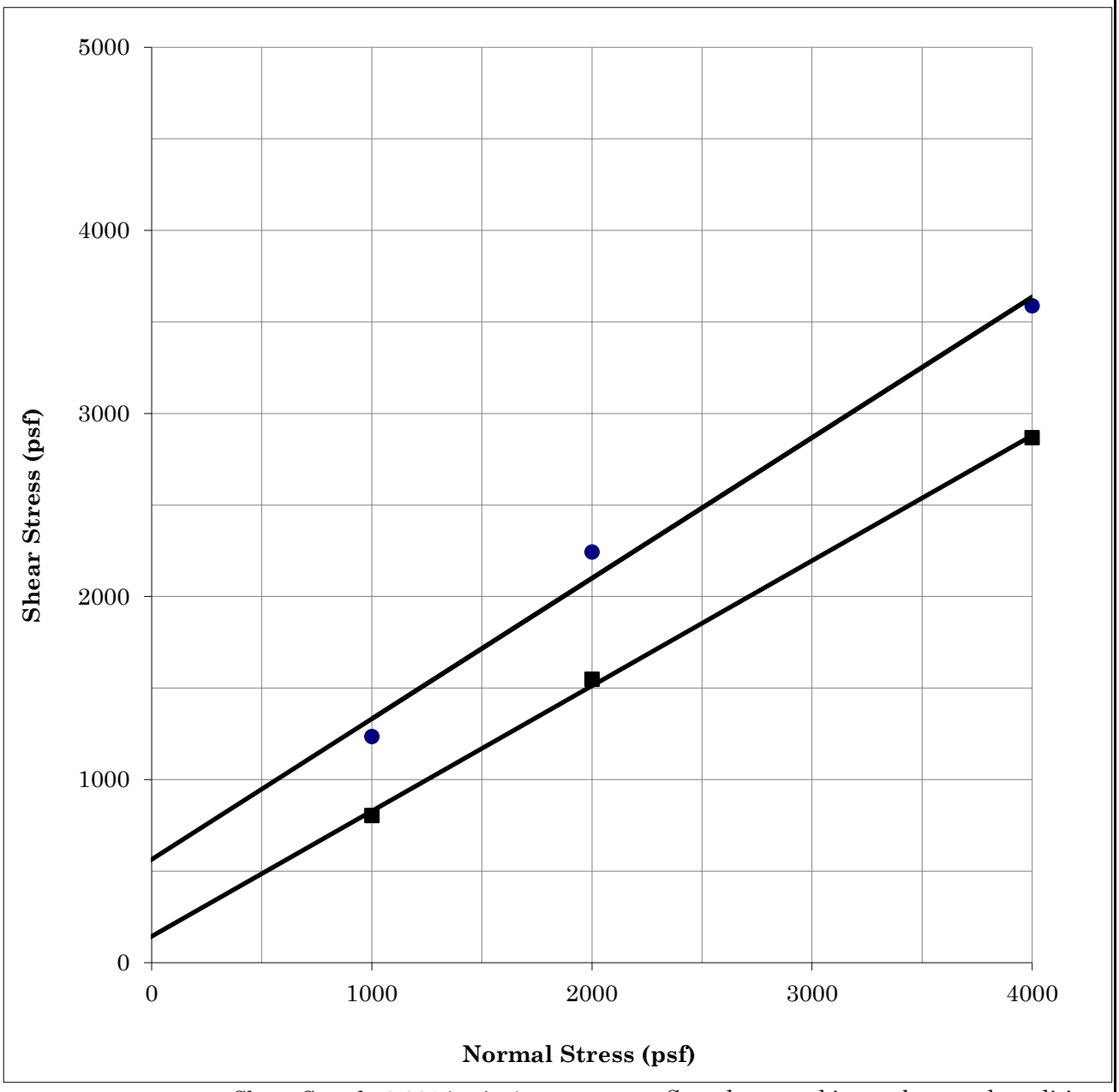
DIRECT SHEAR TEST RESULTS
(ASTM D3080 Test Method)

HILLTOP GEOTECHNICAL INCORPORATED

SAMPLE: B-4, 2.5 feet

SOIL DESCRIPTION: Clayey fine to coarse sand, trace of gravel (SC)

BY:	MC	DATE:	10/26/21
PROJECT NO.:	1407-1-21.1	PLATE NO.:	16



Shear Speed: 0.001 in. / min. Samples tested in a submerged condition.

Average In-Situ Dry Density (pcf)	103.5
Average In-Situ Moisture Content	16.6
Saturated Moisture Content	19.9

Peak •	Cohesion	564 psf
	Internal Friction Angle	38 degrees
Ultimate ■	Cohesion	144 psf
	Internal Friction Angle	34 degrees
Residual	Cohesion	
	Internal Friction Angle	

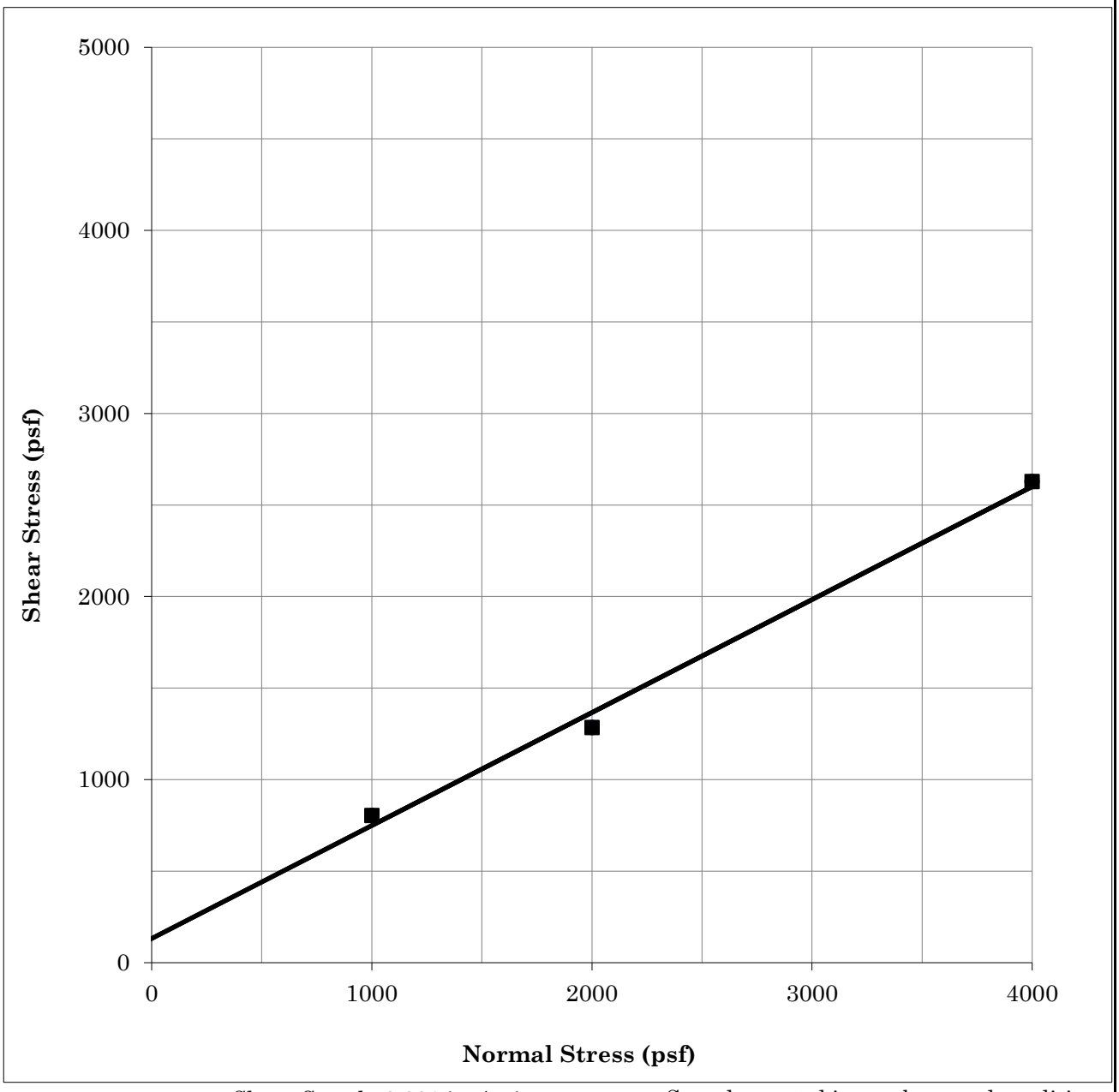
DIRECT SHEAR TEST RESULTS
(ASTM D3080 Test Method)

HILLTOP GEOTECHNICAL INCORPORATED

SAMPLE: B-6, 5 feet

SOIL DESCRIPTION: Clayey fine to coarse sand with gravel (SC)

BY:	MC	DATE:	10/26/21
PROJECT NO.:	1407-1-21.1	PLATE NO.:	17



Shear Speed: 0.001 in. / min. Samples tested in a submerged condition.

Average In-Situ Dry Density (pcf)	80.5	
Average In-Situ Moisture Content	6.5	
Saturated Moisture Content	25.4	

Peak •	Cohesion	132 psf
	Internal Friction Angle	32 degrees
Ultimate ■	Cohesion	132 psf
	Internal Friction Angle	32 degrees
Residual	Cohesion	
	Internal Friction Angle	

DIRECT SHEAR TEST RESULTS
(ASTM D3080 Test Method)

HILLTOP GEOTECHNICAL INCORPORATED

SAMPLE: B-8, 1.5 feet

SOIL DESCRIPTION: Silty fine to medium sand (SM)

BY:	MC	DATE:	10/26/21
PROJECT NO.:	1407-1-21.1	PLATE NO.:	18

APPENDIX B

TECHNICAL REFERENCES

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Appendix D
Transportation Assessment

memorandum

DATE: September 23, 2021

TO: Marc Mitri, County of San Bernardino

FROM: Sandipan Bhattacharjee, PE, TE, AICP, ENV SP

SUBJECT: Lake Arrowhead – Transportation Assessment

Translutions, Inc. (Translutions) is pleased to provide this memorandum discussing the trip generation and project related vehicle miles traveled (VMT) for the proposed 41-unit single family residential development to be located in the area bounded by Whitefir Drive and North Bay Road in the Lake Arrowhead area of Unincorporated San Bernardino County. Figure 1 shows the regional location map and Figure 2 shows the preliminary site plan. All figures are attached to this memo.

PROJECT TRIP GENERATION

The trip generation for the proposed project is based on trip generation rates from the Institute of Transportation Engineers' (ITE) *Trip Generation* (10th Edition) and are based on Land Use 210 – "Single Family Residential". Attached Table A shows the calculation of the project trip generation. As shown in Table A, the proposed project is forecast to generate 30 trips in the a.m. peak hour, 41 trips in the p.m. peak hour, and 387 daily trips.

Table A - Project Trip Generation

Land Use	Units	A.M. Peak Hour In	A.M. Peak Hour Out	A.M. Peak Hour Total	P.M. Peak Hour In	P.M. Peak Hour Out	P.M. Peak Hour Total	Daily
Single-Family Residential								
Trip Generation Rates [1]		0.19	0.56	0.74	0.62	0.37	0.99	9.44
Trip Generation	41 DU	8	22	30	26	15	41	387

Notes: DU = Dwelling Unit

[1] Trip generation based on rates for Land Use 210 - "Single-Family Detached Housing" from Institute of Transportation Engineers' (ITE) *Trip Generation* (10th Edition).

NEED FOR TRAFFIC IMPACT STUDY

The County of San Bernardino *Transportation Impact Study Guidelines (July 9, 2019)* requires a Transportation Impact Study (TIS) if a project generates 100 or more trips without consideration of pass-by trips during any peak hour. Since the trip generation of the project is 30 trips during the a.m. peak hour and 41 trips during the p.m. peak hour, the peak hour trip generation is substantially less than 100 trips during any peak hour. Therefore, it is our professional opinion that a TIS should not be required.

NEED FOR VMT ANALYSIS

The County of San Bernardino has adopted CEQA thresholds under Vehicle Miles Traveled (VMT) pursuant to Senate Bill – 375 (SB-375) and are included in the *San Bernardino County Transportation Impact Study Guidelines, July 9, 2019.* As discussed in the guidelines, there are several screening thresholds which, if met, exempts a project from a detailed VMT analysis, and the project impacts are considered to be less than significant. The County Guidelines have the following screening thresholds for land use projects:

Small Projects: Small, local service projects have the potential to reduce VMT should not be required to complete a VMT assessment. This includes small retail, schools, parks, day-care centers, local serving banks, educational institutions such as K-12 schools and community colleges, etc. Other projects that qualify as small projects include projects which generate less than 110 daily trips. ***The proposed project generates more than 110 daily trips and does not qualify for this exemption.***

Projects within Transit Priority Areas: Projects located within a Transit Priority Area (TPA) as determined by the most recent SCAG RTP/SCS are exempt from a VMT analysis. ***The proposed project is not located in a TPA and does not qualify for this exemption.***

Projects within Low VMT Areas: Projects located within a low VMT generating area as determined by the analyst (e.g. development in efficient areas of the County will reduce VMT per person/employee and is beneficial to the region). This analysis is conducted using the SBCTA screening tool and is based on the San Bernardino Transportation Analysis Model (SBTAM). The SBTAM provides VMT for each Traffic Analysis Zone (TAZ), which is used to identify low VMT areas.

The project is located within TAZ 53866201. Figure 1 shows the project location as well as low VMT areas. As seen on Figure 1, the project is located in a low VMT area. Table B shows the VMT for the project TAZ as well as the County threshold from the screening tool.

Table B - VMT Screening Analysis

TAZ	Homebased VMT/Capita	County Average Homebased VMT/Capita	Difference	% Greater (+) or Lower (-)	Low VMT Area?
53,866,201	14.4	15.94	-1.54	-9.7%	Yes

Source: SBCTA VMT Screening Tool

As seen on Table B, the project zone has an average home-based VMT of 14.4 miles while the County has an average of 15.94 miles and the VMT for the project TAZ is 9.7% lower than the County average VMT. ***The proposed project is located in a low VMT area and qualifies for this exemption. The project is screened out and anticipated to have a less than significant impact on VMT.***

CONCLUSION

The County of San Bernardino *Transportation Impact Study Guidelines (July 9, 2019)* requires a Transportation Impact Study (TIS) if a project generates 100 or more trips without consideration of pass-by trips during any peak hour. Since the trip generation of the project is less than 100 trips during any peak hour, it is our professional opinion that a TIS should not be required.

The VMT/Capita for the project TAZ is 14.4 miles per day, which is less than the average VMT/Capita for the County of 15.94 miles per day. Therefore, the project is located in a low VMT area, and is presumed to have a less than significant impact under the County of San Bernardino VMT thresholds.

ATTACHMENTS:

- Figure 1 – Project Location
- Figure 2 – Site Plan
- Figure 3 – VMT Screening Map

FIGURE 1

Project Location

Lake Arrowhead 41 Units
Project Location

translutions
the transportation solutions company...

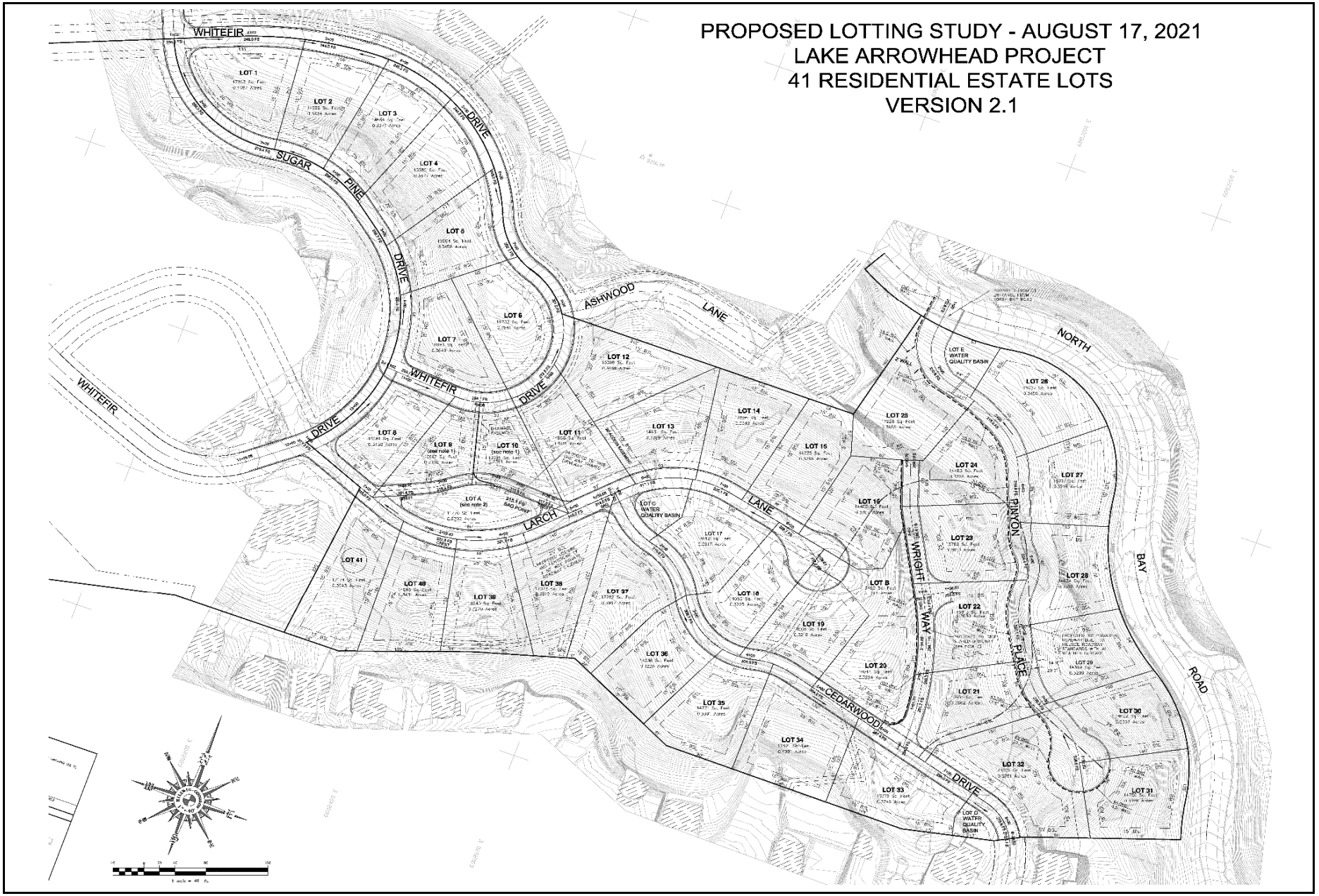
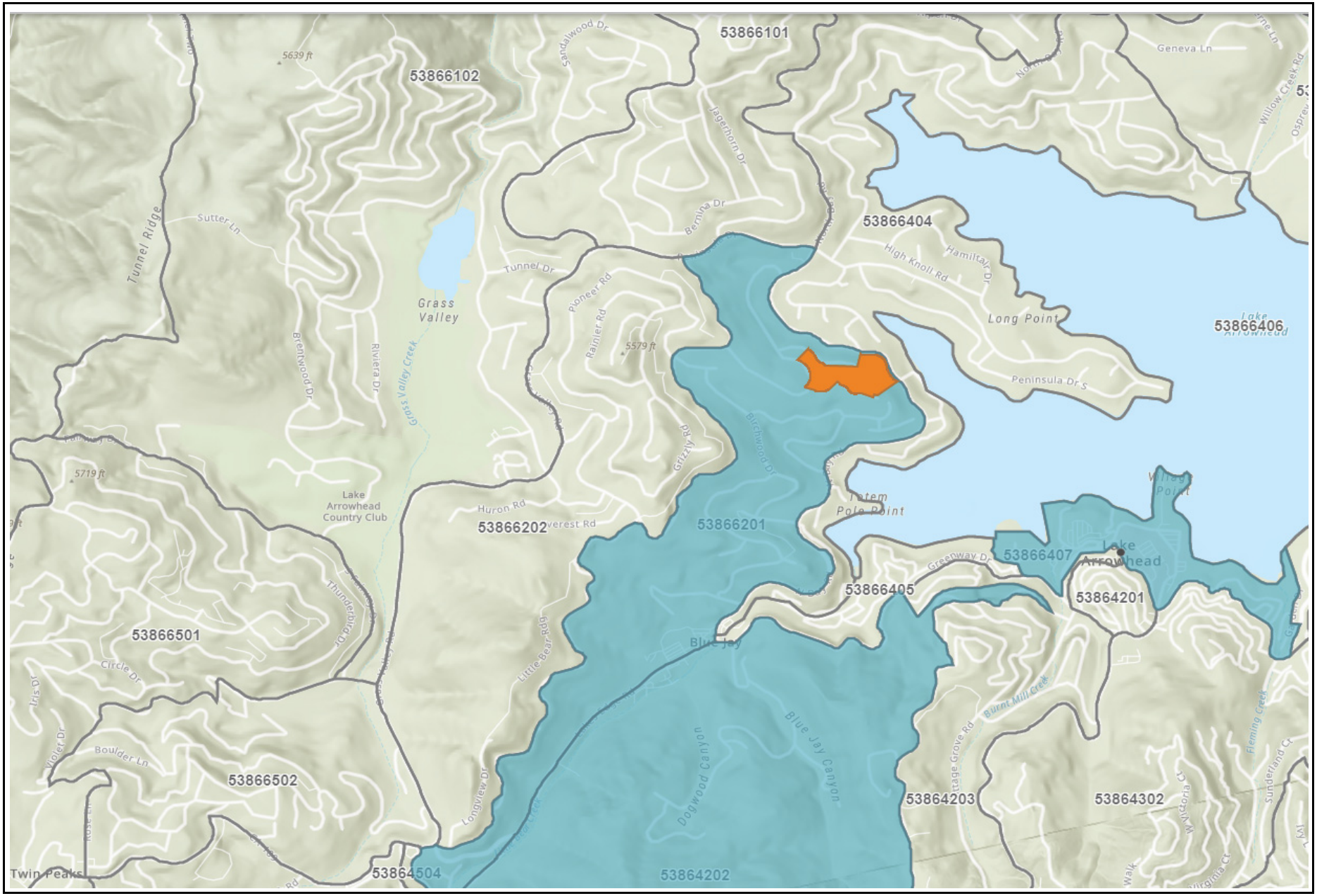


FIGURE 2

Lake Arrowhead 41 Units
Site Plan

translutions
the transportation solutions company...



Source: SBCTA VMT Screening Tool

Low VMT TAZs

Project Parcel

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FIGURE 3

Lake Arrowhead 41 Units
Low VMT Area Map

Appendix E
CalEEMod Statistical Analysis Result

Lake Arrowhead Development - San Bernardino-South Coast County, Annual

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

Lake Arrowhead Development

San Bernardino-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	41.00	Dwelling Unit	13.31	73,800.00	117

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total project size

Construction Phase - Project specific info

Landscape Equipment -

Energy Use -

Land Use Change -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblEnergyUse	NT24E	6,155.97	6,155.97
tblEnergyUse	T24E	199.85	199.85

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

tblEnergyUse	T24NG	22,256.94	22,256.94
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

Lake Arrowhead Development - San Bernardino-South Coast County, Annual

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

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	0.2203	2.0869	1.9290	3.6000e-003	0.2613	0.1003	0.3616	0.1120	0.0936	0.2056	0.0000	314.0521	314.0521	0.0798	1.3300e-003	316.4412
2023	0.3785	1.3124	1.5603	2.7100e-003	0.0232	0.0634	0.0866	6.2100e-003	0.0596	0.0658	0.0000	235.3004	235.3004	0.0524	1.3700e-003	237.0176
Maximum	**0.3785**	**2.0869**	**1.9290**	**3.6000e-003**	**0.2613**	**0.1003**	**0.3616**	**0.1120**	**0.0936**	**0.2056**	**0.0000**	**314.0521**	**314.0521**	**0.0798**	**1.3700e-003**	**316.4412**

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	0.2203	2.0869	1.9290	3.6000e-003	0.2613	0.1003	0.3616	0.1120	0.0936	0.2056	0.0000	314.0517	314.0517	0.0798	1.3300e-003	316.4408
2023	0.3785	1.3124	1.5603	2.7100e-003	0.0232	0.0634	0.0866	6.2100e-003	0.0596	0.0658	0.0000	235.3002	235.3002	0.0524	1.3700e-003	237.0174
Maximum	**0.3785**	**2.0869**	**1.9290**	**3.6000e-003**	**0.2613**	**0.1003**	**0.3616**	**0.1120**	**0.0936**	**0.2056**	**0.0000**	**314.0517**	**314.0517**	**0.0798**	**1.3700e-003**	**316.4408**

Lake Arrowhead Development - San Bernardino-South Coast County, Annual

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

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

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**4-1-2022**	**6-30-2022**	1.1506	1.1506
2	**7-1-2022**	**9-30-2022**	0.5799	0.5799
3	**10-1-2022**	**12-31-2022**	0.5803	0.5803
4	**1-1-2023**	**3-31-2023**	0.5220	0.5220
5	**4-1-2023**	**6-30-2023**	0.5275	0.5275
6	**7-1-2023**	**9-30-2023**	0.5323	0.5323
		Highest	1.1506	1.1506

Lake Arrowhead Development - San Bernardino-South Coast County, Annual

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

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	0.4368	0.0155	0.6836	6.9000e-004		0.0415	0.0415		0.0415	0.0415	4.3550	9.0595	13.4144	0.0137	3.0000e-004	13.8438
Energy	6.2500e-003	0.0534	0.0227	3.4000e-004		4.3200e-003	4.3200e-003		4.3200e-003	4.3200e-003	0.0000	119.8019	119.8019	6.0700e-003	1.7300e-003	120.4684
Mobile	0.2512	0.4563	2.9653	6.8300e-003	0.7008	5.4500e-003	0.7062	0.1872	5.1000e-003	0.1923	0.0000	637.9863	637.9863	0.0334	0.0307	647.9593
Waste						0.0000	0.0000		0.0000	0.0000	9.7375	0.0000	9.7375	0.5755	0.0000	24.1242
Water						0.0000	0.0000		0.0000	0.0000	0.8475	9.4868	10.3343	0.0879	2.1500e-003	13.1719
Total	**0.6943**	**0.5253**	**3.6716**	**7.8600e-003**	**0.7008**	**0.0513**	**0.7520**	**0.1872**	**0.0509**	**0.2381**	**14.9400**	**776.3344**	**791.2743**	**0.7165**	**0.0348**	**819.5676**

Lake Arrowhead Development - San Bernardino-South Coast County, Annual

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

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4368	0.0155	0.6836	6.9000e-004		0.0415	0.0415		0.0415	0.0415	4.3550	9.0595	13.4144	0.0137	3.0000e-004	13.8438
Energy	6.2500e-003	0.0534	0.0227	3.4000e-004		4.3200e-003	4.3200e-003		4.3200e-003	4.3200e-003	0.0000	119.8019	119.8019	6.0700e-003	1.7300e-003	120.4684
Mobile	0.2512	0.4563	2.9653	6.8300e-003	0.7008	5.4500e-003	0.7062	0.1872	5.1000e-003	0.1923	0.0000	637.9863	637.9863	0.0334	0.0307	647.9593
Waste						0.0000	0.0000		0.0000	0.0000	9.7375	0.0000	9.7375	0.5755	0.0000	24.1242
Water						0.0000	0.0000		0.0000	0.0000	0.8475	9.4868	10.3343	0.0879	2.1500e-003	13.1719
Total	**0.6943**	**0.5253**	**3.6716**	**7.8600e-003**	**0.7008**	**0.0513**	**0.7520**	**0.1872**	**0.0509**	**0.2381**	**14.9400**	**776.3344**	**791.2743**	**0.7165**	**0.0348**	**819.5676**

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

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

2.3 Vegetation

Vegetation

	CO2e
Category	MT
Vegetation Land Change	-1,665.0000
Total	**-1,665.0000**

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	4/1/2022	4/28/2022	5	20	
2	Site Preparation	Site Preparation	4/29/2022	5/12/2022	5	10	
3	Grading	Grading	5/13/2022	6/23/2022	5	30	
4	Building Construction	Building Construction	6/24/2022	8/17/2023	5	300	
5	Paving	Paving	8/18/2023	9/14/2023	5	20	
6	Architectural Coating	Architectural Coating	9/15/2023	10/12/2023	5	20	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 90

Acres of Paving: 0

Lake Arrowhead Development - San Bernardino-South Coast County, Annual

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

Residential Indoor: 149,445; Residential Outdoor: 49,815; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	7.00	231	0.29
Demolition	Excavators	3	8.00	158	0.38
Grading	Excavators	2	8.00	158	0.38
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Grading	Graders	1	8.00	187	0.41
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	19.80	7.90	20.00	LD_Mix	HDT_Mix	HHDT

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

Site Preparation	7	18.00	0.00	0.00	19.80	7.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	19.80	7.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	15.00	4.00	0.00	19.80	7.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	19.80	7.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	3.00	0.00	0.00	19.80	7.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

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	0.0264	0.2572	0.2059	3.9000e-004		0.0124	0.0124		0.0116	0.0116	0.0000	33.9902	33.9902	9.5500e-003	0.0000	34.2289
Total	**0.0264**	**0.2572**	**0.2059**	**3.9000e-004**		**0.0124**	**0.0124**		**0.0116**	**0.0116**	**0.0000**	**33.9902**	**33.9902**	**9.5500e-003**	**0.0000**	**34.2289**

Lake Arrowhead Development - San Bernardino-South Coast County, Annual

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

3.2 Demolition - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.9000e-004	5.7000e-004	6.8800e-003	2.0000e-005	2.2100e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.7676	1.7676	4.0000e-005	5.0000e-005	1.7830
Total	**6.9000e-004**	**5.7000e-004**	**6.8800e-003**	**2.0000e-005**	**2.2100e-003**	**1.0000e-005**	**2.2300e-003**	**5.9000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.7676**	**1.7676**	**4.0000e-005**	**5.0000e-005**	**1.7830**

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	0.0264	0.2572	0.2059	3.9000e-004		0.0124	0.0124		0.0116	0.0116	0.0000	33.9902	33.9902	9.5500e-003	0.0000	34.2289
Total	**0.0264**	**0.2572**	**0.2059**	**3.9000e-004**		**0.0124**	**0.0124**		**0.0116**	**0.0116**	**0.0000**	**33.9902**	**33.9902**	**9.5500e-003**	**0.0000**	**34.2289**

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

3.2 Demolition - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.9000e-004	5.7000e-004	6.8800e-003	2.0000e-005	2.2100e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.7676	1.7676	4.0000e-005	5.0000e-005	1.7830
Total	**6.9000e-004**	**5.7000e-004**	**6.8800e-003**	**2.0000e-005**	**2.2100e-003**	**1.0000e-005**	**2.2300e-003**	**5.9000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.7676**	**1.7676**	**4.0000e-005**	**5.0000e-005**	**1.7830**

3.3 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					0.0983	0.0000	0.0983	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0159	0.1654	0.0985	1.9000e-004		8.0600e-003	8.0600e-003		7.4200e-003	7.4200e-003	0.0000	16.7197	16.7197	5.4100e-003	0.0000	16.8549
Total	**0.0159**	**0.1654**	**0.0985**	**1.9000e-004**	**0.0983**	**8.0600e-003**	**0.1064**	**0.0505**	**7.4200e-003**	**0.0579**	**0.0000**	**16.7197**	**16.7197**	**5.4100e-003**	**0.0000**	**16.8549**

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

3.3 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.1000e-004	3.4000e-004	4.1300e-003	1.0000e-005	1.3300e-003	1.0000e-005	1.3400e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	1.0606	1.0606	3.0000e-005	3.0000e-005	1.0698
Total	**4.1000e-004**	**3.4000e-004**	**4.1300e-003**	**1.0000e-005**	**1.3300e-003**	**1.0000e-005**	**1.3400e-003**	**3.5000e-004**	**1.0000e-005**	**3.6000e-004**	**0.0000**	**1.0606**	**1.0606**	**3.0000e-005**	**3.0000e-005**	**1.0698**

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					0.0983	0.0000	0.0983	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0159	0.1654	0.0985	1.9000e-004		8.0600e-003	8.0600e-003		7.4200e-003	7.4200e-003	0.0000	16.7197	16.7197	5.4100e-003	0.0000	16.8549
Total	**0.0159**	**0.1654**	**0.0985**	**1.9000e-004**	**0.0983**	**8.0600e-003**	**0.1064**	**0.0505**	**7.4200e-003**	**0.0579**	**0.0000**	**16.7197**	**16.7197**	**5.4100e-003**	**0.0000**	**16.8549**

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

3.3 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.1000e-004	3.4000e-004	4.1300e-003	1.0000e-005	1.3300e-003	1.0000e-005	1.3400e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	1.0606	1.0606	3.0000e-005	3.0000e-005	1.0698
Total	**4.1000e-004**	**3.4000e-004**	**4.1300e-003**	**1.0000e-005**	**1.3300e-003**	**1.0000e-005**	**1.3400e-003**	**3.5000e-004**	**1.0000e-005**	**3.6000e-004**	**0.0000**	**1.0606**	**1.0606**	**3.0000e-005**	**3.0000e-005**	**1.0698**

3.4 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					0.1381	0.0000	0.1381	0.0548	0.0000	0.0548	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0544	0.5827	0.4356	9.3000e-004		0.0245	0.0245		0.0226	0.0226	0.0000	81.8019	81.8019	0.0265	0.0000	82.4633
Total	**0.0544**	**0.5827**	**0.4356**	**9.3000e-004**	**0.1381**	**0.0245**	**0.1626**	**0.0548**	**0.0226**	**0.0774**	**0.0000**	**81.8019**	**81.8019**	**0.0265**	**0.0000**	**82.4633**

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

3.4 Grading - 2022

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	1.3700e-003	1.1400e-003	0.0138	4.0000e-005	4.4300e-003	2.0000e-005	4.4500e-003	1.1800e-003	2.0000e-005	1.2000e-003	0.0000	3.5352	3.5352	9.0000e-005	1.0000e-004	3.5660
Total	**1.3700e-003**	**1.1400e-003**	**0.0138**	**4.0000e-005**	**4.4300e-003**	**2.0000e-005**	**4.4500e-003**	**1.1800e-003**	**2.0000e-005**	**1.2000e-003**	**0.0000**	**3.5352**	**3.5352**	**9.0000e-005**	**1.0000e-004**	**3.5660**

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					0.1381	0.0000	0.1381	0.0548	0.0000	0.0548	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0544	0.5827	0.4356	9.3000e-004		0.0245	0.0245		0.0226	0.0226	0.0000	81.8018	81.8018	0.0265	0.0000	82.4632
Total	**0.0544**	**0.5827**	**0.4356**	**9.3000e-004**	**0.1381**	**0.0245**	**0.1626**	**0.0548**	**0.0226**	**0.0774**	**0.0000**	**81.8018**	**81.8018**	**0.0265**	**0.0000**	**82.4632**

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

3.4 Grading - 2022

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	1.3700e-003	1.1400e-003	0.0138	4.0000e-005	4.4300e-003	2.0000e-005	4.4500e-003	1.1800e-003	2.0000e-005	1.2000e-003	0.0000	3.5352	3.5352	9.0000e-005	1.0000e-004	3.5660
Total	**1.3700e-003**	**1.1400e-003**	**0.0138**	**4.0000e-005**	**4.4300e-003**	**2.0000e-005**	**4.4500e-003**	**1.1800e-003**	**2.0000e-005**	**1.2000e-003**	**0.0000**	**3.5352**	**3.5352**	**9.0000e-005**	**1.0000e-004**	**3.5660**

3.5 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	0.1160	1.0619	1.1127	1.8300e-003		0.0550	0.0550		0.0518	0.0518	0.0000	157.5732	157.5732	0.0378	0.0000	158.5169
Total	**0.1160**	**1.0619**	**1.1127**	**1.8300e-003**		**0.0550**	**0.0550**		**0.0518**	**0.0518**	**0.0000**	**157.5732**	**157.5732**	**0.0378**	**0.0000**	**158.5169**

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

3.5 Building Construction - 2022

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	5.0000e-004	0.0138	4.6700e-003	6.0000e-005	1.9600e-003	1.6000e-004	2.1200e-003	5.7000e-004	1.5000e-004	7.2000e-004	0.0000	5.5842	5.5842	1.5000e-004	8.3000e-004	5.8342
Worker	4.6700e-003	3.8700e-003	0.0468	1.3000e-004	0.0151	8.0000e-005	0.0151	4.0000e-003	7.0000e-005	4.0700e-003	0.0000	12.0196	12.0196	3.0000e-004	3.3000e-004	12.1242
Total	**5.1700e-003**	**0.0177**	**0.0515**	**1.9000e-004**	**0.0170**	**2.4000e-004**	**0.0173**	**4.5700e-003**	**2.2000e-004**	**4.7900e-003**	**0.0000**	**17.6038**	**17.6038**	**4.5000e-004**	**1.1600e-003**	**17.9584**

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	0.1160	1.0619	1.1127	1.8300e-003		0.0550	0.0550		0.0518	0.0518	0.0000	157.5730	157.5730	0.0378	0.0000	158.5167
Total	**0.1160**	**1.0619**	**1.1127**	**1.8300e-003**		**0.0550**	**0.0550**		**0.0518**	**0.0518**	**0.0000**	**157.5730**	**157.5730**	**0.0378**	**0.0000**	**158.5167**

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

3.5 Building Construction - 2022

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	5.0000e-004	0.0138	4.6700e-003	6.0000e-005	1.9600e-003	1.6000e-004	2.1200e-003	5.7000e-004	1.5000e-004	7.2000e-004	0.0000	5.5842	5.5842	1.5000e-004	8.3000e-004	5.8342
Worker	4.6700e-003	3.8700e-003	0.0468	1.3000e-004	0.0151	8.0000e-005	0.0151	4.0000e-003	7.0000e-005	4.0700e-003	0.0000	12.0196	12.0196	3.0000e-004	3.3000e-004	12.1242
Total	**5.1700e-003**	**0.0177**	**0.0515**	**1.9000e-004**	**0.0170**	**2.4000e-004**	**0.0173**	**4.5700e-003**	**2.2000e-004**	**4.7900e-003**	**0.0000**	**17.6038**	**17.6038**	**4.5000e-004**	**1.1600e-003**	**17.9584**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1290	1.1796	1.3320	2.2100e-003		0.0574	0.0574		0.0540	0.0540	0.0000	190.0799	190.0799	0.0452	0.0000	191.2103
Total	**0.1290**	**1.1796**	**1.3320**	**2.2100e-003**		**0.0574**	**0.0574**		**0.0540**	**0.0540**	**0.0000**	**190.0799**	**190.0799**	**0.0452**	**0.0000**	**191.2103**

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

3.5 Building Construction - 2023

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	3.9000e-004	0.0132	5.0900e-003	7.0000e-005	2.3700e-003	1.0000e-004	2.4700e-003	6.8000e-004	9.0000e-005	7.8000e-004	0.0000	6.4629	6.4629	1.7000e-004	9.5000e-004	6.7515
Worker	5.2100e-003	4.0900e-003	0.0517	1.5000e-004	0.0182	9.0000e-005	0.0183	4.8200e-003	8.0000e-005	4.9100e-003	0.0000	14.1123	14.1123	3.2000e-004	3.6000e-004	14.2279
Total	**5.6000e-003**	**0.0173**	**0.0568**	**2.2000e-004**	**0.0205**	**1.9000e-004**	**0.0207**	**5.5000e-003**	**1.7000e-004**	**5.6900e-003**	**0.0000**	**20.5752**	**20.5752**	**4.9000e-004**	**1.3100e-003**	**20.9793**

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	0.1290	1.1796	1.3320	2.2100e-003		0.0574	0.0574		0.0540	0.0540	0.0000	190.0797	190.0797	0.0452	0.0000	191.2101
Total	**0.1290**	**1.1796**	**1.3320**	**2.2100e-003**		**0.0574**	**0.0574**		**0.0540**	**0.0540**	**0.0000**	**190.0797**	**190.0797**	**0.0452**	**0.0000**	**191.2101**

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

3.5 Building Construction - 2023

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	3.9000e-004	0.0132	5.0900e-003	7.0000e-005	2.3700e-003	1.0000e-004	2.4700e-003	6.8000e-004	9.0000e-005	7.8000e-004	0.0000	6.4629	6.4629	1.7000e-004	9.5000e-004	6.7515
Worker	5.2100e-003	4.0900e-003	0.0517	1.5000e-004	0.0182	9.0000e-005	0.0183	4.8200e-003	8.0000e-005	4.9100e-003	0.0000	14.1123	14.1123	3.2000e-004	3.6000e-004	14.2279
Total	**5.6000e-003**	**0.0173**	**0.0568**	**2.2000e-004**	**0.0205**	**1.9000e-004**	**0.0207**	**5.5000e-003**	**1.7000e-004**	**5.6900e-003**	**0.0000**	**20.5752**	**20.5752**	**4.9000e-004**	**1.3100e-003**	**20.9793**

3.6 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	0.0103	0.1019	0.1458	2.3000e-004		5.1000e-003	5.1000e-003		4.6900e-003	4.6900e-003	0.0000	20.0269	20.0269	6.4800e-003	0.0000	20.1888
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0103**	**0.1019**	**0.1458**	**2.3000e-004**		**5.1000e-003**	**5.1000e-003**		**4.6900e-003**	**4.6900e-003**	**0.0000**	**20.0269**	**20.0269**	**6.4800e-003**	**0.0000**	**20.1888**

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

3.6 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.3000e-004	5.0000e-004	6.3000e-003	2.0000e-005	2.2100e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.7210	1.7210	4.0000e-005	4.0000e-005	1.7351
Total	**6.3000e-004**	**5.0000e-004**	**6.3000e-003**	**2.0000e-005**	**2.2100e-003**	**1.0000e-005**	**2.2300e-003**	**5.9000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.7210**	**1.7210**	**4.0000e-005**	**4.0000e-005**	**1.7351**

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	0.0103	0.1019	0.1458	2.3000e-004		5.1000e-003	5.1000e-003		4.6900e-003	4.6900e-003	0.0000	20.0268	20.0268	6.4800e-003	0.0000	20.1888
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0103**	**0.1019**	**0.1458**	**2.3000e-004**		**5.1000e-003**	**5.1000e-003**		**4.6900e-003**	**4.6900e-003**	**0.0000**	**20.0268**	**20.0268**	**6.4800e-003**	**0.0000**	**20.1888**

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

3.6 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.3000e-004	5.0000e-004	6.3000e-003	2.0000e-005	2.2100e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.7210	1.7210	4.0000e-005	4.0000e-005	1.7351
Total	**6.3000e-004**	**5.0000e-004**	**6.3000e-003**	**2.0000e-005**	**2.2100e-003**	**1.0000e-005**	**2.2300e-003**	**5.9000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.7210**	**1.7210**	**4.0000e-005**	**4.0000e-005**	**1.7351**

3.7 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	0.2309					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9200e-003	0.0130	0.0181	3.0000e-005		7.1000e-004	7.1000e-004		7.1000e-004	7.1000e-004	0.0000	2.5533	2.5533	1.5000e-004	0.0000	2.5571
Total	**0.2328**	**0.0130**	**0.0181**	**3.0000e-005**		**7.1000e-004**	**7.1000e-004**		**7.1000e-004**	**7.1000e-004**	**0.0000**	**2.5533**	**2.5533**	**1.5000e-004**	**0.0000**	**2.5571**

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

3.7 Architectural Coating - 2023

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	1.3000e-004	1.0000e-004	1.2600e-003	0.0000	4.4000e-004	0.0000	4.5000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.3442	0.3442	1.0000e-005	1.0000e-005	0.3470
Total	**1.3000e-004**	**1.0000e-004**	**1.2600e-003**	**0.0000**	**4.4000e-004**	**0.0000**	**4.5000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.3442**	**0.3442**	**1.0000e-005**	**1.0000e-005**	**0.3470**

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	0.2309					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9200e-003	0.0130	0.0181	3.0000e-005		7.1000e-004	7.1000e-004		7.1000e-004	7.1000e-004	0.0000	2.5533	2.5533	1.5000e-004	0.0000	2.5571
Total	**0.2328**	**0.0130**	**0.0181**	**3.0000e-005**		**7.1000e-004**	**7.1000e-004**		**7.1000e-004**	**7.1000e-004**	**0.0000**	**2.5533**	**2.5533**	**1.5000e-004**	**0.0000**	**2.5571**

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

3.7 Architectural Coating - 2023

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	1.3000e-004	1.0000e-004	1.2600e-003	0.0000	4.4000e-004	0.0000	4.5000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.3442	0.3442	1.0000e-005	1.0000e-005	0.3470
Total	**1.3000e-004**	**1.0000e-004**	**1.2600e-003**	**0.0000**	**4.4000e-004**	**0.0000**	**4.5000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.3442**	**0.3442**	**1.0000e-005**	**1.0000e-005**	**0.3470**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule 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	0.2512	0.4563	2.9653	6.8300e-003	0.7008	5.4500e-003	0.7062	0.1872	5.1000e-003	0.1923	0.0000	637.9863	637.9863	0.0334	0.0307	647.9593
Unmitigated	0.2512	0.4563	2.9653	6.8300e-003	0.7008	5.4500e-003	0.7062	0.1872	5.1000e-003	0.1923	0.0000	637.9863	637.9863	0.0334	0.0307	647.9593

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	387.04	391.14	350.55	1,858,461	1,858,461
Total	387.04	391.14	350.55	1,858,461	1,858,461

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
Single Family Housing	19.80	9.60	12.90	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.537785	0.055838	0.172353	0.139003	0.027005	0.007196	0.011392	0.017285	0.000559	0.000254	0.025303	0.000954	0.005071

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

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	57.9124	57.9124	4.8900e-003	5.9000e-004	58.2112
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	57.9124	57.9124	4.8900e-003	5.9000e-004	58.2112
NaturalGas Mitigated	6.2500e-003	0.0534	0.0227	3.4000e-004		4.3200e-003	4.3200e-003		4.3200e-003	4.3200e-003	0.0000	61.8894	61.8894	1.1900e-003	1.1300e-003	62.2572
NaturalGas Unmitigated	6.2500e-003	0.0534	0.0227	3.4000e-004		4.3200e-003	4.3200e-003		4.3200e-003	4.3200e-003	0.0000	61.8894	61.8894	1.1900e-003	1.1300e-003	62.2572

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

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					
Single Family Housing	1.15976e+006	6.2500e-003	0.0534	0.0227	3.4000e-004		4.3200e-003	4.3200e-003		4.3200e-003	4.3200e-003	0.0000	61.8894	61.8894	1.1900e-003	1.1300e-003	62.2572
Total		**6.2500e-003**	**0.0534**	**0.0227**	**3.4000e-004**		**4.3200e-003**	**4.3200e-003**		**4.3200e-003**	**4.3200e-003**	**0.0000**	**61.8894**	**61.8894**	**1.1900e-003**	**1.1300e-003**	**62.2572**

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					
Single Family Housing	1.15976e+006	6.2500e-003	0.0534	0.0227	3.4000e-004		4.3200e-003	4.3200e-003		4.3200e-003	4.3200e-003	0.0000	61.8894	61.8894	1.1900e-003	1.1300e-003	62.2572
Total		**6.2500e-003**	**0.0534**	**0.0227**	**3.4000e-004**		**4.3200e-003**	**4.3200e-003**		**4.3200e-003**	**4.3200e-003**	**0.0000**	**61.8894**	**61.8894**	**1.1900e-003**	**1.1300e-003**	**62.2572**

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

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	326551	57.9124	4.8900e-003	5.9000e-004	58.2112
Total		**57.9124**	**4.8900e-003**	**5.9000e-004**	**58.2112**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	326551	57.9124	4.8900e-003	5.9000e-004	58.2112
Total		**57.9124**	**4.8900e-003**	**5.9000e-004**	**58.2112**

6.0 Area Detail

6.1 Mitigation Measures Area

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

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4368	0.0155	0.6836	6.9000e-004		0.0415	0.0415		0.0415	0.0415	4.3550	9.0595	13.4144	0.0137	3.0000e-004	13.8438
Unmitigated	0.4368	0.0155	0.6836	6.9000e-004		0.0415	0.0415		0.0415	0.0415	4.3550	9.0595	13.4144	0.0137	3.0000e-004	13.8438

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	0.0231					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.2667					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.1343	0.0106	0.2606	6.6000e-004		0.0392	0.0392		0.0392	0.0392	4.3550	8.3688	12.7238	0.0130	3.0000e-004	13.1365
Landscaping	0.0127	4.8700e-003	0.4229	2.0000e-005		2.3400e-003	2.3400e-003		2.3400e-003	2.3400e-003	0.0000	0.6907	0.6907	6.6000e-004	0.0000	0.7073
Total	**0.4368**	**0.0155**	**0.6835**	**6.8000e-004**		**0.0415**	**0.0415**		**0.0415**	**0.0415**	**4.3550**	**9.0595**	**13.4144**	**0.0137**	**3.0000e-004**	**13.8438**

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

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0231					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.2667					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.1343	0.0106	0.2606	6.6000e-004		0.0392	0.0392		0.0392	0.0392	4.3550	8.3688	12.7238	0.0130	3.0000e-004	13.1365
Landscaping	0.0127	4.8700e-003	0.4229	2.0000e-005		2.3400e-003	2.3400e-003		2.3400e-003	2.3400e-003	0.0000	0.6907	0.6907	6.6000e-004	0.0000	0.7073
Total	**0.4368**	**0.0155**	**0.6835**	**6.8000e-004**		**0.0415**	**0.0415**		**0.0415**	**0.0415**	**4.3550**	**9.0595**	**13.4144**	**0.0137**	**3.0000e-004**	**13.8438**

7.0 Water Detail

7.1 Mitigation Measures Water

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

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	10.3343	0.0879	2.1500e-003	13.1719
Unmitigated	10.3343	0.0879	2.1500e-003	13.1719

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	2.67132 / 1.68409	10.3343	0.0879	2.1500e-003	13.1719
Total		**10.3343**	**0.0879**	**2.1500e-003**	**13.1719**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	2.67132 / 1.68409	10.3343	0.0879	2.1500e-003	13.1719
Total		**10.3343**	**0.0879**	**2.1500e-003**	**13.1719**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	9.7375	0.5755	0.0000	24.1242
Unmitigated	9.7375	0.5755	0.0000	24.1242

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

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	47.97	9.7375	0.5755	0.0000	24.1242
Total		**9.7375**	**0.5755**	**0.0000**	**24.1242**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	47.97	9.7375	0.5755	0.0000	24.1242
Total		**9.7375**	**0.5755**	**0.0000**	**24.1242**

9.0 Operational Offroad

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

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	-1,665.0000	0.0000	0.0000	-1,665.0000

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

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Trees	15 / 0	-1,665.0000	0.0000	0.0000	-1,665.0000
Total		**-1,665.0000**	**0.0000**	**0.0000**	**-1,665.0000**