County of San Diego

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FINAL ENVIRONMENTAL IMPACT REPORT for the Alpine County Park Project

State Clearinghouse (SCH) #2021030196

Volume 5

Draft Environmental Impact Report Appendices

Lead Agency:

County of San Diego
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October 2023

Appendix A
Notice of Preparation

County of San Diego

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NOTICE OF PREPARATION
of a
DRAFT ENVIRONMENTAL IMPACT REPORT
for the
ALPINE COUNTY PARK PROJECT

INTRODUCTION

Publication of this Notice of Preparation (NOP) initiates the County of San Diego, Department of Parks and Recreation's environmental review and analysis of the Alpine County Park Project (project or proposed project) pursuant to the California Environmental Quality Act (CEQA). The NOP is the first step in the CEQA process. It describes the proposed project and is distributed to responsible agencies, trustee agencies, involved federal agencies, and the general public. As stated in State CEQA Guidelines Section 15375, the purpose of the NOP is "to solicit guidance from those agencies as to the scope and content of the environmental information to be included" in the Environmental Impact Report (EIR). The NOP provides an opportunity for agencies and the general public to comment on the scope and content of the environmental review of a proposed project.

PROJECT LOCATION

The project site is located in the eastern portion of San Diego County, California, approximately 1 mile south of the center of the unincorporated community of Alpine, and approximately 1 mile south of Interstate 8 (I-8) (Figure 1, *Regional Map*). The project is located adjacent to the Backcountry Land Trust's (BCLT) Wright's Field Preserve located to the north of South Grade Road and east of Tavern Road. The project site encompasses approximately 98 acres. The proposed project will involve construction of approximately 25 acres of active park space and implementation of a Habitat Conservation Plan and long-term monitoring and management of the 73-acre Alpine Park Preserve.

PROJECT DESCRIPTION

The County of San Diego Department of Parks and Recreation (DPR) acquired approximately 98 acres of undeveloped land within the unincorporated community of Alpine in east San Diego County. The proposed project will be located on the DPR-acquired property, which is adjacent to BCLT's Wright's Field Preserve located north of South Grade Road and east of Tavern Road, and south of Alpine Boulevard (see Figure 2, *Project Vicinity*). The County is proposing the development of an approximately 25-

acre active park and will conserve the remainder of the DPR-acquired property as open space.

The proposed project falls within the area covered by the Alpine Community Plan. The project site is subject to the General Plan Rural Lands Regional Category, with an Open Space-Conservation (OS-C) land use designation in the western portion and a Semi-Rural Residential (SR-2) land use designation in the eastern portion. Zoning for the site is A70, Limited Agricultural Use, and S80, Open Space.

The property Assessor's Parcel Numbers (APNs) for the park and preserve are: 404-171-12 and a portion of 404-170-61. The property is currently closed to the public. Access to the project site would be provided from two proposed driveways located along South Grade Road. The primary park entrance would be located on the eastern side of the property at a new intersection leg of the South Grade Road and Calle de Compadres intersection and it would operate as an all-way stop-controlled intersection. The second driveway will be a new intersection located at the southern end of the property and it will operate as a side-street stop-controlled intersection. Both driveways will allow for full access to the project site.

County Park: The proposed project would involve the development of an approximately 25-acre active park that would include amenities such as potential multi-use turf areas, baseball field, all-wheel area, bike skills area, recreational courts (i.e., basketball pickleball, game table plaza), fitness stations, leash-free dog area, restroom facilities, administrative facility/ranger station, equestrian staging with a corral, nature play area, community garden, volunteer pad, picnic areas with shade structures, picnic tables, game table plaza, and trails. The proposed project would also include a parking area capable of accommodating approximately 250-275 single vehicle spaces, 10 ADA spaces that would be available near the primary entrance and administrative building, and in the eastern portion of the site, along South Grade Road. Volunteer pad parking spaces, an equestrian staging area (vehicle parking), and corrals would be located in the northern portion of the project site (please see Figure 3, *Proposed Park Plan*). For utilities, the project proposes to connect to the existing sewer system or include a septic system to serve the restroom facilities, administration facility/ranger station, and volunteer pad. Stormwater retention basins will be located throughout the part.

The proposed project would be open to the public from sunrise to sunset. Dogs on leashes would be allowed within all areas of the park, and dogs off leash would be permitted within the designated leash-free dog area. During operation, "No Parking" signs may be installed along the shoulder of South Grade Road, if deemed necessary by the Department of Public Works (DPW) Traffic Division, to prevent potential overflow parking on South Grade Road. The proposed project would involve one employee, and one volunteer stationed at the project site for a total of one onsite ranger, two maintenance staff, and one volunteer. The volunteer would live on site full time to help with maintenance and management of the property.

Habitat Conservation Plan and Trails: The project includes implementation of a Habitat Conservation Plan and long-term monitoring and management of the approximately 73-acre Alpine Park Preserve. This will include restoration/habitat enhancement for the Quino checkerspot butterfly, maintenance of approximately 1.0 miles of existing trails, and trail closure activities along approximately 3,300 linear feet of existing, informal use trails.

ENVIRONMENTAL CONSIDERATIONS

The EIR will analyze the following potential environmental effects of the proposed project: aesthetics, air quality, biological resources, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, population/housing, public services, recreation, transportation and traffic, utilities/service systems, wildfire and other potential impacts identified during the NOP process. The EIR will also address feasible mitigation measures and a reasonable range of alternatives, as well as the additional mandatory sections required by CEQA. The County Department of Parks and Recreation will also prepare a mitigation monitoring and reporting program to address the potential significant impacts of the proposed project.

COMMENTS

The NOP is available for a public review period that starts on **Monday, March 8, 2021, and ends at 5:00 p.m. on Wednesday, April 7, 2021**. Written comments will be accepted until 5:00 p.m. on Wednesday, April 7, 2021. Comments regarding the scope and content of the environmental information that should be included in the EIR and other environmental concerns should be sent to:

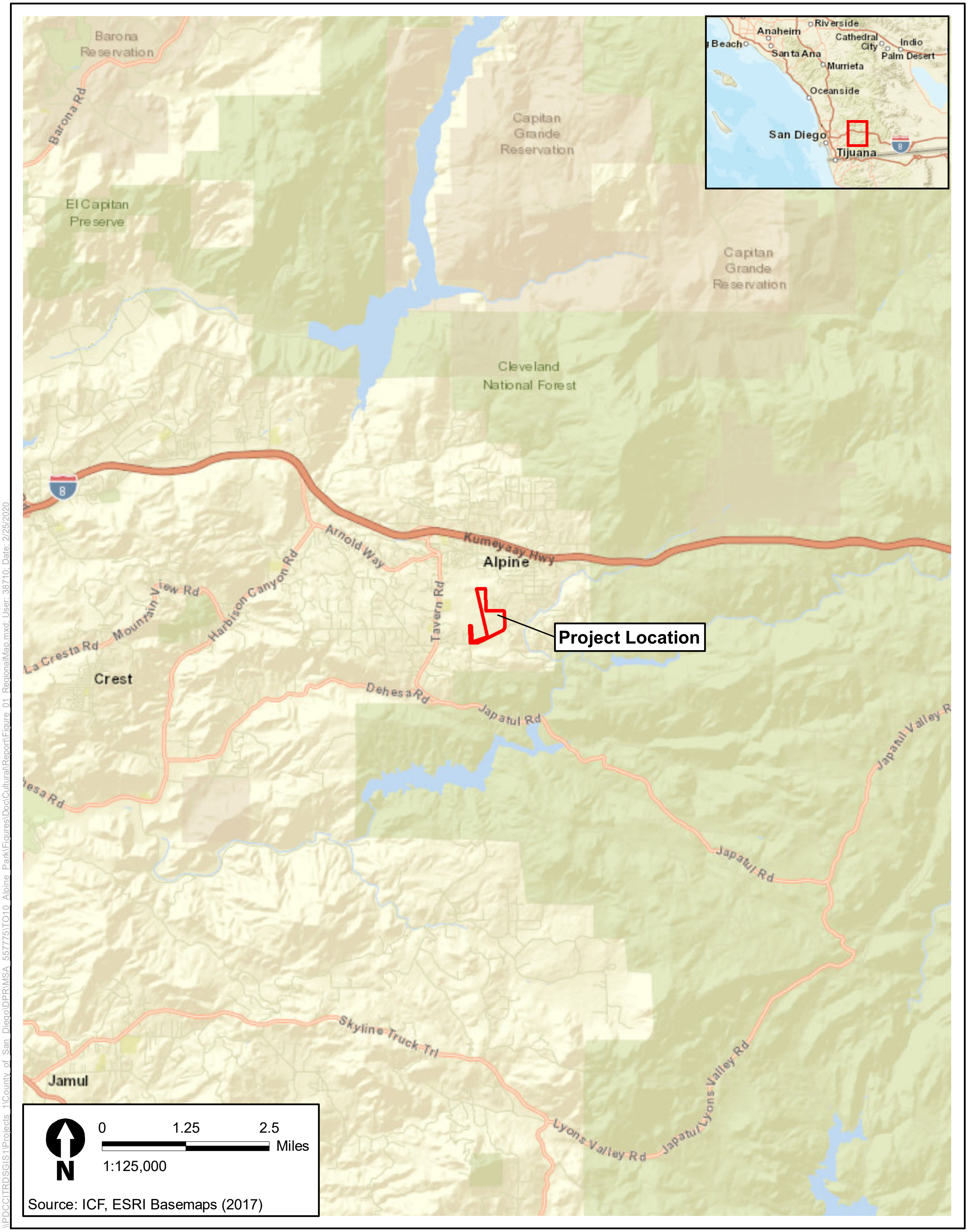
County of San Diego
Department of Parks and Recreation
Attn: Alpine County Park Environmental Review
5500 Overland Avenue, Suite 410
San Diego, CA 92123

or emailed to CountyParksCEQA@sdcounty.ca.gov.

For questions regarding this NOP, please contact Lorrie Bradley, Environmental Planner at (619) 455-7721 or by email at lorrie.bradley@sdcounty.ca.gov.

ATTACHMENTS

Figure 1: **Regional Map**
Figure 2: **Project Vicinity**
Figure 3: **Proposed Park Plan**



Source: ICF, ESRI Basemaps (2017)

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ICF

Figure 1
Regional Location Map
Alpine Park Project

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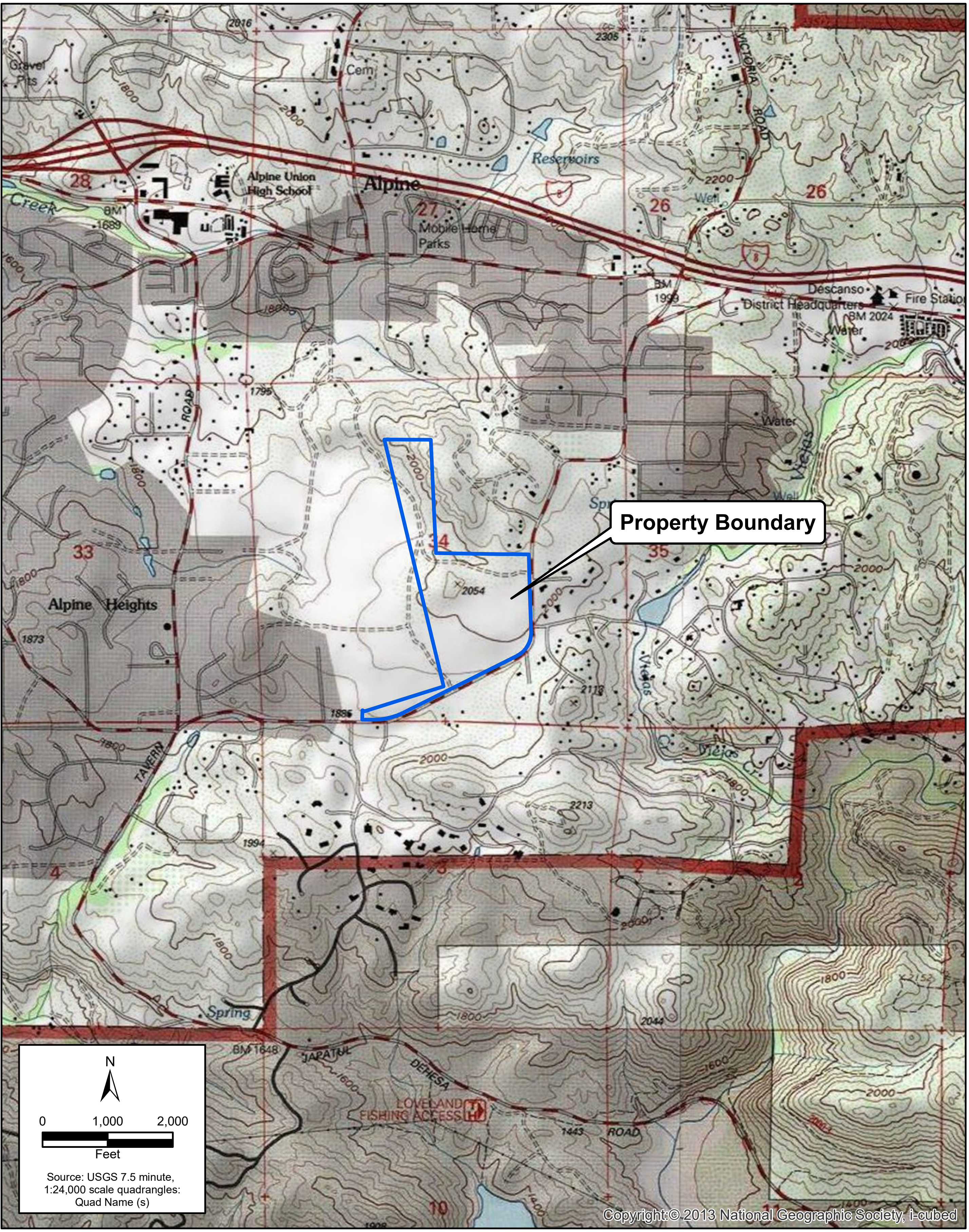


Source: USGS 7.5 minute, 1:24,000 scale quadrangles: Quad Name (s)

Copyright:© 2013 National Geographic Society, i-cubed

Figure 2
Project Vicinity
Alpine Park Project

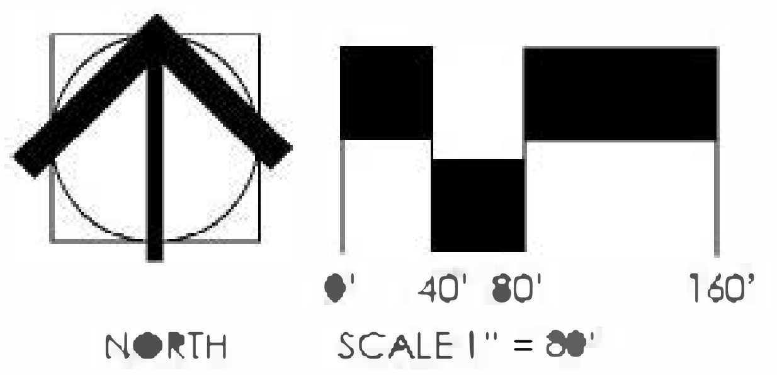
SITE ELEMENT KEY

①	MULTI-USE TRAIL
②	ADMIN/RESTROOM
③	RESTROOM
④	SHADE PAVILION
⑥	SHADE SHELTER
⑥	SHADE SAIL
⑦	ADA PARKING
⑥	ALL-WHEEL PARK GATEWAY
⑨	COMMUNITY GARDEN
⑩	GARDEN STORAGE
⑪	NATURE PLAY AREA
⑬	2-5 PLAY AREA
⑬	VOLUNTEER PAD
⑭	PICKLEBALL COURTS
⑮	BASKETBALL COURT
⑯	GAME TABLE PLAZA
⑰	PICNIC AREA
⑱	CORRAL
⑲	EQUESTRIAN STAGING
⑳	DROP-OFF/PICK-UP
㉑	BIKE PARK
㉒	ALL-WHEEL PARK
㉓	BASEBALL FIELD
㉔	MULTI-USE TURF AREA
㉓	SECONDARY PARK ENTRANCE
㉖	PRIMARY PARK ENTRANCE
㉗	PARKING
⑳	DOG PARK
㉙	EXISTING TRAIL
⑳	EXISTING TREES
㉛	BERMED LANDSCAPE SCREEN
㉜	PARK MONUMENT SIGN
㉓	NATIVE PLANTS
㉞	FITNESS STATIONS
㉟	ENGINEERED WOOD FIBER
㊱	TRASH ENCLOSURE
㊲	RETENTION BASIN
㉟	EXISTING LANDSCAPE/TERRAIN
㊴	EXISTING FENCE

PARKING SUMMARY

250	STANDARD SPACES
10	ADA SPACES
2	VOLUNTEER PAD SPACE
11	EQUESTRIAN STAGING SPACES
273	TOTAL SPACES

DPR DIRECTOR SIGNATURE/APPROVAL DATE



NOVEMBER 3, 2020

Figure 3.
PROPOSED PARK PLAN

ALPINE COMMUNITY PARK

COUNTY OF SAN DIEGO
PARKS AND RECREATION

Appendix B
Notice of Preparation Comment Letters

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

April 7, 2021

Ms. Lorrie Bradley
Environmental Planner
County of San Diego, Department of Parks and Recreation
Lead/Public Agency
5500 Overland Avenue, Suite 410
San Diego, CA 92123
Lorrie.Bradley@sdcounty.ca.gov

Subject: Alpine County Park Project (PROJECT), Notice of preparation (NOP) of a Draft Environmental Report (DEIR), SCH #2021030196

Dear Ms. Bradley:

The California Department of Fish and Wildlife (CDFW) received a NOP of a DEIR from the County of San Diego (County) Department of Parks and Recreation (DPR) for the Project pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.

Thank you for the opportunity to provide comments and recommendations regarding the activities involved in the Alpine County Park Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW Role

CDFW is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the State [Fish & G. Code, §§ 711.7, subdivision (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines, § 15386, subdivision (a)]. CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (Id., § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect state fish and wildlife resources.

CDFW is also submitting comments as a Responsible Agency under CEQA (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW may need to exercise regulatory authority as provided by the Fish and Game Code, including lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). Likewise, to the extent implementation of the Project as proposed may result in "take" (see Fish & G. Code, § 2050) of any species protected under the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.) or the Native

Plant Protection Act (NPPA; Fish & G. Code, §1900 et seq.), CDFW recommends the Project proponent obtain appropriate authorization under the Fish and Game Code.

CDFW also administers the Natural Community Conservation Planning (NCCP) program, a California regional habitat conservation planning program. The County participates in the NCCP program by implementing its approved Subarea Plan (SAP) under the County Multiple Species Conservation Plan (MSCP). The Project site is located with the boundaries of the County's approved MSCP covering southwestern San Diego County. Although the MSCP is permitted under both the California NCCP and federal Habitat Conservation Plan (HCP) programs, the MSCP did not provide take coverage for the Quino checkerspot butterfly (*Euphydryas editha quino*), a federal endangered species that has been identified onsite. Impacts are therefore being addressed by the U.S. Fish and Wildlife Service (USFWS) under a separate HCP.

PROJECT DESCRIPTION SUMMARY

Proponent: County DPR

Objective: The Project site is in the area covered by the Alpine Community plan. The site is subject to the General Plan Rural Lands Regional Category, with an Open Space-Conservation land use designation in the western portion of the property and a Semi-Rural Residential land use designation in the eastern portion. The Project site encompasses 98 acres. Twenty-five acres will be developed and turned into an active park and the 73 acres that will not be developed will be designated as open space and managed as part of the MSCP Preserve. The 25-acre active park will include: multi-use turf areas, baseball field, all-wheel area, bike skills area, recreational courts (i.e., basketball, pickleball, game table plaza), fitness stations, leash-free dog area, restroom facilities, administrative facility/ranger station, equestrian staging with a corral, nature play area, community garden, volunteer pad, picnic areas with shade structures, picnic tables, game table plaza, and trails. Included in the Project boundary will be a parking area with 250-275 single vehicle spaces. There will be two entrances to the parking area located on South Grade Road. The Project site will be open to the public from sunrise to sunset. Dogs are allowed on leashes in the Project boundaries and off-leash in the designated dog area. As stated above, the 73 acres that will not be developed will be called the Alpine Park Preserve (Preserve), and monitored and managed by the County. This management will include maintenance of one mile of existing trail and closure of informal use trails. The HCP will also include restoration and habitat enhancement for the Quino checkerspot butterfly.

Location: The Project site is in eastern San Diego County, one mile south of Interstate 8, and approximately one mile south of the center of the town of Alpine. Alpine is an unincorporated community in the eastern portion of the County and is approximately 25 miles east of downtown San Diego. The Project site is north of South Grade Road, east of Tavern Road, and adjacent to the Backcountry Land Trust's (BCLT) Wright's Field Preserve. Residential and rural communities surround the 98-acre site.

COMMENTS AND RECOMMENDATIONS

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

Specific Comments

1) Consider Alternative Location(s). Due to the presence of highly sensitive habitats (clay soils, native grassland) and species on and/or adjacent to conserved areas of Wright's Field, CDFW recommends that the forthcoming DEIR include an alternative location or locations that would meet the needs of the community yet avoid or minimize impacts while not reducing the remaining acreage of the large block of habitat encompassing the Wright's Field conservation area.

2) Biological Baseline Assessment. CDFW recommends that the DEIR provide a complete assessment and impact analysis of the flora and fauna within and adjacent to the Project site, with emphasis upon identifying endangered, threatened, sensitive, regionally and locally unique species, including any Covered Species under the County's approved MSCP, and sensitive habitats. Impact analysis will aid in determining any direct, indirect, and cumulative biological impacts, as well as specific mitigation or avoidance measures necessary to offset those impacts. CDFW recommends avoiding or minimizing impacts to any sensitive natural communities found on or adjacent to the Project. The DEIR should include the following information:

   a) Information on the regional setting that is critical to an assessment of environmental impacts, with special emphasis on resources that are rare or unique to the region [CEQA Guidelines, § 15125(c)]. The DEIR should include measures to fully avoid and otherwise protect Sensitive Natural Communities from Project-related impacts. Project implementation may result in impacts to rare or endangered plants or plant communities that have been recorded adjacent to the Project vicinity. CDFW considers these communities as threatened habitats having both regional and local significance. Plant communities, alliances, and associations with a state-wide ranking of S1, S2, S3, and S4 should be considered sensitive and declining at the local and regional level. These ranks can be obtained by visiting https://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities#sensitive%20natural%20communities;

   b) A complete floristic assessment within and adjacent to the Project area, with particular emphasis upon identifying endangered, threatened, sensitive, and locally unique species and sensitive habitats. This should include a thorough, recent, floristic-based assessment of special status plants and natural communities.

   c) A complete, recent, assessment of the biological resources associated with each habitat type onsite and within adjacent areas that could also be affected by the Project. CDFW's California Natural Diversity Database (CNDDB) should be reviewed to obtain current information on any previously reported sensitive species and habitat. CDFW recommends that CNDDB Field Survey Forms be completed and submitted to CNDDB to document survey results. Online forms can be obtained and submitted at http://www.dfg.ca.gov/biogeodata/cnddb/submitting_data_to_cnddb.asp;

   d) CNDDB indicates the occurrence of several special status species within the Project vicinity. The DEIR should have a complete, recent, assessment of rare, threatened, and endangered, and other sensitive species onsite and within the area of potential effect, including California Species of Special Concern and California Fully Protected Species (Fish & G. Code, §§ 3511, 4700, 5050 and 5515). Species to be addressed should include all those which meet the CEQA definition of endangered, rare or threatened species (CEQA Guidelines, § 15380). Seasonal variations in use of the Project area should also be addressed. Focused species-specific surveys, conducted at the appropriate time of year and time of day when the sensitive species are active or otherwise identifiable, are required. Acceptable species-specific survey procedures should be developed in consultation with CDFW and the USFWS; and,

e) A recent wildlife and rare plant survey. CDFW generally considers biological field assessments for wildlife to be valid for a one-year period, and assessments for rare plants may be considered valid for a period of up to three years as long as there was not a prevailing drought during the time of the botanical survey. Some aspects of the proposed Project may warrant periodic updated surveys for certain sensitive taxa, particularly if build out could occur over a protracted time frame, or in phases.

3) Management Plan. A site Resource Management Plan (RMP) for the 73-acre Preserve should be completed before any trails are opened to the public. A discussion is needed on the impacts of the designated trails that will be located throughout the Preserve and the cumulative impacts that will result from an increase in human activity. The RMP will need to address how these impacts will be monitored and managed in the Preserve.

4) Listed Species and California Species of Special Concern (SSC). CNDDB indicates that State rare (SR), CDFW Watch List (WL), CDFW fully protected (FP), SSC, or California Endangered Species Act (CESA)-listed (i.e., State Endangered (SE) or State Threatened (ST)) or federal Endangered Species Act (ESA)-listed (i.e., federal Endangered) (FE) or federal Threatened (FT) or a candidate for federal listing (FC)) are known in and adjacent to the Project area. Also indicated below are species which are covered by the South County (i.e., existing/approved) MSCP (SC) and species which are preliminarily proposed for coverage under the forthcoming East County MSCP (EC)).

   a) Sensitive plant species known in the Project area include (but are not limited to): Cuyamaca larkspur (*Delphinium hesperium* ssp. *cuyamacae*, SR); Dehesa beargrass (*Nolina interrata*, SE, SC); Dunn's mariposa lily (*Calochortus dunnii*, SR, SC); Encinitas baccharis (*Baccharis vanessae*, FT, SE, CS); Gander's ragwort (*Packera ganderi*, SR, EC); Mexican flannelbush (*Fremontodendron mexicanum*, FE, SR); and San Diego thorn-mint (*Acanthomintha ilicifolia*, FT, SE, SC).

   b) Sensitive amphibians and reptiles include (but are not limited to): arroyo toad (*Anaxyrus californicus,* FE, SSC, SC, EC); Blainville's horned lizard (*Phrynosoma blainvillii,* SSC, EC, SC); California glossy snake (*Arizona elegans occidentalis*, SSC); coast patch-nosed snake (*Salvadora hexalepis virgultea*, SSC, EC); coast range newt (*Taricha torosa*, SSC, EC); coastal whiptail (*Aspidoscelis tigris stejnegeri*, SSC); Coronado skink (*Plestiodon skiltonianus interparietalis*, WL, EC); orange-throated whiptail (*Aspidoscelis hyperythra beldingi*, WL, EC, SC); red-diamond rattlesnake (*Crotalus ruber*, SSC, EC); silvery legless lizard (*Anniella pulchra,* SSC, EC); southwestern pond turtle (*Actinemys pallida*, SSC, EC, SC); two-striped gartersnake (*Thamnophis hammondii*, SSC, EC); and western spadefoot (*Spea hammondii*, SSC, EC).

   c) Sensitive bird species include but are not limited to: Bell's sparrow (*Artemisiospiza belli*, WL); coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis,* SSC, EC, SC); coastal California gnatcatcher (*Polioptila californica,* FT, SSC, SC); Cooper's hawk (*Accipiter cooperii*, WL, SC); golden eagle (*Aquila chrysaetos*, WL, FP, EC, SC); least Bell's vireo (*Vireo bellii pusillus,* FE, SE, EC, SC); southern California rufous-crowned sparrow (*Aimophila ruficeps canescens,* WL, EC, SC); southwestern willow flycatcher (*Empidonax trailii extimus,* FE, SE, EC, SC); Swainson's hawk (*Buteo swainsoni*, ST, SC); tricolored blackbird (*Agelaius tricolor*, ST, EC, SC); and yellow-breasted chat (*Icteria virens*, SSC).

   d) Sensitive invertebrates include (but are not limited to): Hermes copper butterfly (*Lycaena hermes*, FC, EC) and Quino checkerspot butterfly (FE, EC).

   e) Sensitive mammals include but are not limited to: American badger (*Taxidea taxus*, SSC, SC); Dulzura pocket mouse (*Chaetodipus californicus femoralis,* SSC); northwestern San Diego pocket mouse (*Chaetodipus fallax*, SSC); San Diego desert woodrat (*Neotoma lepida intermedia*, SSC); San Diego black-tailed jackrabbit (*Lepus californicus bennettii,* SSC, EC); pallid bat (*Antrozous pallidus*, SSC, EC); pocketed free-tailed bat (*Nyctinomops femorosaccus*, SSC); big free-tailed bat (*Nyctinomops macrotis*, SSC); Townsend's big-eared bat (*Corynorhinus townsendii*, SSC, EC); western mastiff bat (*Eumops perotis californicus*, SSC); western red bat (*Lasiurus blossevillii*, SSC); and western yellow bat (*Lasiurus xanthinus*, SSC).

5) Quino Checkerspot Butterfly. The Project Description indicates the presence of Quino checkerspot butterfly onsite. This butterfly is federally endangered and a County Group 1 species. This species is found only in western Riverside County, southern San Diego County, and northern Baja California, Mexico (USFWS 2003). The DEIR should make provisions to avoid the occupied area: however, further discussion should be included in the final document to address indirect impacts to the species.

   a) Direct impacts to Quino checkerspot butterfly could result from Project construction and activities (e.g., equipment staging, mobilization, and grading); ground disturbance; vegetation clearing; and trampling or crushing from construction equipment, vehicles, and foot traffic. Indirect impacts could result from fugitive construction dust coating foraging habitat, and other edge effects associated with landscaping and fencing.

   b) CEQA provides protection for CESA- and ESA-listed species. Quino checkerspot butterfly is federally endangered and CDFW considers impacts to federally threatened species a significant direct and cumulative adverse effect without implementing appropriate avoidance and/or mitigation measures.

6) Vernal pools. The Project site is adjacent to the BCLT Wright’s Field Preserve which has vernal pools present. The Project Site has species present that are associated with vernal pools such as western spadefoot and contains high levels of clay soil which are known to support vernal pools and sensitive species. Vernal pools are considered a rare resource, as it is estimated over 95% of vernal pools in California have been destroyed (USFWS 1998). CDFW considers the loss of these pool complexes to be regionally and biologically

significant. To fully avoid impacts to vernal pools and depressions, the entire sub-watershed that supports the hydrology of the pool/depression should be avoided and conserved.

7) Biological Direct, Indirect, and Cumulative Impacts. Due to the proximity of the Project site to the Alpine Park Preserve and BCLT's Wright's Field Preserve, it is essential to understand how the open space and biological diversity within it may be impacted by Project activities. CDFW recommends providing a thorough discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts. The following should be addressed in the DEIR:

    a) A discussion regarding indirect Project impacts on biological resources, including resources in nearby public lands, open space, adjacent natural habitats, riparian ecosystems, and any designated and/or proposed or existing reserve lands (e.g., preserve lands associated with an NCCP (NCCP, Fish & G. Code, § 2800 et. seq.). Impacts on, and maintenance of, wildlife corridor/movement areas, including access to undisturbed habitats in adjacent areas, should be fully evaluated in the DEIR;

    b) A discussion of potential adverse impacts from lighting, noise, temporary and permanent human activity, and exotic species and identification of any mitigation measures;

    c) A discussion on Project-related changes on drainage patterns downstream of the Project site; the volume, velocity, and frequency of existing and post-Project surface flows; polluted runoff; soil erosion and/or sedimentation in streams and water bodies; and post-Project fate of runoff from the Project site. The Project includes plans for an underground parking structure; therefore, the discussion should also address the proximity of the extraction activities to the water table, whether dewatering would be necessary, and the potential impacts on the habitat (if any) supported by the groundwater. Mitigation measures proposed to alleviate such Project impacts should be included;

    d) An analysis of impacts from land use designations and zoning located nearby or adjacent to natural areas that may inadvertently contribute to wildlife-human interactions. A discussion of possible conflicts and mitigation measures to reduce these conflicts should be included in the DEIR; and,

    e) A cumulative effects analysis, as described under CEQA Guidelines section 15130. General and specific plans, as well as past, present, and anticipated future projects, should be analyzed relative to their impacts on similar plant communities and wildlife habitats.

8) Sensitive Bird Species. The Project plans indicate that existing undeveloped land will be developed for the 25-acre park. A review CNDDB indicates occurrences of special status bird species the Project vicinity. Project activities occurring during the breeding season of nesting birds could result in the incidental loss of fertile eggs, or nestlings, or otherwise lead to nest abandonment in habitat directly adjacent to the Project boundary. The Project could also lead to the loss of foraging habitat for sensitive bird species.

a) CDFW recommends that measures be taken to avoid Project impacts to nesting birds. Migratory nongame native bird species are protected by international treaty under the Federal Migratory Bird Treaty Act (MBTA) of 1918 (Code of Federal Regulations, Title 50, § 10.13). Sections 3503, 3503.5, and 3513 of the California Fish and Game Code prohibit take of all birds and their active nests including raptors and other migratory nongame birds (as listed under the MBTA).

b) Project activities including but not limited to staging and disturbances to native and nonnative vegetation, structures, and substrates should occur outside of the avian breeding season which generally runs from February 15 through August 31 (as early as January 1 for some raptors) to avoid take of birds or their eggs. If avoidance of the avian breeding season is not feasible, CDFW recommends surveys by a qualified biologist with experience in conducting breeding bird surveys to detect protected native birds occurring in suitable nesting habitat that is to be disturbed and (as access to adjacent areas allows) any other such habitat within 300 feet of the disturbance area (within 500 feet for raptors). Project personnel, including all contractors working onsite, should be instructed on the sensitivity of the area. Reductions in the nest buffer distance may be appropriate depending on the avian species involved, ambient levels of human activity, screening vegetation, or possibly other factors.

9) Landscaping. The Project Description includes landscaped areas and a community garden on the Project site. Habitat loss and invasive plants are a leading cause of native biodiversity loss. CDFW recommends that the DEIR also stipulate that no invasive plant material shall be used. Furthermore, we recommend using native, locally appropriate plant species for landscaping on the Project site. A list of invasive/exotic plants that should be avoided as well as suggestions for suitable landscape plants can be found at https://www.cal-ipc.org/solutions/prevention/landscaping/.

General Comments

1) Project Description and Alternatives. To enable CDFW to adequately review and comment on the Project from the standpoint of the protection of plants, fish, and wildlife, we recommend the following information be included in the DEIR:

   a) A complete discussion of the purpose and need for, and description of, the Project, including all staging areas and access routes to the construction and staging areas; and,

   b) A range of feasible alternatives to Project component location and design features to ensure that alternatives to the proposed Project are fully considered and evaluated. The alternatives should avoid or otherwise minimize direct and indirect impacts to sensitive biological resources and wildlife movement areas.

2) Compensatory Mitigation. The DEIR should include mitigation measures for adverse Project-related impacts to sensitive plants, animals, and habitats. Mitigation measures should emphasize avoidance and reduction of Project impacts. For unavoidable impacts, onsite habitat restoration or enhancement should be discussed in detail. If onsite mitigation is not feasible or would not be biologically viable and therefore would not adequately mitigate the loss of biological functions and values, offsite mitigation through habitat creation and/or

acquisition and preservation in perpetuity should be addressed. Areas proposed as mitigation lands should be protected in perpetuity with a conservation easement, financial assurance, and dedicated to a qualified entity for long-term management and monitoring. Under Government Code section 65967, the Lead Agency must exercise due diligence in reviewing the qualifications of a governmental entity, special district, or non-profit organization to effectively manage and steward land, water, or natural resources on mitigation lands that it approves.

3) Long-term Management of Mitigation Lands. For proposed preservation and/or restoration, the DEIR should include measures to protect the targeted habitat values from direct and indirect negative impacts in perpetuity. The objective should be to offset the Project-induced qualitative and quantitative losses of wildlife habitat values. Issues that should be addressed include (but are not limited to) restrictions on access, proposed land dedications, monitoring and management programs, control of illegal dumping, water pollution, and increased human intrusion. An appropriate non-wasting endowment should be set aside to provide for long-term management of mitigation lands.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a data base which may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e).) Accordingly, please report any special status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/CNDDB_FieldSurveyForm.pdf. The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp.

FILING FEES

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

CONCLUSION

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

Questions regarding this letter or further coordination should be directed to Emily Gray, Environmental Scientist, at Emily.Gray@wildlife.ca.gov.

Sincerely,

DocuSigned by:
David Mayer
D700B4520375406...

David Mayer
Environmental Program Manager I
South Coast Region

ec: CDFW
Karen Drewe, San Diego – Karen.Drewe@wildlife.ca.gov
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California Native Plant Society

ECO San Diego
Environmental Center of San Diego

Preserve Wild Santee

14245 Dalhousie Road
San Diego CA 92129
conservation@cnpssd.org

April 6, 2021

County of San Diego
Department of Parks and Recreation
Attn: Alpine County Park Environmental Review
5500 Overland Avenue, Suite 410
San Diego, CA 92123
By email to CountyParksCEQA@sdcounty.ca.gov and lorrie.bradley@sdcounty.ca.gov.

RE: Notice of Preparation of a Draft Environmental Impact Report on the Alpine County Park Project

Dear Ms. Bradley,

Thank you for the opportunity to provide information for the Notice of Preparation ("NOP") of the Environmental Impact Report ("EIR") on the Alpine County Park Project ("Project"). The San Diego Chapter of the California Native Plant Society, Environmental Center of San Diego, and Preserve Wild Santee all work to protect California's natural heritage and preserve it for future generations. We promote sound science as the backbone of effective natural areas protection. We work closely with decision-makers, scientists, and local planners to advocate for well informed and environmentally friendly policies, regulations, and land management practices.

There are also two CEQA topics, energy and tribal cultural issues, must be addressed, although they were not identified in the NOP. First, energy efficiency cannot be separated from climate change in the proposed design, so both need to be analyzed for their different impacts. Second, since the Wright's Field area has both recent historical and tribal use, impacts to both cultural and tribal cultural resources must be analyzed.

We have specific comments on biological issues, climate change, and wildfire that need to be addressed in the NOP. These are detailed below. Finally, we strongly urge County Parks to analyze a smaller, less impactful, sustainable park design as an alternative.

Biology

First, we urge the Project DEIR to use reasonably current surveys of the site, surveys conducted during a rainy year in appropriate seasons to find sensitive species. Second, we urge the County to include impacts to Wright's Field in the DEIR. The issue is the impacts to native plants, animals, vegetation communities, and wetlands as a result of the proposed Project increasing biking, hiking, and horseback riding on both Wright's Field and the project site. Since the project is directly connected to the Wright's Field trail system and will have 260-285 parking spaces, it is obvious that construction of the proposed project will increase the level of human recreation on Wright's Field Preserve. Concerns are ever-increasing about recreational impacts to sensitive biological resources on the conserved lands within San Diego County, including in many reserves, such as Carlsbad Highlands Ecological Reserve, Sycamore Canyon Preserve-Gooden Ranch (particularly with unauthorized use of a highway wildlife underpass), Del Mar Mesa Ecological Reserve, and others. There is a growing body of research about recreational impacts to animals and plants. Research on such impacts is termed recreation ecology. This is analogous to *conservation biology*, which also should be a foundational science for work on this project.

We have included a copy of a recent California Fish and Wildlife Journal issue dedicated to recreation ecology to help you get up to speed. Please include it in the written record, and make sure that the biologists and planners working on the biology section of the DEIR read it. It will help their efforts.

Please analyze recreation impacts in the project EIR, and either avoid significant adverse impacts, or at worst, mitigate them below the level of significance. Any proposed mitigation should reflect that knowing how to mitigate for recreation-related indirect impacts to biological resources requires knowing exactly what those impacts are and when they occur. At a minimum, appropriate impact analyses will require up-to-date surveys of both the proposed project site and Wright's Field, scientifically sound modeling of the present and proposed future trails and recreation, and data on how the presence of humans both with and without their dogs, horses, and other animals affects plants and animals; some such data already exists. Adverse biological direct and indirect impacts can arise from most recreational activities, including: hikers, bikers, and horses and their riders simply using a trail; people allowing dogs to chase animals; and people and/or dogs trampling in vernal pools or on sensitive plants and small animals. Indirect recreation-related adverse impacts include the introduction of weed seeds by mountain bikers and equestrians, and detrimental changes to wildlife involving behavior (e.g., vigilance, foraging, hunting), reproduction, growth, immune system function, levels of stress hormones, the survival of individual animals, and ultimately the persistence of wildlife populations and communities.

Second, the Alpine Community Plan update, which was prepared by the County, states, on page 2.12-3: "The Alpine CPA also includes one preserve, Wright's Field. The purpose of preserves is to maintain community character and protect biological, cultural, and historical resources, while making these resources available for *limited* public recreational opportunities. Some preserves may also provide interpretive and educational amenities, *although public access may be limited according to the sensitivity of the resources*…." (emphases added). Please analyze, in detail, how the proposed project and all alternatives comply with this part of the Community Plan Update.

Third, there are issues with sensitive and listed species. Please insure that the video that substituted for a Scoping Meeting (e.g. https://www.youtube.com/watch?v=xyKiPTawDsQ) is included in the official record for the project. Since there is no paper trail from a meeting, it is the only evidence that any attempt was made to satisfy the CEQA requirement for a Scoping Meeting. In the video at 6:28, reference was made that the Project intends to "avoid impacts" to Engelmann oaks (*Quercus engelmannii*, CRPR List 4) and to "minimize impacts" to the federally endangered Quino checkerspot butterfly (*Euphydryas editha quino*).

While protection of the oaks is appreciated, there is no legal requirement for it. There is definitely a legal requirement to protect the Quino checkerspot, to the point where the County is currently involved in several lawsuits over plans that harm it. Please redesign the proposed project to *AVOID IMPACTS* to the Quino Checkerspot, rather than simply minimize them. Harming an endangered species in the name of recreation would be a terrible black eye for County Parks, and for the County as a whole.

Climate change impacts

In the climate change section, please include not just construction and traffic impacts, but impacts from park site maintenance, upgrades, and reconstruction. These are a serious issue, because the county plans to go carbon neutral by 2035, while the state of California plans to go carbon neutral by 2045. A park that cannot be maintained due to emissions constraints is not worth building. As part of the design process, estimate the lifespan of each and all of the amenities installed, along with the maintenance requirements and their expected lifespan. Then create a timeline showing carbon annual carbon emissions from routine maintenance and when each amenity will require major repairs or replacement. To avoid unmitigated impacts, the project needs to be carbon neutral by 2035 and to stay that way for the indefinite future thereafter. Avoiding emissions is the simplest way to avoid and mitigate impacts, since there are few ways to mitigate emissions onsite or offsite in the County.

Second, please do not put solar panels and trees close together, as they shade each other. Also, please only put solar panels where they get unobstructed access to the south-facing and/or west-facing sky. These compass directions are necessary for solar panels to work in San Diego. East-facing solar panels are unproductive due to morning cloud cover, and north-facing panels are unproductive in all conditions. The reason for this comment is that the project design (video, at 3:54) specifies "photovoltaic carports." Looking at the attached figure, the carports will line a north-south running road that gradually curves to the southwest, and is bordered by trees. This is a distinctly suboptimal configuration, as either the trees will shade the panels, or the panels will shade the trees.

Please rethink the addition of solar carports. If they are installed, provide a good estimate of how much electricity they will produce at different times of the year, and how much shading is expected from the panels shading each other, trees shading the panels, and panels shading the trees. Remember that the panels provide electricity, while the trees provide carbon sequestration, but both cannot use the same patch of sunlight.

If the County desires to have a solar-powered park, please provide a project alternative that starts from this premise and designs the park to accommodate both solar powered facilities and carbon sequestration in planted trees. Only then design the rest of the facilities around these constraints.

Slapping a few solar panels on a project not designed for this power source is minimally useful. Around 20 standard-sized solar panels with good southern exposure and no shading from trees are necessary to charge one electric car once per week.[1] How many such panels could be installed on the proposed project?

Wildfire

Wildfire impacts have proved a contentious area between the County and the environmental community, with former Supervisor Jacob at one point asking what it would take for environmental groups to stop suing the county (and winning). We therefore urge the County to perform an analysis and design avoidance or mitigation that meet CEQA requirements.

With regard to the proposed project, the concerns we identify are as follows. First, we are concerned about the possibilities for recreational fires on the project site sparking wildfires in the project site, Wright's Field, and homes and businesses downwind. Second, there has been talk that the proposed project would be an evacuation site, due to the number of parking spaces. Since South Grade Road is considered one of the most hazardous roads in Alpine, concentrating traffic in that area during an emergency seems like a recipe for trouble. Please *carefully* analyze evacuation both to and from the park site under all project alternatives. This is not about checking off boxes, it is about making sure people can evacuate safely during a disaster.

Project Alternatives

Please include a project alternative with a smaller, nature-focused, minimally developed park that has no impacts to the biological, cultural, and other resources of the project site, Wright's Field Ecological Preserve, and neighboring properties. Given voiced community concerns about the lack of maintenance on existing Alpine parks, please focus on making park upkeep and maintenance financially sustainable for the community and County. Also make its construction, maintenance, and rebuilding carbon neutral and environmentally sustainable, to meet federal, state, and county goals. Please also analyze each and every project alternative equally, as unequal analysis has been contentious on past county projects.

Thank you for taking this input. Please keep us informed of all developments with this project and associated documents and meetings, at conservation@cnpssd.org.

Sincerely,

Frank Landis, PhD
Conservation Chair
California Native Plant Society, San Diego Chapter

Van K. Collinsworth
Geographer / Director, Preserve Wild Santee

Pamela Heatherington, Director
Environmental Center of San Diego

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[1] This from personal experience.

California Fish and Wildlife JOURNAL

SPECIAL ISSUE

Effects of Non-consumptive Recreation on Wildlife in California

Journal for the Conservation and Management of California's Species and Ecosystems

California Fish and Wildlife

RECREATION SPECIAL ISSUE 2020

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California Fish and Wildlife, Recreation Special Issue; 6-10; 2020

Introduction

CAN OUR OUTDOOR ENTHUSIASM AND NATURE COEXIST?

RON UNGER, *Environmental Program Manager, Landscape Conservation Planning Program, Habitat Conservation Planning Branch, California Department of Fish and Wildlife*

[Note: As this special edition journal is published, our State, the nation, and the whole world are gripped by the corona virus pandemic. To slow its spread and not overwhelm limited healthcare resources, voluntary and mandatory directives for staying home, social distancing, and closing parks, reserves, and other public facilities have been put in place on a scale not seen for a hundred years, the time of the 1918 influenza (flu) epidemic.

Stories are emerging of more secretive wildlife seen in some park and urban areas normally filled with people, like the reports of bobcats roaming around empty Yosemite facilities, or an adult black bear roaming the nearly empty downtown Solvang. Hopefully, the pandemic and its horrible devastation will be over very soon, and we may again visit and appreciate our parks and wilderness areas. Hopefully, too, we may gain more information on wildlife's response to fewer visitors that helps us improve our management of parks and reserves in a way that protects wildlife and their habitat while also providing for great recreation experiences.]

"Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul alike" (The Yosemite, 1912). John Muir wrote so eloquently of the importance of taking time to be in, and play in, Nature to heal and nourish our spirit and help us to balance the challenges of our everyday lives. Now more than ever, people find a need to balance their work and domestic lives with the wonders, serenity, and invigorating challenges inherent in playing in Nature. In a world increasingly dominated by computers, cyberspace, and cities, people find a need to go and enjoy the Great Outdoors.

But what is the capacity of Nature to absorb the onslaught of millions of us hiking, riding, flying, boating, and otherwise tromping around the forests, fields, mountains, valleys, streams, and rivers on the other 40,000 or more species that also live in and depend on California? An increasing body of evidence is emerging that indicates non-consumptive recreational activities like hiking and biking, which don't involve harvesting of resources, can have harmful effects on species, their habitat, and efforts to protect them. As our population continues to grow and new and popular recreation technologies develop, California's natural areas are experiencing increased and changing recreation demands, such as increased numbers of hikers, nighttime group trail biking with lights, and electronic mountain bikes in wilderness areas.

Many federal, state, and local agencies' missions include non-consumptive, outdoor recreation, since it is often believed to be consistent with wildlife conservation. It is also widely believed that those who know and observe Nature are more likely to appreciate and protect her resources. Recently, however, several sites acquired primarily for conservation have experienced extreme recreation pressures such as the Disney-like crowds coming out to see “superblooms” of native flowers of the desert in the spring or mountain biking occurring in areas where it is illegal along with the creation of several miles of unauthorized trails. So, how can we continue to provide for and manage appropriate, legal recreation opportunities while also protecting California’s amazing and vast diversity of plants, fish, and other wildlife species and their habitats? How and where can we acquire separate lands for recreation access and for protecting habitat instead of frequently demanding too much recreation access on lands set aside for conservation of species and habitat? And, how can we facilitate various consumptive and non-consumptive recreation groups (e.g., hikers, mountain bikers, equestrians, off-highway vehicle users, hunters, anglers) and conservation groups (e.g., environmental activists, land trusts, resource agencies) to work together to advocate for acquiring and managing separate recreation and conservation lands instead of increasingly coming into conflict with one another over the use of the same lands for both purposes?

This special edition journal seeks to tackle this and related questions. In the introductory essay, “Non-consumptive Recreation & Wildlife Conservation: Coexistence through Collaboration,” Dr. Ashley D’Antonio points out the unique need and opportunity California has for addressing recreation use as a social-ecological system (SES) based on its high biodiversity and quickly increasing recreation use of protected lands. Mitrovich, Larson, Barrows, Beck, and Unger, in “Balancing Conservation and Recreation,” point to a need for recreation and conservation stakeholders to work together to ensure that sufficient areas are acquired for both uses and to help plan and manage conservation lands better to reduce adverse effects on wildlife and natural resources. They summarize some of the varied research going on in the field, on wildlife behavior and physiology, habitat degradation and fragmentation, reproduction and survival, community composition and richness, and other topics. Indirect effects like the shifts in day and night activity patterns between predators and prey lead to questions on what effects that has on wildlife interactions and possible changes that may lead to in a whole ecosystem. Two case studies cover visitor perceptions and values, and the importance of having groups with different values come together and work through their differences to build trust and facilitate better management decisions and stakeholder support.

The research paper, “Increased hiking and mountain biking are associated with declines in urban mammal activity,” by Larson, Reed, and Crooks provides findings on how some wildlife can respond rapidly to changes in the levels of human disturbance, which may help planners design targeted trail closures to reduce recreation impacts in important areas. Townsend, Hammerich, and Halbur conducted somewhat similar research to that of Larson, Reed, and Crooks and present their findings in “Wildlife occupancy and trail use before and after a park opens to the public.” Their research provides good insights into how differently various wildlife species respond to trail use by people, including strong differences in how soon and how much species may habituate to people’s presence. Baas, Dupler, Smith, and Carnes make the case in “An assessment of non-consumptive recreation effects on wildlife: current and future research, management implications, and next steps” for doing more research to help wildlife and park managers more effectively manage and respond to non-consumptive recreation impacts on wildlife species and their habitats.

Elizabeth Lucas points out deficiencies and a need to improve how recreation is sited, monitored, managed, and enforced in protected areas in her paper, “Recreation-related disturbance to wildlife in California – better planning for and management of recreation are vital to conserve wildlife in protected areas where recreation occurs.” She also provides a review of several research papers in her paper, “A review of trail-related fragmentation, unauthorized trails, and other aspects of recreation ecology in protected areas.” Elizabeth points out the need for sufficient funding, science-based approaches to managing protected areas, and educating the public on recreation effects on wildlife, to achieve real protection of species and to retain the benefits of the protected lands. Elizabeth suggests several funding options including a compelling argument for establishing a recreation equipment excise fee or tax like those paid for over 80 years now by hunters and anglers to benefit habitat conservation. With so much use of outdoor areas now by “non-consumptive” recreation uses, and with declining popularity of hunting activities in the population at large, is it time to institute such a change for recreational users to pay their share of conserving and managing habitat?

Together, the articles in this special journal edition cover a broad array of research on recreation effects on wildlife. They provide interesting perspectives and offer a variety of solutions. Learning how to best manage non-consumptive recreation to provide great outdoor experiences while minimizing harmful effects on wildlife will continue to evolve as we learn more from research and experience. We hope that you find this special edition journal useful in your own exploration of this important and emerging field.

“Keep close to Nature’s heart… and break clear away, once in a while, and climb a mountain or spend a week in the woods. Wash your spirit clean.” *–John Muir*

Introduction--continued

NON-CONSUMPTIVE RECREATION AND WILDLIFE CONSERVATION: COEXISTENCE THROUGH COLLABORATION

ASHLEY D’ANTONIO, PHD, *Assistant Professor in Nature-Based Recreation Management, Gene D. Knudson Forestry Chair, Department of Forest Ecosystems and Society, Oregon State University*

The most basic principle in the field of recreation ecology—an interdisciplinary field that studies the ecological impacts of recreational activities and the management of these impacts—is that if outdoor recreation is allowed in an area, impacts to that ecosystem are inevitable. It is also established that outdoor recreation has a myriad of benefits to society that range from economic growth, improved human health and well-being, community building, and increases in an individual’s connection to nature. Moreover, outdoor recreation is one of the primary mechanisms by which humans interact with the natural world in contemporary society. As a result, many county, state, and federal park and protected area (PPA) managers around the United States (U.S.) are faced with mandates or missions that require conserving natural resources while also providing quality outdoor recreation experiences. Key challenges facing researchers, conservation practitioners, and PPA managers as they try to balance conservation goals with recreation access are: understanding the mechanism and the level and extent of these impacts; identifying what level of negative impact, if any, is acceptable; and deciding how to mitigate or manage these impacts.

Within recreation ecology, the impacts from recreation to ecosystem components such as soil and vegetation are relatively well studied. The negative impacts of recreation to environmental factors such as water, air quality, soundscapes, and wildlife are less well understood. Studying the relationships between non-consumptive recreation use and impacts to wildlife can be complex. Part of this complexity is because impacts to wildlife can be direct (e.g., harassment or feeding) and/or indirect (i.e., habitat modification) and at times can be hard to measure or observe (e.g., changes in stress hormone levels in response to recreation presence) as compared to soil or vegetation impacts. Additionally, impacts from non-consumptive recreation use can be interacting with, or compounded by, other ecosystem pressures. These added pressures include, but are not limited to, habitat loss due to development or changes in land use, pressures from consumptive recreation (hunting or fishing), and/or climate change. Moreover, impacts at the wildlife population or community level often require long-term studies, which are somewhat rare in recreation ecology but admittedly more common in the wildlife sciences.

Despite these challenges, there is a recent resurgence of interest in studying the impacts of non-consumptive recreation use on wildlife species. Meanwhile, there is a recognition that studies focusing only on the social or human aspects of a PPA system are insufficient to address current recreation and conservation issues, especially those related to wildlife. Many recreation ecologists, conservation scientists, and managers have begun to view outdoor recreation in PPAs as a complex social-ecological system (SES). As such, we must enhance our understanding of the interactions and intersections between both the ecological and social systems that make up our PPAs. Addressing wildlife conservation and recreation access in PPAs requires SES-focused thinking and collaborative problem solving.

The rich social and ecological systems comprising California make this state an excellent place to begin to address recreation use through an SES framework. California is one of the most biodiverse states in the U.S. and while 47% of the state is currently protected, 97% of these protected lands are opened to human access. Non-consumptive recreation use in PPA has increased rapidly in recent years across the U.S. but especially in Western states. California State Parks saw a 10% increase in total visitation numbers from the 2015/16 to 2016/17 fiscal year and many California national parks have seen exponential growth in visitation in recent years. As the U.S population becomes increasingly suburban and urban, PPAs that provide refugia and critical habitat for wildlife face increasing pressure from land use change and suburban expansion. Within California, this trend is evident as the state's population continues to grow while land use change, extreme droughts, and development increases pressure on California's PPAs.

Currently, PPAs and open space are limited, and wildlife species and their habitat face many ecological pressures. We are on the cusp of a resurgence and upswell of research exploring non-consumptive recreation impacts on wildlife. However, to meet conservation objectives, additional research is still needed to best inform recreation management in PPAs. Conserving and protecting wildlife species while providing quality recreation experiences to society requires interdisciplinary and transdisciplinary teams of researchers, managers, practitioners, stakeholders, and the public working together towards shared goals and objectives. Because of the social and ecological complexities and uncertainties around recreation impacts to wildlife, no individual field of science or management entity will be able to address this issue on its own. As such, this special issue is timely and important as it adds to the body of literature aimed at understanding non-consumptive recreation impacts to wildlife. Additionally, this special issue serves as a starting point for cooperatively exploring the challenge of protecting wildlife while balancing non-consumptive recreation use. If we are to meet conservation goals related to wildlife and wildlife habitat, it may not be appropriate to allow recreation use in all PPAs and at all times. However, collaborative dialogues (informed by the SES framework) around wildlife conservation are essential to guide decisions related to where, when, and how non-consumptive recreation use should be permitted in our PPAs.

California Fish and Wildlife, Recreation Special Issue; 11-28; 2020

Balancing conservation and recreation

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Key words: California, equestrian, Habitat Conservation Plans, hiking, horseback riding, human dimensions, Natural Community Conservation Plans, mountain biking, trails, wildlife

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As California's population has grown to nearly 40 million people, and as the State's beautiful natural diversity draws tourists and explorers from around the world, outdoor recreation has also grown (California Department of Parks and Recreation 2013, 2017; Monz et al. 2019). New equipment and technology enable new activities, such as night-time mountain biking, while social media brings increasing numbers of people to areas seldom visited by people only ten or twenty years ago. With increased time and more sedentary work environments, our society is understandably demanding greater access to more land for outdoor recreation. However, since several species-protection challenges already exist throughout the State due to development, fragmentation, invasive species, altered fire regimes, and climate change, consideration of opening up additional wildlands for recreation presents new challenges to conservation.

Outdoor engagement with natural areas is recognized as a necessary part of people's well-being, yet recreationists are generally attracted to the same high-value open spaces and natural areas that harbor diverse plant and animal communities (Mancini et al. 2018). Accordingly, trails, access points, and associated infrastructure need to be planned and managed appropriately to complement, rather than diminish, conservation values of lands dedicated to the protection of species and their habitats. In the absence of good planning, recreation-conservation conflicts are increasing, polarizing these two stakeholder groups and eroding their natural affinity and alliance. When conservation and recreation interest groups work together and conservation and recreation lands are planned and managed based on scientific research, a new opportunity emerges for a coordinated approach to protecting California's wildlife while also meeting the demand for high-quality recreational opportunities for diverse user groups.

Recreation and conservation interests would benefit from regular dialogue and collaboration with each other and with federal, state, and local land use authorities regarding regional and local land use planning, acquisitions, and management. A shared, basic understanding of applicable conservation objectives and regulations would provide context and perspective for recreational users and serve to help the two groups work together to ensure each of their interests are served rather than their respective needs being compromised. Without a close alliance among recreation and conservation interests, California risks having insufficient land areas set aside for the thousands of species that depend on California's natural areas, inadequate areas for recreation, and increasing conflicts between conservation and recreation needs. The necessary conversations, research, and determination to collaborate should be embraced and acted upon as soon as possible to help address these needs, reduce the potential for polarization among these stakeholders, and help ensure good land use planning and management decisions are made as development proceeds.

In this essay, we provide an overview of the mechanisms available to implement conservation in California and introduce many of the issues attributed to outdoor recreation when managing for wildlife and natural resources on conservation lands and other public open spaces. We then describe two case studies from our work in southern California that highlight the perceptions and values of outdoor recreationists when visiting conserved lands. The case studies also demonstrate what a successful balance between conservation and recreation uses can look like when moving from conflict to collaboration. We end with a discussion of what is required to achieve that balance and ways to minimize the impacts of outdoor recreation on wildlife and other natural resources.

CONSERVATION CONTEXT

As California's population grew from a few hundred thousand to nearly 40 million people in less than two hundred years, numerous species' populations have declined. Some, like the iconic grizzly bear (*Ursus arctos horribilis*), are now extinct in the state. Over 450 plant and animal species in California are now listed by the federal or state government as threatened or endangered (CDFW 2019). The cost of species recovery can be enormous, such as the tens of millions of dollars spent to save the majestic California condor (*Gymnogyps californianus*; Walters et al. 2010). To prevent further species declines, a number of laws and regulations exist to avoid, minimize, or compensate for impacts of human activities on species. In California, these include the federal Endangered Species Act (ESA), the California Endangered Species Act (CESA), the National Environmental Policy Act (NEPA), the California Environmental Quality Act (CEQA), among others. Approximately half of California is federally or state-owned lands with a variety of uses, from national forests and state parks to multi-use areas and reserves. In addition to these areas, an appreciable amount of land is conserved in California as mitigation under ESA, CESA, CEQA, and other laws and regulations.

Successful conservation leads to the protection of species and habitat and the preservation of natural landscapes. Principal types of conservation lands in California include reserves acquired and managed as part of Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs), national parks and monuments, state ecological reserves and wildlife areas, state parks, lands owned by private entities (e.g., land trusts), lands with conservation easements, and mitigation lands. The relative importance of conservation and recreation values to the management goals of these lands vary. For example, state and national parks generally emphasize recreational uses more than mitigation lands and ecological reserves. Sixteen HCP/NCCPs have been approved in California covering part or all of seven counties. Through the new Regional Conservation Investment Strategy (RCIS) Program established in 2017, one RCIS has been approved and an additional eight Regional Conservation Investment Strategies (RCISs) are currently in development or have been submitted for review and approval by the Department of Fish and Wildlife (for more information about RCIS and NCCP programs, see Appendix I). The nine RCISs together will cover part or all of 11 counties. There are also over 130 conservation and mitigation banks in the state, privately held conservation lands, and hundreds of mitigation sites. In total, tens of thousands of acres of habitat have been conserved in California through proactive investments and mitigation. Over one and one-half million acres will be conserved in California under approved HCP/NCCPs, benefiting hundreds of species listed as endangered or threatened under federal and state species protection laws.

OUTDOOR RECREATION

Millions of Californians and visitors recreate outdoors on natural lands within the state each year (Outdoor Industry Association 2019). Examples of outdoor recreation activities include hiking, trail running, mountain biking, horseback riding, backpacking, camping, and motorized activities. The positive effects of outdoor recreation are numerous. Stewardship values are enhanced. Appreciation of nature is magnified as people are exposed to the inherent beauty, complexity, and serenity of natural systems. The next generation of land stewards and conservationists are born out of the experience of being introduced to wildlands when young. Equally important, the mental health benefits of exposure to the outdoors and participation in nature are now well-recognized (Louv 2005; Thomsen et al. 2018). For a society that is increasingly becoming more urban and digital, the restorative properties of nature and the increased social well-being of individuals and communities is ever more important.

Despite these benefits, the negative effects of recreation on wildlife can be profoundly damaging to species and their habitats and must be considered when planning for conservation areas (Hammitt et al. 2015). Trails lead to habitat degradation and fragmentation, which increase when visitors go off-trail and informal trails proliferate. Harassment of wildlife, though often unintended, occurs with increased visitation to an area. Less obvious impacts to wildlife, not easily measured, have been tied to noise, light pollution, trash, and other factors associated with recreation activities.

In general, it can be difficult to accept that recreation activities, especially quiet, non-motorized activities like hiking and mountain biking, can have harmful effects on wildlife. Many types of recreation cause little physical habitat change. Perhaps as a result, recreation was widely assumed to be a "benign use" that is compatible with conservation goals (Knight and Gutzwiller 1995) and is permitted in the vast majority of protected areas worldwide (Eagles et al. 2002; IUCN and UNEP 2014). Many HCP/NCCPs include a general provision that allows for "low-impact nature trails" without strongly defining what that means and what types and levels of use would be acceptable, given the species that are to be protected. The viewpoint that recreation is a benign use may be changing, however. In recent years, researchers have found evidence that a variety of recreation activities and intensities can have detrimental impacts on wildlife (Geffory et al. 2015; Larson et al. 2016; Samia et al. 2017).

RECREATION EFFECTS ON WILDLIFE

Behavior, activity budgets, and physiology

Behavioral reactions, such as flight, flushing, or vigilance are some of the most commonly-observed and studied wildlife responses to recreationists (Larson et al. 2016). Changes in activity budgets have also been observed, with animals typically spending less time in activities such as foraging and caring for young and more time moving or being vigilant when recreationists are present (Schummer and Eddleman 2003; Arlettaz et al. 2015). Physiological responses, such as increases in stress hormones (Arlettaz et al. 2007) or decreased body mass (McGrann et al. 2006), are less obvious to observe, and can occur even when a corresponding behavioral response does not. It is critical not to assume that an animal is tolerant of recreation simply because it does not exhibit a visible response.

Habitat degradation and fragmentation

Recreation can degrade or fragment habitat, resulting in habitat that is otherwise of high quality being used less frequently or not at all. This is particularly concerning in highly fragmented or developed landscapes where remaining habitat is scarce and there is limited opportunity for wildlife to move to alternative areas. Researchers have observed avoidance of areas used by recreationists in species as diverse as grizzly bears (Coleman et al. 2013), wolverines (*Gulo gulo*; Heinemeyer et al. 2019), caribou (*Rangifer tarandus*; Lesmerises et al. 2018), capercaillie (*Tetrao urogallus*; Coppes et al. 2017), and dolphins (*Tursiops* spp.; Lusseau 2005).

Reproduction, survival, and abundance

Assessing recreation's impacts on wildlife population abundance or vital rates can be difficult and time-consuming, and is therefore largely unknown. In one of the few studies of population trends in relation to recreation, Garber and Burger's long-term study (1995) observed dramatic declines in North American wood turtle populations after the area was opened to recreation. Reproductive success is one of the better-studied population vital rates; negative effects of recreation on reproductive success have been observed in several species including elk (*Cervus canadensis*; Shively et al. 2005), penguins (Giese 1996; Lynch et al. 2010), and plovers (*Charadrius* spp.; Lafferty et al. 2006; Yasué and Dearden 2006). However, other studies have found that habituation can moderate impacts of recreation on reproductive success (Baudains and Lloyd 2007).

Community composition and richness

Within an ecological community, species respond to recreation differently. This can lead to changes in community composition if more sensitive species avoid areas with recreation or decline in abundance while the habitat use or abundance of tolerant species remains constant or even increases due to reduced competition. When the sensitive species are native and the more tolerant species are non-native, this can lead to dramatic declines of native species as compared to their non-native counterparts (Reed and Merenlender 2008). Overall species richness can also decline if sensitive species disappear from local communities (Bötsch et al. 2018).

Indirect effects

Recreation can also cause other changes that indirectly affect wildlife, many of which are not well understood. Shifts in diel activity patterns could change the way that species interact with each other or with their environment, potentially leading to increased interspecific competition during nighttime hours or increased overlap between predators and their prey (Gaynor et al. 2018). Recreation can facilitate the spread of non-native species in freshwater, marine, and terrestrial environments (Anderson et al. 2015), which can have dramatic effects on native wildlife. Recreation activities also often involve infrastructure (e.g., parking lots, maintenance buildings, roads, ski lifts), which can lead to further habitat loss and fragmentation (Nellemann et al. 2010).

Examples of recreation impacts from southern California

Examples from southern California, where much of our work occurs, highlight some of the many ways recreation can impact natural resources. Results of ten years of camera-trap studies on conservation lands in Orange County indicate mule deer (*Odocoileus hemionus*) and coyotes (*Canis latrans*) are shifting the timing of activity due to the presence of humans on trails creating novel predator-prey conflicts for wildlife (Patten et al. 2017). Observed shifts toward more nocturnal activity by both species leads to greater temporal overlap in activity periods between mule deer and their principal predator, the mountain lion (*Puma concolor;* Figure 1). Greater overlap between coyotes and gray foxes (*Urocyon cinereoargenteus*) has also been observed, leading to predicted changes in predator-prey dynamics.

Bobcat (*Lynx rufus*) movement modeling using more than ten years of telemetry data in the 7,284-ha South Coast Wilderness of coastal Orange County highlights the importance of maintaining regional connectivity among isolated parcels and continued exclusion of human presence at culverts and other critical linkage points along the coast (Boydston and Tracey 2018). Within landscapes containing natural areas constrained by development, protected habitat and other high-value open space is a premium for wildlife. Providing for safe, unobstructed passage for wildlife among isolated parcels, especially at culverts and other pinch-points, is essential to enable access to high-value habitat within these otherwise constrained landscapes.

In heavily used open space areas, some wildlife appear to develop a tolerance for regular human activity on trails over time. However, patterns of wildlife habitat use can be disrupted by disturbances occurring outside this regular activity, such as large recreation events, off-trail visitor behavior, or the proliferation of new social trails, even in areas that traditionally see high levels of visitor use. At a local scale, observations of breeding bird behavior before, during, and after a mountain bike race at a wilderness park in Orange County highlights elements of both sides of this phenomenon (Hamilton et al. 2015). In this example, breeding bird behavior continued uninterrupted in areas experiencing similar amounts of activity along the racecourse during the event as to what was experienced prior. As people gathered in numbers on and off the trail at the designated start/end staging area for the event, evidence suggests behavior was disrupted as the sheer volume and continual

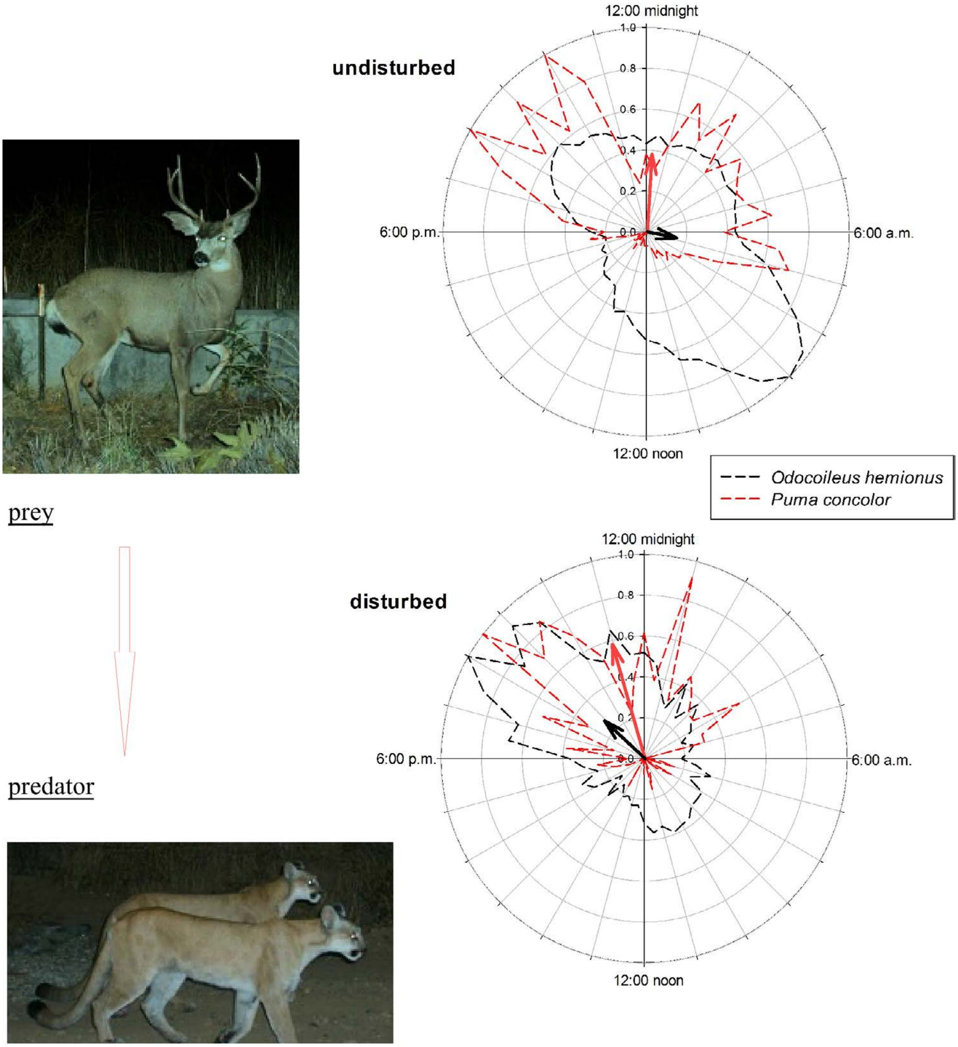

Figure 1. Diel activity of the mule deer and mountain lion with or without human disturbance. Arrows indicate time (direction) and proportional magnitude (length) of mean activity, and the "net" displays the spread of activity on a 24-h clock, binned at 30-minute intervals. Note the prey's (the deer) nocturnal shift when disturbance was present. (Figure credit: Patten et al. 2019)

presence of people gathered around the staging area was atypical for this location within the park.

CASE STUDY:

UNDERSTANDING VISITOR PERCEPTIONS AND VALUES IN ORANGE COUNTY

To successfully strike a balance, we need to know more about the human perspective of conservation. By surveying visitors to protected natural areas in southern California over the last couple of years, we learned there is potential for a shared vision of nature protection addressing the needs of both conservationists and outdoor recreationists. Clearly the issues are complex, but with good planning and communication, much can be done to support the creation of a collective vision for compatible conservation and recreation.

Natural Communities Coalition (NCC) is the non-profit management corporation overseeing implementation of the conservation strategy for the County of Orange Central and Coastal Subregion NCCP/HCP. Stretching from the Newport Coast to the Santa Ana Mountains, over 20,200 ha (50,000 acres) of conserved lands together with National Forest are embedded within the conservation plan's 84,000-ha (208,000-acre) planning area. The 75-year plan, signed in 1996, was the first landscape-scale NCCP in the state and one of the first multi-species HCPs nationally.

With 3.2 million residents in Orange County (Center for Demographic Research 2019), the demand for outdoor recreation on lands protected for conservation purposes is ever-present and increasing. Equally important is the recognized need and desire by the community to conserve the rich natural heritage of the southern California region. In Orange County, like in other high-value natural areas of the state experiencing rapid population growth, there is a strong need to strike a balance between conservation and recreation.

Recreation management is one of four main tenets of the regional landscape-level conservation strategy managed by NCC. Recognizing the increasing need to address this topic, NCC staff began focused and meaningful conversations with recreation ecologists and then followed with talking directly to park visitors to understand the human dimensions, that is, the motivations, desires, and values of visitors to the conserved lands. Partnering with Dr. Christopher Monz, Professor of Recreation Resources Management in the Department of Environment and Society at Utah State University, the organization surveyed close to 2,000 visitors in the spring and fall seasons of 2017 and in the spring of 2018 to better understand their perceptions, values, and characteristics (Sisneros-Kidd et al. 2019). In this process, the research team used a theoretical framework that allowed for the identification of internal constructs embedded within visitor questionnaires to reveal motivations and define different user groups. Through the work, two principal groups or clusters of visitors were discovered, those who are motivated most by the opportunity to experience nature immersion and those who are more focused on fitness-based recreation.

Surprisingly, given the urban-proximate setting, and in contrast to the expectations of local land managers, by almost two to one, recreationists were looking to experience nature immersion compared to those seeking fitness-based recreation. These visitors were more motivated by solitude and escape, learning about and experiencing nature, spiritual renewal, and the social experience, versus those in the fitness-based recreation group who were motivated principally by challenge and outdoor exercise. Learning that the motivation and values of most visitors are more in alignment with resource protection than expected, we had to shift our thinking. Rather than focusing on direct conflict between recreation and conservation, we had to reevaluate how the conversation about balancing recreation and conservation is framed. Knowing it is often the most vocal and well-organized user groups who receive the greatest attention, whether from rangers at a local park or elected officials at a public meeting, we recognized it was of value for decision-makers to be informed of the findings and equally consider the motivations, values, and desires of the quiet majority in these public spaces and forums.

Digging deeper into the results of the work, we found people largely recognize the value of habitat and natural resource conservation; however, they too want to be part of the story. People do not want to be left "standing on the sidelines or looking over the fence;" they want to experience the rich natural resources that make California so unique. When asked how satisfied they were in their ability to achieve a variety of experiences during their visit to a park, visitors reported they were often left wanting more when it came to learning about nature and becoming more in touch with their spiritual values.

Visitor responses indicated they experience place attachment. When asked, they recognize the lands upon which they choose to regularly recreate are not necessarily unique relative to other protected areas. However, to them these lands and parks are special, meaningful, and important. Place attachment may be reflected in the high repeat visitation rates of visitors. More than half of those surveyed visited parks more than 50 times within the same year. Furthermore, many of the visitors live within neighboring communities. For almost half of the parks included in the study, more than 25% of visitors live within 3 miles of an entrance location (Mitrovich, unpublished data). To these people, the parks are a recognized and utilized part of their local community's resources.

Recreation is multidimensional and multifaceted, and we recognize a more sophisticated approach to finding solutions is warranted when seeking to minimize recreational impacts on sensitive natural resources. Impacts and motivations vary by user group, as does the attractiveness of different topography. From the surveys, we learned mountain bikers look to avoid crowds, are most knowledgeable about "leave no trace," most interested in more trails, and most likely of all user groups to be satisfied in their ability to get away from the demands of life when out on trails. Dog walkers, on the other hand, were least knowledgeable about "leave no trace," most avoided by other recreational groups, and least satisfied in their park experiences as it relates to their ability to learn more about plants and animals. Some hikers and runners were concerned about the number of mountain bikers they encountered in particular parks and along certain trails. Different topographic features attracted different users. Steep trails that offer high speeds and technical challenges are attractive to mountain bikers but can be off-putting to other user groups. In unregulated spaces popular with the masses and advertised through social media, trails can be degraded and spider, further fragmenting and degrading available habitat. The overlap between areas used for recreation and high-value wildlife habitat may be greatest with nature-based recreationists.

One positive take-home, as we look for solutions, is that visitors in urban landscapes are much more tolerant of crowded conditions than previously recognized by land managers. Parks in Orange County have seen a dramatic increase in use over the last decade, with increases of greater than 50% not uncommon over a 4-year period (Monz et al. 2019). However, at many parks considered to be "crowded" by land managers, over 80% of respondents surveyed did not feel the presence of other people on the trail interfered with their activities or made them feel rushed or slowed them down during their visit. Equally, over 80% of respondents in 2018 did not feel the number of people at the park increased their risk of injury.

Although many folks are comfortable in a more crowded space, not everyone is comfortable with the changing dynamics and increases in observed use experienced over the last decade. Across both before-mentioned measures, there were respondents that felt the number of people at the park during their visit did increase their risk of injury at least some of the time, and other visitors and their activities interfered with their visit. Like wildlife, it appears people's tolerance of novel conditions is not fully universal and may differ across generations, by past experiences, and expectations (Shelby et al. 1983). When coupled with their understanding that off-trail activity is most impactful, the general tolerance of folks to increased visitation rates gives hope as we look for solutions to meeting increased demand while paying the necessary attention to detail to create the recreational opportunities valued by most that continue to honor the shared commitment and need for lasting conservation.

CASE STUDY:

CONFLICT TO COLLABORATION IN THE COACHELLA VALLEY

Now we turn to one example of how a region is addressing the question, what to do when trail users and sensitive species like the same habitat? Like other areas of southern California, the Coachella Valley in the desert and mountain regions of eastern Riverside County has seen a remarkable increase in the demand for outdoor recreation on trails, especially hiking and mountain biking. In this desert resort area, land of more than 100 lush golf courses, demand for golf is flat, while hiking has surged in popularity, in large part due to the influence of social media.

In 2008, the California Department of Fish and Wildlife (CDFW) and the U.S. Fish and Wildlife Service (USFWS) approved the Coachella Valley Multiple Species Habitat Conservation Plan/Natural Community Conservation Plan (CVNCCP) with a 75-year permit. Like other efforts in California and beyond, it was a visionary effort to balance conservation and development. The plan encompasses an area of almost 500,000 ha (1.1 million acres) from Palm Springs to the Salton Sea and beyond. Implementation of the plan is overseen by the Coachella Valley Conservation Commission (CVCC), made up of elected officials from participating cities, Riverside County, local water districts, and other agencies.

However, several years earlier, the conflict between trail users and agency biologists nearly derailed the CVNCCP. During development of the plan, proposals by state and federal wildlife agencies to impose seasonal closures on some trails galvanized trail users to organize and turn out in large numbers at public hearings. The proposal to close trails centered on concerns about the impacts of trail use on Peninsular bighorn sheep (*Ovis canadensis nelsoni*), a state and federally listed endangered species (Figure 2). In response, trail users read scientific literature, interviewed bighorn sheep biologists, and questioned the scientific basis of the trail restrictions. They used their newfound knowledge and spoke passionately about their concerns to elected officials, often quoting published scientists.

When the CVNCCP was approved in 2008, it did not include the trail closures that had been envisioned. Public input from trail users convinced decision-makers to avoid these measures. It also convinced conservation planners that a full trails management plan needed to be developed for the CVNCCP. Unfortunately, the process also left trail users alienated and with a lack of trust in the state and federal wildlife agencies. Wildlife agencies were suspicious of trail users' motivations. It would be years before these attitudes changed. Trail users seeking nature immersion, who could have been a natural constituency for support of the conservation proposed by the CVNCCP, continued to question the scientific basis of the trails plan. Even after the CVNCCP was completed and fully permitted, the lack of trust remained.

To provide a forum for input from trail users and local governments, the final CVNCCP called for formation of a Trails Management Subcommittee, composed of a representative from each of nine cities involved in the CVNCCP, the Agua Caliente Band of Cahuilla Indians, trail user groups (mountain bikers, hikers, equestrians), environmentalists, biologists from CDFW, USFWS, Bureau of Land Management, and other land management agencies. The group was charged with providing recommendations on trails management, annually reviewing the status of bighorn sheep, and communicating trails-related information to stakeholders. Their tasks required them to develop a shared understanding of relevant conservation objectives and regulations while they worked together to accomplish their charge.

Figure 2. In some areas of the Santa Rosa and San Jacinto Mountains National Monument, seasonal trail closures are in place to allow bighorn sheep and other wildlife access to waterholes during the hot summer months. (Photo credit: CDFW)

A dedicated group of volunteers, the subcommittee took their responsibility seriously and worked hard. Meetings were well attended and often animated. Passions flared, and sometimes sparks flew. On occasion, meetings devolved and became acrimonious and full of conflict. Trail users continued to question the scientific basis for trails management actions proposed by "the agencies." Agency biologists doubted the trail users' commitment to the protection of bighorn sheep and were reluctant to share data. Unfortunately, throughout the process, scientifically rigorous data on the effects of trail use on bighorn sheep was limited. The studies needed to understand the relationship between trail use and bighorn sheep had not been done. The CVNCCP was approved in 2008, the year the recession hit and resources for local, state, and federal agencies were further limited by lack of funding.

In 2011, the conflict between recreation and habitat ended up in the state legislature when CDFW closed the upper portion of the very popular Bump and Grind Trail to protect bighorn sheep. Though not a trail which offers the experience of solitude, the Bump and Grind provides a great cardio workout, with hikers numbering more than 1,000 some days. Questioning whether any studies to prove that hikers have an impact on the endangered bighorn had been presented, trail users went to their state legislators. Ultimately, a compromise was worked out and Governor Brown signed legislation in October 2013. The upper Bump and Grind is now closed for three months during the sensitive bighorn sheep lambing season, from February through April, and open for the remaining nine months of each year. The Coachella Valley Conservation Commission worked with CDFW to install a fence to discourage off-trail travel and educational signs about bighorn sheep.

Despite the challenges, the Trails Management Subcommittee persevered. They worked through the challenges, developed more trust, and learned to work together. They completed an update to the 2008 Trails Management Plan in 2014. The updated plan emphasizes the adaptive management approach described in the CVNCCP. It calls for research on the relationship between bighorn sheep habitat use and trail use, prior to construction of new trails. Technology has made such research more feasible, especially in the rugged and remote terrain of the Santa Rosa and San Jacinto Mountains National Monument. Since 2015, GPS collars have been placed on bighorn sheep, providing data on their movements and habitat use. The CVCC is now working on a study of bighorn sheep and trails, led by Dr. Kathleen Longshore of the U.S. Geological Survey and funded by a grant from CDFW. The trails subcommittee is actively involved with researchers in the development of the study protocol and review of all data. Field work began in fall 2019, with volunteers collecting data on recreational trail use and researchers comparing the human use data with bighorn sheep collar data.

Conflict has been replaced with collaboration. Although all of the best practices were not used initially, when they were used, they became lessons learned. If people understand why, they are more likely to go along with regulations (Marion and Reid 2007). Furthermore, when the need for regulation or constraints are understood, constraints can become a positive as they provide the basis for best practices and assure access via responsible use.

WHAT IS NEEDED TO ACHIEVE BALANCE? WHAT WORKS?

Several land management decisions are being made today with long-term implications for the state of biodiversity and human wellness within California. Without collaboration among recreation and conservation interests, California risks insufficient lands being set aside for the benefit of protecting species, insufficient lands for recreating, and poorly located lands for both purposes, with people and other species suffering the consequences. Recreation and conservation stakeholders need to talk and work with each other and with ecologists and land planners early and often in the regional visioning and land planning process to ensure both interests get what is needed in a way that strikes a balance for species and habitat protection, and people's access to the outdoors.

To achieve a better land use future for conservation and recreation outcomes, we recommend early investment in working relationships. Increased early communication among all stakeholders, land planners, and managers, together with basing decisions on the best available science, can help reduce land use conflicts, the loss of species, and lower-quality recreation experiences. Groups should accept there will be situations when they collectively agree to disagree. However, the long-term commitment to work together will increase the likelihood of achieving goals and objectives for all interests. Most land conserved through public funding sources and/or mitigation and all HCP and NCCP properties have some form of Resource Management Plan (RMP) and/or Conservation Easement attached to them. It is critical RMP's are developed with a "clean slate" to identify critical sensitive species, regional context, and wildlife linkages up front. This, in turn, identifies potential areas appropriate for trails and other recreational uses, thus reducing debate and conflict later.

We also recommend establishing appropriate monitoring programs that are used to evaluate conservation and recreation outcomes and modify management plans to better achieve the original goals and adjust to changing conditions. The wide variety of nature-based recreational activities, timing and frequency of those activities, and numbers of people that participate in them, all result in a complex array of potential effects. Adding to that is the complexity of behavioral responses and sensitivities of different species to those activities. Recognizing this complexity and planning according to research findings that are available, and the anticipated growth or other changes expected, can help planners create conservation areas and recreation areas positioned to avoid future conflicts.

Opportunities to be inclusive and reach out to stakeholders as partners in the long-term management of protected lands are numerous. By simply involving everyone up-front, community members can be engaged early in the planning process and contribute to the search for solutions. Volunteers can help to enforce site rules using peer pressure. They may also be able to help with site maintenance, monitoring, and identification of possible management actions, such as when monitoring information indicates a problem exists. An open phone line to land managers is essential and over time naturally builds relationship and trust.

How can effects be minimized?

Using good science in the decision-making process is key, as is making data transparent and remembering the importance of educating the public throughout the process. Planning efforts should search for and incorporate relevant scientific findings. Despite the variability in species responses to different types and intensities of recreation, researchers have identified some ways to minimize the effects of recreation on wildlife:

- Monitor and prevent unauthorized trail creation and off-trail use. Many animal species respond more strongly to recreationists in unexpected places, such as off-trail (Stankowich 2008; Heinemeyer et al. 2019), so increasing the predictability of human presence by constraining people to the existing trail network may help mitigate negative effects.
- Limit nighttime access to parks and trails. Since people are primarily active during the daytime, many animal species avoid interactions with people by increasing the proportion of their activity that takes place at night (Gaynor et al. 2018). While the

implications of this shift for foraging success and interspecific interactions are largely unknown, limiting activity to daytime hours may be a way for humans and wildlife to coexist in parks and natural areas. Nighttime recreation is growing in popularity but may prevent animals from temporally avoiding people, and should be limited in general, and probably all together avoided in urban-proximate wildland areas where the existence of refugia is already severely limited spatially.

- Leave areas without trails, both within individual properties and at landscape scale. For the most part, research has not yet identified 'safe' levels of human activity that result in minimal negative outcomes for wildlife. Some species appear to respond to very low levels of human activity and would benefit from blocks of trail-free habitat; in one example, mountain lions, coyotes, and bobcats increased nighttime activity and decreased daytime activity in locations with levels of use as low as two people per day (Wang et al. 2015).
- Plan access points and infrastructure carefully. Parking lots and other facilities can increase the level of use at corresponding trails (Larson et al. 2018). On the other hand, a lack of parking space at popular trails can result in public safety issues if visitors park along busy roadways. Improper parking can also impact habitat, which can cascade to impact wildlife as well.
- Use seasonal trail closures during sensitive periods. For many species, the most sensitive period is the breeding period, when disturbance can lead to reduced reproductive success (Bötsch et al. 2017), which in turn can result in population declines.
- Collect visitor use data. Without some knowledge of the intensity and distribution of recreational use, it is difficult for managers to know where and when impacts on sensitive wildlife species may be occurring. Monitoring equipment can be costly to purchase and maintain, but basic measures like periodic manual counts at parking lots or trailheads can be helpful in tracking trends, and there are promising emerging approaches using information that visitors share on social media platforms, mobile devices, and fitness applications (Fisher et al. 2018; Monz et al. 2019; Norman et al. 2019).
- Consider diverse visitor perspectives and values. Employ contemporary scientific approaches so key components in the human dimension of recreation (e.g., perceptions, characteristics, and motivations) can be understood more formally and inform a planning process for long-term sustainable use.
- Determine thresholds of acceptability of key indicators of resource and social conditions. Recognize "carrying capacities" exist for protected lands and their identification is a key component in the planning process and essential to developing a range of possible management actions, from the spatial and temporal separation of different types of recreational uses to acceptance and identification of high and low intensity use areas within the greater protected open space network.

An opportunity is emerging to expand upon local successes and encourage a new dialogue among agencies, conservationists, and recreationists, both at the local level and regionally, in support of the expanded protection of natural lands throughout California. We encourage interested parties to continue to learn more about the use of conservation planning tools and visitor use management made available through the CDFW and USFWS, and Interagency Visitor Use Management Council (Appendix I). Forming partnerships allows stakeholder groups to work together to plan ahead of growth and build regional conservation strategies for the increased protection of natural lands, addressing the long-term conservation needs of California's natural resources and the strong desire of people to experience nature.

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APPENDIX I: AVAILABLE CONSERVATION PLANNING AND VISITOR USE MANAGEMENT TOOLS

Natural Community Conservation Planning

The Natural Community Conservation Planning (NCCP) Program promotes collaborative planning efforts designed to provide for the region-wide conservation of plants, animals, and their habitats, while allowing for compatible and appropriate economic activity. https://www.wildlife.ca.gov/Conservation/Planing/NCCP

Regional Conservation Investment Strategy Program

The Regional Conservation Investment Strategy (RCIS) Program encourages a voluntary, non-regulatory regional planning process intended to result in high-quality conservation outcomes. The Program consists of three components: regional conservation assessments (RCAs), regional conservation investment strategies (RCISs), and mitigation credit agreements (MCAs). https://www.wildlife.ca.gov/Conservation/Planning/Regional-Conservation

Conservation and Mitigation Banking

Conservation and mitigation banking in California is overseen and undertaken by several Federal and State Agencies. The Banking Program coordinates with other agencies and stakeholders to develop statewide policy and guidance for the establishment and operation of conservation and mitigation banks. https://www.wildlife.ca.gov/Conservation/Planning/Banking

Biogeographic Information and Observation System (BIOS)

BIOS is a system designed to enable the management, visualization, and analysis of biogeographic data collected by the California Department of Fish and Wildlife and its Partner Organizations. https://www.wildlife.ca.gov/Data/BIOS

Areas of Conservation Emphasis (ACE)

ACE is a CDFW effort to analyze large amounts of map-based data in a targeted, strategic way, and expressed visually, so decisions can be informed around important goals like conservation of biodiversity, habitat connectivity, and climate change resiliency. https://www.wildlife.ca.gov/Data/Analysis/Ace

Visitor Use Management (VUM) Framework

VUM is a toolbox for visitor use management and addresses conservation issues. The framework also includes topic areas like capacity, indicators and thresholds, as well as the importance for monitoring recreation use. https://visitorusemanagement.nps.gov/VUM/Framework

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Recreation-related disturbance to wildlife in California – better planning for and management of recreation are vital to conserve wildlife in protected areas where recreation occurs

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Expanding levels of authorized and unauthorized non-consumptive recreation increasingly threaten sensitive biological resources in areas protected primarily or solely to conserve them. As California's human population grows, recreational use in protected areas grows commensurately. The majority of the documented effects on wildlife from non-consumptive recreation are negative; they include detrimental changes in behavior, reproduction, growth, immune system function, levels of stress hormones, and finally, to the survival of individual animals and persistence of wildlife populations and communities. This paper provides insights from the recreation ecology literature into these recreation-related disturbances to insects, amphibians, reptiles, birds, and mammals from hiking, jogging, biking, horseback riding, boating, and off-highway/all-terrain vehicles. The documented evidence of these disturbances to wildlife reveals the flaw in the prevalent assumption that recreation is compatible with biological conservation, the dual-role protected areas' core function. This assumption usually rests on the expectations of (1) allowing only ecologically sound siting of recreational areas and ecologically acceptable types, levels, and timing of recreation, and (2) providing sufficient monitoring, management, and enforcement of recreation to ensure the perpetuation of viable populations of focal sensitive species. However, it is rare that these expectations are met. The ultimate essential outcome of the information provided in this paper is the cessation of the extant recreation-related exploitation of dual-role protected areas. This calls for a societal course change involving: widespread, long-term, and continual multimedia dissemination of the science-based information about recreation-related disturbance to wildlife; application of a science-based approach to siting recreational areas and allowing only ecologically acceptable types, levels, and timing of recreation; and, perpetual personnel and funding explicitly for management at levels commensurate with recreational pressure. These measures would also improve the often cited economic, educational, and recreational/health benefits of dual-role protected areas.

Key words: dual-role protected areas, enforcement, fragmentation, management, multimedia education, non-consumptive recreation, perpetual funding, planning and siting of trail networks, recreational disturbance to wildlife, unauthorized trails

Conserving habitats is a key strategy for conserving biodiversity worldwide (Pickering 2010). In California, the core function of many areas protected for conservation is to ensure the perpetuation of sensitive species (i.e., species whose persistence is jeopardized), as is appropriate for the nation's most biologically diverse state (CDFW 2015). The level of land conservation that California enjoys is intended to ensure that the state's globally renowned biodiversity remains intact. However, of all the states in the USA, California hosts the most listed species imperiled by recreation, in part because the strongest association of outdoor recreation is with urbanization (Czech et al. 2000), which is itself an important cause of endangerment (Reed et al. 2014). The anticipated growth of the state's human population from approximately 38 million in 2013 to 50 million by mid-century with a commensurate increase in recreational demands in protected areas will likely increase the continual challenge of conserving the state's wildlife (CDFW 2015).[1, 2] The dual role of protected areas to conserve biodiversity and provide nature-based recreational and educational opportunities for millions of people rests on the assumption that non-consumptive recreation is compatible with wildlife conservation, despite documented evidence to the contrary (Reed and Merenlender 2008; Larson et al. 2016; Hennings 2017; Dertien et al. 2018; Reed et al. 2019).[3] Ecologically sound types, levels, timing, and siting of recreation, and perpetual management of recreation at or exceeding a level commensurate with the recreational pressure, are vital to ensure the perpetuation of viable populations of focal sensitive species in "dual-role" protected areas.[4, 5]

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[1] Protected areas include locally-owned lands (e.g., county and city reserves), state-owned lands (e.g., ecological reserves, wildlife areas, state parks), federally owned lands (e.g., national wildlife refuges, wilderness areas), and privately owned lands (e.g., conservation easements, conservancy lands, mitigation banks and lands). Here, the focus is on protected areas preserved primarily or solely for the perpetuation of sensitive species (e.g., ecological reserves, protected areas established pursuant to Natural Community Conservation Plans and/or Habitat Conservation Plans, mitigation banks and lands).

[2] Wildlife means all wild animals: insects, fish, amphibians, reptiles, birds, and mammals.

[3] In contrast to consumptive recreation (e.g., hunting, fishing), non-consumptive recreation is generally assumed not to directly extract a resource; it includes nature and wildlife viewing, beach-going, kayaking, hiking, biking, horseback riding, and wildlife photography (Reed and Merenlender 2008; CDFW 2016; Gutzwiller at el. 2017). From here forward, "recreation" means non-consumptive recreation, unless otherwise stated.

[4] Focal species are organisms whose requirements for survival represent factors important to maintaining ecologically healthy conditions; identified for the purpose of guiding the planning and management of protected areas in a tractable way, focal species include keystone species, umbrella species, flagship species, and indicator species (Soulé and Noss 1998; Marcot and Flather 2007). Here, the term "focal species" is intended to include those species encompassed by the guild surrogate approach of conservation; this approach entails one member or a subset of members serving as a surrogate for other members of the guild (Marcot and Flather 2007).

[5] From here forward, "management" includes monitoring, management, and enforcement with the necessary authority. The level of enforcement necessary is dependent on the level of continual management implemented; generally, the more the management, the less enforcement is necessary. In addition, monitoring and management encompass both the natural resources and human users of the protected areas. The fiscal support to be secured includes personnel and all program costs.

Insights from studies

Purpose.—The purpose of the following discussion is to provide insights to disturbances to several wildlife species from non-consumptive recreation. Accordingly, the insights are exclusively from studies that document recreation-related disturbance to wildlife. This approach reflects the evidence that the majority of documented responses of wildlife species to non-consumptive recreation are negative, as demonstrated in two systematic literature reviews (Reed et al. 2014; Larson et al. 2016) and a literature review of over 500 articles written and reviewed by the scientific community (Hennings 2017). The insights are intended to (1) illustrate that scientific studies provide clear evidence of recreation-related disturbance to wildlife, (2) elicit awareness of and concern about the disturbance, and (3) stimulate action to address it.

Sources and scope.—The 71 articles and 13 reports[6] reviewed about the recreation-related effects on wildlife generally reflect Larson et al.'s (2016) finding that studies about such effects focus on mammals (42%) and birds (37%), followed by invertebrates (12.4%), reptiles (5.5%), fish (5.1%), and amphibians (0.7%); there are no insights herein from studies of fish. Larson et al. (2016) found that some of the least-studied taxonomic groups (i.e., reptiles, amphibians, and invertebrates) had the greatest evidence for negative effects of recreation. While not all the studies selected for this paper address wildlife in California, all the studies' scenarios could occur in the state as do all species types among the studied taxa (i.e., insect, amphibian, reptile, bird, mammal).

Not all of the studies selected for this paper address sensitive species. This is primarily because current research on recreation-related effects on wildlife includes few species of conservation concern (Larson et al. 2016). However, sensitive species may experience greater levels of recreation-related disturbance than described for common species in the study insights herein. This is because many rare and isolated species are specialists, and they may be more sensitive to anthropogenic disturbance, including recreational activities, than common and widely distributed species (Bennett et al. 2013; Reilly et al. 2017). Recreation-related declines of common species warrant attention because of their functional ecological importance – local depletions of common species can have broad consequences within the food web (Säterberg et al. 2013; Baker et al. 2018; Reed et al. 2019). Recreation-related declines or disturbance in an important common prey species may affect the species in higher trophic levels (Reed et al. 2019). More than a quarter of species become functionally extinct before losing 30% of their individuals (Säterberg et al. 2013; Baker et al. 2018; Reed et al. 2019); here, functional extinction occurs when the population size of the depleted species is below the level at which another species goes extinct (Baker et al. 2018).

The scope of this paper does not include studies about snow-based recreation, though all of the 14 articles addressing snow-based recreation that Larsen et al. reviewed reveal that non-motorized and motorized snow-based activities (i.e., skiing, snowshoeing, snowmobiling) can have significant negative effects. Nor does the scope of this paper include studies exclusively about the effects of dogs on wildlife; however, a literature review on the effects of dogs on wildlife concludes that (1) people with dogs on leash, and even moreso

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[6] All the articles are published in peer-reviewed journals. Some of the reports were peer reviewed and all were written by or contributed to by professionals in the fields of biology or ecology, though none of the reports were published in peer-reviewed journals to this author's knowledge (e.g., Burger 2012; Hennings 2017; Dertien et al. 2018; Reed et al. 2019). This paper does not cite all the articles and reports this author read. And, the totals exclude documents that are not explicitly about recreation-related effects on wildlife (e.g., Tinkler et al. 2019; Taff et al. 2019; Wolf et al. 2019) and all newspaper articles.

off leash, are more alarming and detrimental to wildlife than any non-motorized recreational user group without dogs, and (2) people with dogs substantially increase the amount of wildlife habitat affected (Hennings 2016). Hennings (2016) also asserts that wildlife does not appear to habituate to the presence of dogs; effects linger after dogs are gone because the scent of dogs repels wildlife.

Management measures.—The study insights focus on the documented recreation-related disturbance to wildlife, not on management measures to prevent or minimize the disturbance. However, many of the reviewed articles and reports identify such measures, which range from full prohibition of human access, to time-of-access restrictions (e.g., seasonal or diurnal/nocturnal restrictions), to various measures based on disturbance thresholds. Disturbance thresholds are thresholds of various measurable parameters above or below (depending on the parameter) which wildlife is disturbed. Examples of disturbance thresholds are distance between trails and nesting sites, density of active trails, number of recreationists, number of recreational events per time frame, and duration of recreation. These thresholds may be used to establish management measures such as minimum widths of spatial buffers between recreational trails and wildlife.

A common theme among the management measures is that continual proactive and adaptive management is needed to protect wildlife from recreational disturbance, and that access closures should occur if the management fails.[7] Adaptive management is a cornerstone of large-scale multi-species conservation (CDFW 2014). An example of proposed management measures is Dertien et al.'s (2018) recommendation for a precautionary approach that adopts maximum values of quantitative disturbance thresholds observed for the taxa of concern, while excluding the extreme values of the thresholds.[8] This approach stems from the gaps in knowledge about quantitative disturbance thresholds of recreation; such thresholds are lacking for many species, taxonomic groups, and sources of disturbance.

Regarding spatial buffers, a general rule of minimum thresholds for distance to trails cannot be established for some species, as individual variability within species can be high and can differ among populations, types of topography, and frequencies and types of human intrusion (González et al. 2006). For example, Dertien et al. (2018) recommended a 200-m minimum buffer for ungulates; however, this would be insufficient for the circumstances of Taylor and Knight's (2003) study further cited below in which they found that mule deer (*Odocoileus hemionus*) showed a 96% probability of flushing within 100 m of recreationists located off trails, and the probability of their flushing did not drop to 70% until perpendicular distance reached 390 m. Two additional factors that influence the determination of spatial buffers are "effect zones" (i.e., areas within which wildlife is disturbed by recreational ac-

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[7] Based on section 13.5 of the California Fish and Game Code and the Natural Community Conservation Planning Act (i.e., section 2805 of Fish and Game Code), adaptive management generally means (1) improving management of biological resources over time by using new information gathered through monitoring, evaluation, and other credible sources as they become available, and (2) adjusting management strategies and practices accordingly to assist in meeting conservation and management goals (e.g., conservation of covered or focal species). Under adaptive management, program actions are viewed as tools for learning and to inform future actions.

[8] The central tenet behind the precautionary principle is that precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. Generally, the four central components of the principle are: taking preventive action in the face of uncertainty; shifting the burden of proof to the proponents of an activity; exploring a wide range of alternatives to possibly harmful actions; and increasing public participation in decision making (Kriebel et al. 2001). There are subtle differences between the precautionary principle and precautionary approach, but their consideration is beyond the scope of this paper.

tivities on trails) and the density of the trail networks. The effect zones can extend several hundred meters on either side of the trails (Reed et al. 2019). The smaller a protected area is and the denser its trail networks are, the greater the proportion of the protected area is occupied by effect zones, and the less likely it is that spatial buffers such as those Dertien et al. (2018) recommended will protect the focal species from recreational disturbance (Wilcove et al. 1986; Ballantyne et al. 2014).

There are many sources that provide information about management of recreation in protected areas, or guidance on the design or siting of trails/trail networks. These sources include management framework tools designed to address recreational use, though they vary in their attention to the needs of wildlife (Hennings 2017).

Insects

In a study of the effects of walkers, runners, and runners with dogs on the federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*; Karners) at the Indiana Dunes National Lakeshore, USA, Bennett et al. (2013) found that (1) Karners flushed in the presence of recreationists as they would respond to natural agents, such as predators; (2) recreation restricted host-plant choice by reducing host-plant availability, effectively rendering the quality of habitat within 10 m of the trail unsuitable; (3) recreation had the potential to reduce oviposition rate of virtual females by 50%, and therefore population growth rates; (4) the frequency at which recreationists negatively affected the females (including their oviposition) varied substantially with habitat extent, number of recreationists, and sensitivity; and (5) habitat extent was the primary predictor variable. The authors concluded that Karners will experience less recreation-related disturbance the farther their habitat extends beyond trails.

In a study conducted near Palo Alto, California, USA focusing on 10 native oak woodland species of butterflies, Blair and Launer (1997) concluded that even small perturbations by hikers and joggers in a recreational area led to (1) a loss in the number of butterfly species (species richness) of the original oak-woodland community compared to the number of these species in a biological preserve with no recreation, and (2) a lower number of butterflies (abundance) in the recreational area compared to the biological preserve. The authors also concluded that multi-use areas may not adequately preserve butterfly species diversity.

Herpetofauna

Responses of the Iberian frog to recreational activities.—In a study involving field research in the Guadarrama Mountains in central Spain and simulation modelling to assess the effects of recreation on Iberian frogs (*Rana iberica*), an endemic species in decline, Rodríguez-Prieto and Fernández-Juricic (2005) measured frog abundance and response to human disturbance. The authors found that Iberian frog abundance (a population-level parameter): (1) was significantly affected mainly by study site location and distance to the nearest recreational area, a proxy for human disturbance; (2) was positively related to distance from recreational area (i.e., as distance decreased, abundance decreased); and (3) increased as number of humans decreased. With respect to the effects of repeated disturbances (e.g., human approaching with a steady pace) on the individual-level parameters of flight initiation distance[9] and time to resume pre-disturbance activities, the study showed that: (1) frogs' flight initiation distances were longer in areas with less vegetation cover; (2) though the flight initiation distances did not vary with repeated human approaches, the number of repeated human approaches affected the frogs' time to resume pre-disturbance activities, with second and third approaches increasing the time it took frogs to reoccupy the disturbed spot; and (3) there was an 80% decrease in the frogs' stream-bank use with a 5-fold increase in the direct disturbances per hour, and a 100% decrease in stream bank use with a 12-fold increase in human disturbances per hour. The authors concluded that direct human disturbance affects this species at the population level, and that it needs to be considered as a potential factor affecting amphibian populations with low tolerance for disturbance.

Responses of the yellow-blotched map turtle to human disturbance.—In a study along a 300-m reach of the Pascagoula River in southeastern Mississippi, USA, Moore and Siegel (2006) studied the effects from boating, fishing, jet skis, and direct anthropogenic damage to nests on the nesting and basking behavior of the yellow-blotched map turtle (*Graptemys flavimaculata*), listed as threatened under the U.S. Endangered Species Act. With respect to human disturbance of nesting turtles, the authors found that numerous turtles waited several hours near a sandbar before emerging from the water onto the beach to nest, and turtles that attempted to nest upon emerging onto the beach frequently abandoned their efforts and retreated to the water—of a total of 79 nesting attempts, only 15 successfully completed oviposition. With respect to human disturbance of basking turtles, the authors found that the number of turtles disturbed differed significantly with the type of disturbance; specifically, anglers that remained in the basking vicinity caused the most disturbance, and jet-skis caused less than an expected amount of disturbance; this was likely because of the anglers' closeness (compared to the jet-skis) to the basking logs and the long periods they remained, both of which caused turtles to bask less. Moore and Siegel (2006) concluded that: the interruption of nesting activities may have a severe impact on the viability of this population of turtles through changes in numbers of clutches; and, the interruption of basking and consequent reduction in the turtles' body temperature has the potential to negatively affect the ability of all turtles to process and digest food, and the ability of females to develop eggs during the reproductive seasons.

Responses of the common wall lizard to tourism.—In a study of common wall lizards (*Podarcis muralis*) conducted in areas with high and low levels of tourism within the same habitat in the Guadarrama Mountains in central Spain, Amo et al. (2006) examined whether the lizards differed in several parameters upon each human approach. The authors found that: (1) regardless of the level of tourism, lizards usually exhibited anti-predator behavior by fleeing to hide in refuges upon approach of a human; (2) in comparison to lizards inhabiting areas of low tourism pressure, lizards inhabiting areas with high tourism pressure, and therefore presumably escaping to hide in refuges more often, showed a poorer body condition and higher intensity of tick infection at the end of the breeding period; and (3) the intensity of tick infection was higher in male than in female lizards. The authors speculated that the higher intensity of infection probably resulted from the cumulative costs of high frequency of flight, since anti-predatory behaviors such as flight are costly in terms of losing time for other activities, including feeding—nutritional status can affect the capacity

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[9] The flight initiation distance is the distance from an approaching threat (e.g., recreationist) at which an animal initiates moving away to escape from the threat. This movement is a fitness/energy cost to the fleeing animal. For the Iberian frogs, this was the distance between an approaching human and the frog when the latter jumped into the water in response to the human's approach.

of lizards to mount an immune response to infection. Furthermore, lizards with poor body condition had low levels of immune response, which may aggravate the deleterious effects of anti-predatory behavior on body condition. Female lizards in poor body condition produced offspring of small size, and body size of infant lizards can affect their probability of survival. Additionally, females with blood parasites also showed reduced fat stores and produced smaller clutches. By these effects on infants and clutch sizes, tourism may also negatively affect the maintenance of lizards' populations.

Responses of various reptiles to recreationists.—In a study to systematically assess recreationists' direct and indirect effects on sensitive wildlife species in 14 NCCP/HCP protected areas in San Diego County, California, USA, Reed et al. (2019) integrated monitoring of both wildlife species and recreationists (e.g., hikers, mountain biker, horseback riders).[10] The authors found that recreation was associated with declines in reptilian species' richness, occupancy, habitat use, and relative activity in the NCCP/HCP protected areas. Of the three species (all lizards) for which statistical analyses were feasible, two exhibited negative relationships between occupancy and human recreation—the orange-throated whiptail (*Aspidoscelis hyperythra beldingi*, an NCCP/HCP-covered species) and common side-blotched lizard (*Uta stansburiana*).

Birds

General responses.—In Steven et al.'s (2011) review of 69 peer-reviewed articles (50 of which were research conducted in protected areas) of original research on the effects on birds from non-motorized nature-based recreation, 61 articles reported recreation as having negative effects (i.e., negative changes in physiology, behavior, abundance, and reproductive success, the latter including the number of nests, eggs laid, and/or chicks hatched or fledged). The single documented positive effect involved an increase in the abundance of corvids (e.g., crows and ravens) in campgrounds. Walking or hiking, standing or observing birds from viewing platforms or standing next to a nesting colony, dog walking, running, cycling/mountain biking, and canoeing were all reported as negatively affecting birds. A large majority (85–93 %) of the studies that examined the effects of a single person, groups of two or more people, and/or avian population-level responses, reported negative effects. The population-level responses entailed effects on density, abundance, and reproduction.

In a study using data collected in 112 urban parks throughout Melbourne, Australia, Bernard et al. (2018) tested whether birds responded differently to bikers and walkers. They found that: (1) relative to their response to walkers, four of the 12 focal species studied initiated escape from bikers at longer flight initiation distances and two escaped with greater intensity (i.e., more likely to involve flying); (2) no species responded less to bicycles than to walkers; and (3) the flight initiation distance did not differ in response to speed of bicycle travel, though the difference in the two speeds used was only 1 m/sec. In concluding that

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[10] An NCCP (Natural Community Conservation Plan) is a comprehensive, single- or multi-jurisdictional/utility plan that provides for regional habitat and species conservation at an ecosystem level while allowing local land use authorities to better manage growth and development. Upon issuing an NCCP Permit, the California Department of Fish and Wildlife (CDFW) can authorize take of selected state listed species and other species of concern, subject to the terms of coverage under the NCCP (CDFW 2015). An HCP (Habitat Conservation Plan) is the federal counterpart to an NCCP; the U.S. Fish and Wildlife Service prepares HCPs and issues HCP permits. The terms and conditions under which an NCCP/HCP's protected areas are conserved establish the types and levels of public access that are permitted (Burger 2012). The types and levels of public access vary among the NCCP/HCP protected areas from no access to guided-only access to open access. The species protected by NCCPs/HCPs are typically called covered species.

bikers can appear more or less threatening to birds than a single pedestrian, Bernard et al.'s (2018) results underscore that the responses of wildlife to recreational activities vary among species, sites, types of recreation, and exposure over time to the activities.

Songbirds.—Davis et al.'s (2010) study of the effects of mountain biking on golden-cheeked warblers (*Dendroica chrysoparia*, warblers) with nests near biking trails in the Fort Hood Military Base in Killeen, Texas, USA, and the Balcones Canyonlands Preserve in Austin, Texas, found direct and indirect effects. The direct effects included warblers flushing >20 m in response to encounters with passing mountain bikers. Indirect effects included abandonment of nests <2 m from the biking trails and a reduction in the quality of nesting habitat due to biking-related fragmentation and alteration of habitats. In comparison to the control sites, it was likely that habitat fragmentation resulting from trails in the biking sites caused the increased predation of warbler nests by rat snakes (*Elaphe obsoleta*) and other edge-adapted predators. The authors speculated that the biking sites, which were able to maintain viable populations of warblers at the time of the study, may not continue to do so with additional recreational use, fragmentation, and alteration of the habitats.

Forest birds.—Bötsch et al. (2018) examined how breeding-bird communities changed with distance to trails in four broad-leafed and mature forests in Switzerland and France; the forests were similar in size, structure, and trails, but widely different in levels of recreation (mostly walkers). The authors found that: in the forests with high levels of recreation, the density and species richness of birds decreased by 12.6% and 4.0%, respectively, at points close to trails compared to points farther away; cavity, ground, and open-cup nesters had fewer territories and species close to trails compared to farther away; and, above-ground foragers and ground foragers showed a similar pattern. None of these effects on density, species richness, nesting guild, or foraging guild occurred in the forests with low levels of recreation. Both high- and low-sensitivity species (i.e., long versus short flight initiation distances) had fewer territories and fewer species close to versus far from trails in forests with high levels of recreation; however, in forests with low levels of recreation, highly sensitive species exhibited only a slight tendency for fewer territories close to trails. The authors inferred from their findings that (1) human presence in forests disturbs avian community composition and abundance along trails in recreational areas, (2) the overall effect of recreational trails themselves depends mainly on recreational intensity and only slightly on species characteristics, and (3) the observed effects on birds in forests where recreation has occurred for decades suggest that habituation to humans has not outweighed the effects.

Raptors.—In a study along the Boise River in Idaho, USA, examining flight initiation distances of bald eagles (*Haliaeetus leucocephalus*) in response to actual and simulated walkers, joggers, anglers, bikers, and vehicles, Spahr (1990) found that the highest frequency of eagle flushing was associated with walkers, followed by anglers, bikers, joggers, and vehicles. Eagles were most likely to flush when recreationists approached slowly or stopped to observe them, and were less alarmed when bikers or vehicles passed quickly at constant speeds. However, the longest flight initiation distance was in response to bikers, followed by vehicles, walkers, anglers, and joggers. Hennings' (2017) literature review provides the following about bald eagles: pedestrians within 275 m caused a 79% eagle response rate; eagles did not resume eating for four hours after disturbance by walkers; a suggested minimum 600-m buffer around breeding eagles, beyond which response frequency dropped below 30%; an apparent threshold of about 20 daily recreational events after which eagles were slow to resume feeding, and after 40 events, feeding was uncommon; sub-adults were less tolerant of disturbance than adult eagles; and recreation-related long-term effects can include reductions in survival, particularly during winter and especially for juveniles.

With respect to the tolerance (through habitat imprinting, genetic inheritance, or habituation) of golden eagle (*Aquila chrysaetos*) for recreational disturbance, Pauli et al. (2017) used an individual-based model[11] to assess the effects of walkers and off-highway vehicles on golden eagle populations. The primary modeling results indicated that, while golden eagles can develop tolerance for recreational disturbance, tolerance for even moderate levels of disturbance may not develop within a population at a sufficient rate to offset the effects of increased recreation on breeding golden eagles, particularly because this is a long-lived species with low recruitment. Pauli et al. (2017) conclude that, taken together, the simulation results suggest that recreation-related disturbance has a substantial effect on golden eagle populations and that increased recreation activity will exacerbate such effects. Given the results and the fact that non-motorized recreation decreases the probability of egg-laying in golden eagles (Spaul and Heath 2016), the authors asserted that trail management and a reduction in recreation activity within eagle territories are necessary to maintain golden eagle populations in locations where levels of recreation are increasing.

Shorebirds.—In a controlled study conducted in Scotland of the behavioral responses of the ruddy turnstone (*Arenia interpres*) to an approaching human, Beale and Monaghan (2004) found that birds supplemented with food flushed sooner from the human and searched for predators more frequently than birds not supplemented with food. That is, birds responding most were actually the least likely to suffer any fitness consequences associated with the disturbance. This study demonstrates the possibility of misconstruing the reasons for and implications of observed responses among all wildlife species. Traditionally and intuitively, species that readily flee from or avoid human disturbance are considered to be the most in need of protection from disturbance. However, species with little suitable habitat available nearby cannot show marked avoidance of disturbance even if the costs of reduced survival or reproductive success are high, whereas species with many nearby alternative sites to move to are likely to move away from disturbance even if the costs of the disturbance are low (Gill et al. 2001). It should not be assumed that the most responsive animals are the most vulnerable (Beale and Monaghan 2004). Gill et al. (2001) asserted that the absence of an obvious behavioral response does not rule out a population-level effect. In the same vein, it may be that species occurring in protected areas that are remnant fragments within urban landscapes are forced to utilize all components of the fragments, irrespective of their land-use intensity and land cover. This may occur if animals have nowhere else to go, and may be an explanation for instances when the relative abundance of birds is greater in urban and suburban reserves than in exurban reserves (Markovchick-Nicholls et al. 2008).

Mammals

General responses within NCCP/HCP protected areas in southern California.—In series of three studies about the responses of mammals to hikers and runners, bikers, horseback riders, dog walkers, and motorized vehicles, George and Crooks (2006), Patten et al. (2017), and Patten and Burger (2018) analyzed camera-trap data captured throughout areas protected under the 1995 County of Orange Central and Coastal NCCP/HCP (Orange County NCCP/HCP). All studies analyzed bobcat (*Lynx rufus*), coyote (*Canis latrans)*, and mule

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[11] Individual-based models are simulation statistical tools that use empirical data to examine effects, such as anthropogenic population-level effects, that are difficult or impossible to study in a field setting.

deer, and Patten et al.'s (2017) analysis also considered mountain lion (*Puma concolor*), gray fox (*Urocyon cinereoargenteus)*, striped skunk (*Mephitis mephitis*), and northern raccoon (*Procyon lotor*). The authors found that: (1) mammal detections were negatively correlated with all types of recreationists; hikers and runners had the greatest negative association with wildlife, and equestrians had the least; (2) the overall trend is sharply negative: as human activity increased, mammalian activity decreased, regardless of species, type of human activity, or camera placement; (3) mammals were nearly four times as likely to be recorded on days with no human activity than on days with human activity at the same site; (4) detections of mammals decreased incrementally as the number of humans increased within a day, and fell to near zero probability at $\geq$60 humans per day; and (5) all seven species listed above exhibited short-term spatial displacement in response to events with more than 100 visitors.

Bobcats' negative associations were strongest with bikers, hikers, and domestic dogs. In areas of higher human activity, bobcat were detected less frequently along trails and appeared to show temporal displacement, becoming more nocturnal. Coyotes' overall activity was lower at the sites with the most recreation and was negatively associated with overall human, hiker, and biker visitations; and, a trend of temporal displacement in response to dogs was also evident. Generally, both bobcats and coyotes displayed a relatively wide range of activity levels at sites with low human use, but a lower and markedly restricted range of activity at those sites with the highest levels of recreation. Both coyotes and mule deer shifted their activities temporally over the long term. The mule deer's (a primary consumer) marked shift brought it into closer temporal alignment with its main predator (mountain lion) and the coyote's marked shift (secondary consumer) brought it into closer temporal alignment with a chief prey species (gray fox). These human-induced diel shifts involving animals in two trophic levels have important ramifications for predator–prey dynamics. Despite these studies' results, no evidence was found suggesting mammalian populations have declined in the Orange County NCCP/HCP protected areas between 2007 and 2016, even as human activity increased markedly across the study period. However, it is critical to consider this observation in light of: (1) the fact that, at least for the years 2007-2011, public access was controlled across most of the study area by permit-only entry, regular docent-led programs, and monthly self-guided wilderness access days—much higher levels of restrictions on public access than for most protected areas; (2) the authors' assertion that various mammalian species' avoidance behavior may yet drive mammalian populations downward upon further increase in human disturbance; and (3) the status of the Vail Colorado elk herd as recounted below—once a herd of 1,000 head diminished to 53 due to steadily increasing levels of recreation.

Overall, the results of the above three studies were similar to those of a study to assess recreationists' effects on sensitive wildlife species in 14 NCCP/HCP protected areas in San Diego County, for which Reed et al. (2019) used data from camera traps and a before-after-control-impact (BACI) experiment. Reed et al. found that bobcat, gray fox, mule deer, and northern raccoon were less active in areas with higher levels of human recreation. Bobcat habitat use was more strongly negatively associated with human recreation than urban development, which also decreased the probability of habitat use. The collective results for mule deer among the four studies suggest that mule deer may stop using some areas altogether if human recreation is too high. Reed et al. (2019) did not detect negative associations between human recreation and the habitat use or relative activity of the six following mammalian species of the 12 observed: coyote, striped skunk, ground squirrel, jackrabbit, brush rabbit

(*Sylvilagus bachmani*), and desert cottontail (*S. audubonii*). However, of special note are results from the protected area with the highest level of recreation (i.e., an average of 1,797 people per day) observed in the study, where the cameras captured only rabbits, and no other mid- to large-bodied wildlife species during 7.5 weeks of monitoring. Yet, this 2,449-ha protected area is considered a core biological area and regional wildlife corridor targeted for conservation (City of San Diego 2019). The BACI experiment conducted in another protected area showed a significant decrease in bobcat detection probability in a four-week period following a trail re-opening, suggesting that this species can modify its behavior (e.g., shift its activity patterns) rapidly after a change in human recreation. This is evidence that temporal closures have the potential to reduce disturbance during critical periods for some species. Although human recreation may not often extirpate mammalian species from urban habitat fragments, it can reduce habitat suitability and carrying capacity (Reed et al. 2019).

Responses to human voice.—Suraci et al. (2019) tested whether mammalian carnivores' responses to human voices alone can result in landscape-scale effects across wildlife communities, including cascading effects on the behavior of lower trophic level animals. The results of the study, which was conducted in the Santa Cruz Mountains of central California, USA, indicate that human voice alone does result in such effects. Where humans are absent or rare, large and medium-sized carnivores exhibit greater movement, activity, and foraging, while small mammals use less space and forage less. Where humans are present, the activity, foraging, and/or habitat use of large and medium-sized carnivores are suppressed, while small mammals increase their total space use and foraging intensity. The implications of these results are far-reaching, and include that, even in the absence of land development or habitat fragmentation, increased human presence can: (1) affect large carnivore movement, which could eventually limit carnivores' hunting and feeding behavior or force individuals to abandon high risk areas of their home range; (2) suppress activity of medium-sized carnivorous species; and (3) increase the abundance of small mammals that are prey to the large- and medium-sized predators, which could ultimately increase the abundance of small mammals in wildlife areas people visit (Suraci et al. 2019, citing other authors). Moreover, if the sublethal effects observed in the study in response to human voices alone are comparable to those effects (e.g., increased physiological stress, reduced reproductive success) that fear has been demonstrated to cause in predator-prey systems, they may amount to additional widespread but largely unmeasured effects of humans on wildlife populations (Suraci et al. 2019, citing other authors). Hennings (2017) provides additional insights about, and citations for studies on, the effects on wildlife from the human voice, concluding that conversational noise along trails can be very disturbing to wildlife.

Ungulates.— In a two-year study of elk (Cervus elaphus) in a herd near Vail in central Colorado, USA, Shively et al. (2005) found that elk reproductive success rebounded to pre-disturbance levels after the cessation of their exposure to back-country hikers during the calving season over the previous three years. Shively et al. concluded that, it seems prudent to protect elk during calving seasons, because, although the study provides evidence that elk reproduction can rebound from depressed levels when human disturbances are removed or reduced, there had been a linear decline in calf production in response to increasing levels of disturbance compared to controls without such disturbance, and it is not known if there is a threshold level of reproductive depression from which elk cannot recover. Recognizing that it is seldom easy to curb human activities that have become traditional, or to restore wildlife habitats once they have been developed, they recommended the continuation of some closures imposed on parts of both the Vail and control elk herd study areas. However, a recent article in The Guardian reported that the number of elk in this same Vail herd dropped precipitously since the early 2010s with the steady increase in human recreation; once a herd of 1,000 head of elk, it had decreased to 53 at last count in February of 2019. The article explains that, for Bill Alldredge, one of the authors of the 2005 study, there is no other explanation than the increased levels of hiking, biking, and skiing in the area that supports this elk herd (Peterson 2019). This outcome adds to the already ample evidence that pregnant animals or those with young—especially mammals—are particularly sensitive to human disturbance (Hennings 2017).

In a study subjecting 13 captive female elk in the Starkey Experimental Forest and Range in Oregon, USA, to four types of recreational disturbances (all-terrain vehicles [ATV] riding, mountain biking, hiking, and horseback riding), Naylor et al. (2009) recorded the elk's resting, feeding, and travel times in response to the disturbances. The authors found travel time (a proxy for energy expense) increased in response to all four disturbances and was highest in mornings. The authors suggest that the elk's lesser response to each disturbance in afternoons was likely due to elk moving away from the disturbances in the mornings and avoiding them for the remainder of the day. Elk travel time was highest and feeding time lowest during ATV exposure, followed by exposure to mountain biking, hiking, and horseback riding. Resting decreased with exposure to mountain biking and hiking disturbance, and elk showed no evidence of habituation to mountain biking or hiking.

In a study of how bison (*Bison bison*), mule deer, and pronghorn (*Antilocapra americana*) responded to hikers and bikers on designated recreational trails at Antelope Island State Park in Great Salt Lake, Utah, USA, Taylor and Knight (2003) found the following: with respect to alert distance, flight initiation distance, and distance moved,[12] there was little difference in how each species responded to hikers versus mountain bikers (with an exception of mule deer flight distance), though each species exhibited its own degree of response in the three parameters tested; and all three species exhibited a 70% probability of flushing from on-trail recreationists within 100 m from designated trails. Trials were also conducted with only mule deer along a randomly chosen, off-trail route to assess the response of mule deer to hikers or bikers off designated trails. From these trials, the authors found that mule deer showed a 96% probability of flushing within 100 m of recreationists located off trails, and the probability of their flushing did not drop to 70% until perpendicular distance reached 390 m. There was little evidence of habituation to recreationists among the species at the time of the study. In fact, the pronghorn at the study site did not habituate to largely predictable recreational use over a three-year period following the opening of trails at the site, and used areas that were significantly farther from trails than they had prior to the start of recreational use.

Carnivores.—In a study of mammalian carnivores in 28 protected areas located in oak woodlands in northern California, USA, Reed and Merenlender (2008) found the following about carnivores' responses to recreationists. Generally, in paired comparisons of neighboring protected areas with and without recreation, the presence of dispersed, non-motorized recreation (hiking, biking, and horseback riding) led to a five-fold decline in the

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[12] Alert distance is the distance from a stimulus at which an animal initiates vigilance behavior; more specifically in this context, it is the distance between a recreationist and an animal when the animal first becomes visibly alert to the recreationist. Flight initiation distance is defined in footnote #9. Distance moved is the distance an animal travels from its initial position until it stops (Taylor and Knight 2003).

density of native carnivores and a substantial shift in community composition from native to nonnative species. Specifically, a higher mean number of native species was detected in protected areas that did not permit recreation. By contrast, in protected areas that permitted recreation, more nonnative species were detected, domestic dogs were detected more frequently, and densities of coyotes and bobcats were more than five times lower. The authors concluded that the key variable for moderately sized protected areas (50–2000 ha) near urban development seems to be whether or not the site is open to public access.

In a study within three protected areas in Arizona, USA, Baker and Leberg (2018) found the following about how 11 mammalian carnivore species respond to varying levels of hiking, horseback riding, and border patrol activity. The study sites with the highest levels of human activity had significantly lower carnivore diversity, higher occupancy of common species (coyote, gray fox, and bobcat), and lower occupancy of all other carnivorous species. Generally, rare carnivores (e.g., mountain lion and kit fox, *Vulpes macrotis*), badgers (*Taxidea taxus*), and gray foxes avoided trails, whereas common species (except gray fox) preferred trails. Overall, edges of protected areas appeared to negatively affect occupancy of nearly all the study's species, and the presence alone of roads and trails, and not necessarily how much they are used, has a significant negative effect on the occupancy of most carnivorous species. In general, coyotes and bobcats were the carnivores least sensitive to human disturbance, gray foxes had a moderate negative association with human disturbance variables, and smaller carnivores and mountain lions seemed to be exceptionally vulnerable to human disturbance. Furthermore, the higher the level of overall disturbance in a protected area, the more sensitive carnivores were to disturbance variables.

Conclusions and Suggestions

With the expanding recreation-related disturbance to wildlife in protected areas, their dual role of conserving biological resources and providing nature-based recreational and educational opportunities for people presents a continual challenge to land managers and a continual threat to wildlife and the state's biodiversity, particularly sensitive species. The scientific literature provides clear evidence that recreation can disturb wildlife in several ways. Documented effects include detrimental changes to behavior, reproduction, growth, immune system function, levels of stress hormones, other physiological effects, and finally, the survival of individual animals and persistence of wildlife populations and communities. Having been observed on nearly every continent and in every major ecosystem on earth, recreation-related disturbance to wildlife is increasingly recognized as a threat to global biodiversity, and as having wide-ranging and, at times, profound implications for wildlife individuals, populations, and communities (Dertien et al. 2018). Yet, a prevalent assumption exists that non-consumptive recreation is compatible with wildlife conservation; sources that articulate this assumption in various ways include but are not limited to the Natural Community Conservation Plans/Habitat Conservation Plans (NCCPs/HCPs in the California Department of Fish and Wildlife's (CDFW) South Coast Region, Title 14 of the California Code of Regulations (§630(a)) about CDFW's ecological reserves, CDFW's 2016 State Wildlife Action Plan's Consumptive and Recreational Uses Companion Plan, Burger 2012, Larson et al. 2016, Dertien et al. 2018, and Reed et al. 2019. This assumption underlies the widespread acceptance of non-consumptive recreation in dual-role protected areas.

Is the assumption of compatibility flawed?—The assumption of compatibility rests on four expectations, which are often legal obligations (as with NCCPs/HCPs). First, recreation in protected areas is to occur only in ecologically sound locations. Second, only ecologically sound types, levels, and timing of recreation are acceptable. Third, monitoring is expected to regularly and reliably assess whether the types and levels of recreational activities in protected areas are disturbing the focal species to a degree that these activities should be curtailed or prohibited entirely. Fourth, changes in management are to occur promptly when monitoring determines them to be necessary (see footnote #5 for description of management). In short, the overarching expectation is that recreation would not hinder the achievement of the dual-role protected areas' primary conservation objective (i.e., perpetuation of viable populations of focal sensitive species). At least seven NCCPs/HCPs in the CDFW's South Coast Region explicitly deem recreation compatible or conditionally compatible; most articulate these expectations as conditions that recreational activities in protected areas must meet. Such activities are considered "conditionally compatible" with the protection of the covered species. However, the assumption of compatibility is flawed because: for example, designated trails and trail networks are often ecologically inappropriately planned, designed, or sited; and, even for authorized recreation, there is rarely adequate management to control the allowed types and levels of recreation such that they are compatible with conservation. While finding an appropriate balance between biodiversity conservation and recreation is complicated because recreation-related effects on wildlife vary among species and recreational activities (Larson et al. 2016), there are also societal factors at play that further complicate achieving an appropriate balance and compatibility.

Factors allowing inappropriate planning/siting and inadequate management - a societal conundrum.—The degree to which the above-listed expectations are met varies among NCCP/HCP permittees and other managers of dual-role protected areas, the primary limiting factors being fiscal constraints and each land manager's primary mission. As to the latter factor, for areas protected primarily or solely to conserve biological resources, a serious fundamental conflict with conservation arises when managers' primary mission is to provide recreational opportunities, and the protection of biological resources is a secondary or tertiary priority. As to fiscal constraints, land management budgets generally have not kept pace with the increasing levels of recreation in protected areas (CDFW 2015; Havlick et al. 2016). For example, the activities of the CDFW for resource assessment, conservation planning, and wildlife conservation at risk are "severely underfunded;" in 2005, maintenance, restoration, and management of CDFW's wildlife areas and ecological reserves were supported, on average, at the level of $13 per acre (0.40 ha) and one staff person per 10,000 acres. Many lands were operated at $1 per acre, with no dedicated staff (CDFW 2015—refer to Volume 1, Section 7.3). CDFW's fiscal shortfalls for managing its protected areas mirror the same among public agencies at the local, state, national, and international levels (CDFW 2015); these shortfalls result in continual grave shortages of management personnel and other resources.

California's State Wildlife Action Plan (CDFW 2015) and most of the literature about recreation-related ecological effects identify the economic, educational, and recreational/health benefits of protected areas. They also identify the benefits (e.g., economic) to protected areas from humans pursuing recreational activities. So, despite the documented recreation-related disturbance to wildlife, there seems to be an implicit assumption of a mutually beneficial relationship between protected areas and the humans who benefit from them. But, the severe underfunding of management for protected areas renders mutual reciprocity in this relationship infeasible; the protected areas' wildlife are heavily on the losing side. This is particularly perplexing given the evidence that lack of adequate management negatively affects not only biological resources, but also societal benefits.

Regarding the human health benefits of protected areas, visible recreation-related damage to the terrain diminishes the level of benefit people enjoy while being in nature, as illustrated by a study examining the relationship between recreational impacts in protected areas and human mental/emotional states (Taff et al. 2019). The study's results demonstrate that, as visible recreation-related ecological impacts increased, sense of wellbeing and mental state decreased, especially in response to settings with unauthorized trails. Collectively, the results show that managing tourism in protected areas in a manner that reduces such impacts is essential to providing beneficial cultural ecosystem services related to human health and wellbeing (Taff et al. 2019). As Wolf et al. (2019) put it, the more attractive a site is, the more likely it is that it will be degraded, which in turn, may diminish the quality of the human experience, and thus, visitor satisfaction. To capitalize fully on the positive aspects of tourism (including recreation) for protected areas, the degradation of resources needs to be constrained to ecologically acceptable levels, and to levels beyond visitor perception (Davies and Newsome 2009; Wolf et al. 2019); otherwise, recreationists may think it unimportant to minimize their own impacts. Also diminishing the human experience are the closures to public access as a default reaction to lack of adequate management, and the liability resulting from injuries that can occur when people use unauthorized trails (Dertien et al. 2018).

There is a two-fold irony here: despite the prevalent emphasis on the societal benefits of protected areas and the purported reciprocal relationship between protected areas and humans, most agencies responsible for managing protected areas are chronically underfunded. And, promoting the pursuit of these societal benefits without protecting the dual-role protected areas' core function (biological conservation) from that pursuit actually undermines both the human experience and biological conservation. This is a societal conundrum that stems at least in part from a societal disconnection.

The factor of a societal disconnection.—A lack of public interest in and concern about protected areas figures into the societal conundrum. Public opposition to trail closures, caps on daily visitation, or reservation systems can be strong and could damage the support for conservation agencies and organizations (Reed et al. 2019), despite the ecological need for such measures for protected areas. A disconnection pervades our society with respect to recreation-related disturbance to wildlife (Marzano and Dandy 2012): 50% of 640 backcountry trail users surveyed in 2001 did not believe that recreation negatively affects wildlife, and recreationists generally held members of other user groups responsible for stress or negative effects on wildlife rather than holding members of their own recreational user group responsible (Taylor and Knight 2003). The results of a survey conducted in 2018 for the San Diego End Extinction (SDEE) initiative to elucidate what the San Diego public know, think, feel, and do in relation to species and habitat conservation, indicate that 71% of the 600 respondents are not knowledgeable about the problems San Diego's plants and wildlife face (Tinkler et al. 2019).[13] While the passage of California Proposition 68 in 2018 reflects the voters' broad support for clean water and access to open space, which were the main elements of the Proposition that promotional efforts emphasized, it is unclear how

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[13] The respondents were San Diego County voters and were representative of the voter pool in terms of age, gender, ethnicity, and region, but voters tend to be less ethnically diverse and more educated than the San Diego County population overall (Tinkler et al. 2019).

much the biological conservation-related elements of the Proposition influenced voters.

Overall, it is probable that a large majority of the general public are unaware of or in denial about the disturbance to wildlife from non-consumptive recreation, much less the distinctions between areas protected primarily or solely for conservation and areas otherwise designated as open space (e.g., recreational fields, golf courses, small community parks). Information on these topics is not widely available, and what is in the literature, may not be reaching a broad audience even among conservation scientists and wildlife ecologists (Larson et al. 2016). What then can be done to address this unawareness as a step toward enabling dual-role protected areas to meet their conservation objectives despite the expanding recreational pressure?

Suggested plan of action.—To enable dual-role protected areas to meet their conservation objectives despite the expanding recreational pressure, the optimal approach is to: ensure that all recreational areas (e.g., trails and trail networks) are planned, designed, and sited using ecologically sound criteria; and, to continually employ sufficient proactive and adaptive management to prevent or at least minimize recreation-related disturbance to wildlife; such management would curtail the need for regular enforcement. This approach also has the potential to yield general public support for management, particularly if information provided about management challenges includes data and supporting graphics, specifically about fragmentation, to enhance the public's understanding of the challenges of poorly designed trail systems and the creation and use of unauthorized trails (Leung et al. 2011; Taff et al. 2019; Wolf et al. 2019). But this approach requires perpetual personnel and funding explicitly for management, which in turn points to the urgent need for public advocacy to secure fiscal support for management resources (i.e., fiscal support that is sustainable, perpetual, and at levels commensurate with the recreational pressure; footnote #5). How can this be achieved?

How people perceive their and others' recreation-related effects on wildlife may influence their general perspectives on such effects (Marzano and Dandy 2012). Shifting this perception-perspective nexus over time toward a common value of respecting wildlife may eventually mend some of the aforementioned societal disconnection. A shift in perspectives on the purpose of protected areas is also needed to one of understanding and acknowledging that their core function is conservation (Davies and Newsome 2009; Patten et al. 2017). The only chance there is of influencing people's perceptions is making the pertinent scientific information readily available. So, it is essential to implement a concerted campaign to disseminate science-based information about recreation-related disturbance to wildlife. Such a campaign needs to be well orchestrated, widespread, long-term, continual, and multimedia; this includes social media per Greer at al.'s (2017) conclusions about its efficacy in this context. In addition to the general public/voters (including recreationists), the following parties would be both the audience and the distributors within each of their fields and beyond: the media, environmental organizations, elected officials, policy and land-use decision makers, land management agencies and organizations, outdoor recreation merchants and associations, educational institutions, and researchers. The coverage would be framed as stories aimed to evoke appreciation for the diversity of sensitive species and the many ways they respond to our presence, and provide opportunities for what people can do to lessen the recreation-related disturbance to wildlife, which will benefit not only wildlife and other biological resources in the protected areas, but also the human experience there.

While the objectives of the campaign would be to influence people's perspectives in favor of wildlife and to modify recreational behaviors, policy, planning, and decision-making accordingly, the final goal would be to cultivate support for and harness the power of advocacy to gain the political will and action needed to secure perpetual fiscal support for management resources. Implementing such a campaign would not be easy nor fast and would take diligent oversight, as suggested by William Craven, the chief consultant for nearly 20 years of California's Senate Natural Resources and Water Committee. In an interview with the California Native Plant Society, he stated, "the best way to achieve your policy objectives is to make sure your policy objectives are funded. For example, small but important programs for the [California Department of Fish and Wildlife] are literally budget dust in the California budget, but unless someone is there to pay attention and connect the dots between the budget and the state laws, we don't get a complete resolution…[P]ositive changes in state law that everyone works so hard to accomplish are really much more effective when someone monitors the budget process to make sure those changes get as much funding as possible" (CNPS 2020). But, it seems that the choices are either to never reverse or at least halt the downward trajectory of wildlife in protected areas experiencing damaging levels and types of recreation or to ambitiously implement such a campaign toward a societal course change (Waterman 2019 for the term "course change").

Several of the results of the survey conducted for the SDEE initiative hint at a potential to mobilize a critical mass of people who learn about the recreation-related disturbance to wildlife and the associated urgent need for resources to address it, and assist in information dissemination. While the survey conducted for the SDEE initiative revealed a knowledge deficit among the respondents regarding problems plants and wildlife face, its results also indicate that, over a 12-month period, 74% of respondents voted in favor of laws to protect the environment, 31% volunteered to improve the environment, and 21% donated money to protect San Diego County's environment; in addition, approximately 70% were willing to pay additional local taxes to protect the environment, and a majority of the respondents were willing to pay up to $50 per year (Tinkler et al. 2019).

One avenue available for advocacy to secure perpetual fiscal support specifically for management of protected areas is assessing recreational fees and taxes. With respect specifically to the management of CDFW-owned protected areas, CDFW's 2005 and 2015 State Wildlife Action Plans recommended implementation of recreational fees and taxes beyond fishing and hunting licenses that would allow non-consumptive recreationists to support wildlife conservation and management of the resources they use and enjoy (CDFW 2015, 2016). To generate funds for the management of all protected areas, a long-successful model could be employed: since the 1930s, hunters have been paying federal excise taxes on the sales of sport hunting and shooting equipment to generate funding for habitat conservation (CDFW 2015). Eighty years later, these taxes plus sales of angling equipment had generated more than $10 billion towards conservation (CDFW 2015). Thus, hunters and anglers have been the primary funding sources for conservation efforts in California and North America (CDFW 2015). Considering the disturbance to wildlife from non-consumptive recreationists, it is past time for them also to pay their way for the use of protected areas through paying taxes on equipment for hiking, biking, riding, etc. to support management of these activities. A secondary benefit of such fees and taxes is that they may establish a direct connection for recreationists between their use of protected areas and the costs of protecting the protected areas, and thereby possibly diminish their disconnection from their disturbance to wildlife.

Other avenues for advocacy to secure fiscal support for management of protected areas include bond measures and voluntary contribution funds (VCF), though neither would necessarily provide a reliably perpetual source of funding. VCFs are sponsored by legislators to be enacted by the legislature; a VCF in this context would be explicitly and solely for the management of the protected areas in California, including CDFW's lands (with protected areas and management defined as described in footnotes #1 and #5, respectively). The funds must be administered such that they are made available timely. This would be similar to the VCF for California's Rare and Endangered Species Preservation Voluntary Tax Contribution Program which has funded work benefiting California's native at-risk plants, wildlife, and fish since 1983 (CDFW 2019) and now raises around $500,000 annually (FTB 2019).

Mainstream online and print media carried several articles in 2018 and 2019 about the overcrowding at and underfunding for the national parks (e.g., Simmonds et al. 2018; Waterman 2019; Wilson 2019); coverage such as this provides a good foundation of information. Articles like Yong's (2019) about the effects of the human voice alone on wildlife and Peterson's (2019) about the effects of hiking on elk represent steps in the right direction toward mainstream media honing in on specific impacts on wildlife from recreationists in protected areas. Coverage on species local to where people live is important and may make a stronger and more lasting impression with greater potential for shifting the perception-perspective nexus than species or settings remote from consumers of the media. Organizations like San Diego Zoo Global, which spearheaded the SDEE initiative (Tinkler et al. 2019), could significantly assist the campaign by engaging their media engines on behalf of local wildlife threatened by recreation.

A societal quid pro quo for protected areas?—At some point, the exploitation of protected areas resulting from recreation-related disturbance to wildlife, without commensurate reciprocity with care for the protected areas, may outweigh the benefits of public access to protected areas (Bennett et al. 2013). Many protected areas have already reached this point. Without adequate resources to combat the challenge of the obligation to conserve wildlife exposed to ecologically damaging levels and types of recreation, including unauthorized activities, the challenge will persist indefinitely at great risk of jeopardizing the protected areas' ability to meet their conservation objectives.

Regarding the pressure local, state, and federal government agencies have undergone for decades to acquire additional open space for recreation and to expand public access in existing protected areas (Wells 2000 in Reed and Merenlender 2008), elected officials and land-use decision makers need to address the demands, but not at the expense of biological conservation in protected areas. Some of the protected areas (e.g., the NCCP/HCP reserves) represent long-negotiated compromises for the sensitive species they are intended to protect in perpetuity. For some protected areas, no ecologically sound further compromise (e.g., expansion of public access) is possible; while recreation may be considered conditionally compatible in such protected areas, if open to public access at all, the extant levels of recreation may strain their ability to meet their conservation objectives. Protected areas that represent the final compromise for the species they support are particularly vulnerable to their wildlife values being compromised due to inadequate management (CDFW 2015). Ultimately, for wildlife that avoids human activity, it is unlikely that dual-role protected areas are entirely sufficient or justifiable for meeting conservation objectives; limiting or prohibiting recreation in strategic circumstances and locations within protected areas is necessary to achieve conservation objectives (Reed and Merenlender 2008; Bötsch et al. 2018; Dertien et al. 2018; Reed et al. 2019). Of course, this presumes sufficient management to maintain whatever recreational limits are set.

In summary, in the interest of wildlife in California and, more broadly, conservation within protected areas everywhere, the necessary actions with respect to non-consumptive recreation are to: (1) widely and continually disseminate science-based information about the recreation-related disturbance to wildlife; (2) apply the science to all planning for, policy- and decision-making about, and management of, recreation in dual-role protected areas; and (3) secure perpetual fiscal support for management of recreation in dual-role protected areas commensurate with the recreational pressure.

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Increased hiking and mountain biking are associated with declines in urban mammal activity

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Outdoor recreation can have negative consequences for many wildlife species (Larson et al. 2019, 2016; Monz et al. 2013; Sato et al. 2013). Increasingly, parks and preserves are embedded in a landscape of urban and suburban development (Radeloff et al. 2010), intensifying the exposure of remaining wildlife populations to human activity (Larson et al. 2018). In California, several research groups have studied wildlife responses to recreation in parks and preserves within densely populated coastal cities. Some of the resulting studies have documented negative effects, including declines in native mammal occupancy and detection rates (Patten and Burger 2018; Reed and Merenlender 2008) and reduced daytime activity (George and Crooks 2006), while others have found limited effects of recreation on wildlife occupancy and detection rates (Markovchick-Nicholls et al. 2008; Reilly et al. 2017). Managers need context-specific understanding of the nature and severity of recreation effects on wildlife to sustainably manage recreational use in protected areas, the vast majority of which are open to the public (Leung et al. 2018; UNEP-WCMC and IUCN 2019).

Experimental tests of recreation effects on wildlife can provide valuable insight into species' responses to human activity by minimizing variation in other factors that affect wildlife, such as residential development and vegetation composition. However, fewer than one-third of studies of recreation effects on wildlife include an experimental component (Larson et al. 2016), and a large proportion of experimental treatments exclusively measure immediate reactions of wildlife to an approaching human, often using flight initiation distance (e.g., Ikuta and Blumstein 2003; Jorgensen et al. 2016; Keeley and Bechard 2011). These immediate responses cause increased energy expenditure and can trigger trade-offs between foraging and flight behaviors (Duchesne et al. 2000), but it is less clear how they may translate into longer-term habitat degradation due to the regular presence of recreationists. It can be logistically difficult to experimentally alter the level of recreation on a trail segment or within a defined area, but when successfully implemented such studies have documented increased presence of nest predators (Gutzwiller et al. 2002) and reduced numbers of bird territories and bird species richness (Bötsch et al. 2017).

Conservation of mammals in densely populated and fragmented habitats such as southern California requires an understanding of the suitability of remaining habitat patches (Crooks 2002; Ordeñana et al. 2010), many of which receive high levels of recreational use (Larson et al. 2018). In this study, we assessed whether increased recreation rates were associated with reduced habitat suitability for native mammals. We conducted an opportunistic, quasi-experimental study of recreation effects on mammals using a before-after-control-impact (BACI) design, taking advantage of the closure and re-opening of an existing recreational trail in an open space park in San Diego, California. We expected that at impact locations (sampling points on the trail that was closed and re-opened), hiking and mountain biking would increase and wildlife activity would decline after the trail re-opened, while human and wildlife activity would remain similar at control locations (sampling points on trails consistently open throughout the study) within the same reserve.

The study was conducted in Black Mountain Open Space Park (32.984, -117.117) in San Diego, California, USA, which is owned and managed by the City of San Diego. The park is 951 ha, comprised primarily of coastal sage scrub and chaparral vegetation communities with some riparian and native and non-native grassland habitats. Dense suburban communities surround the park, and it contains approximately 32 kilometers of multi-use trails visited primarily by hikers and mountain bikers. The park also permits leashed dogs on the trails.

We established a total of seven sampling points on official and unofficial trails within the park in January 2017. Two points were located along the Miner's Ridge loop trail ("impact points", Figure 1), which was closed to public access from January 2017 until April 2018 for testing and remediation of elevated levels of arsenic detected in the soil. Five points were located along nearby trails not affected by the closure ("control points"; Figure 1). Point locations were selected as part of a larger project using a spatially balanced random design using the RRQRR algorithm on rasterized trail network data (Theobald et al. 2007).

To monitor human and mammal activity, we installed one motion-triggered camera (Bushnell TrophyCam HD Aggressor) at each sampling point, housed in metal security boxes and affixed to metal poles pounded into the soil facing recreational trails. We did not bait the cameras to avoid influencing animal activity (Wearn and Glover-Kapfer 2019). Cameras were programmed to take two photos per trigger with a five second delay between triggers. We began monitoring human and mammal activity at the impact points in late October 2017, leaving cameras running continuously until after the trail re-opened in April 2018. At the control points, we collected data between November 2017 and February 2018. After the trail re-opened, cameras operated at all seven sampling points for at least four weeks, ending in June 2018 (Table 1).

The seven cameras captured over 80,000 photos during the study period. Many of these were "false triggers" caused by rapidly growing vegetation, high temperatures, and wind, mostly in the mid-morning to late afternoon. Therefore, we randomly subsampled 20% of photos between 11 am and 5 pm at all sampling points to reduce time spent sorting

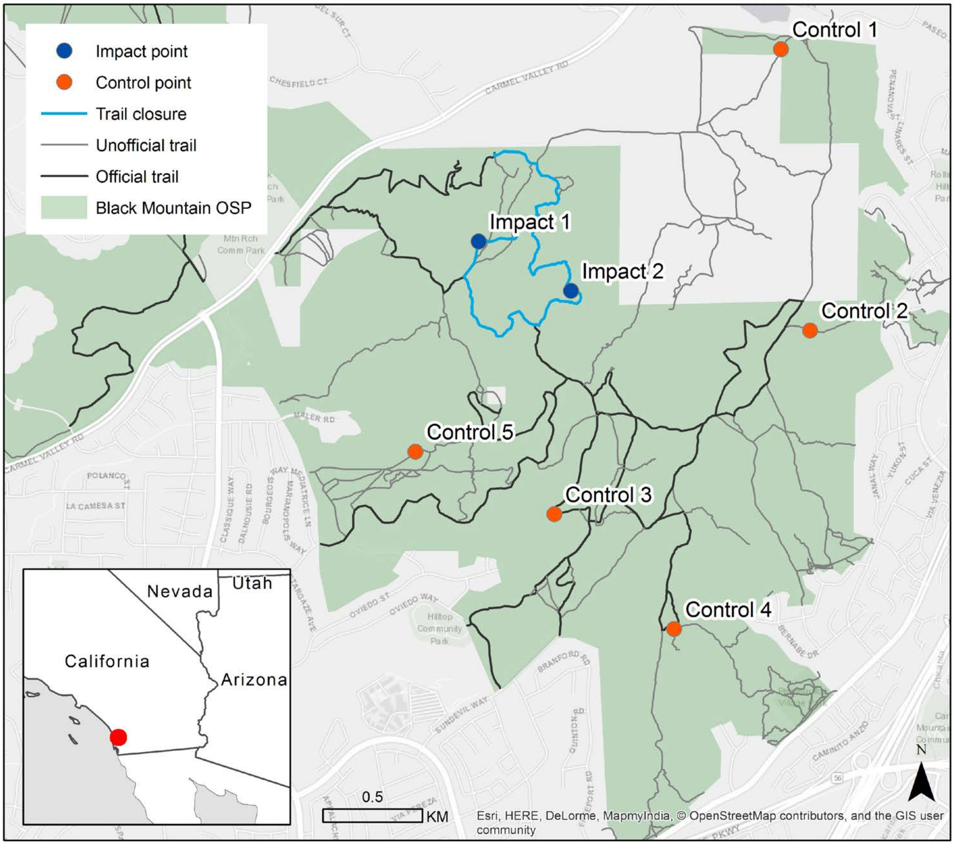

Figure 1. Location and sampling design of the before-after-control-impact (BACI) study conducted in Black Mountain Open Space Park in San Diego, CA, USA.

Table 1. Dates of camera data collection before and after the trail re-opened at impact and control sampling points at Black Mountain Open Space Park. Cameras were not installed or did not operate correctly on all days between the first and last sampling day; the "total days" columns report the number of days on which cameras were operational.

	Sampling effort before trail re-opened			Sampling effort after trail re-opened		
Point	First day	Last day	Total days	First day	Last day	Total days
Impact 1	1 Nov 2017	17 Apr 2018	134	19 Apr 2018	31 May 2018	43
Impact 2	1 Nov 2017	17 Apr 2018	168	19 Apr 2018	28 Apr 2018	27
Control 1	12 Dec 2017	1 Feb 2018	26	18 May 2018	30 May 2018	13
Control 2	12 Dec 2017	1 Feb 2018	26	4 May 2018	31 May 2018	28
Control 3	18 Nov 2017	13 Dec 2017	5	4 May 2018	30 May 2018	22
Control 4	18 Nov 2017	22 Dec 2017	26	4 May 2018	30 May 2018	28
Control 5	19 Nov 2017	22 Dec 2017	21	4 May 2018	31 May 2018	29

photos. Photos were organized in the Colorado Parks & Wildlife Photo Warehouse (Ivan and Newkirk 2016). Humans appearing in photos were categorized by activity (pedestrian, cyclist, equestrian, or vehicle) and animals were identified to species, except for brush rabbit (*Sylvilagus bachmani*) and desert cottontail (*S. audubonii*), which are difficult to distinguish in photos and were both labeled "rabbit."

To assess changes in human activity before and after the trail re-opened, we compared mean people per day at impact and control points using a non-parametric Wilcoxon-Mann-Whitney test since the data are counts. To assess changes in mammal habitat use before and after the trail re-opened, we used single-species occupancy models for each mammal species with sufficient detections using the R package *unmarked* (Fiske and Chandler 2011). Detection data were pooled into 5-day sampling occasions, resulting in ten survey occasions with five before and five after the trail re-opening. We did not include habitat covariates because minimal changes in habitat occurred between the sampling periods and because our primary goal was to investigate the interaction of treatment (control or impact sampling point) and time period (before or after the trail re-opened). Therefore, treatment and time period were the only variables included in the models, and we included the interaction (treatment*period) to test whether species showed a response to the trail re-opening. When a species was predicted to occur at all or nearly all sampling points, we assessed changes in detection probability rather than occupancy as a measure of relative activity or frequency of habitat use (Lewis et al. 2015; Wang et al. 2015).

Across all sampling points and time periods, there were an average (± 1 SD) of 12.2 ± 21.7 hikers, 7.2 ± 10.0 cyclists, 1.7 ± 3.2 dogs, and 0.01 ± 0.2 horseback riders per day at each sampling point, as well as infrequent motorized vehicles (park staff or utility personnel) at one sampling point where the trail was drivable. These recreation rates are relatively low compared to other parks and preserves in the region (Larson et al. 2018). People did not cease using the trail while it was closed, with the two impact points averaging 18.0 ± 15.8 and 20.4 ± 14.9 people per day during the closure (Figure 2). However, human activity approximately doubled at the impact points after the trail re-opened, averaging 38.2 ± 28.9 and 38.9 ± 19.6 per day (time period differences: $P < 0.001$). At the control points, human activity was similar between time periods (all $P > 0.33$) except for Control 5, which averaged 5.7 ± 8.1 people per day before and 23.2 ± 13.0 after the trail re-opened ($P < 0.001$). Control 5, located on an unofficial trail, is not part of the most obvious loop routes that could be made using the closed trail, but it could be connected with a longer loop route using unofficial trails, and therefore may have experienced depressed visitation rates during the closure period. Therefore, we ran additional occupancy models in which Control 5 was considered an impact point to ensure our results were robust to this possibility.

Mammal species we detected included rabbits (*Sylvilagus spp.*, total photos n = 537), coyotes (*Canis latrans*, n = 409), bobcats (*Lynx rufus*, n = 135), California ground squirrels (*Otospermophilus beecheyi*, n = 22), black-tailed jackrabbits (*Lepus californicus*, n = 4), raccoons (*Procyon lotor*, n = 2), and mule deer (*Odocoileus hemionus*, n = 1). However, only the bobcat, coyote, and rabbit were detected frequently enough for analysis. Bobcats were detected at six out of seven sampling points, and coyotes and rabbits were detected at all seven points; accordingly, we used detection probability rather than occupancy as our primary variable measuring changes in frequency of habitat use for all three species. At sampling points where they were detected, each species was detected at least once before and after the trail re-opening.

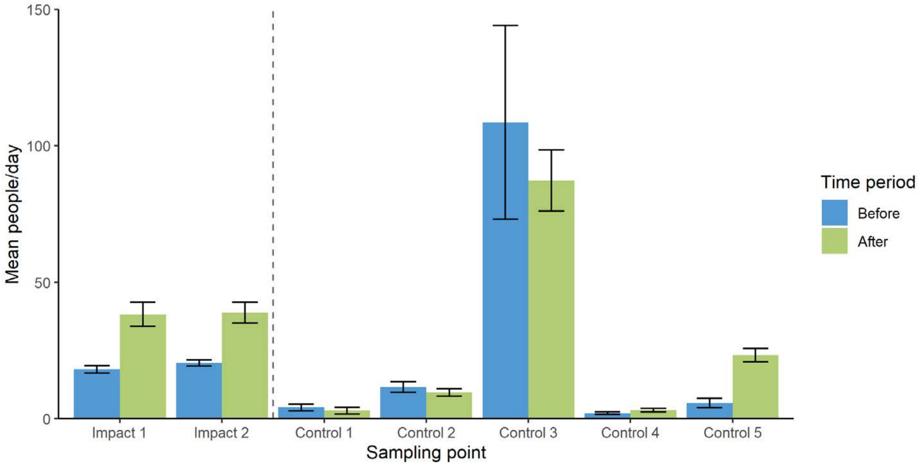

Figure 2. Human activity (mean people per day) before and after the Miners Ridge Loop trail re-opened at impact and control sampling points at Black Mountain Open Space Park. Error bars show one standard error. Differences between time periods were significant ($p < 0.05$ using a t-test) at Impact 1, Impact 2, and Control 5. The vertical dotted line divides the impact points (left) from the control points (right).

Occupancy models showed that detection probability was reduced at impact points after the trail re-opened for bobcats and coyotes, while remaining approximately the same at the control points (Figure 3). The effect was particularly strong for bobcats, with detection probability dropping from 0.90 ± 0.09 to 0.40 ± 0.15 at impact points after the trail re-opened while detection probability at control points increased slightly from 0.53 ± 0.13 to 0.65 ± 0.12. The interaction of treatment*period for bobcats was significant (z = 2.15, P = 0.03). Coyotes were detected at impact points during nearly every occasion before the trail re-opened (detection probability of 1.00 ± 0.001) but afterwards detection probability dropped to 0.70 ± 0.14, while detection probability increased slightly at control points from 0.79 ± 0.09 to 0.82 ± 0.08. However, the interaction term was not significant for coyotes (z = 0.14, P = 0.89). Rabbit detection probability did not differ significantly in relation to time period or treatment (interaction term z = 0.52, P = 0.61). Results did not change for bobcats or rabbits when Control 5 was considered an impact rather than a control point, but for coyotes patterns became less clear, with detection probability dropping more at control than impact points after the trail re-opened.

The number of sampling points was small due to the opportunistic nature of our study, limiting our ability to detect an effect of altered recreation rates on wildlife activity. Therefore, the fact that we still observed reduced activity rates by bobcats and, to a lesser extent, coyotes is particularly notable. Our findings echo those of previous studies in the region, which have found that these species and other mammals avoid human presence on short time scales (same-day occurrence; Patten and Burger 2018), and restrict their activity

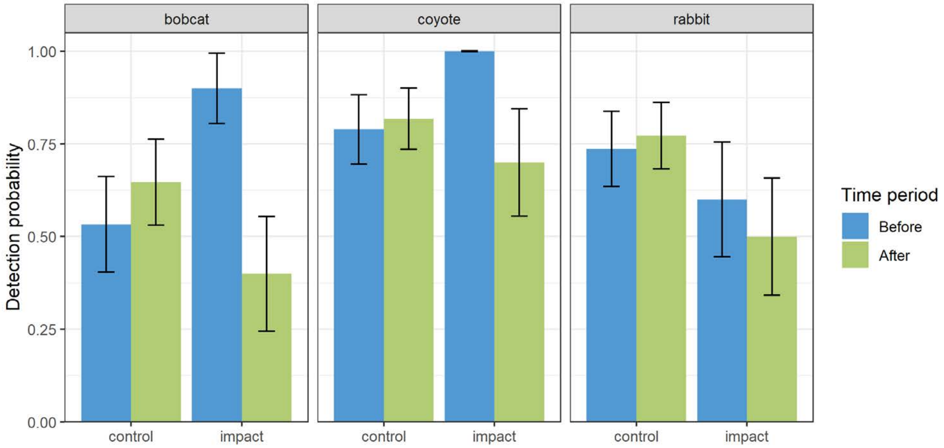

Figure 3. Predicted detection probabilities from single-species occupancy models for bobcats, coyotes, and rabbits before and after the Miners Ridge Loop trail re-opened at impact and control sampling points at Black Mountain Open Space Park. Error bars show one standard error. The interaction term for treatment*period was significant (P < 0.05) for bobcats.

in high human-use areas (George and Crooks 2006). We observed greater responsiveness in bobcats than in coyotes. While both carnivore species have shown sensitivity to recreation in previous studies (Patten and Burger, 2018; Reed and Merenlender 2008), coyotes can be relatively tolerant of human disturbance due to their adaptable behavior and omnivorous diet (Riley et al. 2003; Ordeñana et al. 2010). We did not observe changes in rabbit activity rates in connection with increased human activity, or by extension, reduced predator activity. Their smaller home ranges compared to bobcats and coyotes may mean that they are less able to shift their within-home range habitat use in response to short-term changes in human and predator activity.

Previous studies have also found that these species may shift their diel activity patterns to be more nocturnal in areas with higher human use (George and Crooks 2006; Reilly et al. 2017; Wang et al. 2015; Nickel et al. 2020). While shifts in diel activity patterns may have occurred in our system, overall activity levels were lower after the trail was re-opened, indicating than any temporal shift did not completely mitigate effects of human presence. However, despite changes in activity levels (as measured by detection probability), we did not observe changes in the occupancy status of the sampling points, suggesting that while the habitat may have been somewhat degraded, it was not completely unsuitable after the trail re-opened. Given the relatively small size of the park and its highly developed surroundings, reduced use of impact points by bobcats and coyotes likely indicates a partial shift in habitat use to other areas of the park. Bobcats slightly increased their use of the control points after the trail re-opened, perhaps suggesting such a shift, though this difference was negligible for coyotes.

Future experimental manipulations at larger spatial and temporal scales could help assess the consistency of our findings, increase the precision of estimated detection probability parameters, and assess responses of additional wildlife species. The opportunistic nature of our study design resulted in spatial separation of the impact and control points, which may have limited their ability to serve as true replicates due to spatial autocorrelation (Legendre 1993). A true experimental design with randomly assigned treatment and control locations would provide stronger evidence of recreation effects, such as the study by Bötsch et al. (2017) which documented reductions in bird territory establishment in response to low levels of recreation compared to areas with no recreation. Coordination with volunteer groups and docent-led programs or using recorded human voices (e.g., Suraci et al. 2019; Ware et al. 2015) could make it more feasible to experimentally apply treatments that simulate higher levels of recreation.

Though the level of human activity approximately doubled after the trail was re-opened, we speculate that the difference may not have been obvious to recreationists. Forty people per day, approximately the average level of use after the trail re-opened, is still low compared to many other San Diego-area parks and preserves (Reed et al. 2019). However, this difference appears to have been perceptible and meaningful to wildlife, and perhaps crossed a critical threshold of disturbance causing reduced rates of use of the trail. Accordingly, habitat degradation near trails due to human disturbance is likely common across parks and preserves across the region.

Our findings highlight that wildlife can respond rapidly to changes in the levels of human disturbance, even when they have experienced similar levels of disturbance previously. Data collection for the ‘after’ period started immediately after the trail was re-opened and continued for four weeks. The observed reduction in detection probabilities suggests that bobcats, and to a lesser degree coyotes, may respond to changes in the relative intensity of human activity by rapidly altering their fine-scale habitat selection. Rapid avoidance responses to recreation have been previously documented for mountain caribou (Lesmerises et al. 2018) and bottlenose dolphins (Lusseau 2004), but it is not clear how short-term behavioral avoidance may translate to fitness or population impacts (Bejder et al. 2006). Higher recreation intensity was presumably not novel to these individuals since the trail had been open to recreation for many years prior to our study, which suggests that the animals were not fully tolerant of prior levels of human disturbance. It is therefore possible that for these species, habitat degradation from recreation could be relatively quickly reversed if human activity was limited to lower levels, or spatially or temporally constrained. Land and wildlife managers often use seasonal closures to protect wildlife during periods of heightened sensitivity such as the breeding period (Burger and Niles 2013; Coleman et al. 2013; Richardson and Miller 1997), but the efficacy of these closures is rarely tested. The rapid response we observed suggests that targeted temporal closures could be a promising approach for reducing impacts of recreation.

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Author contributions:

Conceived and designed the study: CLL, SER, KRC
Collected the data: CLL
Performed the analysis of the data: CLL
Authored the manuscript: CLL
Provided critical revision of the manuscript: CLL, SER, KRC

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An assessment of non-consumptive recreation effects on wildlife: current and future research, management implications, and next steps

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Most research on the effects of non-consumptive recreation on wildlife to date has focused on birds and mammals. This research typically focuses on behavioral responses of individuals despite practical limitations in extrapolating ecological outcomes from individual behavior. Data gaps therefore present difficulties in integrating wildlife-protective policies into public access management. These gaps are exacerbated by a lack of wildlife studies that include data on public use patterns of open space areas. In a survey of park and open space managers in the San Francisco Bay Area, few of the entities surveyed restricted recreational access permanently or seasonally to address biological constraints; yet most indicated the presence of sensitive plant or animal species on their lands or stated conservation as one of their organization's purposes. To better bridge the gap between research and management practice, more research is needed on species beyond birds and mammals. This research should extend beyond noting behavioral response and should integrate investigation of outdoor recreation use patterns.

Key words: California, non-consumptive recreation, open space, parks, public access management, San Francisco Bay Area, wildlife

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Throughout the state of California, there exists a large diversity of designated open space and protected areas that allow public access and outdoor recreation. Based on data from the Survey of Public Opinions and Attitudes on Outdoor Recreation in California, the average number of days of outdoor recreation participation among adult Californians is 96 days per year (California State Parks 2012). Based on California's population of approximately 27.4 million adults in 2008, California State Parks estimated approximately 2.6 billion days of outdoor recreation by adults during that year; that figure would be higher based on current population estimates. Within regional, state, or national parks, outdoor recreation participation (i.e., adults and children) totaled an estimated 478 million days, and for non-park natural and undeveloped areas there were an estimated 368 million annual days of outdoor recreation participation (California State Parks 2011).

A large portion of outdoor recreation activity consists of frequent use in the same areas by the same visitors. Much of it is relatively close to visitors' homes, and with California's warm, Mediterranean climate, outdoor recreation use often occurs near dawn and dusk, the times of day when multiple wildlife species are most active. Many areas where outdoor recreation occurs also provide occupied or potentially suitable habitat for special status wildlife species. California includes a variety of habitats that are occupied or potentially occupied by 181 state or federally listed wildlife species (CDFW 2019).

Non-consumptive forms of outdoor recreation (defined as those activities that do not include fishing and hunting) can impact wildlife species and their habitats in a variety of ways. There may be loss of individuals along trail corridors through incidental recreational use, such as crushing burrows or destroying nests. Non-consumptive recreation may also affect habitat. For example, recreation facility development can remove habitat, and recreational use of facilities can result in water quality degradation, soil erosion, and ground cover loss (USDA 2008). Presence of humans may cause displacement or change in behavior of wildlife, both temporary and permanent, through proximity to habitat, habitual use of an area (e.g., trails), or through direct harassment (Trulio et al. 2013; Shannon et al. 2014). There may also be effects on wildlife behavior from nighttime outdoor recreation activity, including light and sound pollution, or other disturbances associated with these recreational activities. Littering can have both direct and indirect effects (Boarman 2002), and bringing pets to open space and other types of protected areas may also cause direct and indirect impacts to wildlife species (Reed and Merelender 2008; Reilly et al. 2017).

However, despite more than 40 years of research on this topic, significant information gaps exist. The purpose of this article is to: 1) summarize what is known about effects on non-consumptive recreation on wildlife, 2) summarize current management practices used by park and recreation agencies in the San Francisco Bay Area to manage public access to protect wildlife, and 3) suggest additional research that will help fish and wildlife managers as well as park and open space managers more effectively manage and respond to potential impacts of non-consumptive outdoor recreation on wildlife species and their habitats.

CURRENT STATE OF THE KNOWLEDGE

Overall state of the knowledge

To preliminarily identify potential data gaps and long-term trends in the literature, we searched Google Scholar for articles containing the keywords "non-consumptive recreation" and "wildlife" at ten-year increments from 1980 to 2019. We subsequently performed the same query substituting "plants" for "wildlife." We identified 515 results containing the keywords "non-consumptive recreation" and "wildlife" between 1980 and 2019. Of these, 26 (5%) were published in the 1980s, 82 (16%) in the 1990s, 170 (33%) in the 2000s, and

237 (46%) in the 2010s. The same search with "plants" substituted for "wildlife" yielded 298 results between 1980 and 2019—15 (5%) in the 1980s, 44 (15%) in the 1990s, 105 (35%) in the 2000s, and 134 (45%) in the 2010s.

It is clear that the number of articles related to non-consumptive recreation and plant and wildlife management has increased over time, and that wildlife is consistently more studied than plants. More granular trends in the literature are less immediately apparent. We therefore identified several comprehensive literature reviews from the last 40 years to better understand which topics in plant and wildlife management are most often studied. In particular, we sought out reviews that would elucidate long-term trends in which types of recreational activities are the most studied, whether response variables are typically quantified at the individual or population level, which taxa are the most studied, and other trends that may inform the scope of future research. Due to the higher volume of studies available on wildlife than plants, we focused our efforts on wildlife-centered articles.

Boyle and Samson (1985) conducted a comprehensive review of the state of knowledge in which they identified trends in studies containing original data on terrestrial vertebrates in North America (n = 166). These articles most often studied birds (103, 62%), followed by mammals (70, 42%), with few studies of herpetofauna (7, 4%). Boyle and Samson reported negative effects for most activities and taxa, postulating potential mechanisms such as direct disturbance and indirect effects such as habitat degradation, noting that the latter may result in simpler vegetation profiles and overall loss of habitat diversity. Positive effects on overall biodiversity were reported in a few studies, but these positive effects typically corresponded with increased abundance and diversity of common species well-adapted to frequent disturbance by humans. Based on data gaps identified through their review process, Boyle and Samson concluded that primary shortcomings in the literature included a lack of experimental, rather than observational data, and a need to move from assessment of disturbance and mortality to analysis of long-term ecological effects (Boyle and Samson 1985).

A more contemporary review conducted by Larson et al. (2016) analyzed 280 articles on the effects of non-consumptive recreation and wildlife. This review was broader in scope than that of Boyle and Samson, including a wider swath of recreational activities and all taxa globally. Although these results are not directly comparable due to differences in scope, Larson et al. identified similar trends to Boyle and Sampson 31 years earlier. The researchers found that articles remained mostly observational, with only 30% of articles containing an experimental component. Among the articles included in their review (n = 280), mammals were studied the most often (114, 42%), followed closely by birds (101, 37%). A wide gap was observed between mammals and birds and invertebrates (34, 12%), herpetofauna (17, 6.2%), and fish (14, 5.1%). Notably, the authors found that the majority of species studied with International Union for Conservation of Wildlife (IUCN) status were classified as species of least concern, and that endangered, critically endangered species, and data-deficient species were the least often studied. Similar to Boyle and Samson, most studies evaluated identified significant effects of non-consumptive recreation on wildlife, with negative effects being the most frequent. Most studies that showed unclear results as to whether effects were positive or negative had a behavior-based response variable, demonstrating the challenges associated with interpreting behavioral responses (one of which is the potential for wildlife to habituate to recurring, non-threatening recreational use), and the implications for long-term ecology and land management (Larson et al. 2016).

Most studies on the effects of non-consumptive recreation on wildlife were conducted in North America (Larson et al. 2016). In a paper on recreation impacts on wildlife submitted to the federal Interagency Visitor Use Management Council (IVUMC), Marion (2019) summarized the current state of research, with results falling into five broad categories. The categories included: 1) type of recreational activity; 2) recreationist behavior; 3) impact predictability; 4) impact frequency and magnitude; and 5) impact timing and duration. In regard to category one, Marion found mixed results on impacts from slow versus fast (e.g., walk, run, mountain bike, motorized vehicles) recreation activities. Regarding category two, he found visitors who directly approach wildlife are perceived as threatening, and wildlife are less disturbed by recreation travel that is slow, quiet, and in directions parallel to or away from them. Marion also found that wildlife are able to adapt to and tolerate consistent nonthreatening recreational activities, but unpredictable recreational activity in less visited off-trail locations can cause greater impact (category three). Repeated human interaction and disturbance of wildlife can exceed a threshold of tolerance that causes wildlife to leave a preferred habitat (category four). In regard to category five, Marion found wildlife show locational and seasonal sensitivities to recreation. Marion then describes multiple strategies to manage recreation to minimize impacts on wildlife, which are summarized later in this paper.

California-focused research

California plays an important role in this body of research due to its abundant biodiversity and large areas of protected and/or publicly-owned lands. California has been relatively well-studied, with most research focused on birds, and more recently mammalian carnivores. The discussion below is not intended to be exhaustive but rather to summarize the findings of representative research efforts with implications for recreation and wildlife management and provide context for on-the-ground practices and recommendations, with a focus on California.

In the San Francisco Bay Area, several studies on avian wildlife have emerged in recent years. A 2008 study on foraging shorebirds and trail use found no change in behavior or species diversity during trail use (Trulio and Sokale 2008). These findings indicate foraging shorebirds at regularly used trails may habituate to human activity. However, other experimental studies have found that shorebird numbers decreased with human presence on trails (Trulio et al. 2013), and that trail uses such as jogging and dog walking can increase flight distance (Lafferty 2001). Differences in shorebird response to human disturbance are likely attributable to the birds' degree of habituation to human disturbance. Studies indicate that shorebirds in areas of more frequent human disturbance display less response to human activity; although, birds tend to use these areas at lower rates than areas with less disturbance (Josselyn et al. 1989). Trulio et al. (2013) recommended keeping trail users at least 50 m from foraging habitat. They also suggested that infrequent trail use may be more disruptive to birds then frequent trail use, indicating that habitation may occur as referenced above. Similarly, Miller et al. (1998) found the composition and abundance of birds to be altered in a Colorado grassland and forest setting, with an area of influence of approximately 75 m (zone where human activity may displace wildlife from suitable habitat).

As exemplified by these studies, even the least intrusive non-consumptive recreational activities, such as hiking and picnicking, have the potential to affect wildlife. Reed and Merenlender (2008) examined this possibility in the context of mammalian carnivores in the Northern San Francisco Bay Area. They consistently found that sites where quiet, non-consumptive recreation is permitted had lower density of native mammalian carnivores than areas with no recreation. All recreational sites showed a shift in carnivore detections toward non-native carnivores such as domestic dogs and cats (Reed and Merenlender 2008). These results corroborate the relatively consistent finding that the mere presence of humans and their introduced domestic species may prove detrimental to native wildlife, regardless of the types of recreation in which they engage.

The finding that community composition shifted toward non-native species such as domestic dogs where recreation was permitted suggests a need to better understand the effects of dogs on native wildlife and the efficacy of various dog management strategies. This need is furthered by the outsized role dogs tend to play in open space management efforts. To follow up on their previous findings, Reed and Merenlender (2011) further studied the effects of different dog management policies in recreation areas. They found no significant differences in mammalian carnivore abundance or species richness between recreational sites with no dogs, sites with on-leash dogs, and sites with off-leash dogs. They did, however, identify significant differences between all three types of sites and reference sites with no recreation, suggesting that the presence of humans is a more important influence on species diversity and carnivore density than that of dogs (Reed and Merenlender 2011).

MANAGING PUBLIC ACCESS TO PROTECT WILDLIFE

To better understand whether trends identified in the literature are translated to open space management practice, we obtained information from local park, recreation, and open space area managers on how they address public access and its potential impacts on wildlife. Due to the abundance of literature focusing on the region and the richness of open space availability and biodiversity in close proximity to urban populations, we focused this effort on the San Francisco Bay Area.

Case study on San Francisco Bay Area open space management strategies

To assess current practices in addressing biological constraints in public access management and to identify how principles elucidated in the literature are applied in practice, we conducted a case study based on information obtained from ten open space management entities in the San Francisco Bay Area. Four of these were special districts, four were county agencies, and two were non-profit organizations. Each organization is identified numerically in the following discussion for the purposes of anonymity. All organizations were contacted by email in September 2019 and provided a survey with a standardized set of questions on public access management approach in areas known to contain sensitive biological resources. Each organizations' webpage was subsequently queried for supplemental information.

Five of ten organizations contacted via email responded to initial outreach efforts. Of these, three indicated that they restrict recreational access to some or all of their lands based on the presence of sensitive biological resources (County Two, Special Districts Two and Three). The other two respondents said they do not restrict access on any of their lands (Special District Four) or that they entitle open space preserves but do not hold land in the long-term or provide access opportunities (Non-Profit One).

County Two's response suggests limitations in their capacity to restrict public access for the purposes of addressing biological constraints. This County was in the process of developing a dog policy to determine where dogs are permitted and where leashes are required. In describing this policy, County Two representatives did not specify any biological factors being considered. Outside of its dog policy, the County indicated that they may restrict park access due to wet weather or public safety concerns; but that they generally do not restrict access for biological reasons apart from seasonally fencing off a small portion of one park for nesting shorebirds. In describing their shorebird protection efforts, representatives stated that they only restrict access insofar "as that is allowed."

Webpage queries of all 10 organizations demonstrated that a management approach similar to County Two's was common. There was little indication of restricted recreational access such as permit-only areas or seasonal park or trail closures to address biological constraints, with dog policies being the most common strategy to protect wildlife. Most permits were related to facility rental or special event production, with some parks containing sensitive plant species also providing scientific collection permits. Furthermore, most seasonal trail closures cited severe weather and trail washouts, and few were explicitly tied to biological concerns. Among the organizations surveyed, restricting the presence of dogs in parks was the most common strategy used by land managers to reconcile potential incompatibilities between non-consumptive recreation and sensitive species protection. Virtually all organizations had some type of dog policy in place or were in the process of establishing a dog policy. More than half of them specifically cited disturbance of wildlife or other biological constraints when describing dog access restrictions. Policies ranged from outright prohibition of dogs to requirements that dogs be kept on leashes.

Special District One was a notable exception to the patterns described above. In addition to restrictions on dogs, this organization employed a variety of methods, including permit-only access areas and seasonal trail and road closures. Special District One maintains one area that can only be accessed by permit holders. This area provides habitat for special-status avian species and other non-special status wildlife species. Recreational activities in this area are restricted to camping, hiking, horseback riding, and backpacking, and permits must be purchased in advance. Hunting is not allowed. Additionally, Special District One closes portions of one park annually for raptor nesting, and at the time of writing, one other park had trail closures for unspecified habitat protection. Special District One indicated in its response to outreach efforts that it annually and occasionally employs this technique as needed, closing trails and roads based on the presence of wildlife during sensitive windows such as nesting or mating. Moreover, correspondence with this District indicated that they purchase lands in collaboration with conservation organizations and place these lands under easement, and that when these lands become publicly accessible, permissible recreational activities are limited to those compatible with applicable habitat conservation plans. In addition to these strategies and similarly to other organizations, Special District One provides restrictions on where and how dogs may be present on their land. Biological considerations incorporated in this District's dog policy included prohibition on dogs where specified by conservation easements and in sensitive habitats such as marshes and wetlands.

The two non-profit entities included in this study had management practices that were among the most wildlife-protective. Non-Profit One indicated that opportunities for public access on their lands are very limited due to their high conservation value and the organization's emphasis on preserving biodiversity—suggesting an approach placing higher value on conservation than recreation and incidentally allocating recreational opportunities where compatible with biological constraints. Perhaps the most unique management strategy identified in our case study was employed by Non-Profit Two. This organization divided their lands into two distinctive types of preserves—with the primary purpose of one type being public outreach and education, while the other type primarily served conservation purposes. While conservation and restoration activities are held on both types of preserve, the former includes more opportunity for educational events, hiking, and community volunteer days than the latter, where public access is limited due to resource constraints.

In our outreach and website queries, we looked for permit-only access areas, seasonal trail closures, restrictions on dogs, and other management strategies. Few of the public entities included in this case study restricted recreational access permanently or seasonally to address biological constraints, with surveyed non-profit organizations doing so more holistically. Yet, most public entities indicated the presence of sensitive plant or animal species on their lands or stated conservation as one of their organization's purposes. Although this case study examines a small, non-representative sample of management entities, these findings suggest that the public land management agencies that responded to our query may be constrained by mission and purpose in their ability to limit public access relative to other organizations such as non-profits with a singularly focused purpose of resource protection.

ADDITIONAL RESEARCH NEEDS

Several implications emerge from our review: 1) research efforts need to extend beyond noting individual behavioral responses; 2) more research is needed on species beyond birds and mammals; and 3) impact studies needs to be more frequently integrated with research on outdoor recreation use patterns.

The studies we reviewed indicate that although some research has been conducted on the effects of non-consumptive recreation on wildlife, the scope is generally narrow. There is a need for additional information on other taxa, given the number of listed species that are not birds or mammals. Moreover, recreational impacts on special status plant species are consistently less studied than those on wildlife, despite the high number of listed plant species, and the fact that habitat degradation (including impacts to vegetation) is a potential mechanism for recreation's impacts on wildlife. One example of such an investigation is the Spring Mountains National Recreation Area Landscape Analysis (USDA 2008). This report included an evaluation of spatial impacts from current and future recreation facilities on habitat loss for 30 special status species, most of which were plants. Another example is the Marin County Road and Trail Management Plan (Marin County Parks and Open Space District 2014) which included an analysis of illegally constructed mountain bike trails on special status species, most of which were plants.

Our findings suggest that individual wildlife response to recreational activity is studied more often than population-level response. One exception is experimental, longitudinal research conducted by Riffell et al. (1996), who evaluated the effects of repeated intrusion by hikers to avian communities in Wyoming's Medicine Bow National Forest for 10 weeks during the breeding season over 5 years. Their study found no cumulative or yearly declines in seasonal species richness, mean richness, or mean total abundance. They did find that repeated intrusions altered the composition of the community represented by the most common species, but no widespread impacts on avian community structure were documented. Continuing this line of research will be important to evaluate recreation impacts at the population level. This is particularly crucial given the nature of Federal and State regulatory schemes for endangered species, which typically take a population-based approach to species protection. Moreover, conducting research at the population level eliminates the need to interpret individual-level responses' implications for broader conservation efforts. Extrapolating individual response to a population-level context can prove difficult (Bejder et al. 2009; Caro 2007), and eliminating the need to do so reduces uncertainty for decision-makers.

Population-based outcomes should continue to be incorporated in future studies to facilitate stronger understanding of recreation's implications for conservation. While this is a more difficult undertaking than simply investigating behavioral responses, this type of research is needed to inform policies implemented by land managers. Useful models for conducting long-term, quasi-experimental research that addresses the larger question of population viability in the context of known threats, including non-consumptive recreation, to special status species exists in previous studies and can be used to inform future research.

Additionally, the taxa studied need to be prioritized to include additional groups. Mammals and birds have been studied more often than other taxonomic groups since non-consumptive recreation became a popular topic of research in the 1980s, and continue to be the most studied today. This does not necessarily correspond with greater conservation or research needs, especially considering the high number of amphibian, reptile, and invertebrate species with special status as designated by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service (~61% of listed species in California). If park and open space managers are to make informed, high-impact conservation decisions using the limited resources available to them, research efforts must be prioritized based on conservation need rather than focusing on the most visible species. Similar work is needed to provide frameworks for prioritizing research dollars in wildlife and open space management.

Before embarking on a new vein of research to address these above areas, it may be useful to consider comments offered by Dr. David Cole and William Hammitt, from their textbook, *Wildland Recreation: Ecology and Management*. From Hammitt and Cole (2015):

> The relationship between amount of recreational use and wildlife impacts is not well understood. Very few studies have systematically examined the effects of varying numbers of visitors on wildlife. Even fewer wildlife studies have determined an accurate population count of organisms prior to the introduction of recreation…..Previous research indicates the complexity of the relationship by stating that the number of visitors cannot be considered in isolation from species requirements and habits, setting attributes, and type of recreational use. Various aspects of use intensity are also involved, including frequency and regularity of use and number of people at one time.

Thus, the third area where additional research is needed is integrated research that links specific outdoor recreation patterns to effects on species distribution and abundance. Some of this is occurring via research by Larson, Reed, Merelender, and others. For example, Larson et al. (2018) correlated recreational use levels with habitat occupancy for seven special status species for 18 reserves in San Diego County. This is a thorough research effort that integrates a model to predict recreation use levels with whether habitats for special status species are occupied. A more comprehensive and robust effort is needed that extends this type of research to a variety of habitat types and recreational use levels throughout California. Finally, the effectiveness of the “regulatory toolkit” that park, recreation, and open space managers have to control outdoor recreation use is well-established for federal lands, but its applicability to protected areas in close proximity to urban areas is largely unknown. Marion (2019) mentions strategies on how to address recreation impacts to wildlife including: reducing use, modifying the timing and location of use, modify the type of use, visitor behavior and expectations, and maintain and/or rehabilitate the resource. In regard to modifying visitor behavior, there is an entire body of research that focuses on how well visitors comply with wilderness and other protected area regulations (Lucas 1981; Washburne 1982; Duncan and Martin 2002; Marion and Dvorak; Martin and McCurdy 2010), and a review of low impact education programs (Marion and Reid 2007), such as Leave No Trace, suggests these programs can be effective at altering visitor behaviors that can cause impacts to natural resources. However, what has not been well investigated is how widespread such programs are implemented by park, recreation, and open space managers, and their applicability to open space preserves near urbanized areas.

Furthermore, it is important for research to go beyond theory and be adopted into practice by land managers. Research findings must be placed into a conservation and management context, with actionable priorities and recommendations for park, recreation, and open space managers. Researchers should engage with park and open space managers to ensure that science-based policies are enacted. Although limited in scope, our case study indicates some potential disconnects exist between the scientific community and on-the-ground open space management entities. For example, a large portion of the San Francisco Bay Area open space management and wildlife conservation efforts focused on developing sound dog policies; yet our research on the matter suggests that the effects of dogs are secondary to those of the presence of humans. Therefore, it may be of higher impact to examine ways to limit human activity in areas with sensitive biological resources through trail routing, permanent and seasonal park closures, and other methods.

Researchers and managers should therefore work together to develop, implement, and test science-based strategies. Social science-based methods should be included when testing approaches to better understand compliance with and attitude towards various management approaches as well as park use patterns. Several studies described above (Duncan and Martin 2002; Martin and McCurdy 2009) integrated these methods into their research but were focused on compliance with wilderness regulations.

Taylor and Knight (2003) demonstrated a potential approach for researchers to integrate study of park user perceptions into their work. They used a behavior-based model to study ungulate response to hikers and mountain bikers in a state park in Utah and, importantly, analyzed visitors’ perceptions of their own effects on wildlife. They found that recreationists tend to attribute adverse effects on wildlife to other recreationists’ actions and not their own. These results illustrate the importance of park user education as well as collaboration between the natural and social sciences in recreation and wildlife management.

Another example may be found in research conducted by Jefferson County Open Space District in Colorado, which has documented “heat maps” of recreation use for trails that bisect their open space areas. This information can then be overlaid with known or potential occurrences of special status species. Accurately collected recreation use data such as these would help biologists and park and open space managers better understand the relationship between overall park use patterns and wildlife impacts, an area of research that we found to be notably understudied.

To move toward sound management practice that effectively accommodates demand for public access and need for species protection, methodological changes and research prioritization are needed. Through review of literature related to the effects of non-consumptive recreation on wildlife and a survey of local agencies' integration of science-based methods into open space management efforts, we found that significant data gaps exist in both science and policy. New frameworks are needed to prioritize conservation efforts, which identify sensitive resources and integrate these into management efforts. Additional research using population-based response variables is necessary to quantify effects and determine whether management strategies are effective. A holistic approach incorporating conservation status and public recreational use patterns is needed to prioritize finite research and management resources.

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Author Contributions

Conceived and designed the study: JB
Collected the data: AS
Performed analysis of the data: AS
Authored the manuscript: JB, KD, AS
Provided critical revision of the manuscript: JB, KD, RC

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Wildlife occupancy and trail use before and after a park opens to the public

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We investigated changes in wildlife trail use and occupancy from baseline conditions after a park opened to the public; we were curious if wildlife would alter either their use of the trails or the surrounding areas or both in response to the park opening. We generated single-season occupancy estimates as a site-wide occupancy metric from 23 camera traps placed at 0.5 km intervals throughout the park and wildlife and human detection rates to measure intensity of trail use from 10 camera traps placed every 500 m on the trail. We compared the findings from the four seasons before to the four seasons after the park opened to the public. Human trail use increased sharply after opening and then lessened, but was markedly higher than prior to opening. Bobcat (*Lynx rufus*), coyote (*Canis latrans*) and gray fox (*Urocyon cinereoargenteus*) did not alter trail use relative to study area occupancy. Two species, black-tailed deer (*Odocoileus hemionus*) and gray squirrel (*Sciurus griseus*) altered trail use, and puma (*Puma concolor*) and wild turkey (*Meleagris gallopavo*) altered both trail and study area use. All species, except for the raccoon (*Procyon lotor*) and wild turkey, recovered to pre-opening conditions, by the winter (that is, after approximately 9 months) following opening.

Key words: camera trapping, occupancy, open space, recreational impacts, trail use

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Protected open space is considered important for conserving wildlife and providing public recreational opportunities in the San Francisco Bay Area. Recreation is often supported by concomitant trails and infrastructure, that is, that existing trails and fire roads are used by the public and, in turn, additional infrastructure is required to facilitate access. To conserve wildlife effectively, it is important to understand how wildlife may be affected by human use of the landscape even when those uses appear benign. Wildlife often share the use of trails with humans, their dogs, cyclists, motorized vehicles, and equestrians, while also preferentially using roads and trails for movement (Whittington et al. 2005). The extent to which non-motorized recreational human uses impact wildlife that rely upon open space (for breeding, movement, foraging, etc.) is the subject of this study. Wildlife may be disturbed by human presence on trails and, as a result, vacate the surrounding landscape despite the landscape's capacity to support them. An alternate scenario may be that wildlife avoid or reduce trail use (that humans are using) but remain resident in the surrounding landscape in response to human trail use.

Wildlife can be both negatively or positively associated with human presence and zones of urbanization. Recreation has been shown to have behavioral impacts on wildlife, such as reduced feeding times (Cassirer et al. 1992), detrimental stress responses (Barja et al. 2011), reduced temporal occupancy (Wang et al. 2015), but also the reverse (Ordeñana et al. 2010; see also Reilly et al. 2016 for a review of the literature). With pressure on open space providers to accommodate human recreation and increase accessibility, understanding how access and intensity of human use affects wildlife provides essential information towards making decisions that effectively balance wildlife conservation with human interests.

We examined how public presence may affect wildlife trail use and occupancy in the surrounding landscape in the North Sonoma Mountain Regional Park and Open Space Preserve (hereafter, "Park/Preserve") in southeastern Sonoma County, California. A camera trapping array (grid) encompassed the Park/Preserve to assess changes in single season occupancy estimates (that is, we use occupancy as an index of prevalence or a surrogate of abundance in the study area; O'Brien et al. 2010; Royle and Nichols 2003; MacKenzie and Nichols 2004; MacKenzie et al. 2006; but see Burton et al. 2015 and Steenweg et al. 2018, 2019 for cautionary discussions). Additional cameras were placed on the trail to assess wildlife and human use (that is, through detection rates as a measure of intensity of use); trail construction had been completed by the time the study began.

Below we outline the key hypotheses to address the following question: How does human trail use affect wildlife trail use and occupancy in the study area?

$H_{ø}$: Wildlife did not change their use of trails or residency (abundance) within the Park/Preserve after it is opened to the public. Wildlife occupancy estimates (abundance) from the grid and the trail detection rates do not change after the Park/Preserve opens to the public.

H_1: Wildlife use trails less but are still resident within the study area after the Park/Preserve is open to the public. Wildlife trail detection rates decrease after human trail use increases but occupancy estimates (abundance or residency) does not change in study area after the Park/Preserve opens.

H_2: Wildlife reduce trail use and vacate the study area after the Park/Preserve is open to the public. Both wildlife trail detection rates and site-wide occupancy decrease within the Park/Preserve after it opens to the public.

H_3: Certain types of wildlife (e.g., carnivores or ungulates) may be differentially affected by the presence of humans. With regard to trail and Park/Preserve use, see H1 and H2.

H_4: Wildlife resume a similar intensity of trail use and abundance within the study area after a period of time post-opening compared to pre-opening measures (latency to habituation). Wildlife trail detection rates decrease initially after opening, but then return to the pre-opening levels after a period of time. If wildlife do leave the study area for a period of time (lower abundance), these measures (trail detection rates and occupancy estimates) will both decrease initially after Park/Preserve opening but then recover to pre-opening levels.

METHODS

Study area

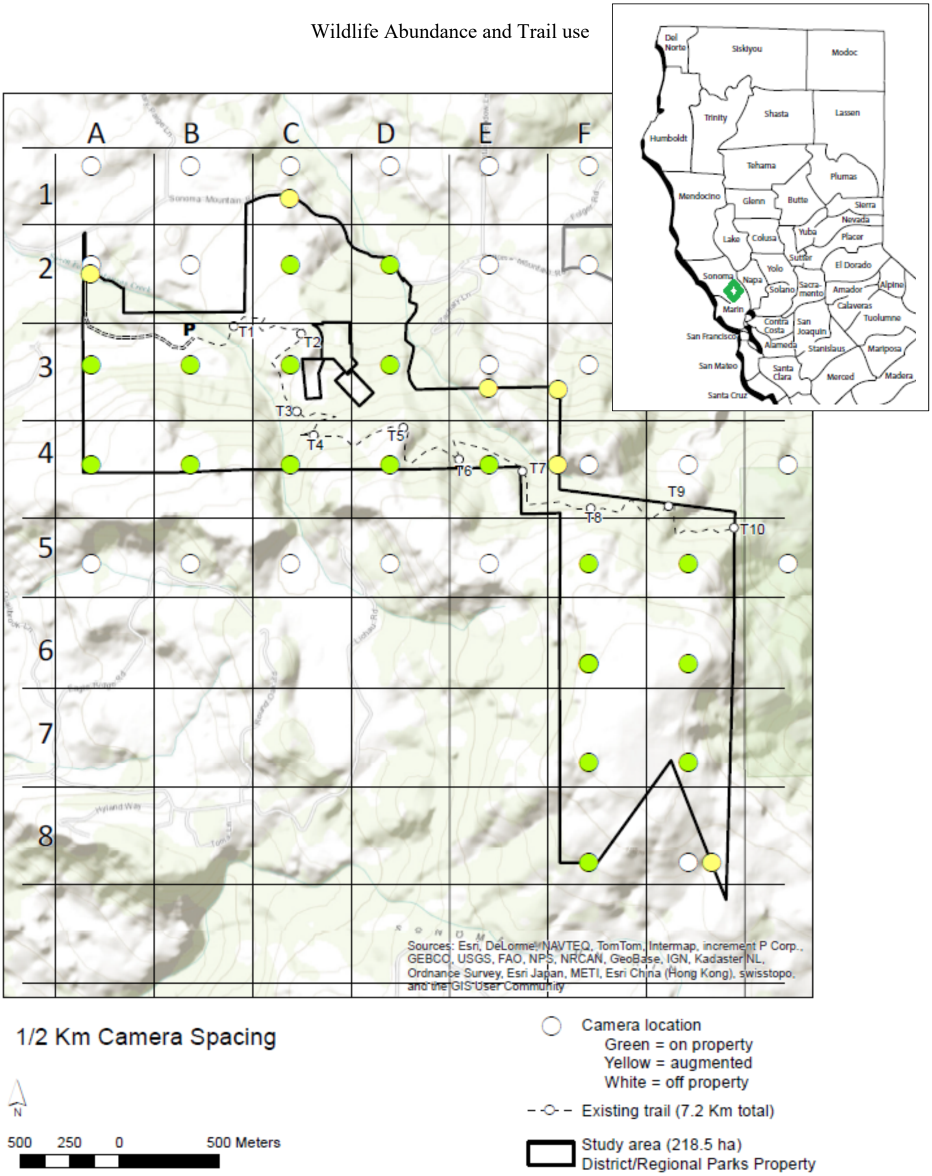
The 3.4 km^2 study area, North Sonoma Mountain Regional Park and Open Space Preserve (Park/Preserve; 38.3235 N, 122.5756 W, parks.sonomacounty.ca.gov/Visit/North-Sonoma-Mountain-Regional-Park/Park-Map/) is located in Sonoma County, California, USA (Figure 1). Sonoma County Agricultural Preservation and Open Space District (SCAPOSD) acquired the property and built the 5.95 km trail that ranges in elevation from 244 m to 750 m between June 2010 to September 2012. The Park/Preserve was then transferred to Sonoma County Parks in 2014 and opened to the public on 14 February 2015. Cattle grazing occurred before and during the study in portions of the site that supported grasslands; the site had no exclusionary fencing dividing up the site.

This area is subject to a Mediterranean climate characterized by wet, cool winters and dry, hot summers. Habitats included non-native grasslands (warm grasslands), oak-bay woodland (montane hardwood), redwood forest, mixed forest with madrone (montane hardwoods), and remnants of coast live oak forest/woodland and California bay forest (Biodiversity Portfolio Report, https://www.bayarealands.org/explorer/#, Conservation Lands Network Explorer 2016, 1 December 2016; Bay Area Open Space Council 2011). Matanzas and South Fork Matanzas creeks run through the study area. The topography is characterized by the steep hillsides of Sonoma Mountain. The surrounding land use matrix is composed of low-density rural development, protected open space, vineyards, and grazed grasslands.

Study design

A north-south grid of 23 motion and heat-differential triggered camera traps, HCO SG550V IR Scouting Cameras [and replacement Bushnell Trophy Cams (model#119636c)] were set in a randomly-generated fixed array at 0.5 km intervals covering the entire Park/Preserve ("grid cameras"). We adjusted six camera coordinates by less than 200 m to fit within the study area prior to going in the field (see yellow circles on Figure 1). Species-specific single-season occupancy estimates were generated for four seasons before and after the Park/Preserve opened to the public (see Table 1). We placed ten additional cameras at 500 m intervals along the trail ("trail cameras"; Figure 1). We calculated seasonal trail detection rates (detections per 100 trap nights) as a measure of intensity of wildlife and human use for four seasons before and after the Park/Preserve was opened to the public (see Appendix I for a list of human use categories).

Camera trapping methodology.—We followed a camera trapping and data management protocol, which is a modified version from TEAM Network 2009 and O'Brien 2010. Grid cameras were uniquely identified by line letter and number (e.g., A1, A2, A3, etc.; Figure 1). We placed camera traps within 100 m of the pre-determined coordinate during field deployment. Camera traps were attached to a wooden stake or tree with a nylon strap. Camera height was standardized to detect a mammal approximately gray fox size at a distance of 2 m at a perpendicular angle. Eight of the ten trail cameras were mounted on trees, and, after the Park/Preserve opened, were outfitted with security boxes to prevent theft. We recorded location (GPS coordinates), habitat within which the camera was placed (open, closed, or mixed), and elevation during deployment. Habitat (vegetative structure) included just three



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Figure 1. Camera layout for grid (yellow and green circles) and trail cameras (T1-T10) with study area location (green diamond in inset map of California counties); North Sonoma Mountain Regional Park and Open Space Preserve, California, USA, 2014–2016.

Table 1. Seasons before and after park opening, beginning and end dates for seasonal analysis, and effort (trapnights) for trail (n = 10) and grid (n = 23) camera arrays in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA, 2014-2016.

Before or after opening Park/Preserve	Season	Begin and end dates	Trail trapnights	Grid trapnights
Before	Spring	1 March–30 May 2014	591	1,251
Before	Summer	1 June–31 August 2014	601	1,266
Before	Fall	1 September–31 November 2014	656	1,508
Before	Winter	1 December 2014–13 February 2015	606	1,106
Opening		*14 February 2015*		
After	Spring	1 March–30 May 2015	245	1,019
After	Summer	1 June–31 August 2015	16	701
After	Fall	1 September–31 November 2015	540	1,200
After	Winter	1 December 2015−15 January 2016	146	587

categories: closed (closed canopy), mixed (mixture of open and some overhead canopy such as oak woodland intergrading with grassland or chaparral), and open (no overhead canopy usually grassland). All cameras were set to take three images per trigger (event), a five second interval between events, 6 MP image size, high sensitivity level, and time stamp "ON." We adjusted image size and sensitivity as needed to match field conditions and improve data collection.

To verify camera station functioning during set up and maintenance, we took photographs of whiteboards with date, camera station identification, region, and subregion. We maintained camera stations regularly for proper functioning. We downloaded images from SD cards into a Windows Explorer embedded file system; EXIF image data was exported using PIE software (Picmeta v.6.75, www.picmeta.com/) into .csv files. We (authors and C. Lafayette) catalogued images to species or highest taxonomic order attainable; one of the authors (SET) vetted for accuracy during data preparation. Birds and other non-mammalian taxa were not identified to species nor included in the analysis. We categorized humans into several categories including pedestrian, cyclist, or equestrian (see full list in Appendix I). Unidentifiable images ("unknowns") and blanks were recorded as such.

Statistical analyses

We prepared a species detected list for the study area and trail compiled from before and after the Park/Preserve opened (Appendix I). We calculated single-season occupancy estimates from the camera grid and trail detection rates (detections per 100 trapnights) for terrestrial mammals (squirrel-size and larger) and wild turkeys (*Meleagris gallopavo*) from the cameras placed on trails (only). Trail cameras were not used in calculating occupancy estimates.

We calculated camera trap days ("trapnights") as the number of 24-hour periods (0000 to 2359) that the camera trap was functioning for each season [spring (March-May), summer (June-August), fall (September-November), and winter (December-February)]. We aggregated trapnights by grid and trail (Table 1) and compiled detection histories for grid cameras.

We recorded detections as the maximum number of individuals for each species in an image in a burst of three (an “event”), which are taken when the camera trap was triggered by movement and/or heat differential. For example, in a burst of three images, one image recorded two deer, in the next, three deer and in the final image, a deer; 3 deer would be recorded for that detection (maximum number of individuals in an image detected during one event).

Occupancy Analysis.—An occupancy estimate (ψ) for each species detected for the season was obtained using the program PRESENCE (v3.2, www.mbr-pwrc.usgs.gov/software/presence.html; Hines 2016). We used single-season occupancy models to estimate initial occupancy estimates (ψ) and detection probabilities (ρ) for each species (Mackenzie et al. 2003). Occupancy models account for imperfect detection and provide unbiased estimates of occupancy. To apply these models, detection histories were compiled for each species at each camera station as a series of ones (detection) and zeroes (non-detection). Each day (24-hour period commencing at 0000) the camera station was up was considered a (re)survey. Each day the camera station was “down” or not functioning was treated as a missing value.

Two pre-defined models were run, and the model with lowest delta Akaike’s Information Criterion (AIC) was used to estimate probability of detection and occupancy (Hines 2016) . The first model assumes the same occupancy probability for all camera station locations and that detection probability (ρ) was constant across both camera station location and survey occasions (i.e., two parameters). The second model assumes that all camera station locations have the same probability of occupancy (ψ), but that ρ varies between the surveys—although at each survey occasion, ρ is the same at each camera station location. The software PRESENCE uses AIC to rank models (Burnham and Anderson 2002), which relies on rules of parsimony. In this case, twice the log-likelihood values at the maximum likelihood estimates were used to calculate the AIC values in model weighting.

Comparison of seasonal occupancy estimates and detection rates.— Single-season occupancy values were compared from the season before to the season after and plotted in a seasonal time series to compare to trail detection rates relative to occupancy estimates. We added linear trend lines in several time series figures to show trend from the first season (spring 2014) to the last season of the study (winter 2015-2016).

RESULTS

We set up camera traps during February 2014 and maintained them regularly until the study ended in mid-January 2016. Camera placement elevation ranged from 252 to 737 m in closed, open, and mixed habitat. Of the 23 grid cameras, four (17%) were set in closed habitat, four (17%) in mixed, and 15 (65%) in open habitat; of the 10 trail cameras, five (50%) were in closed habitat, two (20%) in mixed, and three (30%) in open habitat. The trail was located largely within closed habitat. The Park/Preserve was open (warm grasslands, 50%) with remainder mixed and closed (41.8% montane hardwoods and 6% redwood forest; Biodiversity Report, www.bayarealands.org/explorer/#, Conservation Lands Network Explorer 2016).

The composition of the wildlife community changed little from before and after the Park/Preserve opened (Appendix I). Common and expected species including large and medium-sized carnivores were detected; a California Species of Special Concern, the American badger (*Taxidea taxus*), was detected within the study area after the Park/Preserve was opened. Several rare and data-deficient species that may occur in this region were not detected [e.g., the western spotted skunk (*Spilogale gracilis*), ringtail (*Bassariscus astutus*), porcupine (*Erethizon dorsatum*), and black bear (*Ursus americanus*)].

Seasonal analysis and effort

We generated seasonal Park/Preserve occupancy estimates and trail detection rates for eight seasons (four seasons before and after, Table 1). Trail camera trap nights averaged 425 (range = 16–656) per season. Grid trapnights averaged 1,080 (range = 587–1,508) per season. Seasonal trapping effort varied due to stolen (and replaced) camera traps, data loss due to theft of SD cards, and increased trail use filling up the SD cards with images.

Before and after seasonal comparison of occupancy estimates

Five wildlife species exhibited changes in occupancy estimates in the first season after the park opened; opossum increased (*Didelphis virginianus)* and raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), and puma (*Puma concolor*) declined (Figure 2a) in the spring post-opening. Seven wildlife species exhibited changes in summer occupancy estimates; five decreased: striped skunk, gray fox (*Urocyon cinereoargenteus*), coyote, puma, and wild turkey (*Meleagris gallopavo*), and two increased [opossum and bobcat (*Lynx rufus*), Figure 2b] in the summer post-opening. Four wildlife species exhibited changes in occupancy estimates in the fall following opening; three decreased (gray fox, puma, and wild turkey) and one increased (opossum; Figure 2c). Only one wildlife species, raccoon, exhibited changes (increased) in occupancy estimates in the winter post-opening (Figure 2d).

Trail use

Even though the trail was not officially open to the public, some pre-opening trail use by "humans" (pedestrians, staff and trail crew) as well as their dogs and cyclists was observed in consistently low numbers (Figures 3a-c). The Park/Preserve did not allow dogs, and dog detection rates remained low throughout the study period (Figure 3c). Human trail detection rates increased dramatically immediately after the park opened; 4,393 detections per 100 trap nights (spring 2015) from 148 the season prior to opening (winter 2014–15, Figure 3a). Cyclists increased from an average of 53 (range 4–64) pre-opening to 228 (range 77–338) post-opening. Aggregated wildlife trail detection rates decreased after Park/Preserve opening (Figure 3d).

Comparing Wildlife Occupany in the Park/Preserve and on the Trail

We compared wildlife species' intensity of trail use (trail detection rates) with occupancy estimates seasonally before and after park opening.

Black-tailed deer. —Black-tailed deer occupancy increased post-opening (Figure 4a) and trail use decreased for two seasons then returned to pre-opening levels (see Figure 4b).

Gray squirrel.— Gray squirrel occupancy was stable both before and after the Park/Preserve opened to the public (Figure 4a). Gray squirrels decreased trail use post-opening summer, fall and winter from pre-opening levels (Figure 4c).

Striped Skunk.— Occupancy of striped skunks decreased (slightly) post-opening

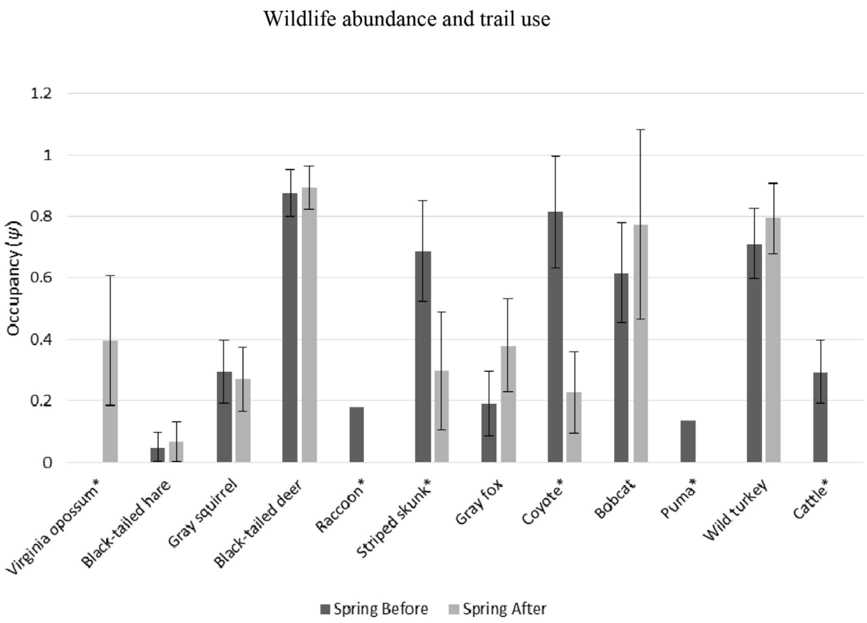


Figure 2a.

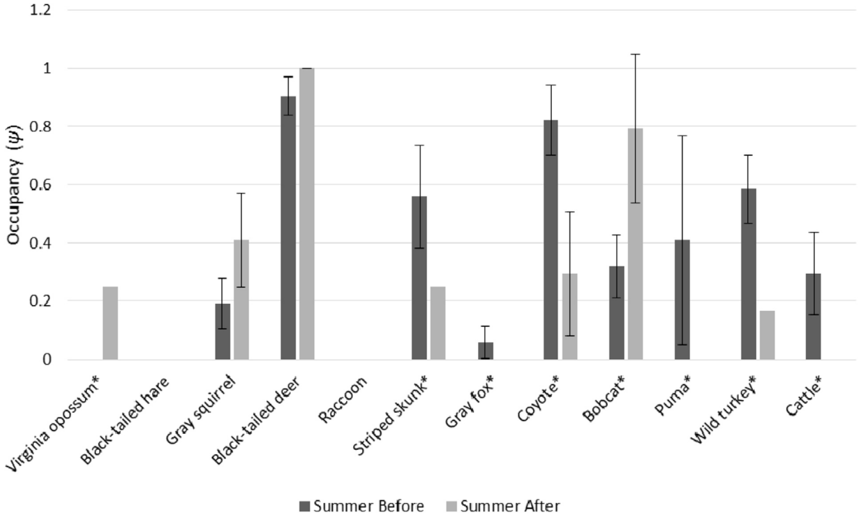


Figure 2b.

Figure 2a-d. Single-season occupancy estimates (error bars = ±SE) for wildlife species (* = difference noted between before and after occupancy estimates) in the a) spring before (2014) and after (2015), b) summer before (2014) and after (2015), c) fall before (2014) and after (2015), and d) winter before (2014_15) and after (2015_16) in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA.

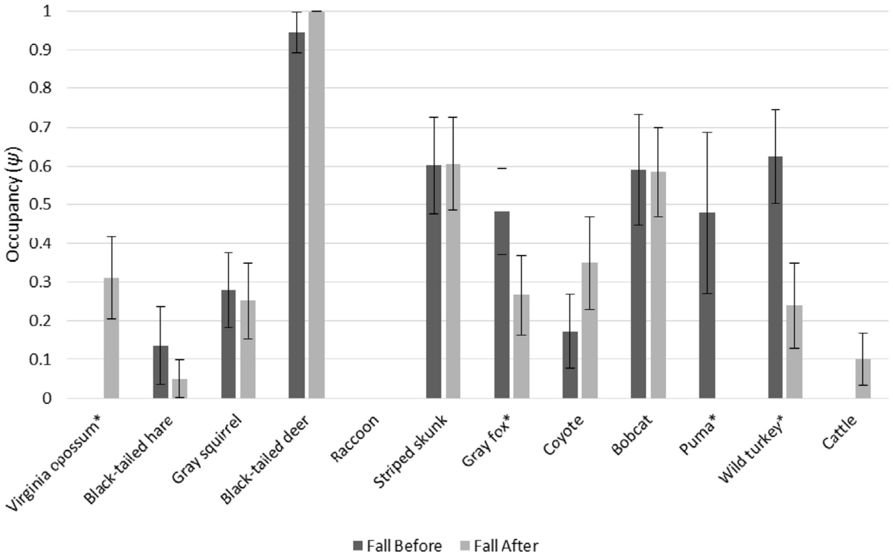


Figure 2c.

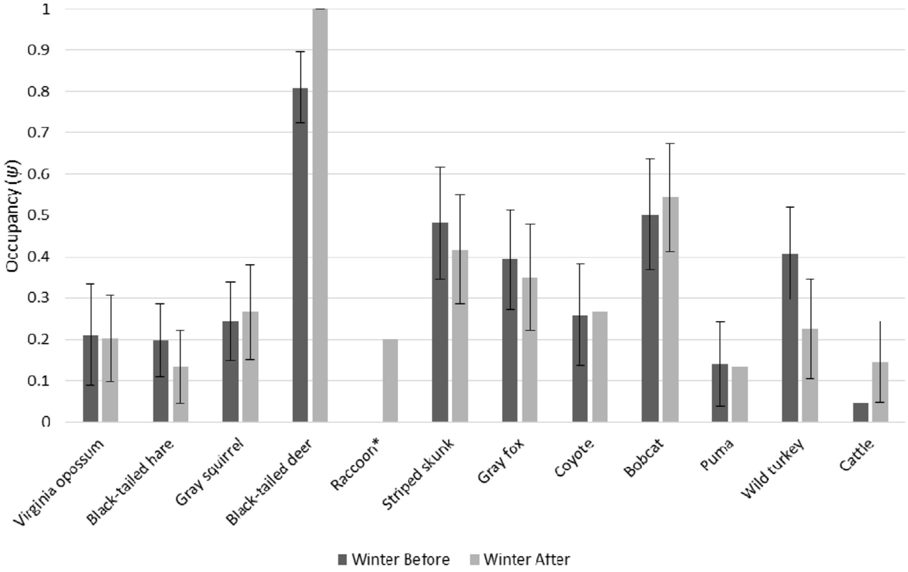


Figure 2d.

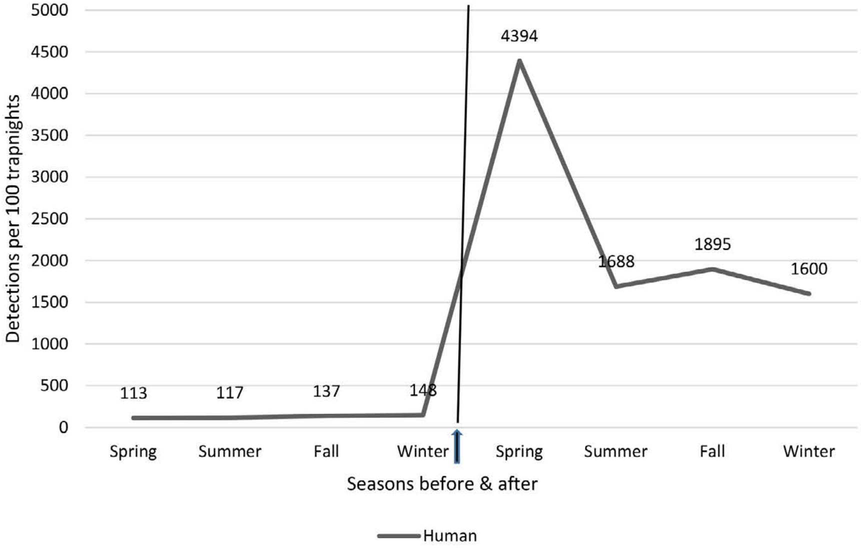


Figure 3a.

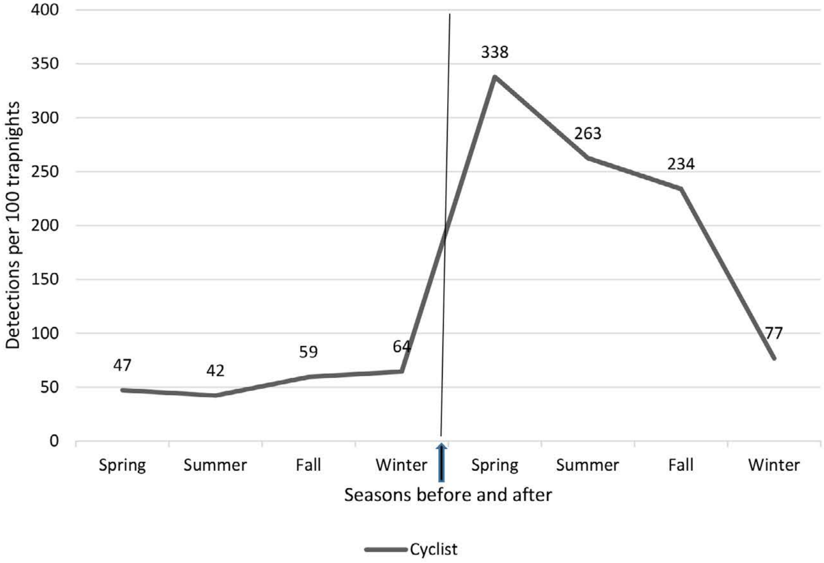


Figure 3b.

Figure 3a-d. Seasonal trail detections rates (detections per 100 trapnights) for before (spring 2014-winter 2015) and after (spring 2015-winter 2016) park opening (vertical line and arrow indicating 14 February 2015) for a) humans (non-cyclists), b) cyclists, c) domestic dog and livestock, and d) wildlife (linear = linear trend line) in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA.

Wildlife abundance and trail use

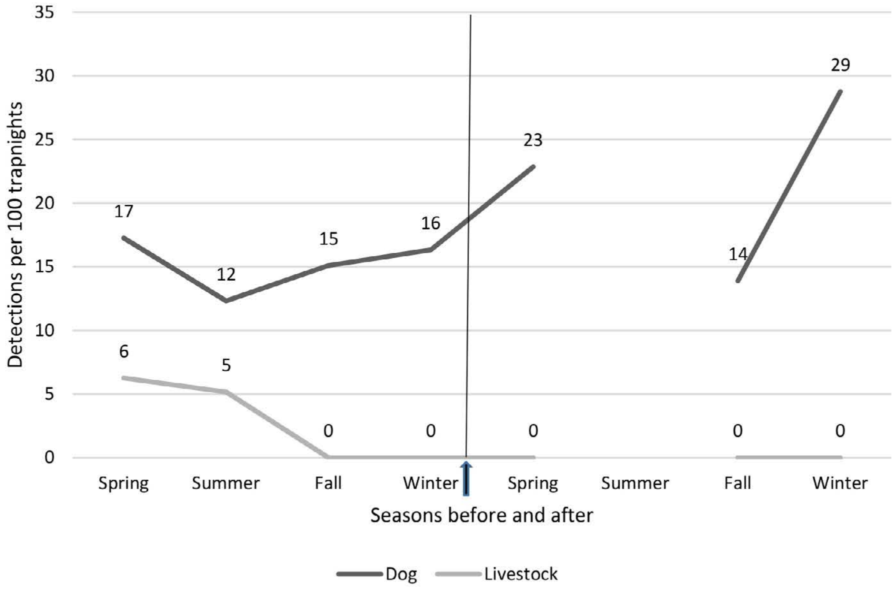


Figure 3c.

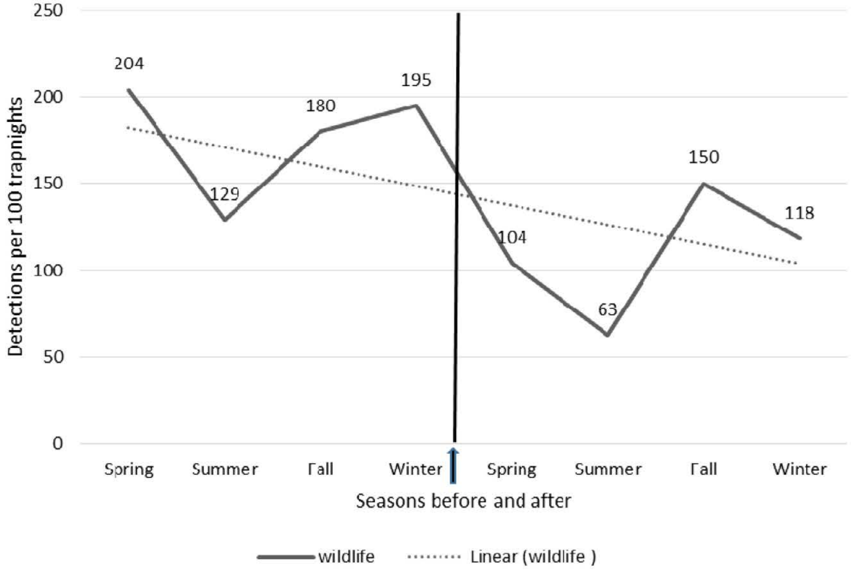


Figure 3d.

(Figure 5a). Striped skunk trail detection rates were the same post-opening for two seasons then increased to rates greater than pre-opening (Figure 5c).

Wild turkey.—Wild turkey increased in occupancy in the spring following Park/Preserve opening and decreased trail use (detection rates) post-opening (Figure 5b and 5d). Wild turkey had lower occupancy estimates and trail detection rates for post-opening summer, fall and winter.

Puma.— Puma occupancy fell to zero post-opening then increased after 3 seasons ($\psi = 0.13$, Figure 6a), potentially indicating some latency to recover. Puma decreased trail use post-opening (Figure 6c).

Bobcat.—Bobcat occupancy increased slightly in the Park/Preserve (Figure 6b) and decreased slightly in trail use (Figure 6d) post-opening.

Coyote.— Coyote occupancy decreased prior to the Park/Preserve opening and then remained relatively stable (Figure 7a). Trail use remained stable with a slight increase post-opening (Figure 7c); trail use was similar to patterns of occupancy.

Gray fox.— Gray fox occupancy was stable and similar to pre-opening occupancy (Figure 7b). Trail use was similar to patterns of occupancy (Figure 7d).

DISCUSSION

By our measures within this one study area, the wildlife that were the most affected by increased human trail use were puma and wild turkey, both decreasing in study area occupancy estimates, which we are using to detect changes in abundance and detection rates, which we are using as a measure of intensity of trail use. Additionally, the striped skunk notably increased trail use the third (fall) and fourth (winter) season after Park/Preserve opened. After two seasons post-opening, bobcat, gray fox, and coyote (three common mesocarnivores) appeared to be unaffected by public trail use both in abundance (as measured by occupancy estimates as an index of prevalence in the Park/Preserve) and trail use; these findings are consistent with a recent San Francisco Bay Area study (Reilly et al. 2016). The puma, which was present before the Park/Preserve opened, was then notably absent for three subsequent seasons post-opening. The majority of wildlife with the exception of the raccoon returned to previous occupancy levels the winter following opening (that is, after 9 months, Figure 2d).

Bobcat, coyote, and gray fox (mesocarnivores) showed little change in trail use, measured by camera detection rates on trail,and within the study area as indicated by by occupancy estimates from pre-opening measures, which support the null hypothesis, $H_ø$ (Table 2); that is, that public trail use (at the rates we measured) did not appear to affect these species. Deer and gray squirrel showed decreased trail use despite no change in study area abundance post-opening, supporting H_1 that states that species change their trail use but not their overall use of the study area as measured by occupancy estimation. Puma and wild turkey decreased both trail use and abundance supporting H_2, which states that species will be affected by human trail use both on the trail and in the study area. Striped skunk increased trail use two seasons after opening and slightly decreased in abundance in the study area (see Table 2, Figures 5a and 5c). Deer may also have exhibited latency to habituation because their trail use resumed to pre-opening rates after two seasons (although it should be noted that human use declined; Figure 2a). Puma indicated latency to habituation for Park/Preserve abundance (Figure 6a).

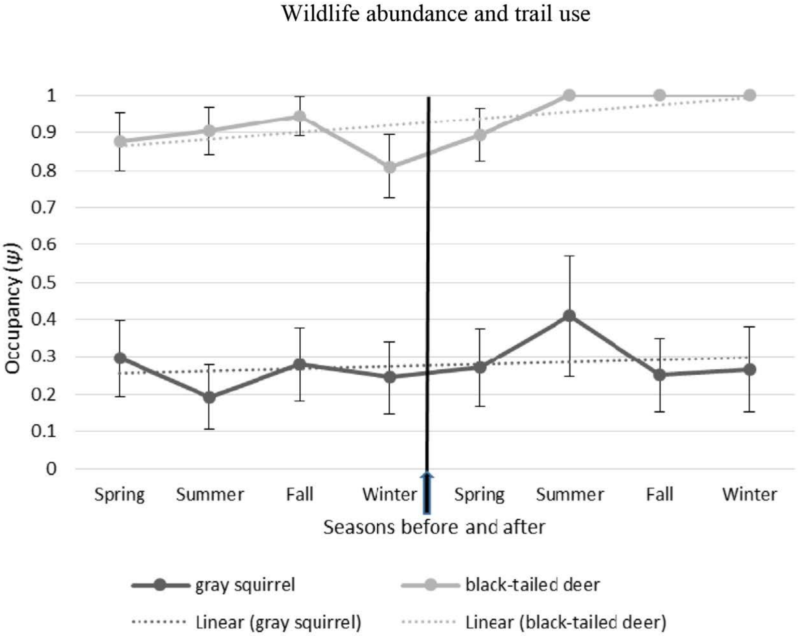


Figure 4a.

Figure 4a. Black-tailed deer and gray squirrel single-season occupancy estimates (ψ; error bar = ±SE, no error bar = no standard error) for seasons before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line and arrow indicating 14 February 2015) in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA.

In contrast to our findings, Reed and Merenlender (2008) conducted a study in the same region and found coyote and bobcat scat prevalence, as an indicator of animal presence, to be five times lower in protected areas that allowed recreation compared to sites that did not. Reilly et al. (2016), however, point out that carnivore scats are problematic as a surrogate for carnivore density because domestic dogs can consume these scats. Additionally, the human ability to visually detect scat is extremely low when compared to trained scat dogs for this purpose (i.e., humans detect only a very small fraction of scat that are present; Smith et al. 2005, Oliveira et al. 2012). Our findings were consistent with Reilly et al. (2016) that mesocarnivores appeared largely unaffected by public access and, additionally, that striped skunks increased trail use with recreational trail use.

The puma is the largest carnivore in the San Francisco Bay Area and is thought to play an important role in the ecosystem. Pumas are used as a surrogate to examine overall connectivity in the landscape due to its large body and home range size. Wang et al. (2015) examined puma behavioral responses to development and roads. According to their study, communication and denning required a four times larger buffer from human development. Findings from our study show a pattern of avoidance, at least, initially; pumas were detected very infrequently or not at all from the study area with commensurate lower trail use for three seasons post-opening; this finding was in contrast to puma adults and young consis-

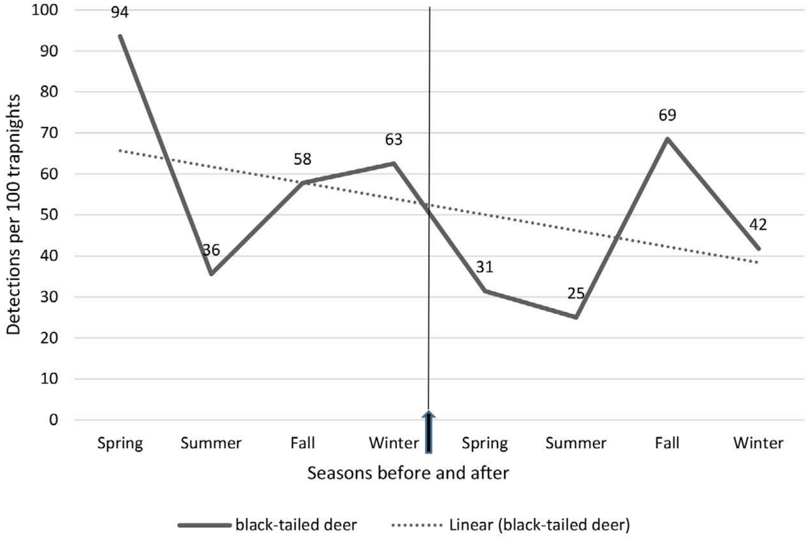


Figure 4b.

Wildlife abundance and trail use

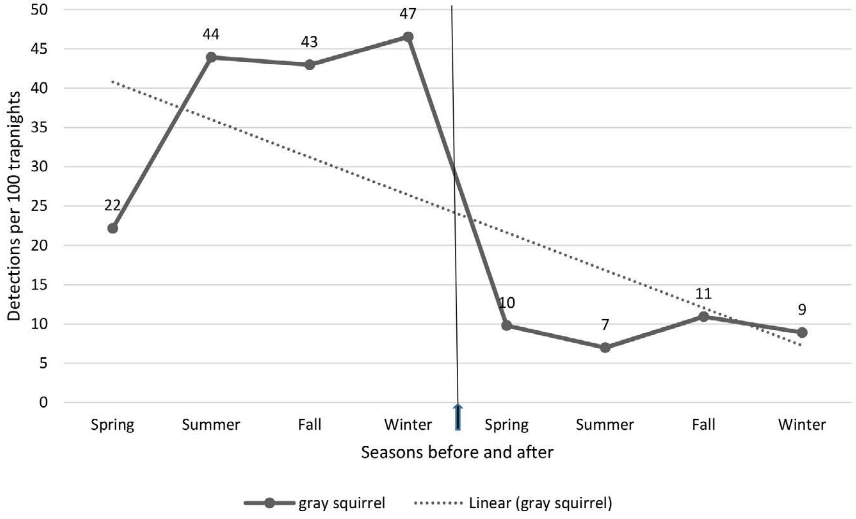


Figure 4c.

Figure 4b-c. Trail detection rates (detections per 100 trapnights) for b) black-tailed deer and c) gray squirrel for seasons before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line and arrow indicating 14 February 2015) in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA. Linear indicates linear trend line.

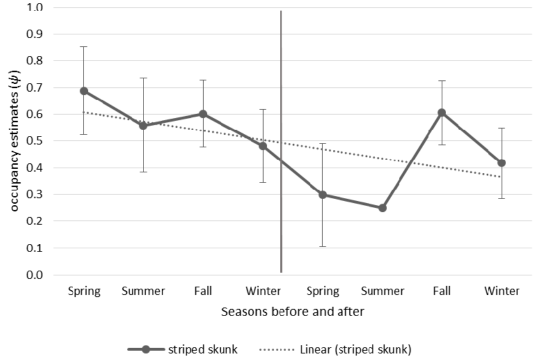


Figure 5a.

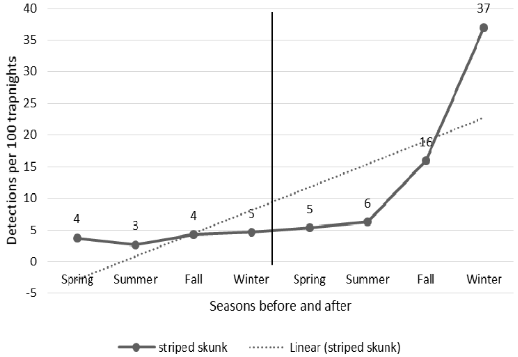


Figure 5c.

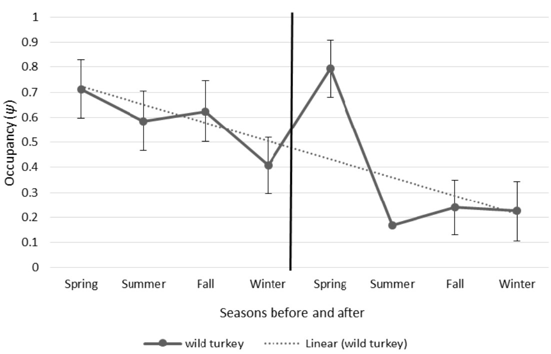


Figure 5b.

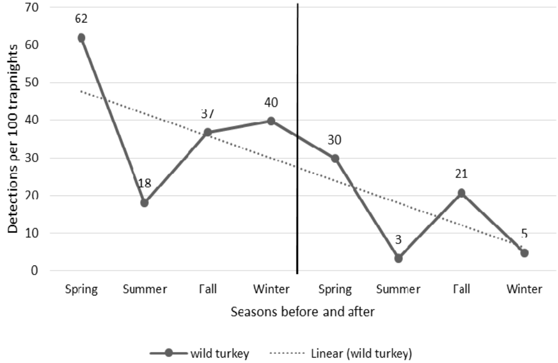


Figure 5d.

Figure 5a-b. Single-season occupancy estimates (ψ; error bar = ±SE, no error bar = observed occupancy) before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line indicating 14 February 2015) for a) striped skunk and b) wild turkey in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA. **Figure 5c-d.** Trail detection rates (detections per 100 trapnights) before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line indicating 14 February 2015) for c) striped skunk and d) wild turkey in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA. Linear indicates linear trend line.

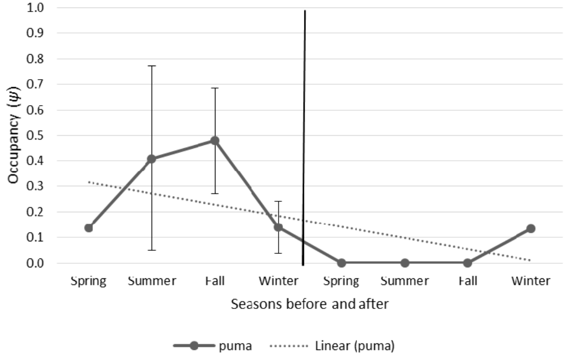


Figure 6a.

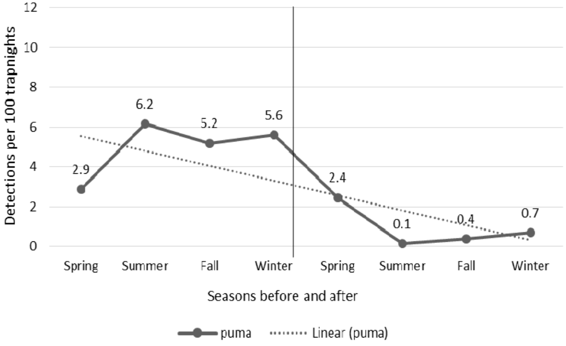


Figure 6c.

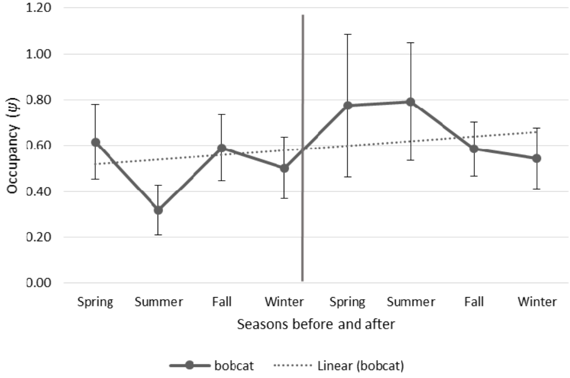


Figure 6b.

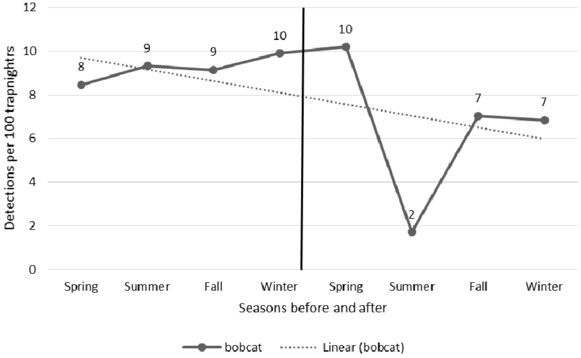


Figure 6d.

Figure 6a-b. Single-season occupancy estimates (ψ; error bar = ±SE, no error bar = observed occupancy) for seasons before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line indicating 14 February 2015) for a) puma and b) bobcat in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA. Figure 6c-d. Trail detection rates (detections per 100 trapnights) before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line indicating 14 February 2015) for c) puma and d) bobcat in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA. Linear indicates linear trend line.

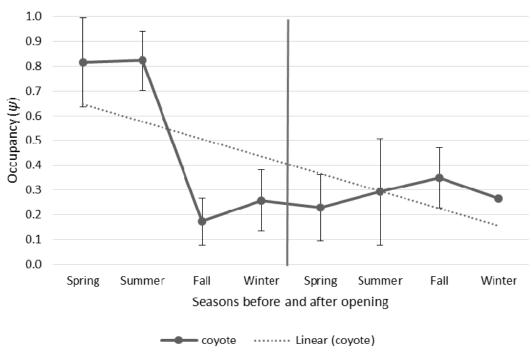


Figure 7a.

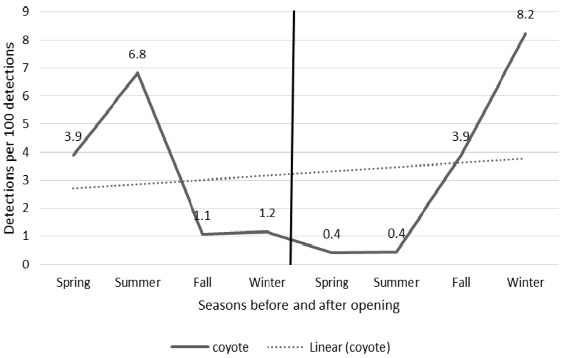


Figure 7c

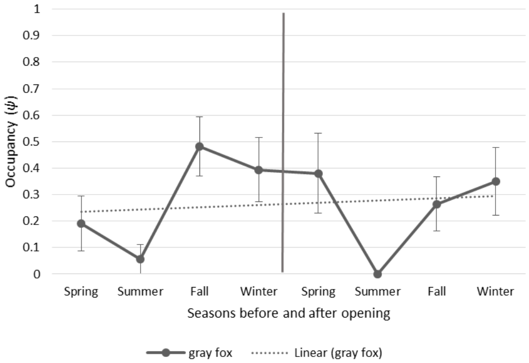


Figure 7b.

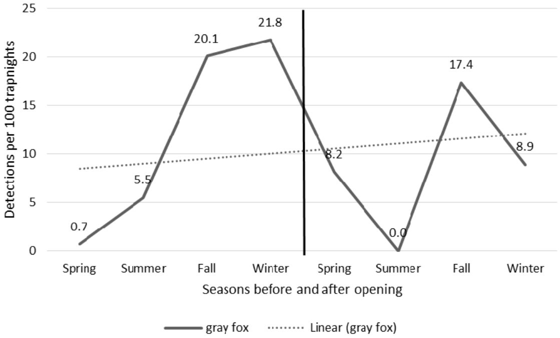


Figure 7d.

Figure 7a-b. Single-season occupancy estimates (ψ; error bar = ±SE, no error bar = observed occupancy) before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line indicating 14 February 2015) for a) coyote and b) gray fox in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA. Figure 7c-d. Trail detection rates (detections per 100 trapnights) before (spring 2014–winter 2015) and after (spring 2015–winter 2016) opening (vertical line indicating 14 February 2015) for c) coyote and d) gray fox in North Sonoma Mountain Regional Park and Open Space Preserve, California, USA. Linear indicates linear trend line.

Table 2. Which hypotheses are supported for selected wildlife species [Column headings: No change = no difference in trail use or Park/Preserve occupancy, Trail only = differences observed in trail use but not in Park/Preserve occupancy, Trail/Grid = differences observed in trail use and Park/Preserve occupancy, and Latency = recovery to pre-opening trail use and/or Park/Preserve occupancy values]. Under "Trail/Grid," minus sign indicates a decline and a plus sign indicates an increase for each respective array. An "X" indicates findings support the hypothesis. North Sonoma Mountain Regional Park and Open Space Preserve, California, USA, 2014-2016.

Hypotheses				
Common name	No change (H_0)	Trail only (H_1)	Trail/Grid (H_2)	Latency (H_4)
Bobcat	X			
Coyote	X			
Gray fox	X			X?
Deer		X		X
Gray squirrel		X		
Puma			X-/-	X?
Striped skunk			X+/-	
Wild turkey			X-/-	

tently present in all seasons before the trail opened. Camera trap images of puma from the pre-opening year frequently had a mother with cubs or almost fully adult offspring.

Our study area represents an area with low to moderate human disturbance (both recreational and agricultural); therefore, the wildlife in our study have had exposure to humans, roads and other infrastructure. Naïve wildlife from more pristine areas (free from human influence) may behave differently to human presence on trails and may be affected for longer period of time and in a larger area; this factor (exposure to human influence) should be accounted for when planning trails and increasing recreational access. Undeveloped open space surrounding trails provides a buffer so wildlife can (initially) move away from novel human presence or disturbance even if they are able to habituate to human trail use over time. Certain species such as pumas may require large trail free "zones" near trails to habituate over time and to successfully fulfill the full suite of life history activities such as hunting, reproduction and raising young.

Finally, for this specific study area and trail, wildlife was documented using trails even with a marked increase in human use (pedestrians, cyclists and equestrians); wildlife trail use did not drop to zero with the exception of wild turkeys and puma (at least for 3 of the 4 seasons following opening). Additionally, the apparent habituation after a period of time indicated that much of the local wildlife community, but not all, may be resilient to an increased presence of humans on a trail given time to adjust; it also should be noted that the cyclist detection rates decreased to pre-opening levels of use by the 4th season after opening, so as an alternative explanation, wildlife trail use may be able to tolerate relatively high levels of human use (1600 detections per 100 trapnights) with lower levels of cyclists (77 detections per 100 trapnights compared to a high of 338 after opening)

Land acquisition and preservation can go a long way toward ensuring future open space for wildlife; however, without commensurate wildlife monitoring, particularly for things like trail building and increased human access, with concomitant changes occurring in the surrounding landscape (e.g., traffic intensity, climate change, development, fencing), the actual benefit of that land to wildlife over time will remain unknown. From a management perspective, this "unknown" is a lost opportunity. Identifying thresholds of human use beyond which wildlife or particular species are unable to adjust may differ with various disturbance regimes and for different life history needs (e.g., foraging and movement versus breeding). Determining these thresholds and for which species are important next steps in understanding the impacts of recreationalists on wildlife. Through studies that capture pre-impact conditions as well as a post-impact timeframe that is meaningful for wildlife, open space effectiveness as a conservation tool can be measured, evaluated and improved.

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Author Contributions

Conceived and designed the study: SET
Collected the data: SET, SH, MH
Performed the analysis of the data: SET
Authored the manuscript: SET
Provided critical revision of the manuscript: SH, MH, SH

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APPENDIX I. Human categories and wildlife species detected before and after park opening in each camera array for the North Sonoma Mountain Regional Park and Open Space Preserve, California, USA, 2014-2016.

Common name	Species	Grid before	Grid after	Trail before	Trail after
Human Cyclist			•	•	•
Domestic cat	*Felis sylvestris*		•		
Domestic dog	*Canis familiaris*	•	•	•	•
Equestrian		•		•	•
Hiker		•	•	•	•
Hikers with >2 dog				•	n/a
Human with dog				•	n/a
Staff				•	•
Vehicle		•	•	•	•
WPI crew		•	•	•	•
Ranger				•	n/a
Livestock					
Goats	(Goats)	•		•	•
Cattle	(Cattle)	•	•	•	
Wildlife					
Unknown	Unknown	•	•	•	•
Badger	*Taxidea taxus*		•		
Bird	(Bird)	•	•	•	•
Bat	(Bat)	•			
Black-tailed deer	*Odocoileus hemionus*	•	•	•	•
Black-tailed hare	*Lepus californicus*	•	•	•	•
Bobcat	*Lynx rufus*	•	•	•	•
Coyote	*Canis latrans*	•	•	•	•
Gray fox	*Urocyon cinereoargenteus*	•	•	•	•
Gray squirrel	*Sciurus griseus*	•	•	•	•
Opossum	*Didelphis virginiana*	•	•	•	•
Puma	*Puma concolor*	•	•	•	•
Raccoon	*Procyon lotor*	•	•	•	•
Striped skunk	*Mephitis mephitis*	•	•	•	•
Wild turkey	*Meleagris gallopavo*	•	•	•	•
Small rodent	(Small rodent)	•	•		•
Red fox	*Vulpes vulpes*			•	
Insect	(Insect)	•	•	•	
Lizard	(Lizard)	•			
Snake	(Snake)	•			

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A review of trail-related fragmentation, unauthorized trails, and other aspects of recreation ecology in protected areas

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Expanding levels of authorized and unauthorized non-consumptive recreation increasingly threaten sensitive biological resources in areas protected primarily or solely to conserve them. The majority of the documented effects on wildlife from non-consumptive recreation are negative. From a review of 84 papers in the recreation ecology literature about the effects of recreation on wildlife, the following topics emerged as warranting full consideration: trail-related internal fragmentation and expansion of the effect zone; the proliferation and use of unauthorized trails; disturbance thresholds; population-level effects; distinguishing facets of mountain biking; interpretation of observed behavioral responses by wildlife to recreation; magnitude and duration of responses; comparisons of effects among types of recreation and of results among studies; cumulative and synergistic effects; habituation; and the complexity of recreation ecology. Knowledge of these topics must inform efforts to cease the extant recreation-related exploitation of protected areas and to prevent it in the future. These efforts include: securing urgently needed perpetual monitoring, management, and enforcement commensurate with recreational pressure in dual-role protected areas to ensure the perpetuation of viable populations of focal sensitive species; preventing further use and proliferation of unauthorized trails; restoring areas damaged by inappropriate trails (i.e., unauthorized trails, unnecessarily redundant designated trails, and trails to be decommissioned); using science-based disturbance thresholds to develop management measures for recreation; using the best available science to guide all policy and decision-making about (1) the siting, design, and alignment of trails, and (2) the types, levels, and timing of recreation under consideration; and, planning separate protected areas and recreational areas in the future.

Key words: dual-role protected areas, effect zone, disturbance thresholds, internal fragmentation, mountain biking, non-consumptive recreation, perpetual monitoring/management/enforcement, recreation ecology, recreation-related disturbance to wildlife, unauthorized trails

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Conservation of habitats is a key strategy for conserving biodiversity worldwide (Pickering 2010a; Soulé and Noss 1998). The core function of many areas in California protected for conservation is to ensure that the wildlife species living in them thrive in what is the nation's most biologically diverse state (CDFW 2015).[1] Areas protected for conservation (protected areas) include locally owned lands (e.g., county and city reserves), state-owned lands (e.g., ecological reserves, wildlife areas, state parks), federally owned lands (e.g., national wildlife refuges, wilderness areas), and privately owned lands (e.g., conservation easements, conservancy lands, mitigation banks and lands). Here, the focus is on protected areas conserved primarily or solely for the perpetuation of viable populations of sensitive species (i.e., species whose persistence is jeopardized).[2] These protected areas often serve a dual role of conserving biodiversity and providing nature-based recreational and educational opportunities for millions of people, despite the evidence that even non-consumptive recreation[3] may not be compatible with protected areas' core function (Reed and Merenlender 2008; Larson et al. 2016; Dertien et al. 2018; Reed et al. 2019).

Recreation ecology is the scientific study of the ecological effects of outdoor recreation and nature-based tourism activities and their effective management in natural or semi-natural environments (Monz et al. 2013; Gutzwiller et al. 2017).[4] Studies in recreation ecology have shown that the majority of documented responses of wildlife species to recreation are negative (Steven et al. 2011; Larson et al. 2016; Hennings 2017; Patten and Burger 2018). Recreation-related disturbance to wildlife is recognized as a threat to global biodiversity, and as having wide-ranging and, at times, profound implications for wildlife individuals, populations, and communities (Dertien et al. 2018). Documented negative effects include detrimental changes to behavior, reproduction, growth, immune system function, and levels of stress hormones, and ultimately the survival of individual animals and persistence of wildlife populations and communities.

In this review, several topics about recreation ecology became apparent as warranting full consideration.[5] These topics are (1) the major issues of trail-related fragmentation and

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1 Wildlife means all wild animals: insects, fish, amphibians, reptiles, birds, and mammals.

2 These areas include areas protected pursuant to Natural Community Conservation Plans and/or Habitat Conservation Plans (NCCPs/HCPs). An NCCP is a comprehensive, single- or multi-jurisdictional plan that provides for regional habitat and species conservation at an ecosystem level while allowing local land use authorities to better manage growth and development. Upon issuing an NCCP Permit, the California Department of Fish and Wildlife (CDFW) can authorize take of certain state listed species and other species of concern, subject to the terms of coverage under the NCCP (CDFW 2015). An HCP is the federal counterpart to an NCCP; the U.S. Fish and Wildlife Service prepares HCPs and issues HCP permits. The terms and conditions under which an NCCP/HCP's protected areas are conserved establish the types and levels of public access that are permitted (Burger 2012). The types and levels of public access vary among the NCCP/HCP protected areas from no access to guided-only access to open access.

3 In contrast to consumptive recreation (e.g., hunting, fishing), non-consumptive recreation is generally assumed not to directly extract a resource; it includes nature and wildlife viewing, beach-going, kayaking, hiking, biking, horseback riding, and wildlife photography (Reed and Merenlender 2008; CDFW 2016; Gutzwiller at el. 2017). From here forward, "recreation" means non-consumptive recreation, unless otherwise stated.

4 From here forward, "management" includes monitoring, management, and enforcement. The level of enforcement necessary depends on the level of continual management implemented; generally, the more the management, the less enforcement is necessary. In addition, monitoring and management encompass both the natural resources and human users of the protected areas.

5 The author read 71 articles and 13 reports about the recreation-related effects on wildlife; this paper does not cite all of them. All the articles are published in peer-reviewed journals. Some of the reports were peer reviewed and all were written by or contributed to by professionals in the fields of biology or ecology, though none of the reports were published in peer-reviewed journals to this author's knowledge (e.g., Burger 2012; Hennings 2017; Dertien et al. 2018; Reed et al. 2019). And, the totals exclude documents that are not explicitly about recreation-related effects on wildlife (e.g., Taff et al. 2019) and all newspaper articles.

expansion of the effect zone, unauthorized trail creation and use,[6] disturbance thresholds, population-level effects, and distinguishing facets of mountain biking, and (2) the following aspects of recreation ecology: the interpretation of observed behavioral responses by wildlife to recreation, magnitude and duration of responses, comparisons of effects among types of recreation and of results among studies, cumulative and synergistic effects, habituation, and the complexity of recreation ecology.

This paper discusses the issues identified above to inform efforts to cease the extant recreation-related exploitation of protected areas and to prevent it in the future. These efforts include: securing urgently needed perpetual management of recreation commensurate with recreational pressure to ensure the perpetuation of viable populations of focal sensitive species[7] as intended upon establishment of the protected areas; preventing further use and proliferation of unauthorized trails; restoring areas damaged by inappropriate trails (i.e., unauthorized trails, unnecessarily redundant designated trails, and trails to be decommissioned); using science-based disturbance thresholds; using the best available science to guide all policy and decision-making about the siting, design, and alignment of trails, and about the types, levels, and timing of recreation under consideration; and, planning separate protected areas and recreational areas in the future. This paper discusses the above-listed aspects of recreation ecology for consideration in designing field studies and while reviewing recreation ecology literature.

Trail-related disturbance: fragmentation, edge effects, and expansion of the effect zone

External fragmentation.—There is much peer-reviewed literature on the ecological effects of fragmentation, a process by which once-contiguous areas of habitat are physically separated by human disturbance creating a network of isolated habitat patches (Soulé et al. 1988; Ballantyne et al. 2014; Vickers et al. 2015; Cheptou et al. 2017). Most fragmentation research worldwide has concentrated on progressive losses of natural habitat through removal of vegetation as a result of development, agriculture, and resource extraction. Physical fragmentation, in conjunction with other related factors (e.g., duration of isolation of habitat fragments, low vagility of species, loss of genetic diversity), causes the isolated areas of habitat to experience a decay of species diversity over time due to local extinctions (Soulé et al. 1988). Consequently, fragmentation is a major threat to biodiversity (Cheptou et al. 2017). This fragmentation is considered external to the protected areas within a landscape, though it influences the viability of protected areas with respect to wildlife conservation.

Internal fragmentation.—Recreational trails themselves can fragment habitat, thereby causing fragmentation that is internal to the areas they traverse (Pickering 2010a; Leung et al. 2011; Burgin and Hardiman 2012; Pickering and Norman 2017). Because of their linear nature, trails can have a greater negative effect than if the affected terrain were consolidated in a more compact form (Pickering 2010a). Complex networks of trails within protected areas

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[6] The literature refers to illegally created trails and constructed trail features variously as unauthorized, informal, social, unofficial, off-trail, visitor-created, user-created, and demand trails. "Unauthorized" is the term of choice here because it is the only term among these that clearly denotes the illegality of the creation and use of such trails and features.

[7] Focal species are organisms whose requirements for survival represent factors important to maintaining ecologically healthy conditions; types of focal species include keystone species, umbrella species, flagship species, and indicator species. Focal species are identified for the purpose of guiding the planning and management of protected areas in a tractable way (Soulé and Noss 1998, Marcot and Flather 2007). Here, the term "focal species" is intended to include those species encompassed by the guild surrogate approach of conservation; this approach entails one member or a subset of members serving as a surrogate for other members of the guild (Marcot and Flather 2007).

can cumulatively affect nearly as much area as the above-mentioned external fragmentation (Ballantyne et al. 2014). Substantial evidence exists that trails may act as barriers to the movement of animals due to behavioral avoidance, the presence of a physical barrier, or development of a home range along the physical barrier (Burgin and Hardiman 2012). Trail density is a main factor influencing how wildlife respond to trail users and the ability of wildlife to disperse or reach seasonally important habitats such as breeding grounds (D'Acunto et al. 2018). Particularly when resulting from unauthorized trails or poorly sited and/or designed official trails, internal fragmentation can compound the negative effects of the external fragmentation in the surrounding landscape. The arterial spread of multiple cleared areas for trails within protected areas may cause losses of plant communities and ultimately result in long-term degradation of protected areas across large areas (Ballantyne et al. 2014).

Effects of trail presence on wildlife.—A likely consequence of internal fragmentation within protected areas is that the mere presence of trails, even in the absence of humans, can compromise protected areas' ability to sustain sensitive species (Pickering and Norman 2017; Baker and Leberg 2018). This is partly due to edge effects in the area of transition between two contrasting habitats, where resulting changes can occur in species abundance, community structure, and/or predation and parasitism (Zurita et al. 2012). Edge effects are major drivers of change in many fragmented landscapes (Laurance et al. 2007) and factor into the observations that internal fragmentation can restrict movement of some native animals and plants among habitat fragments and enhance the movement of invasive species along the trails (Barros and Pickering 2017). Baker and Leberg (2018) found that the presence alone of roads and trails, and not necessarily how often humans use them, had a significant negative effect on the occupancy of most of the 11 mammalian carnivore species they studied. Trails also potentially expose native animals to predators, including feral species such as the red fox (Vulpes vulpes), that penetrate natural areas by moving along the trails (Burgin and Hardiman 2012): a study on the effects of mountain biking on golden-cheeked warblers (Dendroica chrysoparia) found that the indirect effects from fragmentation and alteration of habitats from mountain biking trails may reduce the quality of the warblers' nesting habitat by increasing the vulnerability of warbler nests to predation by rat snakes (Elaphe obsoleta) and other edge-adapted predators (Davis et al. 2010). Edge effects associated with trails are known to affect other avian species similarly and to reduce the local abundance and nesting frequency of certain avian species, increase the incidence of nest parasitism by cowbirds, and affect avian vocalizations (Hennings 2017). The penetration of edge effects into the areas adjacent to trails is an aspect of internal fragmentation that underscores the ecological cost of unauthorized trails (Pickering and Norman 2017).

Trails expand the zone of effect.—Another notable consequence of trails is the expansion of the zone of effect of recreational disturbance to wildlife as habitats become more open, as occurs from the proliferation of unauthorized trails (Reed et al. 2019). In this context, "effect zones" are areas within which wildlife is disturbed by recreational activities on trails; effect zones encompass and extend beyond the area influenced by edge effects. The expanse of effect zones likely varies depending on the types and intensities of recreation and therefore may not be consistent across a trail network (Reed et al. 2019). Particularly in urbanized areas where protected areas are already highly confined in the surrounding urban matrix, the expansion of the effect zones further dissects and internally fragments what are already essentially habitat 'islands' (Balantyne et al. 2014; Pickering and Norman 2017).

The expansion of effect zones occurs in all protected areas with widespread trails irrespective of the sizes of the protected areas. For small protected areas (~300 ha) with dense trail networks, an effect zone of several hundred meters on either side of the trails can encompass a substantial proportion of the protected areas (Reed et al. 2019). In this way, effect zones reduce the proportion of a protected area that is suitable for various wildlife species (Reed et al. 2019), and can result in no contiguous areas across a protected area free from recreation-related disturbance to wildlife (Dertien et al. 2018).

The higher the level of recreation in protected areas, the greater the potential there is for the effects of trails and their use to extend beyond habitat loss and individual-level effects (behavioral and physiological) on wildlife into population- and community-level effects, including depletion of floral and faunal populations, alteration of trophic and community structures, and reduction of biodiversity (CDFW 2015). If habitat is available, wildlife may move to areas farther from trails, areas beyond the effect zone, to avoid recreation-related disturbance (Reed et al. 2019). However, the greater the proportion of a protected area occupied by effect zones, the fewer options there are for wildlife to move to areas outside the effect zones.

Unauthorized trails and technical trail features

General.—The implications to wildlife conservation of the disturbance to wildlife from trail-related fragmentation and expansion of effect zones are particularly grave with respect to unauthorized trails and recreational activities. The creation and use of unauthorized trails and technical trail features (TTFs) are commonplace and present concerns about the sustainability of biological resources in protected areas worldwide (Marion and Wimpey 2007; Newsome and Davies 2009; Ballantyne et al. 2014; Havlick et al. 2016; Barros and Pickering 2017).[8] Though most unauthorized trails and TTFs are readily visible and accessible, they are not officially planned or designed, approved for construction, managed, or part of a formally designated trail network (Davies and Newsome 2009; Leung et al. 2011; Hennings 2017). All user groups tend to create and use unauthorized trails, and there are several motivations for doing so, such as wanting access to trails closer to home or to engage in off-trail activities (Hennings 2017).

Though other recreationists venture off of designated trails, mountain bikers increasingly create unauthorized trails as they seek more challenging, wider-ranging, or free-riding opportunities (Havlick et al. 2016), or want a shortcut to reach specific destinations or to connect existing trails (Davies and Newsome 2009). If a trail is not sited in a place where bikers want to go, the off-trailing that results eventually forms trails (Davies and Newsome 2009).

Unauthorized trails expand the negative effects of human recreation on the flora and fauna of any protected area (Dertien et al. 2018). Similar to the above-discussed problems associated with internal fragmentation, unauthorized trails and recreational activities can negate the ecological benefits of both well-planned designated trails/trail networks and of prohibitions on access and activity (e.g., avoidance of breeding areas and seasonal access restrictions). The proliferation of unauthorized trails is often more responsible for trail-based fragmentation than formally designated trails (Ballantyne et al. 2014).

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[8] TTFs are created on mountain biking trails to increase the challenge of the ride. Examples of TTFs are jumps, ditches, mounds, bridges, ramps, ladders, drop offs, see saws, and 'skinnies' (i.e., narrow features that can be traversed) (Davies and Newsome 2009; Pickering et al. 2010c; Quinn and Chernoff 2010; Ballantyne et al. 2014; Havlick et al. 2016; Hennings 2017; Pickering and Norman 2017).

Even where unauthorized trails occupy a relatively small proportion of a landscape, they can be quite detrimental if in vital habitat; sensitive species whose territories or home ranges include the affected area(s) may be prevented via displacement or loss of habitat connectivity from accessing limited and essential resources (Gutzwiller et al. 2017). Wildlife can be more disturbed by off-trail than on-trail recreationists. For example, Taylor and Knight (2003) compared how mule deer (*Odocoileus hemionus*) respond to hikers and bikers using designated trails and one randomly chosen off-trail route. The deer exhibited a 70% probability of flushing from on-trail recreationists within 100 m from designated trails, whereas they exhibited a 96% probability of flushing within 100 m of recreationists located off trails, and their probability of flushing did not drop to 70% until the distance from the recreationists reached 390 m.

Examples.—Examples of protected areas affected by unauthorized trails include: 19 Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP; see footnote #2) protected areas in San Diego County, California where unauthorized trails comprise a mean of 45% (range: 8–85%) of the 1,206 km of trails mapped (Reed et al. 2014); an 829-ha area of the endangered Tall Open Blackbutt Forest in southeast Queensland, Australia, where 57% (26.5 km) of the 46.1 km of recreational trails was unauthorized when mapped in 2013 (Ballantyne et al. 2014); and, a 237-ha protected area in Argentina where 94% of the 19 km of trails found was unauthorized, resulting in landscape-level fragmentation and loss of vegetation (Barros and Pickering 2017). Another example of a protected area affected by unauthorized trails is the 191-ha Carlsbad Highlands Ecological Reserve in San Diego County. Though mountain biking is prohibited in this reserve, in addition to the 4 km of legal hiking trails in the reserve are also 27.4 km of unauthorized mountain biking trails and TTFs (E. Pert, South Coast Region, Regional Manager, California Department of Fish and Wildlife [CDFW], personal communication, 2019; Figure 1). This ecological reserve, so designated in 2000, comprises a critical component of an NCCP/HCP protected area and supports coastal sage scrub (a sensitive plant community), grasslands, thread-leaved brodiaea (*Brodiaea filifolia*, listed as threatened and endangered under the Federal and California endangered species acts, respectively), and several sensitive wildlife species: the federally threatened coastal California gnatcatcher (*Polioptila californica*), sharp-shinned hawk (*Accipiter striatus*), golden eagle (*Aquila chrysaetos*), white-tailed kite (*Elanus leucurus*), turkey vulture (*Cathartes aura*), and grasshopper sparrow (*Ammodramus savannarum*).[9]

Managing unauthorized trail creation and use.—Managing the rapid proliferation of unauthorized mountain biking trails and TTFs and their use is challenging. Even if only a small proportion of bikers is involved, the resulting vandalism can have serious ecological consequences as is well reflected in the statement, "[g]enerally when you ask people to stay out of the area no matter what the reason is, 80-90% obey you, [b]ut if you get 10% who don't obey you, you haven't done any good" (Bill Andree, retired district wildlife manager of Colorado Parks and Wildlife; Peterson 2019).

In the aforementioned Carlsbad Highlands Ecological Reserve, enforcement and education are necessary to substantially reduce the illegal riding, but the bikers monitor

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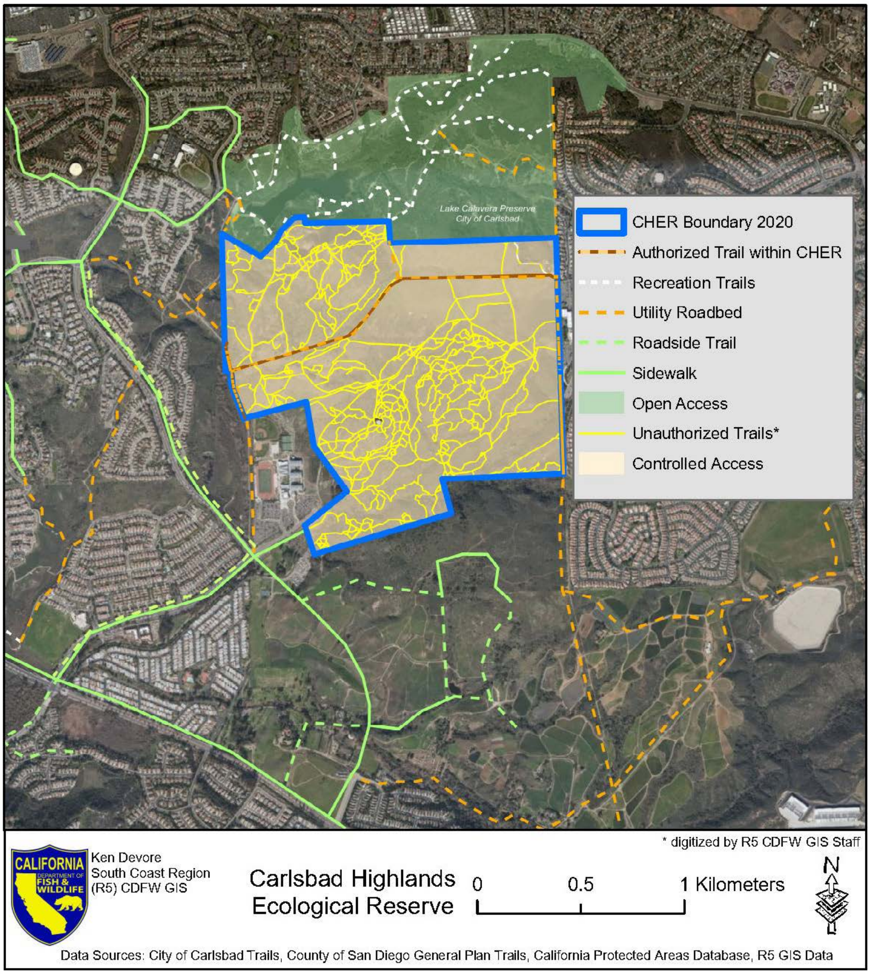
[9] Of CDFW's 136 ecological reserves (ER) statewide, biking is allowed on eight. About ERs, Title 14, California Code of Regulations §630(a) states, "All ecological reserves are maintained for the primary purpose of developing a statewide program for protection of rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types. Visitor uses are dependent upon the provisions of applicable laws and upon a determination by the [Fish and Game] commission that opening an area to such visitor use is compatible with the purposes of the property."



Data Sources: City of Carlsbad Trails, County of San Diego General Plan Trails, California Protected Areas Database, R5 GIS Data

Figure 1. Carlsbad Highlands Ecological Reserve, Carlsbad, California. The yellow lines represent the unauthorized trails. Their associated effect zones occupy most, if not all of, the Ecological Reserve. (Credit: Ken Devore, South Coast Region (R5), GIS, CDFW 2017).

enforcement activity and recommence riding in the ecological reserve when enforcement officers leave (E. Pert, CDFW, personal communication, 2019). A similar protected area is the 350-ha Del Mar Mesa Preserve (Preserve) in the City of San Diego; the Preserve supports rare and endangered species such as Del Mar Manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia)*, Orcutt's brodiaea (*Brodiaea orcutti)*, San Diego button celery (*Eryngium aristulatum* var. *parishii)*, San Diego mesa mint (*Pogogyne abramsii*), San Diego fairy shrimp (*Branchinecta sandiegonensis)*, and the California gnatcatcher, and was the subject of a study the City conducted to determine whether enforcement by CDFW Wildlife Officers (wardens) is an effective method to curb unauthorized trail uses (SANDAG 2015; Greer et al. 2017). Of the 32.22 km mapped trails on a 257-ha portion of this Preserve, 21.98 km are considered unauthorized (Reed et al. 2014). Prior to the study, City Park Rangers had conducted regular educational efforts in the field an average of 3–4 times monthly over a 17–month period. Despite the Rangers' efforts, non-compliance became the social norm as more users followed expanding numbers of unauthorized trails (Greer et al. 2017). The subsequent period of the CDFW Wildlife Officers' enforcement comprised 810 hours during a 12-week period with an unpredictable schedule. Prior to enforcement activities, the majority (78.7%) of the use within the study area was illegal, and over 85.5% of the illegal use was mountain biking. Illegal mountain biking decreased quickly during the enforcement period by 66.0% over the study period and stayed low during the 43-day post-enforcement period, while legal mountain biking remained the same. Other illegal use also decreased significantly, while other legal uses doubled (Greer et al. 2017). Greer et al. (2017) cite decades of research indicating that a combination of soft (i.e., education) and hard (e.g., warnings, citations, arrests, confiscation of bikes) enforcement is the most effective approach to promoting compliance. They assert that education becomes less effective in areas with chronic unauthorized trail creation and use.

Overall conclusions from Greer et al.'s (2017) study follow: (1) soft enforcement aimed at public education and redirecting social norms was not sufficient to curb unauthorized trail use in the Preserve; (2) open space enforcement by CDFW Wildlife Officers was determined to be effective in reducing unauthorized use in the Preserve; (3) the threat of sanctions (hard enforcement) has a more general utility and effectiveness in curbing non-compliant behavior than outreach to promote "awareness-of-consequence" of user actions (soft enforcement). The authors also concluded that social media has great potential to engage and educate the public on environmental issues, and that its use in combination with community policing can be a powerful tool to: redirect user attitude and subsequent behavior through peer-to-peer education about environmental impacts; answer questions regarding authorized uses; and, warn users of potential sanctions for non-compliance. They recommend the implementation of a social media component prior to and during enforcement efforts to help educate recreationists and reduce misinformation and recreationists' distrust of managers and enforcement personnel (Greer et al. 2017).

Paucity of information available.—Despite the global proliferation and use of unauthorized trails and TTFs and their far-reaching effects on wildlife in protected areas, there is a paucity of information of any depth available on such effects. The impacts of unauthorized trails and TTFs have been rarely documented (Marion and Wimpey 2007; Davies and Newsome 2009). A comprehensive literature search prior to 2010 produced only eight studies documenting the effects of unauthorized trails (Pickering et al. 2010c). Since then, additional studies have assessed the effects on vegetation from unauthorized trails, with little elucidation about their effects on wildlife. The proliferation, use, and wildlife-related effects of unauthorized trails remain understudied and insufficiently addressed. For protected areas where the creation and use of unauthorized trails and TTFs are prevalent, it is infeasible to fully assess the recreation-related effects on wildlife without including these activities and their effects. Yet, these effects have a great potential to impair the ability of protected areas to meet their conservation objectives.

Disturbance thresholds

Disturbance thresholds are predetermined levels of various measurable indicators above or below (depending on the indicator) which wildlife is disturbed (Hennings 2017).

These thresholds may be used to establish management measures such as minimum widths of spatial buffers between recreational trails and wildlife. Exceedance of a threshold may trigger the implementation of further management measures (Hennings 2017). Examples of disturbance thresholds are distance between people and wildlife or between trails and nesting sites (i.e., the distance within which wildlife species avoid people or trails), density of active trails above which wildlife alters its use of habitat, number of recreationists per day over which wildlife abundance decreases, duration of recreation, and number of recreational events per unit time (Hennings 2017; Dertien et al. 2018).

Thresholds should be set at levels equal to or more protective of predetermined levels of disturbance, and should be responsive to trends in changing conditions as identified by monitoring (Hennings 2017). Data from studies of recreational activities can be used to estimate quantitative thresholds of disturbance to wildlife (Dertien et al. 2018); however, determining these thresholds requires very specific empirical data (Rodríguez-Prieto et al. 2014).

While determining and using disturbance thresholds would be ideal for managers to optimize management decisions (Rodríguez-Prieto et al. 2014), they are difficult to determine for broad application. For example, thresholds established for distance to trail are not necessarily adequately protective of the focal species under all conditions in which they occur; a general rule of minimum thresholds for distance to trail cannot be established for some species, as individual variability within species can be high and can differ among populations, types of topography, and frequencies and types of human intrusion (González et al. 2006). As a result, the literature about recreation-related disturbance to wildlife provides limited information about quantitative thresholds for distance to trail (Dertien et al. 2018). Though their sample sizes (i.e., number of articles reviewed with such information) are accordingly small, Dertien et al. (2018) found the following examples of such thresholds: wading birds and passerines were generally affected at distances less than 100 m; larger-bodied species such as hawks and eagles had threshold effect distances greater than 400 m; small rodent species avoided areas within 50-100 m of trails or people; and some carnivores and ungulates had minimum effect distances up to 350-1000 m from trails and people.

As another example of a spatial buffer, Dertien et al. (2018) recommend a 200-m minimum buffer for ungulates; however, this would be insufficient for the circumstances of Taylor and Knight's (2003) study in which they found that mule deer showed a 96% probability of flushing within 100 m of recreationists located off trails, and the probability of their flushing did not drop to 70% until perpendicular distance reached 390 m. Two additional factors that influence the determination of spatial buffers are the density of the trail networks and the above-discussed effect zones. The smaller a protected area is and the denser its trail networks are, the greater the proportion of the protected area is occupied by effect zones, and the less likely it is that spatial buffers will protect the focal species from recreational disturbance (Wilcove et al. 1986; Ballantyne et al. 2014).

Land managers should consider both trail density and the level of human recreation before deciding on disturbance thresholds, since thresholds that work at lower levels of human activity may be ineffective when activity levels increase (D'Acunto et al. 2018). D'Acunto et al. (2018) simulated the success of trail closure strategies on reducing disturbance from Off Road Vehicles and pedestrians to nesting golden eagles during laying and incubation, focusing on eagle flushing behavior from the nest and alteration of foraging flight. They found that, for current levels of human recreation, the restrictive buffer (i.e. all trails closed within the buffer) was best at reducing flushing of incubating eagles, while closing all but the popular trails was best for foraging eagles. When the simulated human recreation was increased, trail density was the main factor influencing eagle flushing frequency.

Hennings (2017) reports the following thresholds for levels of human recreation (i.e., number of users) from four studies: for guanacos (*Lama guanicoe*), about 250 visitors per day, above which the number of birds observed declined; for sanderlings (*Calidris alba*), 20 visitors per day; for songbirds, eight out of 13 species showed thresholds ranging from 8-37 visitors per ha; and, for Mexican spotted owls (*Strix occidentalis lucida*), around 50 hikers per day. Regardless of any threshold effects, the majority of the research indicates that more visitors will generally cause more wildlife effects (Hennings 2017). However, since recreational impacts vary nonlinearly with use in a variety of ecosystems, a small number of visitors can have a disproportionate impact on sensitive species (Reed and Merenlender 2008).

Other aspects of recreation ecology to consider

Interpretation of observed behavioral responses.—It is possible to misconstrue the reasons for and implications of observed responses by wildlife to recreational activity. Traditionally and intuitively, species or individuals showing strong negative responses (e.g., readily flee or avoid) to human disturbance are those assumed to most need protection from disturbance. However, species with little suitable habitat available nearby cannot show marked avoidance of disturbance even if the fitness costs of the disturbance are high (e.g., reduction of survival or reproductive success; Gill et al. 2001). Conversely, species with many nearby alternative sites to move to are likely to move away from disturbance even if the fitness costs of the disturbance are low (Gill et al. 2001). It should not be assumed that the most responsive animals are the most vulnerable (Beale and Monaghan 2004). For example, in a controlled study of the behavioral responses of a shorebird (ruddy turnstone, *Arenia interpres*) to human disturbance (an approaching observer), Beale and Monaghan (2004) found that birds in better condition (i.e., supplemented with food) had longer flight initiation distances (i.e., flushed sooner) from the disturbance and searched for predators more frequently than control birds (i.e., not supplemented with food).[10] That is, birds responding most were actually the least likely to suffer any fitness consequences associated with the human presence; this is opposite from the response generally expected when behavior is used as an index of disturbance effects. Birds that had the most to lose by flushing, or otherwise changing their behavior in a manner that reduced feeding time, showed the least behavioral response; this could be interpreted incorrectly as meaning that these birds were not disturbed. Gill et al. (2001) assert that the absence of an obvious behavioral response does not rule out a population-level effect. In the same vein, it may be that species occurring in protected areas that are remnant fragments within urban landscapes are forced to utilize all components of the fragments, irrespective of their land-use intensity and land cover. This may occur if animals have nowhere else to go, and may be an explanation for instances when total relative abundance of birds is greater in urban and suburban reserves than in exurban reserves (Markovchick-Nicholls et al. 2008).

In addition to the reasons Gill et al. (2001) provide for an absence of detected effects, other possible reasons for finding no recreation-related effects include that there

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[10] Flight initiation distance is the distance from an approaching threat (e.g., recreationist) at which an animal begins to move away to escape from the threat.

may be a negative effect but it is not detected due to methodological issues. For example, the response variable examined (e.g., behavior versus physiology) and/or the number of replicates used compared to the amount of variation in the traits measured may not reveal the actual response of the species studied or the associated longer-term population-level effects (Steven et al. 2011). Furthermore, some studies may not include sufficiently high levels of human activity to detect responses from species that can tolerate lower levels of disturbance (Reed et al. 2019).

Threatened, endangered, and sensitive species.—Current research of recreation-related effects on wildlife does not include many species of urgent conservation concern (Larson et al. 2016). As many rare and isolated species tend to be specialists, anthropogenic activities could have a greater detrimental effect on the distribution, breeding success, and survival of individuals of these species (Beale and Monaghan 2004b; Bennett et al. 2013) than found in studies involving less sensitive species. Studies do not always reveal the strongest effects because the most disturbance-sensitive species are naturally rare in number or are already gone from disturbed sites (Hennings 2017). While recreation may not be the primary reason for the sensitive status of such species, it is a threat worth understanding for types of recreation that occur in the protected areas designated to conserve them (Larson et al. 2016).

Magnitude and duration of wildlife responses to recreation.— It is known that the nature (e.g., behavioral, physiological), magnitude, and duration of recreation-related disturbance to wildlife depend on a variety of factors, including, but not limited to, frequency and type of recreation, distribution of recreational use, season(s) of use, and environmental conditions (Marzano and Dandy 2012). Evaluating the effectiveness of measures to manage recreation can be complicated by the intensity of recreational use of a protected area because levels of use influence the magnitude of recreation-related effects on wildlife (Reed and Merenlender 2011). But studies do not always quantify the levels of recreational uses. Likewise, research seldom provides insight to the duration of wildlife species' response (e.g., nest abandonment, interruption of foraging/hunting, breeding, fleeing) to human disturbance (Marzano and Dandy 2012; Burger 2012; Larsen et al. 2016) or degree of response (e.g., how far wildlife moves away from human disturbance at a greater energetic cost and resulting in less availability of habitat). The same is true for the spatial scale at which wildlife response occurs (Burger 2012).

Generalized comparisons of effects among types of recreation.—It is clear from the literature that recreation in protected areas, particularly in more urbanized areas, can negatively affect wildlife (Larsen et al. 2016). However, it is difficult to make defensible generalized comparisons of the effects on wildlife among different types of recreation, partly because of the diversity of recreational activities, study methodologies, and observed responses (Monz et al. 2013). A comparison of results among similar studies indicates that sweeping conclusions about the effects of urbanization and human activity on wildlife need to be made with caution and are likely to be species-specific (Markovchick-Nicholls et al. 2008). For example, applying this caution to one species, the U.S. Fish and Wildlife Service (2000) concludes that attempts to ascribe relative importance, distinguish among, or generalize the effects of different human activities on bighorn sheep (*Ovis canadensis*) behavior are not supportable, given the range of potential reactions reported in the literature and the different variables impinging on given situations. Therefore, generalized comparisons of the effects on wildlife among different types of recreation are ill advised. The differences among types of recreation in their effects on wildlife are less important than the negative association for wildlife of human presence, irrespective of type of recreation (Patten and Burger 2018).

Despite the difficulty of making well-founded comparisons of the effects on wildlife among different types of recreation, comparisons are made. Among the types of recreation examined in the literature, the ecological effects of hiking and biking are most often compared. For studies done in the United States, this reflects the 22% increase to 8.3 million from 2006 to 2015 in mountain bikers, and the 24% increase to 37.2 million hikers during the same time period (Hennings 2017). And, notwithstanding the foregoing caveat about generalized comparisons, Hennings (2017) underscores that photographers, people with small children, bird watchers, and people engaging in loud conversations may be especially detrimental to bird communities because they are unpredictable and generally alarming. Photographers and wildlife watchers tend to stop, look directly at wildlife, and even follow them around, triggering stronger antipredator responses than people who simply pass by; photographers also tend to seek out rare species and look for nests. Also, curious, excited children tend to run around and shout in an unpredictable fashion (Marzano and Dandy 2012; Hennings 2017).

An absence of differences among effects.—The absence of differences among recreational activities' effects on wildlife does not equate to no effects. There can be similar levels of both benign or significant effects. For instance, in a study of bison (*Bison bison*) and pronghorn (*Antilocapra americana*), the authors found little difference in wildlife response (i.e., alert distance, flight initiation distance, or distance moved)[11] to hikers versus mountain bikers, but both species exhibited a 70% probability of flushing when within 100 m from trails with recreationists present (Taylor and Knight 2003).

Cumulative and synergistic negative effects.— The negative effects of recreation on wildlife compound, and may also act synergistically with, those from other influences (Larson et al. 2016; Reed et al. 2019). The cumulative negative effects of all anthropogenic influences on wildlife complicate efforts to minimize the effects and assess their population-level consequences (Pirotta et al. 2018). However, recreation ecology studies typically do not factor in other anthropogenic influences to which wildlife in protected areas are exposed (Pickering et al. 2010c; Erb et al. 2012; Messenger et al. 2014; Reed et al. 2019). Other anthropogenic influences include climate change and its associated effects on natural disasters; fires and other natural or human-caused disasters; consumptive recreation; non-recreational human activity such as habitat loss or alteration, the associated lack of connectivity, and the resulting loss of genetic diversity; poor air and/or water quality; invasive species; roads; vehicles; artificial light; prey declines; reverse zoonoses; drones; and noise (e.g., from vehicles, planes, ships, and boats). Recreation-related cumulative effects may be important if, for instance, the densities of different types of recreationists influence predator use of sites more than does the density of any one type of recreationist alone (Gutzwiller et al. 2017).

Wildlife habituation to human activity.—Habituation is a form of tolerance in which, as the result of a lack of negative consequences, there is a waning of response to a repeated, neutral stimulus (Whittaker and Knight 1998; Pauli et al. 2017). Habituation allows wildlife to use their energy for normal fitness-enhancing behaviors such as resting, foraging, and mating instead of fleeing when confronted with human activities that result in neutral outcomes (Whittaker and Knight 1998; George and Crooks 2006; Reilly et al. 2017). Habituation is

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[11] Alert distance is the distance from a stimulus at which an animal initiates vigilance behavior (Guay et al. 2016 in Reed et al. 2019); more specifically in this context, it is the distance between a recreationist and an animal when the animal first becomes visibly alert to the recreationist. Distance moved is the distance an animal travels from its initial position until it stops (Taylor and Knight 2003).

an apt description for crows (*Corvus* spp.) ignoring a scarecrow, or a red fox ignoring the human activity in a suburban area (Whittaker and Knight 1998). Citing several authors' work, Martínez-Abraín et al. (2008) identify level and frequency of disturbance, species, location, size and diet of species, and age of individual animals as factors that affect the degree of wildlife habituation to human disturbance.

The ability to habituate to predictable and recurrent human use of recreational trails may be an important behavioral adaptation for wildlife (González et al. 2006; Martínez-Abraín et al. 2008). However, habituated urban wildlife might be less likely to avoid contact with humans, which may increase the probability of human-wildlife conflicts and of attraction to anthropogenic food sources; both circumstances are considered problematic in many urban areas (Whittaker and Knight 1998; George and Crooks 2006). Wildlife habituation to humans may also increase wildlife aggression toward humans, or render wildlife more vulnerable to predators, hunters, poaching, or roadkill (Whittaker and Knight 1998; George and Crooks 2006; Marzano and Dandy 2012). Habituation of adult individuals may be associated with negative consequences for their offspring since habituation of adult animals does not translate to immediate habituation of juveniles (Reilly et al. 2017).

True habituation is not easily measured, and what appears to be habituation is often not (Hennings 2017). Apparent habituation is not a true measure of whether people are disturbing wildlife (Hennings 2017). Wildlife can experience significant stress without fleeing, and when this is misconstrued as habituation, disturbance effects on wildlife are underestimated (Hennings 2017). Care must be taken to avoid attributing a lack of observable response by wildlife to human presence as habituation (Beale and Monaghan 2004). Wildlife that seem not to avoid recreational disturbance may experience stress or be unable to leave a site if, for example, there is no suitable habitat nearby (Gill et al. 2001; Beale and Monaghan 2004; Markovchick-Nicholls et al. 2008).

While habituation to human disturbance could result in development of tolerance within a population (Pauli et al. 2017), Bötsch et al. (2018) infer from their findings on the recreation-related disturbance to birds in forests where recreation has occurred for decades that habituation to humans has not outweighed the effects of the disturbance. A long-lived species with low recruitment, such as the golden eagle, may be unable to experience individual learning or population-level evolutionary adaptation at a rate sufficient to compensate for a rapidly shifting anthropogenic landscape (Pauli et al. 2017).[12]

In a study subjecting captive female elk to four types of recreational disturbances (all-terrain vehicles riding, mountain biking, hiking, and horseback riding) over a two-year period, the elk showed no evidence of habituation to mountain biking. Similarly, elk travel time in response to hiking was generally above that of control periods, suggesting elk also did not habituate to hiking disturbance (Naylor et al. 2009).

In a study of how bison, mule deer, and pronghorn responded to hikers and bikers on designated recreational trails, Taylor and Knight (2003) found little evidence of habituation to recreationists among the species at the time of the study (summers of two consecutive years). In fact, the pronghorn at the study site did not habituate to largely predictable recreational use over a three-year period following the opening of trails at the site, and used areas that were significantly farther from trails than they had prior to the start of recreational use.

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[12] Evolutionary adaptation is the hereditary alteration or adjustment in structure or habits, the process by which a species or individual improves its ability to survive and pass on its genes in relationship to the environment (Ha and Campion 2019); unlike habituation, evolutionary adaptation does not result from learning during an individual's lifetime.

Hennings (2017) asserts that wildlife do not appear to habituate to the presence of dogs; impacts potentially linger after dogs are gone because the scent of dogs repels wildlife. It may be too that wildlife do not habituate to dogs (particularly off-leash dogs) because wildlife perceive dogs as predators and because they are unpredictable (Hennings 2016). Dog-specific disturbance has been studied for birds, with no evidence of habituation even with leashed dogs and even where dog-walking was frequent; the disturbance was much weaker for people without dogs (Hennings 2016).

The challenge of research.—Recreation ecology, similar to other fields of ecology, faces challenges in conducting statistically valid research (Quinn and Chernoff 2010). The degree to which and how the biotic and abiotic resources present in any one location respond directly or indirectly to recreational activities depends on many variables, some of which may be confounding (Figure 2, Table 1). Measuring the effects of human activity on wildlife is difficult because of the variability in the underlying spatial, diurnal, seasonal, and even the type of, indices being measured (Burger 2012). Recreation-related effects on wildlife vary among species (Larson et al. 2016) as different wildlife species respond differentially to visual, auditory, olfactory, and tactile stimuli (Hennings 2017). Wildlife responses to recreationists are likely influenced by a suite of variables that may differ in each field setting (Steidl and Anthony 1996; Taylor and Knight 2003), including level of human presence/activity that evokes a response as well as feedbacks and interactions with other factors (e.g., edge effects, availability of cover, exposure to disturbance, or time since fire; Patten and Burger 2018). Study methodology (i.e., design, sampling, data collection, and data analysis) itself encompasses many variables that dictate how other variables will influence the study outcomes. Even if methodology is consistent between/among two or more studies, other variables can result in different study results (Taylor and Knight 2003). Methodological issues may limit the inferences that can be made from the results (Pickering et al. 2010c).

Study design and statistical analyses can utilize methods to control for the effects of confounding variables (e.g., by using covariates). Statistical analyses can be used to examine alternative use-impact or use-response relationships between recreational activity and wildlife responses to assess the effects of recreational activity relative to other known drivers (e.g., habitat fragmentation, invasive species) of species occupancy, distribution, physiology, reproduction and survival (Monz et al. 2013; Reed et al. 2014).

Differences among study results.—Differences among studies' results can be due more to differences in variables not accounted for (e.g., space, diet, competition; Markovchick-Nicholls et al. 2008), study design, and/or analytical methodologies than to actual differences among species' responses to recreational disturbance. As to methodology, for instance, some studies may not include sufficiently high levels of human activity to detect responses from species that can tolerate lower levels of disturbance (Reed et al. 2019).

Reilly et al.'s (2017) study using camera trap data to quantify how hiking, mountain biking, horseback riding, and dog-walking affect habitat use/occupancy and diel shifts in activity patterns of ten mammalian species is illustrative for this discussion because some of its results differ markedly from those of other studies. For example, the authors found no negative association between recreation and habitat use by bobcats (*Lynx rufus*) and coyotes (*Canis latrans*), whereas Reed and Merenlender (2008) documented (in the same study area as Reilly et al.) densities of these two species more than five times lower in protected areas that permitted recreation versus those that did not. Dertien et al. (2018) identify differences in the following aspects of the two studies: field study methods, statistical analyses,

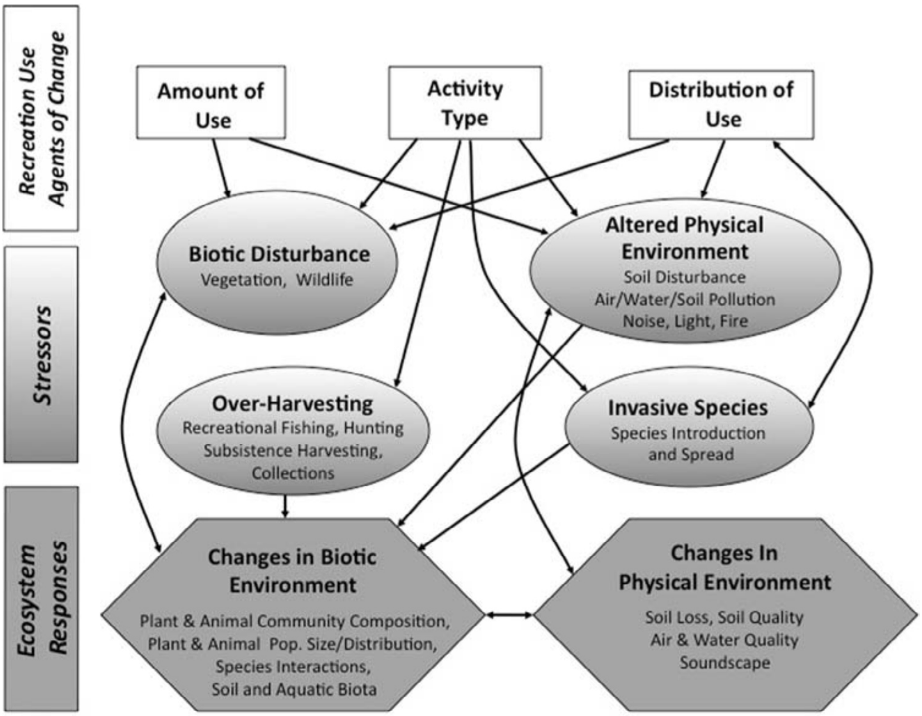

Figure 2. A conceptual model of ecological effects of outdoor recreation (Credit: Monz et al. 2010).

and research design – namely, types of study sites selected, treatment of data sources as replicates or independent of one another, and duration of data collection (one versus three years). These differences may have contributed to the greater variability observed in Reilly et al.'s (2017) study compared to Reed and Merenlender (2008).

Strong variability in other factors that are well known to influence mammalian distributions (e.g., habitat type, human development, or seasonal effects) make it difficult to conclude whether the potential effects of recreation on the target species were truly absent or simply undetected (Dertien et al. 2018). In addition, studies that use abundance, relative abundance, or species richness generally observe stronger effects of recreation than do studies such as Reilly et al.'s (2017) that use occupancy as a response variable (or occupancy interpreted as habitat use; Reed et al. 2019).

Reilly et al. (2017) acknowledge that: species vary widely in their responses to human activities; recreation-related effects on mammalian species that are rare or declining may be greater than on those that are more common or widely distributed; and birds, reptiles, amphibians, and small mammals may respond differently than the large and medium-sized mammals they studied. Finally, in contrasting their results with those of George and Crooks (2006), Reilly et al. do not acknowledge Gill et al.'s (2001) assertion that proximity to other suitable habitat influences how wildlife will respond to human disturbance; George and Crooks (2006) not only acknowledge but give credence to Gill et al.'s work.

Population-level effects

The foregoing discussion reveals many complexities of recreation ecology and provides a sense of why the population-level effects of human disturbance to wildlife are still poorly known (Burger 2012; Hennings 2017). Parameters used to measure population-level effects include population size, density, age structure, fecundity (birth rates), mortality (death rates), and sex ratio (Tarsi and Tuff 2012). Comprehensive assessments of the nonlethal effects on wildlife at the population level are rarely undertaken due to several constraints, including that robust assessment of these effects is challenging (Pirotta et al. 2018). Nonetheless, from a strictly conservation standpoint, human disturbance to wildlife is important only if

Table 1. Variables that influence the outcome of studies designed to assess the ecological effects of recreational activities. Each variable is mentioned in one or more of the cited articles (Taylor and Knight 2003; Beale and Monaghan 2004; Markovchick-Nicholls et al. 2007; Davis et al. 2010; Monz et al. 2010; Pickering 2010a; Quinn and Chernoff 2010; Burger 2012; D'Acunto 2018).

a. regional geophysical traits
b. size(s) of protected area(s) where research occurs
c. type(s) of vegetation present
d. area and density of vegetative cover
e. surrounding environment, including vegetation between the recreational activity and the target species
f. edaphic conditions (e.g., soil type, level of compaction, moisture, composition)
g. weather (temperature, precipitation, wind, shade, sun etc.)
h. timing (day / night / season)
i. time of day x location
j. design of trails (e.g., steepness of trails)
k. placement of trails (orientation to terrain - on flat, along a slope, across a slope)
l. direction of trails (ascending or descending)
m. spatial relationship between trails and target animals
n. trail density
o. wildlife present, target and non-target
p. total # of target wildlife individuals
q. spatial distribution of target wildlife
r. age classes and genders of target wildlife present (adult males/females, subadults, young of year)
s. reproductive status of target wildlife
t. fitness of target wildlife
u. predictability of recreational activity
v. degree of target animals' habituation to tested activities
w. duration of target animals' exposure
x. whether the target animals have the ability to retreat
y. type(s) of recreation
z. duration of recreational activity
aa. # of humans present (e.g., individuals or groups)
bb. # of human disturbances per day
cc. whether recreational activity is on or off an official trail
dd. recreationists' positions
ee. angle / trajectory of recreationists' approach to wildlife
ff. speed and style (e.g., 'aggressive') of recreationists' approach
gg. distance of recreational travel
hh. whether the recreationists apply best practices
ii. recreationists' behavior (e.g., talking or silent, continuous movement or stopping)
jj. encounter distance
kk. perpendicular distance
ll. encounter x perpendicular
mm. researcher bias
nn. study methodology (e.g., is recreationists' approach to wildlife direct or tangential, on or off trail; includes statistical analyses)

it affects survival or fecundity such that a population declines (Gill et al. 2001). Assessing and managing the nonlethal effects on wildlife populations has long been a goal of ecologists, land managers, and decision makers (Pirotta et al. 2018). The management of human activities that cause nonlethal effects on wildlife presents a fundamental ecological problem: how to understand the population-level consequences of changes in the behavior or physiology of individual animals that are caused by external stressors (Pirotta et al. 2018). Given the expansion of recreational activities that can disturb wildlife, quantitatively linking the effects of this disturbance to population dynamics is a major objective for modern conservation (Pirotta et al. 2018).

While behavioral responses, which are studied far more often than other types of responses (e.g., physiological; Larson et al. 2016), have the potential to affect survival or reproductive success, the actual fitness[13] costs of behavioral responses need to be quantified before the responses can be used as reliable estimates of population-level perturbations (Gill et al. 2001).

In most situations when statistical models are used to estimate or forecast the population-level effects of disturbance, selection of a model structure is likely to be driven by data availability (Pirotta et al. 2018). Collecting recreation data in conjunction with ongoing animal population monitoring efforts would be a valuable way to improve the understanding of the effects of human disturbance on demographic trends; and, studies that combine behavioral responses with physiological or demographic metrics would help calibrate the relationships between behavioral responses and population-level effects (Reed et al. 2019). Whichever models are used, uncertainty in the estimated population consequence can be reported as a distribution of potential outcomes, allowing the application of the precautionary principle if the results are used to make management decisions (Pirotta et al. 2018).[14] Application of the precautionary principle is warranted given that any simulation model simplifies reality (D'Acunto et al. 2018).

The dearth of conclusive evidence of recreation-related population-level effects in the literature does not mean that such effects are rare; logic dictates that, if the negative consequences of some observed behaviors or physiological changes in wildlife persist, negative population-level effects will eventually follow. For example, negative population-level effects on desert bighorn sheep (*Ovis canadensis nelsoni*) from recreational disturbance have been documented and are implicated in the bighorn sheep abandonment of habitat (and extirpation of the population) in the Pusch Ridge Wilderness in Arizona, USA (Longshore et al. 2013). And, recreation is one reason cited for the population of bighorn sheep in the Peninsular Ranges of California being listed in 1998 as endangered under the Federal Endangered Species Act (USFWS 2000).

The effects of hikers on elk (*Cervus elaphus*) provide another example of recreation-related population-level effects. Based on a two-year study of the response of female elk to the presence of back-country hikers during the calving season, Shively et al. (2005) recommended that some recreational closures be continued because, despite the evidence that elk reproduction can rebound from depressed levels when hikers are removed or reduced in

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[13] Fitness refers to reproductive success and reflects how well an organism is adapted to its environment (Hennings 2017).

[14] The central tenet of the precautionary principle is that precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. Generally, the four central components of the principle are: taking preventive action in the face of uncertainty; shifting the burden of proof to the proponents of an activity; exploring a wide range of alternatives to possibly harmful actions; and increasing public participation in decision making (Kriebel et al. 2001).

number, they could not determine if there is a threshold level of reproductive depression from which elk cannot recover. In fact, a 2019 article in *The Guardian* reported that the number of elk in the same herd Shively et al. (2005) studied had dropped precipitously since the early 2010s with the steady increase in recreation; what was once a herd of 1,000 head of elk, had dropped to 53 at last count in February of 2019 (Peterson 2019). The article explains that, for Bill Alldredge, one of the authors of the study, there is no other explanation than the increased levels of trail users in the area that supports this elk herd (Peterson 2019).

In a study to assess the effects of recreational activities on Iberian frogs (*Rana iberica*), an endemic species in decline and listed as vulnerable in the Spanish Red Data Book, Rodríguez-Prieto and Fernández-Juricic (2005) concluded that (1) the decrease in Iberian frog abundance with the proximity to recreational areas suggests that direct human disturbance affects this species at the population level, and (2) overall, the results suggest that direct human disturbance needs to be considered as a potential factor affecting amphibian populations with low tolerance for disturbance.

From the peer-reviewed recreation ecology literature, Steven et al. (2011) compiled 69 journal articles that describe the results of original research examining the effects of non-motorized nature-based recreation on birds. Among the articles were 33 that examined population-level avian responses (i.e., reproductive success including number of nests, number eggs laid, and number of chicks that hatched or fledged). Negative effects were reported in 85% of these 33 articles.

Patten et al.'s (2017) 10-year study of mammalian populations across the County of Orange Central and Coastal NCCP/HCP protected areas coincided with a marked increase of human activity and provides insight to potential population-level effects. Though the authors did not discern a decline in the populations studied, they did discern temporal and spatial shifts by wildlife due to human presence, and they suggested that the associated losses in prey populations are unsustainable in light of additional stressors these populations face, which range from continued loss of habitat to human disturbance in the protected areas. Furthermore, given the avoidance behavior and temporal shifts of the various mammalian species, any further increase in human disturbance may yet drive mammalian populations downward (Patten et al. 2017).

With regard to population-level effects of anthropogenic fragmentation, evolutionary adaptation to such fragmentation has received some attention. Even when adaptation to fragmentation occurs, it may not be enough to fully compensate for the environmental effects from fragmentation, and in some cases may even exacerbate them (Cheptou et al. 2017).

Distinguishing facets of mountain biking

Together with the extent of the above-discussed creation and use of unauthorized trails and TTFs by mountain bikers, the mass-marketing of the sport, and the very large numbers of mountain bikers (Burgin and Hardiman 2012), at least four facets of mountain biking distinguish it from other recreational activities such that it may be of potentially greater concern with respect to its effects on wildlife than yet accounted for in the literature. These facets are distance traveled, speed of travel, biking in the dark, and political lobbying and advocacy.

Distance traveled.—Bikers traveling faster obviously travel farther than hikers per unit time and could therefore disturb more wildlife than hikers per unit time (Taylor and Knight 2003; Burgin and Hardiman 2012); the same applies to bikers and equestrians when bikers travel faster than equestrians. Larson et al. (2016) reasoned that, since motorized activities often cover larger spatial extents than non-motorized activities, it is possible that the effects of motorized activities have been underestimated. The same logic applies to the distances traveled by bikers and hikers. For valid comparisons among recreation-related ecological effects, the comparisons must account for distances traveled and the associated levels of disturbance to wildlife along the entire route traveled.

Speed of travel.—While recreation-related effects on wildlife are generally assumed to be indirect (Dertien et al. 2018), the speed at which mountain bikers travel, combined with their relatively quiet mode of travel, can result in direct disturbance to wildlife. A relatively fast moving, quiet mountain bike may approach an animal undetected until well within the animal's normal flight response zone. The result may be a severe startle response by the animal with significant consequences to the animal and/or the mountain biker (Quinn and Chernoff 2010). The sudden encounter is the most common situation associated with grizzly bear (*Ursus arctos horribillis*) inflicted injury (Quinn and Chernoff 2010). Biking-caused wildlife fatalities likely resulting because of bikers' speed occur with amphibians and reptiles that may be attracted to trails for thermoregulation and are thus exposed to collision with bikes' wheels (Burgin and Hardiman 2012); photo-documentation provides evidence of three such fatalities in CDFW's Del Mar Mesa Ecological Reserve in San Diego where a San Diego horned lizard (*Phrynosoma coronatum blainvillii*, a species of concern under CDFW and the U.S. Fish and Wildlife Service), three western toads (*Anaxyrus boreas*), and two Baja California treefrogs (*Pseudacris hypochondriaca*) were killed by mountain bikes (J. Price, CDFW, personal communication, 2019). The treefrogs appear to have been mating when run over—the photo documentation shows eggs spilling out of the female. Biking is prohibited in this ecological reserve, and two of the run-overs occurred on unauthorized trails (J. Price, CDFW, personal communication, 2019).

Though there are methods (e.g., bells attached to bikes) for mountain bikers to give warning of their approach to other trail users, and these can be effective for this purpose, these methods themselves can introduce additional disturbance to wildlife. And, such warning sounds are ineffective for wildlife whose hearing range does not detect them or who do not hear them soon enough to avoid a collision. Moreover, when recreationists are visible on approach to wildlife, the more threatening (e.g., faster, more direct) the recreationists appear to wildlife (as potential predators), the greater the flight initiation distance from the recreationists (Stankowich 2008). Fleeing from a perceived predator represents potentially needless expenditure of valuable energy.

Biking in the dark.—Mountain biking in the dark (i.e., night riding), which is on the rise in protected areas, can disrupt the natural balance between diurnal and nocturnal wildlife. Consequently, night riding poses a dual threat to wildlife that exhibit diel shifts toward night: night riding can compound the pressure such wildlife experience from daytime recreational activities by increasing encounters with competitors and even further reducing the time available for foraging and breeding (Reilly et al. 2017). Night riding can also startle naturally nocturnal wildlife and wildlife that has become increasingly nocturnal to avoid daytime recreationists and other anthropogenic disturbances. Generally, temporal shifts by wildlife involve disruptions to both the shifting wildlife and to the wildlife naturally active during the time frame the shifting wildlife move into. In this way, such shifts set both groups of wildlife up for conflict and competition, disrupt predator/prey relationships, reduce feeding/hunting time and success, and disrupt breeding and other activities (Gaynor 2018). Temporal shifts can also result in spatial shifts and thus potentially cause further ecological disruptions. Thus, temporal shifts are disruptive not only to individuals, but also to communities, and ultimately, populations (Gaynor 2018).

Political lobbying and advocacy.—In part due to the markedly different motivation driving mountain bikers compared to other recreationists in protected areas, especially in the more extreme forms of mountain biking (Burgin and Hardiman 2012), the mountain biking community has come to wield significant lobbying and advocacy pressure throughout the United States. Networking among members if the mountain biking community has resulted in changes in land managers' decisions (Bergin and Hardiman 2012). In California, a newly formed mountain biking nonprofit aims to gain a voice at the capital with lawmakers to put trail access and trail development front and center (Formosa 2019). And, the community has much experience in planning trail networks, experience that is necessary to negotiate areas appropriate for mountain biking. In San Diego County, the local mountain biking coalition and the United States Forest Service (USFS) work in partnership to build trail networks on national forest lands; because the USFS does not have a budget for recreation, the only way trails will be built on national forest lands within the County is if the coalition pays the USFS for the agency's staff time, studies and environmental review, and project-processing needed to approve the trail networks (SDMBA 2017). While the USFS-biking coalition partnership may be similar to the accepted practice of an applicant (e.g., utility) paying a lead/permitting agency to dedicate personnel to the applicant's project(s) or a certain body of work, conflicts of interest are usually inherent in such collaborations. In addition, much of the USFS-biking coalition partnership's planning process occurs outside of public view, prior to the public knowing anything about it. It is notable that, while not all USFS lands are considered protected areas in the meaning of this paper, the wilderness areas the USFS manages are.[15]

Recommendations and conclusions

Conservation of habitats is critical to the perpetuation of viable populations of sensitive species. California is home to several types of protected areas whose primary or sole purpose is conservation of sensitive species. After conserving these protected areas, the next crucial step in biological conservation is managing how, where, and when humans use the land. However, there is rarely adequate management to control the allowed types and levels of recreation such that they are compatible with conservation, much less prevent the illegal recreation. The following discussion provides recommendations related to the major issues of recreation ecology addressed above. The implementation of most of these recommendations is considered management as the term is used in this paper (footnote #4), and land managers are familiar with most, if not all, of them. Still, it is hoped that the recommendations provide some new insights and even useful guidance for practical application in the management of dual-role protected areas, the wildlife they support, and the recreationists they serve. For simplicity, clarity, and brevity, several of the recommendations are in imperative sentences. For some of the aspects about recreation ecology discussed

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[15] The USFS manages approximately 33% of the acreage within the National Wilderness Preservation System (https://wilderness.net/learn-about-wilderness/agencies.php) and describes wilderness areas as places where nature "still calls the shots… They are final holdout refuges for a long list of rare, threatened, and endangered species, forced to the edges by modern development… They are places where law mandates above all else that *wildness* be retained for our current generation, and those who will follow" (https://www.fs.usda.gov/managing-land/wilderness).

above, there are no discrete recommendations.

Continual management is imperative.—Continual management (footnote #4) of recreation is imperative for dual-role protected areas to meet their conservation objectives. The chronic insufficiency of management resources for protected areas is of obvious concern. It is urgent that action be taken to address the chronically underfunded management of protected areas by securing perpetual fiscal support that is sufficient for the management needs in perpetuity; the perpetual fiscal support to be secured includes all costs for personnel and all program costs. The level of management must be commensurate with expanding levels of authorized and unauthorized non-consumptive recreation. Given the upward trajectory of recreational activities in protected areas, garnering broad support for securing the perpetual fiscal support requires a societal course change to a collective perspective of respecting and tending to other species in need of protection. Management that is effective for the biological resources would also improve the often cited economic, educational, and health benefits of protected areas.

Prevent further use and proliferation of unauthorized trails.—Prevent the creation and use of unauthorized trails in the first place. This approach would be far preferable to having to contend with the damage to the ecological resources and cultural ecosystem services (discussed below) from the creation and use of unauthorized trails in protected areas. Here, prevention requires continual management. Consider the lessons learned from the work Greer et al. (2017) describe, as summarized above. Where feasible, gain the trail user community's support for and involvement in proactive efforts to prevent vandalism.

Restore habitat to reverse internal fragmentation.—It is reasonable to assume that the disturbance to wildlife from internal fragmentation associated with authorized trails and from legal recreation on them, occurs at least as much from fragmentation associated with unauthorized trails and recreation on them. The internal trail-related fragmentation and expansion of the effect zone most negatively affects those species for which the fitness costs of disturbance are high but have little or no excess habitat to move to; these species are thus constrained to stay in disturbed areas and to suffer the costs in terms of reduced survival or reproductive success (Gill 2001). For these species, restoring the habitat lost to inappropriate trails (i.e., unauthorized trails, unnecessarily redundant designated trails, and trails to be decommissioned) is critical from the standpoint of the negative recreation-related population-level effects. Using restoration to minimize the effects of recreation within fragmented protected areas in urban areas might enable the fragments to better support the focal species (Reed et al. 2019).

Therefore, though the effects on wildlife from unauthorized trails and recreation, per se, have received comparatively little formal study, the precautionary principle (Kriebel et al. 2001; footnote #14) dictates that there seems no need for further study to justify prioritizing restoration of habitat lost to inappropriate trails. So, for levels or habitat loss and the associated internal fragmentation that meet some yet-to-be-established criteria, the restoration should occur. If there is competition for resources (budget/funding, personnel) between (1) research on recreation-related disturbance to wildlife and (2) restoration of habitat lost to inappropriate trails to stop the disturbance, the latter should take priority to reverse internal fragmentation.

To assess the effects of the restoration on the wildlife communities within the protected area, conduct biological surveys within a year prior to the restoration and three to five years after the completion of the groundwork and planting. For this assessment, valid pre-disturbance wildlife survey data collected prior to the loss of habitat within the footprint of the trails that will be restored and associated effect zone will help. But if there are no pre-disturbance data for the protected area or a nearby undisturbed control area, care must be taken in the interpretation of the results of the survey conducted a year prior to the restoration (i.e., the first survey). This is because the results of the first survey will likely represent wildlife communities altered from the pre-disturbed condition (Hennings 2017). It may be that the level of fragmentation, recreation, and many other factors, have caused conditions in which there are no or very few individuals of the focal species (Hennings 2017). These are reasons to be conservative in estimating the recreation-related effects on wildlife in disturbed protected areas without pre-disturbance data; if wildlife have already vacated the disturbed site before the first survey is done, the results will underestimate disturbance effects on wildlife (Hennings 2017). Here, the purpose of the survey data is to aid in determining how the restoration affects the occurrence and/or density of species (depending on the survey methodology), all other factors being equal. The assessment must account for whether the restoration involves the cessation of recreational activities on and/or in the vicinity of the trails to be restored, especially if no other recreational activities begin elsewhere within the species' effect zone throughout the restoration period. If there is funding available and a desire to monitor human activity and wildlife within the restoration areas, deploy camera traps within the areas; camera traps are the most cost-effective method currently available to monitor wildlife activity (Burger 2012).

Minimally, include the following tasks in the restoration: track the actual and in-kind costs (personnel, capital costs, volunteer hours, etc.) for the entire process; map the inappropriate trails and constructed trail features (some use of aerial imagery may work, but on-the-ground mapping validation is essential; Dertien et. al. 2018); prioritize the order of their restoration; determine the best approach for restoring each trail (e.g., passive, active, or a combination); do the restoration itself;[16] and, monitor for several years. Finally, publicize the costs of the restoration to inform the public (F. Landis, California Native Plant Society, personal communication, 2017); for this, compare the costs of the restoration with the costs of the management (footnote #4) that would have been necessary to prevent the damage requiring the restoration. Reasons for documenting the costs include being able to provide to local and state elected officials comparisons of the costs of reactive and proactive approaches to management, and to inform the public about the costs of repairing ecological vandalism.

If possible and logistically advantageous, it would be prudent and economically beneficial to collaborate with recreationists to volunteer with the restoration. For example, this would be an opportunity to mobilize well-organized volunteer contingents of the mountain biking community that are dedicated to building trails. In fact, in some areas, the mountain biking community provides well-organized volunteer assistance in the designing, building, and/or maintenance of officially designated trails in and outside of protected areas. Such volunteer dedication to the restoration of unauthorized trails is sorely needed.

In addition to the biological benefits, another motivation for this habitat restoration in protected areas is its potential to improve the human experience in protected areas open to public access. California's State Wildlife Action Plan (CDFW 2015) and much of the literature about recreation-related ecological effects point to the economic, educational, and recreational/health benefits (i.e., cultural ecosystem services) of protected areas and the species they support. Regarding the human health benefits, the visible recreation-related

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[16] Here, restoration encompasses decompacting the soil, building back and stabilizing the damaged or destroyed terrain and soil, and restoring the affected native plant communities.

damage to the terrain requires consideration beyond its ecological effects—it also affects the level of benefit people enjoy while being in nature, as illustrated by a study examining the relationship between recreational impacts in protected areas and human mental/emotional states (Taff et al. 2019). The study's results demonstrate that, as visible recreation-related ecological impacts increased, sense of wellbeing and mental state decreased, especially in response to settings with unauthorized trails. Collectively, the results show that managing tourism in protected areas in a manner that reduces such impacts is essential to optimizing beneficial cultural ecosystem services related to human health and wellbeing (Taff et al. 2019). Also diminishing the human experience is the risk of injury when using unauthorized trails and TTFs (Davies and Newsome 2009), a risk that restoration would remove. The benefits of the cultural ecosystem services from habitat restoration may increase the potential to obtain funding for such restoration.

Use science-based disturbance thresholds and the precautionary approach.—Establish and use science-based disturbance thresholds to guide management, recognizing and accounting for the notion that the imprecision of thresholds applies to all species, even those for which quantitative thresholds for known sources of disturbances under specific conditions have been identified; thresholds may not adequately protect the target focal species under all conditions in which they occur. The determination of disturbance thresholds must consider the influence of trail-related expansion of effect zones, especially with respect to reductions in the proportions of protected areas that are suitable for wildlife.

To compensate for the imprecision of thresholds when using them to guide management, (1) apply a precautionary approach that adopts maximum values of quantitative disturbance thresholds observed for the taxa of concern, while excluding the extreme values of the thresholds (Dertien et al.'s 2018),[17] (2) take into account that the default position should be a precautionary approach that assumes a priori that the functional value of species' abundance is high (Baker et al. 2018), (3) employ continual proactive and adaptive management to protect wildlife from recreational disturbance,[18] and (4) restrict access if the management fails. The need for the precautionary approach stems from the gaps in knowledge about quantitative disturbance thresholds of recreation.

In trail and trail network planning, use the best available science.—When planning new or modifying existing trails and trail networks in protected areas, the best available science ought to guide policy and decision-making about the siting, design, and alignment of the trails, and about the types, levels, and timing of recreation under consideration. To protect the sensitive species, the policy and decision-making should factor in the capacity to manage the existing and planned trails and recreation in perpetuity. No matter how high the pressure from recreationists for more recreational trails and opportunities, it must be recognized that the majority of recreation-related effects on wildlife are negative. The implications of this necessitate thorough consideration as to whether recreational accommodations that are being considered (in conjunction with all other anthropogenic effects) are compatible with

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[17] The precautionary approach and the precautionary principle (footnote #14) have subtle differences between them, but consideration of the differences is beyond the scope of this paper.

[18] Based on section 13.5 of the California Fish and Game Code (FGC) and the Natural Community Conservation Planning Act (i.e., section 2805 of the FGC), adaptive management generally means (1) improving management of biological resources over time by using new information gathered through monitoring, evaluation, and other credible sources as they become available, and (2) adjusting management strategies and practices accordingly to assist in meeting conservation and management goals (e.g., conservation of covered or focal species). Under adaptive management, program actions are viewed as tools for learning and to inform future actions. Adaptive management is a cornerstone of large-scale multiple species conservation (CDFW 2014).

the protected areas' conservation objectives. The planning should incorporate protective disturbance thresholds, allowing for adaptive modifications as needed. In situations where recreation has been assumed to meet the conditions of compatibility (e.g., as negotiated in NCCPs/HCPs), great care is needed to ensure the veracity of this assumption. The outcome of the planning process should be ecologically soundly designed, sited, and aligned trails and trail networks, with science-based restrictions on types, levels, and timing of recreation. In conjunction with new trail/trail network construction, restore the habitat lost to inappropriate trails within the area of the construction.

For future protected areas, plan separate recreational areas.—Planning for future protected areas and associated trail networks and recreational areas holds the greatest potential for successful collaboration among landowners, agencies, recreationists, and other stakeholders that allows for truly protective conditions for sensitive species with respect to recreation. Perhaps it is not too late for California to redirect the trajectory of the recreational juggernaut toward an inspirational conservation success story, where stakeholders come together in the planning process, and apply the prevailing science regarding recreation-related disturbance to wildlife to ensure the perpetuation of viable populations of wildlife in the very protected areas set aside primarily or solely for that purpose. Representatives of the recreation community should sit at the table when planning future protected areas and associated trail networks and recreational areas (Burgin and Hardiman 2012); if the outcome is acceptable to them, it may prevent or minimize the creation of unauthorized trails. For example, without a strong strategic approach to mountain biking that includes community engagement, the outcome will be further degradation of protected areas and, at the least, loss of individuals of wildlife, if not major threats to wildlife populations; it's likely that there will also be on-going conflict between mountain bikers and other recreationists and residents (Burgin and Hardiman 2013).

The limited availability of resources for management suggests that it may be more effective to allocate recreational uses and conservation targets among different sites, which will require a diverse suite of land conservation strategies (Reed and Merenlender 2008). At least until such time that there is management of recreation in protected areas commensurate with recreational pressure, planning for future protected areas should heed what has been commonly known for at least 60 years: if conservation of land occurs without enforcing quotas on visitors, then separate areas need to be provided to accommodate recreational activities elsewhere so that the protected land will not bear the burden of those activities (Wilson 2019). This sentiment applies far more today, principally to protected areas preserved primarily or solely for the perpetuation of sensitive species. While this approach is infeasible for many established protected areas (most protected areas in urban areas), going forward, this ought to be the paradigm of habitat and species conservation in areas of high recreational pressure.

Figure 3 depicts an idealized vision of conservation planning using this approach. For protected areas established pursuant to NCCPs/HCPs negotiated in urban settings within an already fragmented landscape, there is often limited latitude for separate areas for recreation; furthermore, sensitive species are typically distributed more evenly across the urbanized landscape than depicted in Figure 3. Nevertheless, it represents the fundamental approach of separating conservation areas from recreational areas. Even in constrained areas, if planning for recreational access occurs at the regional level, planners and land managers could ensure that protected area networks include some areas that are closed to recreation, thus

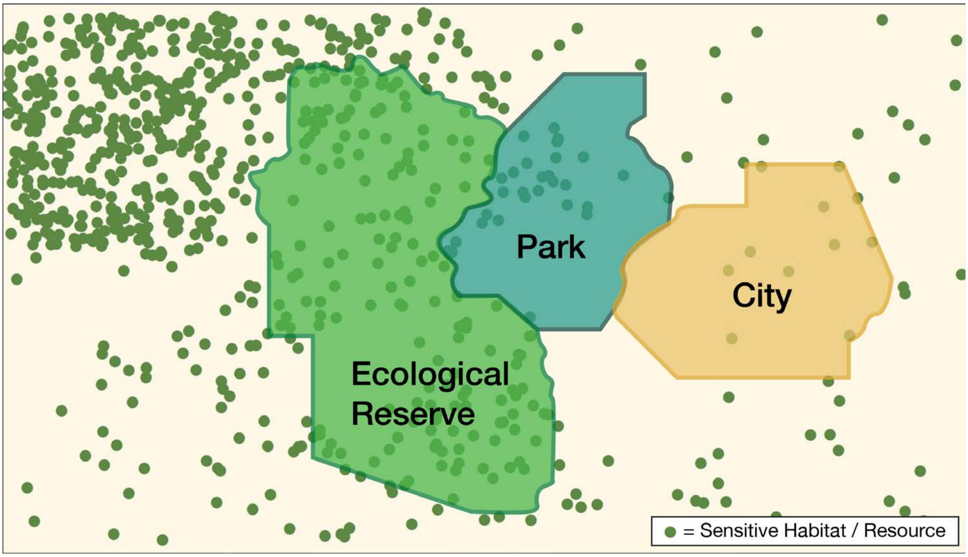

Figure 3. Effective planning for protected areas preserved primarily or solely for the perpetuation of viable populations of sensitive species: provide separate areas for conservation (e.g., ecological reserves) and recreational activities (i.e., parks). (Credit: Landscape Conservation Planning Program, CDFW 2020)

balancing the dual land uses of conservation and recreation at the scale of the protected area network instead of each individual protected area (Reed et al. 2019). Formally incorporating wildlife considerations into the trail planning process from the start is essential to reducing recreation-related disturbance to wildlife; if trail planning is well underway by the time wildlife is considered, it may be too late to gather sufficient wildlife information to inform the planning process (Hennings 2017).

A consideration often not made in conservation planning is the need to address the temporal aspect of human-wildlife interactions. For example, similar to seasonal restrictions, diurnal or nocturnal "temporal zoning" may be necessary to restrict certain human activities during times of the day when sensitive species are most active or when the likelihood of negative human-wildlife encounters is greatest (Gaynor 2018; Whittington 2019). The effectiveness of temporal closures likely depends on the amount and quality of habitat, and levels of human use and fragmentation, within the planned protected areas and in the surrounding landscape. Temporal closures may not benefit wildlife with diurnal activity patterns that differ from the timing of the temporal closures; so, full closures may be required to increase wildlife use in many situations (Whittington 2019). For situations when protected areas and recreational areas are separate but share a boundary, temporal zoning would also apply to the effect zone within the recreational area.

Conclusion.—The most sensible approach for species conservation may be to concentrate research and protection efforts on species whose populations are declining and for which human disturbance is implicated as a possible cause (Gill et al. 2001). The designation of ecological reserves and the conservation of habitat pursuant to NCCPs/HCPs are examples of processes that embody this approach. But, when recreation in such protected areas is not properly planned and adequately managed, their ecological viability and ability to meet their conservation objectives are jeopardized. Implementation of the recommendations provided herein is necessary to ensure the focal species thrive.

Ultimately, for wildlife that avoids human activity, it is unlikely that dual-role protected areas are entirely sufficient or justifiable for meeting conservation objectives; limiting or prohibiting recreation in strategic circumstances and locations within protected areas is necessary to achieve conservation objectives (Bötsch et al. 2018; Dertien et al. 2018; Reed et al. 2019). Enforced closures of inappropriate trails in all protected areas and restoration of those trails would substantially decrease the trail-related disturbance to wildlife across the landscape; waiting until after wildlife detections or estimates of habitat use decrease is too late to implement these measures (Dertien et al. 2018). These approaches require perpetual management commensurate with expanding levels of authorized and unauthorized non-consumptive recreation in protected areas. Action is urgently needed to secure perpetual fiscal support for management sufficient to ensure the perpetuation of viable populations of sensitive species in protected areas.

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INFORMATION FOR AUTHORS

The California Fish and Wildlife Journal (CFWJ) is a peer-reviewed, scientific journal focused on the biology, ecology, and conservation of the flora and fauna of California and surrounding areas, and the northeastern Pacific Ocean.

Submissions guidelines (PDF) for the Journal have been updated (July 2019).

The California Fish and Wildlife Journal accepts manuscripts in the following categories:

- Original research papers
- Research notes
- Review papers
- Book reviews
- Commentaries and Essays

Manuscripts must be submitted by e-mail following directions provided in the link: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=171113&inline. The journal standard for style is consistent with the Council of Science Editors (CSE) Style Manual. Instructions in the CFWJ guidelines supersede the CSE Style Manual where differences exist between formats. Please follow these formatting guidelines carefully. Manuscripts that do not conform to the guidelines will be returned for revision.

Authors of manuscripts that are accepted for publication will be invoiced for charges at the rate of $50 per printed page shortly after page proofs are distributed.* Authors should state acceptance of printing charges in their cover letters. The corresponding author will receive a PDF file of the publication without additional fees and may distribute copies without restriction.

*Page charges may be waived for authors under in certain instances (e.g., for authors from developing countries or students without funding). If applicable, please request a waiver in your cover letter.

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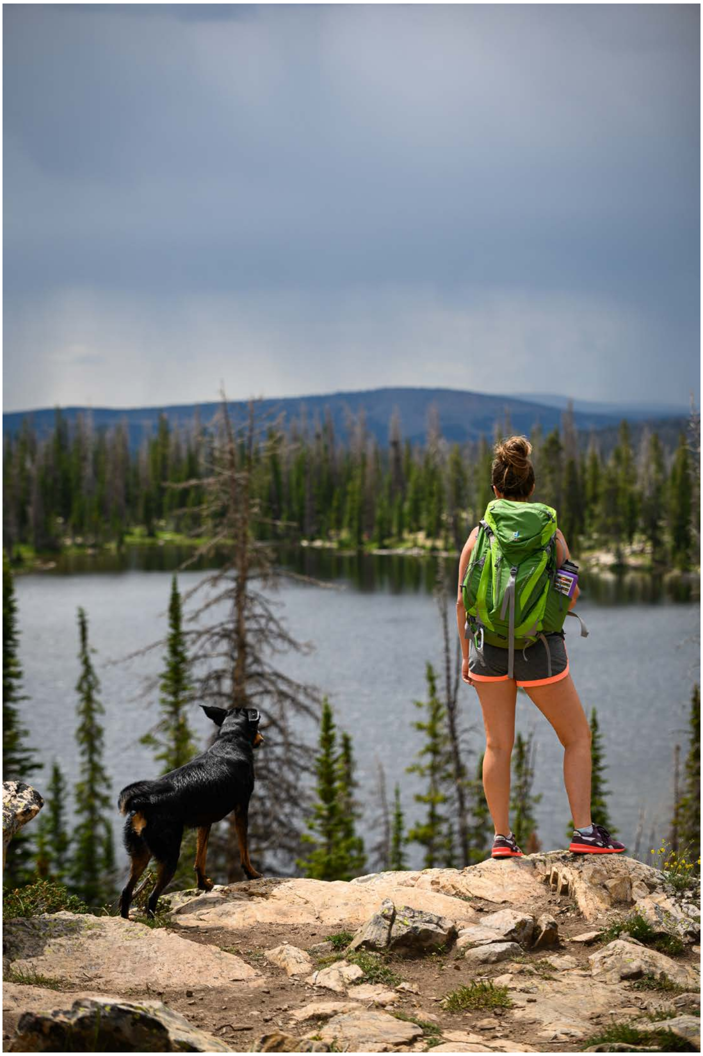

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San Diego County Archaeological Society, Inc.

Environmental Review Committee

5 April 2021

To: Ms. Lorrie Bradley
Department of Parks and Recreation
County of San Diego
5500 Overland Avenue, Suite 410
San Diego, California 92123

Subject: Notice of Preparation of a Draft Environmental Impact Report
Alpine County Park Project

Dear Ms. Bradley:

Thank you for the Notice of Preparation for the subject project, which we downloaded from the County's website.

We are pleased to note the inclusion of cultural resources in the list of subject areas to be addressed in the DEIR and look forward to reviewing it and its cultural resources technical report(s) during the upcoming public comment period.

SDCAS appreciates being included in the County's environmental review process for this project.

Sincerely,

James W Royle Jr.

James W. Royle, Jr., Chairperson
Environmental Review Committee

cc: SDCAS President
File

P.O. Box 81106 San Diego, CA 92138-1106 (858) 538-0935

From: Ray Teran
To: CEQA, CountyParks
Cc: Ernest Pingleton
Subject: Alpine County Park
Date: Wednesday, March 10, 2021 11:22:36 AM

The Viejas Band of Kumeyaay Indians (“Viejas”) has reviewed the proposed project and at this time we have determined that the project site has cultural significance or ties to Viejas. Cultural resources have been located within or adjacent to the APE-DE of the proposed project.

Viejas Band request that a Kumeyaay Cultural Monitor be on site for ground disturbing activities and to inform us of any new developments such as inadvertent discovery of cultural artifacts, cremation sites, or human remains.

If you wish to utilize Viejas cultural monitors, please call Ernest Pingleton at 619-655-0410 or email, epingleton@viejas-nsn.gov, for contracting and scheduling. Thank you.

Ray Teran

Viejas Tribal Government
Resource Management Director
619-659-2312
rteran@viejas-nsn.gov

Alpine Community Planning Group
PO Box 1419, Alpine, CA 91903

April 7, 2021

County of San Diego, Department of Parks and Recreation
Attn: Alpine County Park Environmental Review
5500 Overland Avenue, Suite 410
San Diego, California 92123
Sent via email: CountyParksCEQA@sdcounty.ca.gov

To Whom It May Concern:

The Alpine Community Planning Group held a public meeting on April 6, 2021 to review and comment on the Notice of Preparation of an Environmental Impact Report for the Alpine County Park Concept Plan. The group made the following recommendations.

Motion to recommend support for the Alpine County Park Concept Plan subject to the Alpine Community Planning Group's review of the final design once the Environmental Impact Report for the project is completed.

The Alpine Community Planning Group specifically requests:

1. *the County review the sustainability of watering the grass field playing areas*
2. *the County works directly with Alpine Fire Protection District and the County Fire Authority on a fire safety plan for the park*
3. *the County reviews the feasibility of all-way stop signs at both entrances to the park to provide traffic calming measures on South Grade Road.*

The motion was made by Jim Easterling and seconded by Mike Milligan. The motion passed with a vote of 11 yes, 0 no, 1 abstain, 3 vacant/absent.

Please include this letter summarizing the recommendations of the Alpine Community Planning Group in the public record.

Best regards,

Travis Lyon, Chairman

From: Neville Connell
To: CEQA, CountyParks
Cc: travislyonacpg@gmail.com
Subject: Alpine County Park
Date: Thursday, March 11, 2021 1:28:32 PM
Attachments: Letter to SD County Alpine Park 2021 FINAL DRAFT GAFSC.docx

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The Board of the Greater Alpine Fire Safe Council submitted the attached letter to the Alpine Sun where it was published two weeks ago. Its chief concern is that the final design of the park should match the available resources on Wrights' Field, so that the park will be sustainable in perpetuity. After attending the webinar about the current design and hearing County's responses to questions about water, we are concerned that this balance may not be achieved with the design proposed. We therefore ask the County to pay particular attention to this issue in its CEQA study so that the park built will be as attractive in 10 years' time as it was when it opened.

We also propose that open flames of any kind should not be permitted to minimize the chance of ignitions and a repeat of the West Fire. In spite of this ban, fires will occur and the water supply must be sufficient and must be easily accessed by fire fighters.

Finally, we ask that the design pays detailed attention to how children in particular with slate boards and bikes will access the park from the town center and from Joan McQueen Middle School . Expecting them to take Tavern or Eltinge then South Grade, though unlikely to happen in our opinion, is also dangerous under current traffic and sidewalk conditions.

Thank you for your attention.

Neville Connell
President GAFSC

PRESERVE
ALPINE'S
HERITAGE

ONCE GONE
GONE FOREVER

Thursday, April 1, 2021

County of San Diego
Department of Parks and Recreation
Attn: Alpine County Park Environmental Review
5500 Overland Avenue, Suite 410
San Diego, CA 92123
E-mail : CountyParksCEO@sdcounty.ca.gov; lorrie.bradley@sdcounty.ca.gov

Re: Notice of Preparation of a Draft Environmental Impact Report on the Alpine County Park Project

Dear Ms. Bradley:

Thank you for the opportunity to provide information for the Notice of Preparation (NOP) of the Environmental Impact Report (EIR) on the Alpine County Park Project (Project).

Preserve Alpine's Heritage (non-profit status pending) is a group of dedicated community advocates representing all areas and demographics of Alpine. We promote meaningful collaboration and creative partnerships with public representatives and other stakeholders. We embrace a diversity of views as we work toward the common goal of designing innovative, sustainable, and financially-responsible solutions that bring desired facilities and services to Alpine, while preserving the unique natural, cultural, and rural heritage of our community.

We have various issues with the Project including, transportation and traffic, aesthetics, hydrology and water quality, wildfires, biological resources, and public services.

Concern Paragraph 1 - **Transportation and Traffic**. The Project is located on a two-lane road with no sidewalks or crosswalks to neighboring residential areas. The plan contemplates 250-275 parking spaces and potentially 1,000 visitors per week. It is located near two public schools and would be an appealing location for children to walk or ride their bikes, scooters, or skateboards to visit. There already has been pedestrians hit by automobiles on South Grade Road. This concern needs to be analyzed in the Project's EIR. The risk of the safety to all visitors, but especially the children, needs to be eliminated or mitigated below the level of significance.

Concern Paragraph 2 – **Aesthetics.** The Project will have an adverse impact on the existing visual character and quality of the site and its surroundings. Presently, the site has a beautiful view of open space and mountains. At night there is an unobstructed view of the planets and stars since there are no street lights or other light sources on the site. While the County has not been specific on what lights they will utilize on the Project, there has been some discussion of security lights during the evening. This concern needs to be looked into as a part of the Project's EIR and be avoided or greatly mitigated.

Concern Paragraph 3 – **Hydrology and Water Quality**. The County has yet to specify its water source for the Project's extensive landscaping, fields, restroom facilities, etc. Because of that, there has been no investigation of leach field size or location, decrease in ground water supply, or interference with ground water management if wells are the source. The water source must be selected and analyzed as a part of the Project's EIR and assure that a source does not interfere with drainage patterns and ground water supply for neighboring property.

Concern Paragraph 4 – **Noise**. With the contemplated traffic, visitors, and activities, the Project will significantly increase the noise level at the site and the surrounding community. Those that presently use Wright's Field Ecological

Preserve quietly enjoy the trails, wildlife, natural grasslands and trees. With ball fields, basketball courts, biking facilities, and other active sports facilities attracting hundreds of visitors, this quiet enjoyment will be lost. This needs to be addressed and mitigated in the Project's EIR.

Concern Paragraph 5 – **Wildfires**. The Project contemplates fire pits for barbecuing in the park which is a high wildfire zone. This, plus the fire risk associated with the number of visitors to the Project needs to be analyzed as part of the EIR process and the pits need to be eliminated and the other risks avoided or significantly mitigated.

Concern Paragraph 6 – **Biological Resources**. The Project site and neighboring Wright's Field Ecological Preserve are blessed with some of California's Species of Special Concern and natural grasslands. The Project has not addressed the Project's impact on habitat modification of the site or adjacent Wright's Field. This needs to be addressed in the Project's EIR and these resources should be protected.

Concern Paragraph 7 – **Public Services**. The Project will cost taxpayers significant amounts of money both on developing the Project and maintaining it. The source of these funds has not been disclosed. Previously, the County has invested in athletic fields with other government and nonprofit agencies in Alpine to provide recreational space for soccer, softball, baseball, etc. Development of these existing resources should be analyzed in the EIR as the most logical and economic way of achieving what Alpine needs without creating redundant facilities on one new site.

Reasonable Alternative: Small, Nature-Based Park

As outlined in the County's permitting process, the County has to show they have considered reasonable alternatives to the proposed project and they have to demonstrate that their project is the best option. Since County has previously stated they cannot recommend the proposed park site for development "due to significant and not mitigable impacts to biological resources" they need to consider a smaller alternative. The one proposed by Preserve Alpine's Heritage (PAH) is supported by feedback in outreach meetings and independent polling.

The PAH alternative is a much smaller, nature-based park that minimizes the impact on the rare habitat features and significant rural heritage. The most prominently expressed community wishes and needs, as confirmed by the County community outreach efforts and surveys, were nature-based play areas, picnic tables, shade areas, an interpretive area for local history, and protection of the adjacent Wright's Field Ecological Preserve, on-site native grasslands, and Engelmann oak woodland.

As such, please include a project alternative with a smaller, nature-based, minimally developed park that has no impacts to the biological, cultural, and other resources of the project site, Wright's Field Ecological Preserve, and neighboring properties. Focus on making its upkeep and maintenance financially sustainable for the community. Make its construction, maintenance, and rebuilding carbon neutral and environmentally sustainable, to meet federal, state, and County goals.

Reasonable Alternative: Network of Local Parks

Alpine community already has a number of indifferently maintained, underutilized parks and recreational facilities designed to provide many of the amenities this project seeks to build. Why add redundant facilities in one large park? As part of the alternative or in parallel negotiations, the County needs to seek alternate sites (such as Shadow Hills) for the all-terrain bike park, all-wheel park, and the seven acres of sports fields. Multiple distributed sites and options have been identified by the county and by PAH for these larger proposed sports facilities, areas that where there are fewer impacts, and where they are closer to the people who would use them. These local facilities should be connected by a system of safe walkways, bike paths, and trails.

The County needs to revisit joint use and partnering options with Alpine Unified School District for shared investments in sports field facilities at Shadow Hills Elementary School, Joan McQueen Middle School, and other land-holding/management entities to revitalize and upgrade currently neglected, existing, active-recreational facilities with monies already earmarked and/or raised for such projects, rather than building more of the same facilities.

Follow Up

Please analyze all of these potential impacts and avoid the significant ones. Please also provide all updates and meeting notices on this project to info@preservealpinesheritage.org. Additionally, we request a follow up meeting with County of San Diego Parks and Recreation Director, Brian Albright, to discuss the above concerns and how they will be appropriately addressed.

On behalf of the hundreds of the concerned Alpine community members comprising Preserve Alpine's Heritage, we thank you for taking our comments and look forward to your follow up on the above.

Kindest regards,

Julie Simper
Chair, Steering Committee
Co-Chair, Community Outreach Committee
Preserve Alpine's Heritage

Find us on
Tel: (619) 606-8692
info@preservealpinesheritage.org
www.preservealpinesheritage.org
Alpine, California 91901

From: Tom Myers
To: CEQA, CountyParks
Cc: info@alpinehistory.org
Subject: Comments for County Park in Alpine
Date: Friday, April 30, 2021 10:05:38 AM

Good Morning Marcus,
I would like to add one comment to the list for the County Park being planned in Alpine.

In 1998, Alpine was the first ***Certified Community Wildlife Habitat*** in the USA. We have continued to this day as a leader in education related to sharing our home gardens, neighborhoods parks, and open spaces with native wildlife. We urge the planners for this park to include landscape elements that will qualify this park as a certified wildlife habitat. This will be a way to demonstrate how easy it is to share our active community parks with wildlife and it is very simple to do. The landscape design must consider five topics in it's development.

1. FOOD: All living things need to eat to survive, so food sources are a critical component of wildlife habitat. Native plants form the foundation of the food chain in the natural world, and should do the same in wildlife-friendly landscapes. Plants provide food to wildlife in a wide variety of ways, from berries to nuts to pollen, seeds, nectar and even the insects they support that feed other animals.

2. WATER: Wildlife needs clean drinking water to survive. Birds need to bathe in order to keep their feathers in good working order, while other species including some amphibians, insects and other wildlife actually live in water. You can provide this habitat component in a variety of ways, from a simple birdbath or shallow dish of water to a water garden or pond.

3. COVER: Wildlife need places to hide to feel safe from people, predators, and inclement weather. Native vegetation is a perfect cover for terrestrial wildlife. Shrubs, thickets, and brush provide great hiding places within their bushy leaves and thorns.

4. PLACES TO RAISE YOUNG: Wildlife need a sheltered place to raise their offspring. Many places for cover can double as locations where wildlife can raise young, from wildflower meadows and bushes where many butterflies and moths lay their eggs to tall shrubs or trees for nesting species.

5.SUSTAINABLE PRACTICES: Maintaining the landscape in a sustainable, environmentally-friendly way ensures that the soil, air, and water that native wildlife (and people) rely upon stay clean and healthy.Some key sustainable practices that will enhance the park are

- Soil and Water Conservation: Riparian Buffer • Capture Rain Water from Roof • Xeriscape (water-wise landscaping) • Drip or Soaker Hose for Irrigation • Limit Water Use • Reduce Erosion (i.e. ground cover, terraces) • Use Mulch • Rain Garden
- Controlling Exotic Species: Practice Integrated Pest Management • Remove Non-Native Plants and Animals • Use Native Plants • Reduce Lawn Areas
- Organic Practices: Eliminate Chemical Pesticides • Eliminate Chemical Fertilizers • Compost

On behalf of the Certified Wildlife Community Habitat program in Alpine, we request that you include these wildlife friendly concepts in the landscape plans as they continue to develop.

Tom Myers, President
Alpine Historical & Conservation Society
PO Box 382
Alpine, CA
email: info@alpinehistory.org
website: alpinehistory.org
phone: 619-885-8063

From: Alex Carroll
To: CEQA, CountyParks
Subject: Alpine County Park
Date: Wednesday, April 07, 2021 4:55:20 PM

Dear County,

The proposed park has fancy amenities and it's beautifully designed, however, I am opposed to certain elements. Specifically, I'm opposed to the noise elements in the design such as the all-wheels park, bike course, basketball, baseball/softball fields and cemented areas that will carry noise through the field/hills and into the residential areas. I do not live adjacent to the park but I believe the noise level will rise significantly and disturb those who do live nearby and are directly affected by the impacted design. Also, I'm concerned South Grade is a very dangerous road for local children that will attempt to walk/ride to the park. I love the size of the park, the 2 dog parks, the volunteer pad, the playgrounds, trails, grass and gathering areas in the design and I believe a more natural type park, or passive setting, would be best aligned with the community desires and balanced with nature. There are parks such as Damon Lane where children enjoy the open and natural areas just as much, if not more, than over designed or impacted parks such as the proposed park in Alpine. Please scale down the amenities of the park and simplify the design to mimic the surround natural area as much as possible.

Respectfully,
Alex Carroll
2811 Via Asoleado
Alpine
619. 300-6634

From: Amanda Pavich
To: CEQA, CountyParks; Bradley, Lorrie
Cc: Miles Pavich; Dr. Amanda Pavich
Subject: Comment on NOP Draft EIR- Alpine County Park
Date: Tuesday, April 06, 2021 8:56:10 PM

Miles & Amanda Pavich

2422 Nido Aguila,

Alpine CA 91901

April 6, 2021

County of San Diego

Department of Parks and Recreation

Attn: Alpine County Park Environmental Review

5500 Overland Avenue, Suite 410

San Diego, CA 92123

By email to CountyParksCEQA@sdcounty.ca.gov and lorrie.bradley@sdcounty.ca.gov.

RE: Notice of Preparation of a Draft Environmental Impact Report on the Alpine County Park Project

Dear Ms. Bradley,

Thank you for the opportunity to provide information for the Notice of Preparation ("NOP") of the Environmental Impact Report ("EIR") on the Alpine County Park Project ("Project"). We moved to Alpine a year ago with our children expressly for the rural, open spaces, access to nature, and dark skies. We are regular users of active and passive recreation areas/parks. We live across South Grade from the proposed park site, the direct line-of-sight view from our property is the Project acreage.

As neighbors who will be directly impacted by this Project, the CEQA issues we are concerned about include: 1- Traffic safety and noise; 2- Use of tax dollars and cost of Project upkeep/ maintenance; 3- Fire Safety; 4- Lighting and Dark Sky Designation; 5- Property value decline due to changed view ; 6- Alternative Park Design

1. Traffic Safety and Traffic Noise

As stated above, we live across South Grade Road from the proposed park site. We travel on this road to and from our home daily. South Grade is a narrow, two-lane country road with dangerous twists and turns where residents travel at high speeds. The current Project details nearly 300 parking spaces and facilities adjacent to and emptying out onto this road, anticipation of large gatherings, tournaments and events, and no safe walkways, sidewalks or horse trails to get to and from the park. The Project's all-wheels park is a tempting destination for local kids, like ours, to ride to without any safe bike paths or trails to get there. County representatives have described this as a "regional destination park," designed to make people travel by vehicle. This, and the amount of people the mega-park is designed to accommodate, will greatly impact the amount of cars on the road and traffic noise we, as neighbors, will experience. In light of the three deaths that have occurred on that road and the very recent hit- and- run of a teenage girl that left her with serious injuries, it seems utterly irresponsible to proceed with ANY PART of this Project until concrete traffic/road plans are proposed and vetted, and analyzed in the EIR. Our own 18-year- old sometimes has to walk that road on his way to work, if he gets called in when we are away from home with the car.

County representatives have merely stated "we're working closely with other departments on this." Putting out a proposal without a traffic plan demonstrates a lack of understanding of the seriousness of adding large amounts of park traffic to an already dangerous road. Putting enticing play areas to attract local kids-- without a safe way to get them there-- is outrageous. Not providing a safe way for horses to get to and from the park in a horse-community, requiring trailering, also adds to the noise, congestion and safety issues. These traffic safety and noise impacts need to be avoided, or, at worst, mitigated below the level of significance.

2. Cost of Project Upkeep and Maintenance

Alpine already has several active recreational fields (that utilized public funds to build) that are in disrepair, decay, or closed to the public. As taxpayers concerned with good stewardship of undeveloped land AND our dollars, it seems financially irresponsible to replace open space near an Ecological Preserve with a high-cost park with redundant facilities. The Alpine Community Plan Update (COS 4.5) calls for the support of joint powers agreements for park and recreational facilities. It would be far less expensive to taxpayers to repair and/or upgrade existing recreational assets using Joint-Use or Joint-Maintenance agreements, in order to fulfill County recreational/ park goals.

Active-use facilities and grass fields such as those detailed in the Project are expensive to maintain, and many of these facilities in existing County Parks are currently in disrepair, closed, and/or neglected from lack of funds. County representatives have publicly stated “there are many ways to generate revenue for a park” and some general ideas for how parks generate revenue are listed on the website. However, there is no plan detail for how the upkeep and maintenance costs for THIS SPECIFIC PARK will be generated. With tax revenues falling because of the Covid -19 Pandemic, how will this park be any different, once it’s built? What is the taxpayer impact if there are not enough funds to maintain these facilities, and what are the actual costs to the local users of the Park?

These questions about utilizing Joint Use/ Joint Maintenance agreements to fulfill County goals while managing taxpayer dollars more effectively, as well as a concrete fiscal plan for continued upkeep and maintenance of the Project need to be analyzed in the project EIR.

3. Fire Safety

Alpine is a high-risk fire area. Our neighborhood has one exit route for fire evacuation, utilizing South Grade Road. The proposed Project would significantly increase traffic and congestion on that road. The situation could become dire if a fire evacuation was needed while a large sporting event or gathering was going on at the proposed sports fields or pavilion. Additionally, the Project includes BBQ pits/grills, a high fire hazard for all of the houses that surround the proposed Project land, like ours, and for Wright's Field Ecological Preserve. Inclusion of and allowing any type of fire or grilling at this location is utterly irresponsible in light of the sensitive habitat of the adjacent Ecological Preserve and known challenge of a being in high fire-risk area. These impacts must be avoided or, at worst, mitigated below the level of significance.

4. Lighting and Dark Sky Designation

We intentionally purchased a home in Alpine because it is a more rural community with an ongoing Dark Sky Designation in process. We have no streetlights. Our home is on a hill and directly overlooks the proposed site, also with a completely dark, natural nighttime view. The Project calls for a 24/7 live-on site volunteer and "safety lighting," and the ball fields to be "lighting-ready should the people of Alpine decide to add it later in the future," according to the County's representatives in the January public meeting. The lighting required by a permanent resident and for parking lot safety alone will eliminate completely the current dark sky; it will also interfere with local wild animal behavior and the natural beauty of the sunsets, dusks, and starry nights. This is in conflict with Alpine's efforts to achieve Dark Sky designation. These impacts should be avoided or, at worst, mitigated below the level of significance.

5. Home Value Decline Due to Loss of Natural View

One of the key features of our property is the natural view over the County-owned land and Wright's Field Ecological Preserve. We purchased this home because of the beauty of the natural landscape viewed from our property, and paid a premium for it. The Project as drawn would make our direct view, not mitigated by trees or berms, a large, asphalt parking lot, cars and/or solar panels, bathrooms, and turf fields with chain link fences. If these facilities are allowed to fall into disrepair as in similar County Parks, we would be looking directly at an eyesore. Furthermore, depending on the way the solar panels are installed, they would be reflecting directly onto our property. This will negatively impact our resale value beyond any suggested benefit a park might bring. These impacts need to be avoided, or mitigated below the level of significance.

6. Alternative Project Design

We would like to suggest, as an alternative to the current Project, a smaller, nature-based park, with a focus on fiscal and environmental sustainability and native plants. We would like the construction to be carbon neutral, and the Native Peoples to be meaningfully included in the process. This minimally-developed park should have little to no impacts to the biological, cultural, and other resources of the project site, Wright's Field Ecological Preserve, and neighboring properties. It should also address traffic and road improvements needed, and able to meet federal, state, and county goals.

We respectfully request that the potential impacts to both our personal property and safety, and those of the larger community, including traffic safety and noise, financial costs and upkeep, fire safety, effect on Dark Sky Designation, and loss of home value, be analyzed and to avoid the significant ones. Please also make sure that we receive all updates and meeting notices on this project, at ampavich@mac.com and mmpavich@me.com and the mailing address above. Thank you, again, for the opportunity to bring light to these important issues.

Sincerely,

Miles and Amanda Pavich, Alpine Residents

Dr. Amanda Pavich, Ph.D.
DIRECTOR

EastLake Leadership College
A Campus of Southeastern University

(925) 580-1772
eastlake.college

Tom & Julie Dyer 2650 Calle De Compadres, Alpine, CA 91901
Beverly & David Francis 2695 Calle De Compadres, Alpine, CA 91901
Larry & Tamara Ham 2643 Calle De Compadres, Alpine, CA 91901
Jeff & Alanna Light 2634 Calle De Compadres, Alpine, CA 91901
Kyle Ogle & Dominique Norton 2623 Calle De Compadres, Alpine, CA 91901
Al & Kelly Wilkey 2662 Calle De Compadres, Alpine, CA 91901

April 3, 2021

County of San Diego
Department of Parks and Recreation
Attn: Alpine County Park Environmental Review
5500 Overland Avenue, Suite 410
San Diego, CA 92123

CountyParksCEQA@sdcounty.ca.gov and lorrie.bradley@sdcounty.ca.gov.

RE: Notice of Preparation of a Draft Environmental Impact Report on the Alpine County Park Project

Dear Ms. Bradley,

Thank you for the opportunity to provide information for the Notice of Preparation ("NOP") of the Environmental Impact Report ("EIR") on the Alpine County Park Project ("Project"). We are residents of Calle De Compadres which is the cul-de-sac directly across the street from the Project. We are concerned about a number of issues that will directly impact our quality of life.

We are concerned about traffic safety, parking issues in our cul-de-sac, groundwater impact on our wells and the endangered Engelmann Oak trees, noise pollution from the dog park, active sports facilities and high volume of traffic and people, light pollution, septic lines polluting the groundwater and increased fire risk.

One of our biggest concerns is traffic on South Grade Road. It is a dangerous two-lane road with no room for pedestrians or cyclists. This Project will result in more traffic on South Grade Road. Aside from additional traffic accidents, there will be more car pollution and noise. The additional greenhouse gas emissions need to be evaluated in the EIR.

Parking on South Grade Road and Calle De Compadres has increased to a level where our visibility to safely navigate onto South Grade Road is limited. If people are charged for parking, we are concerned that the visibility issues we are already experiencing will be ten-fold. We would like the impact on our visibility avoided and evaluated in the EIR.

Three of the residents in our cul-de-sac have wells. We are concerned that if the Project uses groundwater to keep their extensive grass areas and landscape watered, it will negatively impact our wells, and will impact the health of the Engelmann Oaks at the Project site. We are also concerned that fertilizer leaching into the aquifer, could taint the groundwater. This needs to be evaluated in the EIR. If septic lines are used for the park's restrooms, there is a concern that it could impact the aquifer. This also needs to be evaluated in the "EIR."

Noise pollution is of great concern to us, especially to the residents adjacent to South Grade Road. The increased traffic, dog park and active sports facilities need to be mitigated below the level of significance.

Light pollution will significantly impact our rural community, deter wildlife in the preserved grassland and eliminate the possibility of Alpine being a dark sky community. With the addition of a live-on volunteer, security lights and the possibility of lighting the sports areas in the future, any and all lighting needs to be evaluated in the EIR.

The last concern is fire risk. This Project will attract many additional people to Alpine and we are concerned this will increase risk of wildfire at the adjacent preserve. Whether it's a cigarette, ember from a BBQ pit, or a vehicle backfiring, fire is a big concern. In addition, two-lane South Grade Road is not a feasible road for multiple cars to evacuate in a fire situation. Please evaluate in the EIR what can be done to eliminate this risk and improve South Grade Road to accommodate evacuation in an emergency.

Residents would like to see this park downsized to a community park, which local survey's supported and people voted for in meetings. We would like a nature-based park with little to no impact on the grasslands, as well as no impact on the adjacent Wright's Field Ecological Preserve.

Currently, Alpine has a number of parks that are already in place, underutilized, and poorly maintained. The existing parks in Alpine are centrally located, easy and safe to access, and already have infrastructure in place. Improving our existing parks and continuing to enjoy this peaceful, wonderous open space IS what will BALANCE our beautiful Alpine Community. Instead of spending 28 million to duplicate more parks, consider a more cost effective approach of spending this money to improve what we already have. Just because the County doesn't own the parks, doesn't mean there isn't parkland for residents of Alpine.

In conclusion, please analyze the above potential impacts that this Project will have in our community and avoid the significant ones. Please also make sure that we receive all updates and meeting notices on the project at the addresses included above.

Thank you, in advance, for listening to our comments.

Sincerely,

We, the undersigned.

Tom & Julie Dyer
Beverly & David Francis
Larry & Tamara Ham
Jeff & Alanna Light
Kyle Ogle & Dominique Norton
Al & Kelly Wilkey

From: Robert Figari
To: CEQA, CountyParks; Bradley, Lorrie
Subject: Alpine County Park Environmental Review
Date: Monday, April 05, 2021 2:10:35 PM

TO: County of San Diego, Department of Parks and Recreation
Attn: Alpine County Park Environmental Review

Hello, I've lived in Alpine almost three years. Our family moved here from a similar rural area in Northern California because we like to see the stars at night, hear the sounds of birds and animals and enjoy the scenic beauty of the area. I walk and mountain bike along the trails of Wright's Field regularly.

I have several concerns about the potential environmental impacts of the proposed park design:

- **Tribal Cultural Resources**: I did not see Tribal Cultural Resources specifically noted in the NOP and expect to see a complete analysis in the EIR.
- **Hazardous Materials**: Given the number of acres devoted to artificial turf and natural grass, I'm concerned about hazardous chemicals and pesticides needed to install and maintain the surfaces in good condition. I request to see an analysis of the chemicals and pesticides that will be used over the life of the park and the impact on, among others, neighboring wells, surrounding watersheds and biological resources.
- **Biological Resources**: In addition to an analysis of the impact of hazardous materials (chemicals and pesticides used on the artificial turf and natural grass) on biological resources, the EIR should include a thorough analysis of the other direct and indirect effects on biological resources, such as the introduction of gophers, moles, skunks and other non-native species.
- **Wildfire**: As a local resident and having just lived through the recent Valley Fire, I have serious concerns with the projected park usage (270-plus parking spaces) during fire season. The EIR must provide substantial and quantitative evidence that operation of the park will not impair the emergency response plans, impact escape routes and will not expose people to significant risk resulting from wildfires.
- **Alternate sites**: There is much public debate and many unanswered questions about the environmental impacts of this proposed park. Because of this, I expect to see a thorough analysis of alternative sites at different locations and of different sizes, including substantial and specific evidence for why other sites for the proposed park are not feasible.

In the EIR I request that:
1) all of the aforementioned concerns be thoroughly analyzed,
and that
2) the impacts of these concerns are avoided or mitigated below the level of significance.

I also respectfully request that you keep me up to date on all project updates, notifications and documents.

Thank you!

Bob Figari

rfigari@well.com
415 259-8153

From: Frank Landis
To: Bradley, Lorrie
Cc: Julie Simper; Preserve Alpine"s Heritage Dominique Norton; Justin Daniel; President Cnpssd; Nick Jensen; George Courser
Subject: NOP and lack of true scoping meeting on Alpine County Park Project
Date: Wednesday, March 31, 2021 10:27:43 AM
Attachments: image001.png

Dear Ms. Bradley,

I am puzzled by the email sent out March 30 (subject: NOTICE OF EIR SCOPING MEETING, at end). I have never heard a YouTube video referred to as a meeting, especially when the purpose of the meeting is (per 15082(c)): "to assist the lead agency in determining the scope and content of the environmental information" that may be required in the EIR.

While it is not clear that a notice of a scoping meeting should be part of the NOP itself, the NOP on the current project did not apparently contain notice of a scoping meeting. This is a problem, because the NOP is publicly available, while the Scoping Meeting notice apparently was only sent out to people who have already expressed an interest in the proposed project. Anyone else who has an interest--perhaps the local tribes?--were not notified.

This is particularly confusing, given that the County has recently issued very different NOPs. This quote below, for example, was part of the December 23, 202) NOP for the County Climate Action Plan: "Consistent with Section 21083.9 of the CEQA Statutes, a public scoping meeting will be held to solicit comments regarding the scope and analysis of the Supplemental EIR. On March 17, 2020, California Governor Gavin Newsom issued Executive Order N-29-20, relating to the convening of public meetings in the State of California in response to the COVID-19 pandemic. The Executive Order outlined requirements for public meetings to take place telephonically or electronically without the need for the public or agencies to attend in person. This meeting will be held virtually on January 28, 2021, 6:00 p.m. to 8:00 p.m. Please follow this link for instructions on how to participate in this virtual scoping meeting: CAP Update….Comments on this Notice of Preparation document will be accepted for 57 days."

This example suggests a solution to the issue that should satisfy all concerns:
--schedule a scoping meeting on Zoom
--Issue a new NOP with a revised date and notice of the Scoping meeting.

Unlike the County Climate Action Plan, Alpine County Park is not urgent, and no one's interests will be harmed by extending the comment period for the NOP. Certainly it will not hamper the County in preparing the draft EIR on this project.

Moreover, this will give the County a chance to double-check their Initial Checklist for the project. We were surprised to note that the County did not think that Tribal Cultural Resources or Energy resources were potentially significant on this project. We know the Kumeyaay are very interested in Wright's Field, and the County has embarked on a plan to go carbon neutral by 2035, a goal requiring energy efficiency. Perhaps whoever prepared the Initial Checklist for this project did not use the most recent checklist available, or filled it out in haste? In any case, issuing a new NOP and holding a virtual scoping meeting to gather information would let these issues be amicably resolved in everyone's favor.

Please feel free to contact me with any comments or questions. Please also keep me on the list to receive all documents and notices related to this project.

Sincerely,

Frank Landis
Conservation Chair, CNPSSD

MARCH 30, 2021 EMAIL:

On Tuesday, March 30, 2021, 8:30:11 PM PDT, CEQA, CountyParks <countyparksceqa@sdcounty.ca.gov> wrote:

NOTICE OF EIR SCOPING MEETING

PROJECT TITLE: ALPINE COUNTY PARK PROJECT

SCH #: 2021030196

APPLICANT: County of San Diego Department of Parks and Recreation

LOCATION: The project is located on South Grade Rd. between Deland Dr. and Boulder Oaks Ln. in the unincorporated community of Alpine in San Diego County.

NOTICE IS HEREBY GIVEN that the County of San Diego, Department of Parks and Recreation (DPR), as lead agency, is holding a Scoping Meeting pursuant to Section 15082(c)(1) of the State CEQA Guidelines.

Due to COVID-19 restrictions on gatherings, an in-person public meeting is not possible. Therefore, the EIR scoping meeting will be in the form of a recorded presentation. DPR is using this format to allow you to view the presentation at your convenience and to allow as many people as possible to provide input.

On March 8, 2021, a Notice of Preparation (NOP) of a Draft Environmental Impact Report (EIR) was published for the Alpine County Park Project. The purpose of the public comment period is to solicit input and feedback from various agencies, stakeholders, and the public pertaining to the scope and content of the environmental information that will be included in the EIR. The public comment period for the NOP is from March 9, 2021 – April 7, 2021.

Project Description: The proposed project involves the development of an approximately 25-acre active park.

Availability: The recorded presentation along with the EIR Scoping materials can be viewed via the DPR website:

https://www.sdparks.org/content/sdparks/en/AboutUs/Plans/public-review-documents.html

or via direct link:

https://www.youtube.com/watch?v=xyKiPTawDsQ

Comments: Due to the time limits mandated by state law, your written comments on environmental concerns must be sent no later than **5:00 p.m. on Wednesday, April 7, 2021.** Information on how to submit comments can be found on the DPR Website.

For questions regarding the EIR Scoping Meeting or the Notice of Preparation, please contact Lorrie Bradley, Environmental Planner, at (619) 455-7721 or by email at lorrie.bradley@sdcounty.ca.gov.

For local information and daily updates on COVID-19, please visit **www.coronavirus-sd.com.** To receive updates via text, send **COSD COVID19** to **468-311.**

Coronavirus Disease 2019
COVID-19

From: Sandy Castle
To: Bradley, Lorrie
Subject: Hi Lorrie
Date: Wednesday, March 10, 2021 10:50:17 AM

I sincerely hope this goes through. I'd love to have a dog park, and the kids need this. Alpine is growing day by day and we need to grow along with it. Thank you, Sandy

From: MIKE HEIDTBRINK
To: CEQA, CountyParks
Cc: Bradley, Lorrie
Subject: Alpine County Park
Date: Monday, March 29, 2021 5:24:09 PM

This email is in response to the letter we received concerning the 25 acre development of a public park at the current location of Wrights Field in Alpine.

My husband, 4 children and I moved to Alpine 4 years ago after living in the SDSU area for 35 years. We were tired of city living, the noise, congestion, and over development. We have enjoyed the quiet, rural feel of Alpine and have spent many days hiking in Wrights Field since our move. We were delighted and surprised to find such an unadulterated gem. Imagine our dismay when we began hearing rumors of a large county park being planned adjacent to such a very sensitive nature preserve - one which has been kept quite untouched despite the growth around it. We attended the first two "community input" meetings and personally saw the response from the community. What is being proposed is a gross inflation of that idea.

What disturbs me the most is the politics I see behind the scenes in this situation. Those of us voicing concern over the over reach of the board are being put off as "a small group", or being patted on the head and told, "Thank you for your input". I can tell you, we are not a small group, and what you are doing if you go forward with this overblown project is a travesty that cant be undone.

I understand the need for some development at the site according to the needs of those who live here - equestrian staging, an off-leash dog area, a bit more development of the trails, some adequate parking and perhaps a skate park. The rest of it will create litter, noise and light pollution, disturb the wildlife living in Wrights Field, disrupt existing wildlife corridors, create congestion on South grade Rd. and forever change what was once a beautiful and unique area, all in the name of progress.

Please search your consciences and listen to the Alpine Community. Or perhaps take a hike in Wrights Field and sit for a moment to take in what is already there - something which cannot be experienced in any of our other County Parks, and should remain as it is.

Best Regards

Elaine and Mike Heidtbrink

Seth, Sam, Sierra and Shenoah

From: Brad Bach
To: CEQA, CountyParks
Subject: Re: Alpine County Park - Notice of Preparation of a Draft Environmental Impact Report
Date: Tuesday, March 09, 2021 6:15:02 PM

Hey Ron,

I looked at the links but didn't see any environmental reports. All I saw was that they would be having meetings and people could comment on the environmental reports, but they were nowhere to be found. Maybe I'm just not seeing it. Did you see them on this email?

Brad

On Tue, Mar 9, 2021 at 5:52 PM CEQA, CountyParks <CountyParksCEQA@sdcounty.ca.gov> wrote:

> **NOTICE OF PREPARATION**
>
> **of a**
>
> **DRAFT ENVIRONMENTAL IMPACT REPORT**
>
> **PROJECT TITLE:** ALPINE COUNTY PARK PROJECT
>
> **APPLICANT:** County of San Diego Department of Parks and Recreation
>
> **LOCATION:** The project is located on South Grade Rd. between Deland Dr. and Boulder Oaks Ln. in the unincorporated community of Alpine in San Diego County.
>
> NOTICE IS HEREBY GIVEN that the County of San Diego, Department of Parks and Recreation, as lead agency, is preparing an Environmental Impact Report (EIR) for the Alpine County Park Project. The County is soliciting input and feedback from various agencies, stakeholders, and the public pertaining to the scope and content of the environmental information that will be included in the EIR.
>
> **Project Description:** The proposed project would involve the development of an approximately 25-acre active park that would include potential multi-use turf areas,

baseball field, all-wheel area, bike skills area, recreational courts, fitness stations, leash-free dog area, restroom facilities, administrative facility/ranger station, equestrian staging with corral, nature play area, community garden, volunteer pad, picnic areas with shade structures, picnic tables, game table plaza, and trails.

Availability: The project description, location, and possible environmental effects of the proposed project can be viewed and downloaded at:

http://www.sdparks.org/content/sdparks/en/AboutUs/Plans/public-review-documents.html.

Comments: Due to the time limits mandated by state law, your comments on environmental concerns must be sent at the earliest possible date but no later than **5:00 p.m. on Wednesday, April 7, 2021.** Comments should be directed to:

County of San Diego, Department of Parks and Recreation

Attn: Alpine County Park Environmental Review

5500 Overland Avenue, Suite 410

San Diego, California 92123

or emailed to:

CountyParksCEQA@sdcounty.ca.gov. Please include “Alpine County Park” in the subject line of the email.

For questions on this Notice of Preparation, please contact Lorrie Bradley, Environmental Planner, at (619) 455-7721 or by email at lorrie.bradley@sdcounty.ca.gov.

From: Dominique Norton
To: CEQA, CountyParks; Bradley, Lorrie; Lubich, Marcus
Cc: Pisano, Nina
Subject: Re: Alpine County Park - Notice of Preparation of a Draft Environmental Impact Report
Date: Thursday, March 18, 2021 6:34:08 PM

Hello,

I would like to provide my name, Dominique Norton, and address 2623 Calle de Compadres, Alpine, CA 91901, and request to receive any future communications of any type relating to the project, as well as information on the following:

1. Who are the “agencies, stakeholders”, and the identified members of the public who are included as recipients of your notice, and how widely will those members of the public be solicited for comment on the NOP, and subsequent review and decision processes?

2. When was the park proposal initiated, and what prior public input regarding the proposed park has been received or requested by the Department?

3. Are you subject to Special District assessment to pay for any of those costs that are different from other areas of the County?

4. What is/are the funding sources for the park for acquisition, development, and long-term operations?

5. Who prepared the initial study that led to the determination that the project would have a significant adverse effect on the environment, and is a copy of that study available to me?

6. If any conclusion arising out of the initial study suggested local impacts may be significant, what resources are potentially subject to a significant adverse effect, and which may particularly affect the neighboring property owners and community?

The above questions are merely threshold questions, and that further comments may be provided after I have a chance to consider both the NOP and any of the information listed above.

Thank you,
Dominique

> Begin forwarded message:
>
> **From:** "CEQA, CountyParks" <CountyParksCEQA@sdcounty.ca.gov>
> **Date:** March 9, 2021 at 6:01:34 PM PST
> **Subject: Alpine County Park - Notice of Preparation of a Draft Environmental Impact Report**

NOTICE OF PREPARATION

of a

DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT TITLE: ALPINE COUNTY PARK PROJECT

APPLICANT: County of San Diego Department of Parks and Recreation

LOCATION: The project is located on South Grade Rd. between Deland Dr. and Boulder Oaks Ln. in the unincorporated community of Alpine in San Diego County.

NOTICE IS HEREBY GIVEN that the County of San Diego, Department of Parks and Recreation, as lead agency, is preparing an Environmental Impact Report (EIR) for the Alpine County Park Project. The County is soliciting input and feedback from various agencies, stakeholders, and the public pertaining to the scope and content of the environmental information that will be included in the EIR.

Project Description: The proposed project would involve the development of an approximately 25-acre active park that would include potential multi-use turf areas, baseball field, all-wheel area, bike skills area, recreational courts, fitness stations, leash-free dog area, restroom facilities, administrative facility/ranger station, equestrian staging with corral, nature play area, community garden, volunteer pad, picnic areas with shade structures, picnic tables, game table plaza, and trails.

Availability: The project description, location, and possible environmental effects of the proposed project can be viewed and downloaded at:

http://www.sdparks.org/content/sdparks/en/AboutUs/Plans/public-review-documents.html.

Comments: Due to the time limits mandated by state law, your comments on environmental concerns must be sent at the earliest possible date but no later than **5:00 p.m. on Wednesday, April 7, 2021.** Comments should be directed to:

County of San Diego, Department of Parks and Recreation

Attn: Alpine County Park Environmental Review

5500 Overland Avenue, Suite 410

San Diego, California 92123

or emailed to:

CountyParksCEQA@sdcounty.ca.gov. Please include "Alpine County Park" in the subject line of the email.

For questions on this Notice of Preparation, please contact Lorrie Bradley, Environmental Planner, at (619) 455-7721 or by email at lorrie.bradley@sdcounty.ca.gov.

From: cfigari@well.com
To: CEQA, CountyParks; Bradley, Lorrie
Subject: Alpine County Park Environmental Review
Date: Monday, April 05, 2021 11:28:50 AM

Greetings,
My husband and I moved to Alpine two years ago from Northern California and live in Rancho Palo Verde. I regularly walk on Wright's Field MSCP Preserve and almost daily we must travel on South Grade Road when we leave our home for any destination in Alpine, or beyond.

I have studied the proposed park plan for Alpine and have several concerns about the potential environmental impacts. **In the EIR I request 1) the following items to be thoroughly analyzed and 2) that impacts are avoided or mitigated below the level of significance.**

- Aesthetics: Given the significant changes to the property as it currently exists, I need evidence that the park will not have a substantial negative impact on the scenic vista and quality of public views. I therefore expect the EIR analysis to include visual simulations from a variety of locations.
- Wildfire: Given the fire danger in the area and that South Grade Road is the only road most residents in the area can use to evacuate, I need evidence that in the event of a wildfire when the proposed park is at full capacity, emergency evacuation plans will not be impacted.
- Traffic: Given the expected usage of the proposed park (270-plus parking spaces), I need to see a traffic impact analysis that focuses on level of service/peak hour trips (especially the impact on emergency services and access), in addition to the vehicle miles traveled analysis.
- Noise: Please ensure that the noise assessment in the EIR includes an analysis for ALL sensitive receptors such as hikers, biological species, and tribal cultural resources.
- Alternatives Analysis: Given the significant environmental impacts associated with this park project, including the proposed size, number of amenities, number of parking spots and this particular location, I expect that the alternatives analysis will include several alternatives at different locations and of different sizes, all of which are analyzed fully (not just considered but dismissed) with substantial evidence for why other sites for a proposed park are not feasible.

Please be sure I am notified of all project updates, notifications and documents.

Thank you,
Christine Figari

cfigari@well.com
Landline: 619-722-1993

Patrick L. Williams Ph.D.
Geomorphology, Neotectonics
PO Box 1437
Alpine CA 91903

April 6, 2021

County of San Diego
Department of Parks and Recreation
Attn: Alpine County Park Environmental Review
5500 Overland Avenue, Suite 410
San Diego, CA 92123
By email to CountyParksCEQA@sdcounty.ca.gov and
lorrie.bradley@sdcounty.ca.gov

RE: Notice of Preparation of a Draft Environmental Impact Report on the Alpine County Park Project

Dear Ms. Bradley,

Thank you for the opportunity to provide information for the Notice of Preparation of the Environmental Impact Report (EIR) on the Alpine County Park. I am a professional geologist specializing in geohazards and landscape analysis. For six years I served as BCLT Operations Director for almost 4000 acres of high-value-habitat located in Potrero (Long Potrero) and Campo (Clover Flat). My academic training includes project design, zoology, botany and geology. During my time managing BCLT properties I worked closely with staff of multiple state and federal entities and other individuals and organizations too numerous to name. Relationships with this network continue beyond my association with BCLT.

Below please find comments on *geology, biological issues, wildfire, noise and traffic* that need to be addressed in an EIR for the proposed Alpine County Park.
I implore the County to evaluate all current options to distribute park facilities in Alpine. The proposed park measures at least 28 acres, more than twice the size indicated in early press and social media discussions which were widely read by Alpine residents. I urge County Parks to analyze a smaller, less impactful, sustainable park design on the South Grade property as an alternative. A map of large land tracts in Alpine is attached below. Many of these are more central and several are much more suitable for the amenities proposed in the current park plan. However challenging, I believe it is necessary to continue to investigate possible park location(s) to achieve a park(s) without essential destruction of unique, rare, extremely high-value habitat and scenic splendor.

Geology

In my first acquaintance with BCLT, in Fall 2014, I was invited to a field meeting with Jon Green and Yolaine Stout. The outing took place after I inquired regarding the status of the property at the exact site of the proposed Alpine County Park. The uniqueness of the site had captured my attention. Not only is the park area a striking native grassland, nearly devoid of woody "chaparral" species, but the entirety of the property's grassland is decorated with exotic boulders of a very large and very ancient riverbed, which, per SDSU faculty cannot be associated with a provenance because the mountains of their origin have long since disappeared. The field itself was an active riverbed until about eighty-million years ago, at which time the river's flow was captured into Sweetwater Canyon. Such a site is not only unique in southern California, it is extremely rare in the world. The County property and Wright's Field is a geological heritage site and deserves to be formally recognized as such. Investigation of the geological uniqueness of the site is a necessary component of the EIR process. I am happy to volunteer to assist the County in facilitating a site study by local academic geologists.

Botany/Zoology
Taking of 30 acres of native grassland and Engelmann Oak habitat is communicated as a very serious matter in the County's own documents: "Native grasslands are now quite rare and occur [only] in the hills south of Poway, Wright's Field in Alpine, parts of Camp Pendleton, Ramona, and Rancho Guiejito east of Valley Center." Furthermore the County previously stated that development of the site of the proposed Alpine County Park could not be mitigated in their opinion towards a search for locations for an Alpine high school:
(DPLU/ DPW/ DPR dated 2/20/2009 "Due to the significant and not mitigable impacts to biological resources for Alternative B (Wright's Field) and the direct implications to the County's Multiple Species Conservation Plan, the County cannot recommend that this site be chosen for such an intensive land use. Study Area B is located within the County's Wright's Field Pre-Approved Mitigation Area (PAMA) and adjacent to Wright's Field Preserve, an integral part of the County of San Diego's South County Multiple Species Conservation Program (MSCP) Subarea Plan.").
Development of a park of this size and impact, at a location that the County previously stated development could not be mitigated, is an important contradiction. The projects EIR needs to explain the difference in review that concluded previously that development of the park site could not be mitigated.

Wildfire
It is incredible that wildfire has not burned across the area of the County's Alpine property and Wright's Field Preserve since the *1970 Laguna Fire*. During the *2018 West Fire,* scene command was certain the fire would run west across the grassland and extend indefinitely into neighborhoods in that direction. This terrible outcome was inhibited, but not prevented, by firefighting. The primary reason the fire was able to be brought under control was a drop in wind and temperature. It is certain that a large increase of potential ignition sources will be introduced by smoking materials of youth (and other park users) crossing and assembling in grassland while coming and going from the proposed park attraction. Near certainty of eventual occurrence of a fire ignited auxiliary to the transit of "thousands of daily

park users and hundreds of daily users of adjoining land" (per Rhodes and Associates fire hazard investigation).

A real question arises whether the park should remain open during wind events. I feel strongly that park-caused increases of fire hazard to adjoining habitat areas and extended neighborhoods needs to be more deeply and critically evaluated in the EIR process.

Noise

It is essential that an EIR noise study for the propose park include "nonlinear" impacts due to sound direction and amplification that may be caused by abrupt local topographic features. An steep 220 foot-high granite hill is located across South Grade Road, very close to the park. This feature will almost certainly direct and amplify sound northward. Fifty-foot high granite hills northwest and north of the proposed park will likely redirect sound into the neighborhoods to the east and south. Finally the 250 foot-deep canyon containing Viejas Creek is located close by to the east of the proposed Park. The granite-walled canyon of Viejas Creek is a demonstrated noise echo chamber and the impact of noise from localized large group sports play may be impossible to mitigate. Technical evaluation of these unique local topographic features on noise direction and amplification (individually and collectively) needs to be included in EIR study of noise impacts of the due to the proposed park.

Traffic

Wind driven fire is certain to impact the proposed park site and surrounding neighborhoods in the foreseeable future. A significant fire bearing down from the east during a Santa Ana wind pattern will require evacuation of about 500 homes and up to 1000 vehicles onto South Grade Road. I have attached a "Fuels Map" which I drafted for my interest in fire fuels distribution across Palo Verde Ranch, Ranch Palo Verde and neighborhoods surrounding the proposed park site.

Parking for up to 300 additional vehicles at Alpine County Park is now proposed. Taking the worst case, which is the most conservative evaluation, of a fire occurring during the daytime on a weekend, within a high time-of-use for the park, up to 300 vehicles would exit onto South Grade Road, slowing normal traffic (up to a few vehicles per minute) and eventually backing up at controlled intersections. A line of 300 cars is almost exactly one mile in length (https://www.quora.com/How-many-cars-make-up-a-mile), thus without any cars entering South Grade Road from the adjacent communities, cars could be backed up to Tavern Road or to Alpine Boulevard. With the addition of cars entering from surrounding homes traffic could quickly back up in both directions to such a degree to produce a hazard of enormous proportions. Evaluation of various "worst-case" scenarios should be an integral part of EIR traffic studies for the proposed Alpine County Park.

Project Alternatives

Given all of these concerns a DEIR should include a project alternative with a smaller, nature-focused, minimally-developed park that has no impacts to the biological, cultural, and other resources of the project site, Wright's Field Ecological

Preserve, and neighboring properties. Given voiced community concerns about the lack of maintenance on existing Alpine parks, please focus on making park upkeep and maintenance financially sustainable for the community and County. Also make its construction, maintenance, and rebuilding carbon neutral and environmentally sustainable, to meet federal, state, and county goals. Please also analyze each and every project alternative equally, as unequal analysis has been contentious on past county projects.

Thank you for taking this input. Please keep me informed of all developments with this project and associated documents and meetings, at the address below or by email to geoplw3@gmail.com

Respectfully

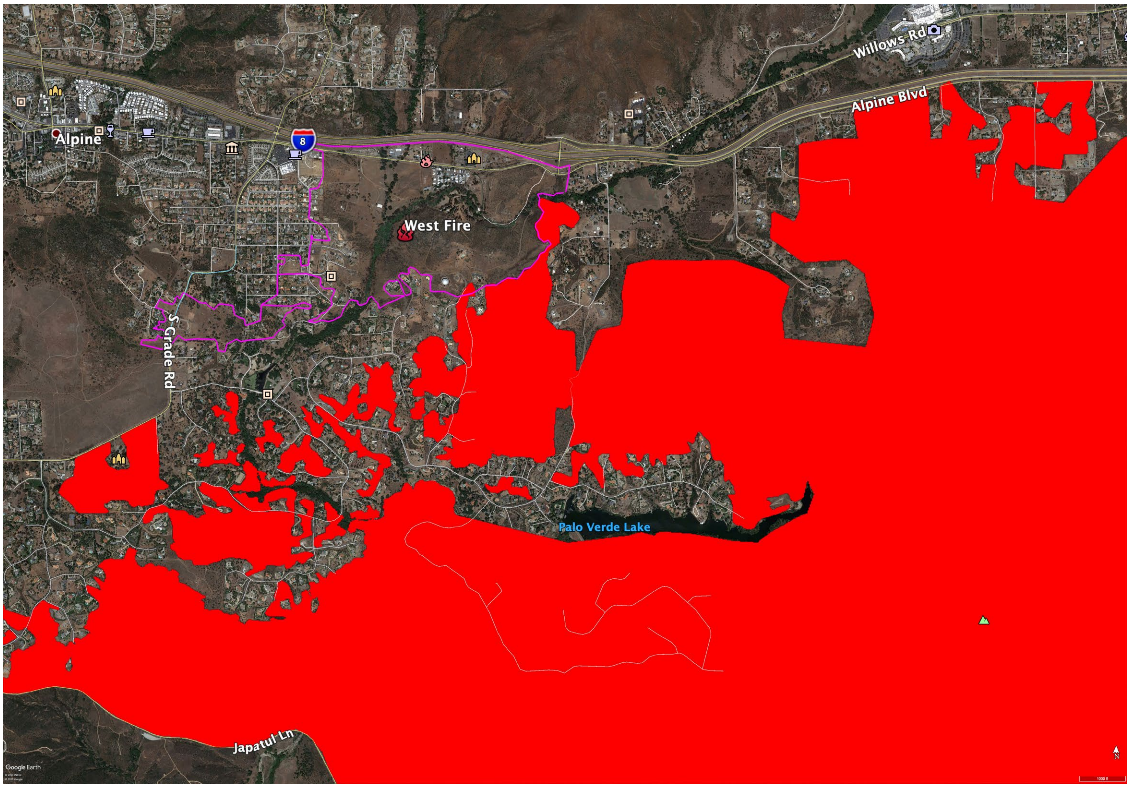
Patrick Williams PhD
PO Box 1437
Alpine, CA 91903

Attachment 1. Selection of "Alpine Recreation Areas and Larger Land Parcels" identified by SDPR and Preserve Alpine's Heritage

Attachment 2. Draft Fuels Map of PVR, RPV and surrounding areas – Dr. Pat Williams

From: Patrick Williams
To: Bradley, Lorrie; CEQA, CountyParks
Subject: Re: Alpine County Park NOP
Date: Tuesday, April 06, 2021 4:45:33 PM

Attachments to PL Williams Letter:
Attachment 2. Draft Fuels Map of PVR, RPV and surrounding areas – Dr. Pat Williams



Attachment 1. Selection of "Alpine Recreation Areas and Larger Land Parcels" identified by SDPR and Preserve Alpine's Heritage:

On Tue, Apr 6, 2021 at 4:38 PM Patrick Williams <geoplw3@gmail.com> wrote:

> Laurie,
>
> Please find comments attached.
>
> Thanks very much,
>
> Pat
>
> --
> Patrick Williams
> Williams Associates
> 508-274-9618
> PO Box 1437

Alpine, CA - 91903


Alpine Parks and Larger Parcels
Blackwolf Partners 184 ac
AID 17 acres
P&R 2.9 acres
Alpine Community Center fields 2 acres
Alpine elementery playing fields 2 acres
Park Meadows Inc 4ac
Alpine Fire District 3.1ac
AUSD rec area 2.5 ac
OAA 23ac
Jabro 25ac
Thorman 33 ac
P&R 9 ac
P&R 1.8 acres
P&R 2.4 acres
Shadow Hills AUSD recreation area 11 acres
Yee Group 5ac
Nelson 3.5ac
Albertsons hill 1.5 acres
P&R 4.4 ac
P&R 4.6 acres
P&R 1.8 acres
P&R 19 ac
Walser 12.5ac
Bailey 14 acres
AID46 ac
Halstead- Tyler 15.5ac
P&R 2.6 acres
Kniffing 21.5 ac
P&R 29 ac
Bailey 12 acres
Augustyn 49 ac
P&R 21 ac
willing seller 9 ac
Flodo Properties LLC 7ac
Fawns Trust 6.8ac
JMMS AUSD Fields 9 acres
Coleman 21 Acres
Lionhead Properties LLC 21ac
28 acre County Sports Park
Boulder Oaks park
Tent City Dev Corp 20 ac
Wise 63 ac
Google Earth
2000 ft

From: Peggy Easterling
To: Bradley, Lorrie
Subject: Alpine park
Date: Wednesday, March 31, 2021 6:08:33 PM

Please consider changing the community garden area to a “Sage, Songbird and butterfly garden”. This is nod to the history of Alpine.

Peggy Easterling

Sent from my iPad

From: PAT
To: CEQA, CountyParks
Subject: "Alpine County Park"
Date: Wednesday, March 10, 2021 6:57:30 AM

Good Morning,
The very idea of a park like what the county is proposing is exactly what the people of the Alpine community do not want.

I have lived in Alpine for over 20 years.

The people of Alpine have fought hard to keep our area known as Wright's Field out of developers hands.

The Alpine Planning Group is made up of people that do not represent Our community. They merely are interested in profiting from this Park from various vendors that will be needed to install things like turf.

We only want to preserve it as a quiet park that the locals could hike in And enjoy in its natural state. The County people do not realize what the Alpine people want.

The County people asked everyone in town for ideas and got plenty. These Ideas are fine for a park on land in the area, but not on this field and area Of natural beauty.

If you have 38 million dollars to work with,
Why not purchase an area where this kind of park would be appropriate?
It is not in Wrights Field.

For the County's information:

The land is composed of clay and does not perk, which means Thousands of dollars will be needed to grade it. Grading this site Will destroy the beauty of this beautiful Open Space. Why do places Like Julian get to have open hiking only areas, and we do not in Alpine?

The land is filled with huge amounts of granite boulders. When Joan McQueen Middle school was built, huge amounts of rock got in the way of the grading.

Why put a sports complex in a beautiful open space such as Wright's Field?

Why not put a park like the one proposed for this site on the Site of the Double A Ranch where the new high school was supposed to go?

What about the site on the North side of I-8 that was owned by Tom Dyke?

What about other appropriate sites east of Albertsons?

What would this proposed plan by the County people do to our community?

It would allow lots of criminal activity for drug dealing at the park.

It would open up the nearby residential areas to burglary activity and the crime Rate Would rise dramatically.

The fire danger would hugely increase exposing the nearby residents to loosing their Homes and possessions.

It will increase their fire insurance costs and make it very costly to insure their homes.

If there were a fire, people In the community would have a difficult evacuation.

Where is the water coming from necessary to support this "plan"?

There are many trees planted on the "plan". The clay will not support this Landscape.

It will increase traffic noise and make the quiet rural area crowded and unpleasant.

Why would the county desire nearly 300 parking spaces in an area where only 10 to 20 cars use daily? A small parking lot on the South side would be the Only part of this plan that makes any sense for just 20 to 30 cars is the only Thing that is needed.

Why would the County encourage bringing people into our quiet Peaceful community so people who do not live in the area will create Noise from all the activities this plan would encourage in our community?

This is part one of my email.
It will be continued later
Sincerely,
Patricia Barton

Sent from my iPad

From: nicole@pacific-ps.com
To: CEQA, CountyParks
Cc: nicole@pacific-ps.com
Subject: Alpine County Park
Date: Wednesday, March 10, 2021 1:55:41 PM

I am writing in response to the proposed plan to build a park in Wright’s Field.

As a resident of Palo Verde Ranch and with a direct view to Wright’s Field from my home, I am opposed to this “sports complex”.

A park, is manageable and feasible for this area. The majority of my neighbors do not oppose a true park as originally proposed. The current plan is presenting a sports complex, something that is not wanted, and will create nothing but problems for those who live nearby. I do not want to imagine the increased traffic on an already unsafe road, let alone the “undesirables” that this project can attract to this peaceful back side of Alpine.

Aesthetically – I would rather look at the natural landscape of Wrights Field than a parking lot, lights, buildings, not to mention the fencing
Land use and planning – planning, involving, and listening to locals, people who actually live here, would be nice. I feel blindsided by the this expansive project
Noise – there is none now, this is how we like it, and this is why we chose to live here
Recreation – wrights field is used by many in the way it is intended to be used. As a natural landscape
Transportation and traffic – nothing positive in regards to traffic will come from this project
Wildfire – this project will open wrights field to more risk for wildfire, especially by bringing people into this area who are not as familiar with the risks as those who live here are aware.

The purpose of my email is to make you aware that I am highly opposed to this project in its current state. If the county cares to take into account those opposed, please be sure to include me in that number.

Thank you,
Nicole Stockmoe
3113 Via Luiseno
Alpine, CA 91901
Direct# 619) 540-0559

From: Michelle Rader
To: CEQA, CountyParks
Subject: Alpine County Park
Date: Wednesday, April 07, 2021 3:43:51 PM

Hello San Diego County Parks and Recreation,

I would like to add the following comment for the Alpine County Park Environmental Review.

Thank you,

Michelle Rader
3155 Via Viejas
Alpine, CA 91901
michelle.rader@sbcglobal.net

I'd like to start by saying I do love parks of all shapes and sizes, and have a great appreciation for community and public places that allow for all community members to enjoy a wide variety of healthy activities.

And I would love to be able to highlight examples of park uses I consider ideal for this location. But unfortunately my time is too short for proper research and inadequate for any real discussion or presentation of substantial evidence regarding the potential environmental and community impacts of similar examples. Thankfully, I know other members of the Alpine Community have completed extensive research and review and no doubt will have presented this to you for consideration.

My family has lived here in the Palo Verde Ranch area for 40 years. The open space of Wright's Field has been a treasure throughout these years. It is this semi- rural environment that drew my family to the Ranch to begin with. Safety, quiet and low traffic were and still are a big part of it. I would like to see it remain a quiet, treasured open space for future generations.

There's a wonderful opportunity to do what's right for Wright's Field and the surrounding community. Spending millions to bulldoze it and cover it in sports facilities and pavement isn't the highest and best use, and it will destroy the opportunity to preserve and celebrate the natural beauty we all love and treasure.

The county should step back and realize 'bigger' is not always better. And sometimes 'progress' is achieved by letting go of big ideas and embracing the beauty that already exists. Preservation is a positive. And nature is necessary. Let's nurture that nature and preserve it for future generations. We will reap far greater benefits in the long run, with far fewer costs.

The location of Wright's Field, the transportation infrastructure, and the surrounding neighborhoods, are inappropriate for the scope and scale of the county's park plan. A location closer to town center and the freeway would better serve the entire community, and would be safer for everyone. Or the money could be better spent through improving the large number of public facilities already existing in the Alpine area.

Many examples exist of ecologically sensitive passive parklands that highlight the natural and historical resources while preserving them and also providing recreational and physical fitness opportunities. Time spent in physical activity in a natural environment has been proven time and again to benefit us both physically and mentally. THIS is the highest and best use of Wright's Field in its entirety, and THIS is what I ask of all of you to reconsider moving forward.

Again, thank you,

Michelle Rader

To: CountyParksCEQA@sdcounty.ca.gov

From: Yolaine M. Stout _ Ystout11@gmail.com

Re: NOTICE OF PREPARATION of a DRAFT ENVIRONMENTAL IMPACT REPORT :

PROJECT TITLE: ALPINE COUNTY PARK PROJECT

APPLICANT: County of San Diego Department of Parks and Recreation

My concerns for above-referenced project include -but are not limited to- the following.

I request that these are addressed in the draft EIR.

1. Known endangered species near or on the proposed site include the endangered Quino Checkerspot Butterfly and the San Diego Thornmint. Please indicate how this project will impact these species in particular. Additionally, describe impacts to the habitat for the critically imperiled Hermes Copper Butterfly known to be present on Wright's Field.
2. Of the 25 acre proposed Alpine County Park Project Map, it is estimated that 20 of those acres will destroy high quality California Native Valley Needle Grassland will be destroyed in addition to the 20 acre impact from Joan MacQueen Middle School and surrounding homes. The grassland area (Mesa del Arroz) was estimated to have originally been ca. 400 acres. Currently, the grassland area has been reduced to approximately 280 acres. In the Stagecoach EIR SP91-002; TM4974; P91-007; P91-008 that overlay this project area, the grassland was considered an "unmitigable resource." Due to its high biological significance this project area is within the Pre-Approved Mitigation Area (Pama) Multiple Species Conservation Plan (MSCP). Please describe how this project is mitigating a previously determined unmitigable resource that has already been cumulatively and considerably reduced.
3. Please describe how the Alpine County Park project is consistent with CEQA and the County's Biological Mitigation Ordinance in regard to the mitigation of approximately 20 acres of California Native Valley Needle Grassland as well as mitigation measures for Engelmann Oak Woodland, Diegan Coastal Sage Scrub and Riparian habitats.
4. With 2:1 mitigation ratio for California Native Grasslands, please demonstrate how and where approximately 40 acres (or more if required) of equivalent grasslands that will be used as mitigation either onsite or offsite. Please include a map of the habitat areas.
5. As an ancient riverbed containing the remains of a mountain range to the east that no longer exists, with many stones that are not found in the surrounding landscape, the geology underlying the Project area may be unique to San Diego County, if not California. Please evaluate the significance of the riverbed with possible paleontological or fossil presence.
6. As the following will have substantial environmental impacts, please include an economic evaluation and demonstrate the financial (taxpayer) feasibility of the following:
    a. The cost including exact size of leach fields and number of septic tanks that will enable the percolation of x amount of sewage expected to be generated on site. Include percolation rates.

b. If, alternatively, the county is planning on extending the sewer to the site, in addition to the cost, please include a map of the route and describe all cumulative growth impacts that may result.
c. As the site largely occurs on expansive clay soils with stony subsurface, please include a financial evaluation and demonstrate the feasibility of all grading, removal of clay and boulders, rock crushing and disposal of such as needed for the concept plan. Please include less environmentally impactful and less costly alternatives to the concept plan.
d. Please include the costs of replacing clay soils with the expected amount turf that will drain properly as well as enable the growth of grass in those areas proposed for irrigation.

Thank you for considering my concerns,

Yolaine M. Stout

From: VIRGINIA WALKER
To: CEQA, CountyParks
Cc: Alannah Light
Subject: Alpine County Park
Date: Wednesday, March 10, 2021 8:06:17 AM

First of all, I think you need to spend the money on the parks we already have here in Alpine. They are not used because they are not kept up. Why should we want another park that is bigger and will be an eyesore next to our beautiful Wright's Field Preserve when you don't have the money for that to be kept up. It will just become a hangout for homeless and drug dealers. We don't want that here in Alpine. You need to fix up the fields and such that we already have and get people back to using those.

Another reason not to put the park here is because it is still a part of our native grasslands. Native natural grasslands are very hard to find anymore. This piece of property needs to be included into the preserve. This area is a corridor for our wildlife that live around here. Even with the buffer, by only using 25 acres of the 75, this will not prevent the loss of our wildlife. They will go somewhere else as their life will be disturbed. The noise and activity in this area will drive them away. Yes, you have changed the plans to take care of the oaks in this area, but what you plan still won't keep them alive. As you grade around them you will disturb the roots and soil that they have survived in for all these years. They will die.

This piece of land would be great to put, at the entrance area, a parking lot for people to park cars and horse trailers. This doesn't have to be paved, just gravel would do. Put some port a potties there and some picnic tables. That way this could become a destination park for people to walk or ride horses. They would come and explore one of the only large native grassland areas left in our county area. What a pull for birders, animal lovers, and nature hikers. What a stress relief after work. "Come to Wrights Field Preserve to walk and enjoy the native grasslands that used to be everywhere in our county." Wow, you would get a lot of people that way.

Why do you want to destroy something that is so precious in today's world?

You have over the years considered other parcels but have turned them down for different reasons. Most of the reasons are because of some difficulty that you didn't want to deal with. Well the difficulty you are going to deal with here are the people of Alpine. You need to go back to the drawing board on this one. Make it a nature park, connected to Wright's Field. That would solve the problem.

Thanks for reading this if you do.

Virginia Walker

From:	VIRGINIA WALKER
To:	CEQA, CountyParks
Subject:	Alpine Park
Date:	Tuesday, April 06, 2021 7:04:20 AM

I really do think that the Board of Supervisors could do a better job for Alpine then to place this park in this area near the Wright's Field Preserve. This active type of park at this location will not only disturb the wildlife of the preserve, this is a wildlife corridor, but disturb the quiet life of the surrounding area. The people of Alpine deserve better from you. We move up here for space, quiet, and nature, not the hustle and bustle of traffic, ball games, parties, all day long. Yes maybe we need pickleball courts and this all wheel course, but let's put those things in a more suitable area. This is not the area for screaming and yelling, but an area for more quiet contemplative activities. Long walks, runs, horseback rides, where one can look for birds and animals. There are not many parks like this around. Not any special grasslands around like this area. Once you start cutting into this land, you will destroy this native grassland and it can never be recovered again. Don't you have a duty as the Board of Supervisors to protect areas like this in our county, not to destroy them!

I really feel that the ball fields we have here in Alpine should be maintained, which they are not, and possibly expanded at the different sites if possible, before any new ones are built. Why not look into if more basketball courts and pickleball courts can be added at any of the school sites. Then start looking elsewhere for places to put these play sites. I know you have been looking for 20 years, but that sounds like a problem of the board. There have been plenty of places, some offers of donated land even, that you have not acted on. So why now all of a sudden do you want to take this pristine grassland and turn it into this enormous park, just so you can pat yourselves on the back and say, "It took us 20 years, but we did it!" That tells me for the past 20 years you have been sitting on your hands and getting nothing done.

I don't feel this is right. I have lived in Alpine for the past 20 years and have never heard anyone complain about not enough ballparks. So let's rethink this idea of destroying this pristine grassland for a park that can be split up and put on pieces of ground that have already been graded, built on, etc. and leave this piece of our heritage alone.

Thank you,

Virginia Walker

From: Louis Russo
To: CEQA, CountyParks
Subject: Alpine County Park
Date: Wednesday, March 10, 2021 12:20:15 PM

This email responds to the request for comments per CEQA for the Alpine County Park to be built in Alpine, CA.

I am a 20-plus year resident of Alpine and a former member of the Alpine Community Planning Group (ACPG). I was also a member of the San Diego Rural Fire District (SDRF) Board and the Grossmont Union High School District (GUHSD) Bond Commission. I wish to state that I was the person who recommended that Jill Blankston investigate the possibility of purchasing this property for a County Park. I wish to also state that I recommend the entire 98 acres be utilized to the maximum extent possible. It is also essential, that Mr. Travis Lyon and Mr. George Barnett, who are members of the Alpine Community Planning Group recuse themselves from any further involvement in this park as they are board members of Back Country Land Trust BCLT) and therefore have a conflict of interest in this matter. In addition, Mr. Lyon is a member of the Alpine Union School District (AUSD) Governing Board, which also causes a conflict of interest with this project. Finally, I must state that I am not an "environmentalist" and supported Mr. Singer's (the original owner) proposed development of this property for estate homes and I also supported his plan to donate a portion of this property to GUHSD for a high school site.

Wright's field, though touted as "environmentally sensitive" is actually no more "environmentally sensitive" than much of Alpine or Cleveland National Forest (CNF), which has nearly 500,000 acres, much abutting Alpine. I view with skepticism any declaration that it is "unique" environmentally. It is a relatively flat piece of land covered with weeds, the same weeds I clear every spring from my property for wildfire abetment. If, indeed, there is a particular plant that needs "protection" then that small area can be protected while the rest is used. Note that Joan McQueen Middle School (JMMS) classes conduct "nature walks" through it and the cross country teams run on it, not to mention the kids who walk to/from school, etc. Having an active park on a portion certainly isn't going to hurt any flora or fauna on it.

At one time a "wall" was declared ancient and needed to be protected. The same professor from San Diego State University who declared it as such has been consistently overruled by State experts on numerous declarations I am aware of.

For my entire time on the ACPG, there was a consistent request for parks by the community. These came from parents in the main, who wanted to take their preschool children to a park during the school day to those who wanted to walk their dogs or ride their horses or have a picnic. Tom Dyke offered the property that currently has the SDGE yard on it for a park. In fact, County Parks came up with a plan for this area. There were two problems with it. First, this parcel was created when Interstate 8 was blasted through the granite and the material was dumped into a depression. There was never any idea to use this land later so proper compaction techniques were not used. (In fact, you can see issues on Interstate 8 today being addressed by CalTrans.) Also, the fuel tanks from the gas station to the east have leaked and contaminated portions of it, which prevent a Sheriff Station from being built there also. When Albertson's was built, County Parks once again created a plan for the portion that Albertson's wasn't going to use and was going to donate. The problem here, besides being small, is that it looked into people's bedroom windows. I could go on and on, but you get the idea. The parcels being floated as possibilities all had fatal flaws. Throughout this entire time, the individuals listed above kept telling the community that "there's no land in Alpine for a park", knowing full well there was, because THEY were trying to buy it. Finally, through various sources, I learned that this parcel was still available and made the recommendation to the County.

Let me address the issues:

Fire Safety: As a former member of the SDRF Board I must state that County Park's plan will make this parcel MORE safe. Note that on the other side of BCLT's holding is JMMS. It is a wildfire evacuation site and this park can be also, especially for large animals. The design of the park mitigates the BBQ's, etc. fire potential. Also, it enables fire fighting equipment access where only Brush Rigs could currently traverse.

Road Safety: South Grade is no more dangerous than any similar section in Alpine or East County. The fatal accidents there were not atypical. As a side note, the 19 year old girl who was recently hit by a hit and run driver was walking well off the road near Albertsons. As an aside, she is my daughter's best friend and I am furious that those opposed to this project would attempt to use her misfortune to their advantage. Also it seems disingenuous that parents have been begging for sidewalks to JMMS from town to no avail for decades yet somehow those opposed want the lack of sidewalks to be a show-stopper for the park.

Water: The individuals above got the former Supervisor, Jacob, to give AUSD the nearly $1 million (and now $1.2 million) of PLDO funds to refurbish the PE fields at JMMS. These are going to be grass fields and water is plentiful there via a well. There is no doubt that there is plenty for the Park. I am also aware of the County's ability to limit water usage through landscaping modifications, etc.

Light/Noise Pollution: This is especially grating in that the same people raising this issue here had loss of hearing when AUSD planned to place lights/have youth sports leagues on the refurbished fields being paid for with PLDO monies and those living next to those fields raised the issue. There is no doubt that any light/noise pollution at the park will be less especially considering the traffic noise and daylight only hours.

In short, those who are opposed to the park are so inclined for their own personal reasons, primarily that they want it for their environmental organization or want it for their own "greenbelt", and they are throwing everything they can at the wall to see if anything will stick. Build the park as your plan shows, and consider INCREASING the area utilized. 98 acres is awesome and in the future can continue to serve the recreation needs of Alpine...actively!

You may call or email me for any questions/information.

Sincerely,

Louis Russo
1524 Montecito Vista
Alpine, CA 91901

619 300-0866

P.S. I've learned over the years with BCLT that it is always best to ask for the proof, e.g. if they say "this plant is endangered", etc., get proof.

From: susanem
To: Bradley, Lorrie
Subject: please inform where the completed enrollment report can be obtained for review. thank you. susan sweeney
Date: Tuesday, March 09, 2021 10:21:02 PM

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susanem@cox.net

Sent from my Verizon, Samsung Galaxy smartphone

Kyle Ogle and Dominique Norton

2623 Calle de Compadres

Alpine, CA 91901

April 7, 2021

County of San Diego

Department of Parks and Recreation

Attn: Alpine County Park Environmental Review

5500 Overland Avenue, Suite 410

San Diego, CA 92123

By email to CountyParksCEQA@sdcounty.ca.gov and lorrie.bradley@sdcounty.ca.gov

RE: Notice of Preparation of a Draft Environmental Impact Report on the Alpine County Park Project

Dear Ms. Bradley,

Thank you for the opportunity to provide information for the Notice of Preparation ("NOP") of the Environmental Impact Report ("EIR") on the Alpine County Park Project ("Project").

Transportation and traffic

The proposed park currently includes a new four-way stop feeding all traffic into the park at the intersection of Calle de Compadres and South Grade Road, exactly where our home sits. The idling cars at this intersection will increase congestion, noise and air pollution. South Grade Road is an extremely dangerous two-lane unimproved country road. There have been several people who have lost their lives on this stretch of South Grade Road of which one death occurred directly abutting my property.

The County states that there will not be a parking fee to use the proposed park at this time, but there is no guarantee of the future. Parking onsite would help to reduce street parking, congestion, accidents and fatalities. If a parking fee is instituted, like many other County parks, patrons will find other locations to park their vehicles to avoid paying the fee. In this situation, it will remain the same with patrons parking on South Grade Road and Calle De Compadres exasperating the dire mobility element.

In addition, there is no safe way for young people to get to access the park without either traveling from the town center via South Grade Road, which in most areas does not have a shoulder and has many potentially fatal blind spots, or via Wright's Field Ecological Preserve.

This concern needs to be analyzed in the project EIR. The impacts should be avoided or, at worst, mitigated below the level of significance.

Noise pollution
We chose to live here. We did not choose to live next to heavy machinery needed for construction nor did we choose to live next to constant traffic, idling cars at the proposed four-way stop, increased number of people's voices, endless dogs barking, car alarms going off, amplified music at events held at the pavilion, wheels at the bike and skate park, and all conducted over an abundance of additional concrete needed to complete the park. County Parks' current solution is to build a berm at some unknown height to mitigate noise. The impacts should be avoided or, at worst, mitigated below the level of significance.

Water
Our world is in a climate crisis and water is a finite resource. The proposed park includes water-guzzling manicured turf and landscaping. As new property owners, we are considering when to drill a well for our use and would then share an aquifer with the park. We are concerned that we will lose our well water if the park starts pumping. The impacts should be avoided or, at worst, mitigated below the level of significance.

Septic/Sewer
The NOP states sewer or septic would be used to accommodate public bathrooms. There is currently no municipal sewer tie-in close to this property. Septic tanks and leach fields could affect neighboring properties if it were to pollute our groundwater. This concern needs to be analyzed in the project EIR. The impacts should be avoided or, at worst, mitigated below the level of significance.

Wildfire
Alpine is a in a high fire risk area of the County. As a property owner, it is hard to obtain fire insurance as such. This proposed park would increase the fire risk to all abutting neighbors thus making it even more difficult to obtain/keep insurance and worse than that threaten all of our properties with the increased use of this space. The impacts should be avoided or, at worst, mitigated below the level of significance.

Aesthetics
We moved to Alpine for the quiet rural community, and specifically fell in love with this home due to its amazing views and sunsets. We are deeply concerned about how having a bunch of concrete and berms across from our home will affect our view and hence the resale value of our property. This concern needs to be analyzed in the project EIR. The impacts should be avoided or, at worst, mitigated below the level of significance.

Light pollution
Alpine is a dark sky town. The current proposal includes safety lighting along with light for the volunteer housing. When asked, County Parks stated that ball field lighting is not currently included in this proposal but if that is something Alpine wants it can be incorporated. There will be motion sensor lights that will undoubtedly go off all night long as a result of the active wildlife on the property (owls, coyotes, mountain lions, bobcats, etc). This light will destroy the dark sky. The impacts should be avoided or, at worst, mitigated below the level of significance.

Project Alternative
Please include a project alternative with a smaller, nature-focused, minimally developed park that has no impacts to the biological, cultural, and other resources of the project site, Wright's Field Ecological Preserve, and neighboring properties. Focus on making its upkeep and maintenance financially sustainable for the community. Make its construction, maintenance, and rebuilding carbon neutral and environmentally sustainable, to meet federal, state, and county goals. The Alpine community already has a number of indifferently maintained, lightly-used parks designed to provide many of the amenities this project seeks to build. Why add more?

Please analyze all of these potential impacts to transportation and traffic, noise pollution, water, septic/sewer, wildfire, aesthetics, and light pollution and avoid the significant ones. Please also make sure that I receive all updates and meeting notices on this project, at dqnorton@gmail.com and the mailing address above. Thank you for taking my comments.

Sincerely,

Kyle Ogle and Dominique Norton

From: joyce nygaard
To: CEQA, CountyParks
Subject: Alpine Park CEQA comments
Date: Wednesday, April 07, 2021 3:55:54 PM

Hello,
Thank you for opportunity to express my concerns about the proposed Alpine County Park.

Noise

Many of the amenities planned for the Alpine County Park are noise generating. These will be stationary and will be generated 7 days a week from dawn to dusk. The Alpine Community Plan Update states that 75 CNEL is acceptable for land uses. It further states that the County will "maintain the tranquility of residential neighborhoods by reducing potential noise pollution." Their goal is to "encourage land use and circulation patterns that will minimize noise in residential neighborhoods and sensitive land use areas." This proposed park has homes surrounding it on three sides and sensitive habitat on the other.
Noise levels from skateparks can be 64-96 dB, depending on materials used and tricks done by riders. Basketballs can generate 75-85 dB. Bats hitting balls can range from 50-120 dB. Added to that will be the sound of dogs barking and the loud pop of a pickleball on the paddle and asphalt. Sound travels very well in this area. People speaking at a normal conversational level (60dB) can be heard at homes on the surrounding hills and neighborhoods. Noise analysis needs to take into consideration how the added noise pollution generated by these proposed amenities will be heard by residential neighbors and those trying to enjoy the adjacent sensitive habitat.

Greenhouse Gas Emissions

With all of the amenities currently included in The Alpine County Park it will be a destination park. People will drive there from surrounding areas to visit the bike and skate parks in particular. There is also no safe access to this park by foot, bike, or skateboard and there is no public transportation available. It will mainly be reachable by automobiles. The County estimates the park will attract thousands of visitors per week. The increase in greenhouse gas emissions from increased vehicle traffic to and from the Alpine County Park needs to be studied.

Traffic

The County is anticipating thousands of vehicle trips to the proposed park weekly. These vehicles will have to travel on South Grade Road. In some sections, South Grade already has a very poor level of service. The road cannot easily be straightened, widened or have sidewalks added. Doing so would likely require the use of eminent domain. There is no public transportation to the proposed park property. Many homes have driveways that are directly off of South Grade. At least 3 people have died on this stretch of South Grade in the past few years. More cars will put more people at risk. Serious consideration of traffic issues and how they can be mitigated and a cost/benefit analysis are needed.

Wildfire

I am concerned about having BBQ pits with open flames and hot ashes in the proposed County Park. This area of Alpine has burned in the past, most recently during the West Fire in 2018. The County's plan is to cover the grills with bags during high wind warnings. Even when there is not a high wind warning, embers can blow to trees or other areas of the park and surrounding homes and cause a wildfire.

Utilities/Service systems

The County seems to be still debating whether to use sewer or septic for this site. All surrounding residential areas are on septic. This property has failed percolation tests many times in the past. This park is not close to sewer lines. What will the cost be to connect to sewer and who will pay for it?

These are just a few of my concerns.

Thank you,
Joyce Magruder Nygaard
1434 Ramsey Rd.
Alpine, CA 91901
619-599-6242

From: Jonah Gula
To: CEQA, CountyParks
Subject: Alpine County Park
Date: Tuesday, April 06, 2021 2:26:21 PM

Hello,
I would like to express the following environmental concerns about DPR’s proposed plan for the County Park in Alpine:

- Besides the listed threatened species that occur on the property (which seem to have only been of concern thus far), the following California Species of Special Concern can be found on the property:
    - Crouch’s Bumble Bee
    - Western Spadefoot
    - Coastal Whiptail
    - San Diego Legless Lizard
    - Red Diamond Rattlesnake
    - Grasshopper Sparrow

- Additionally, during winter the following species are found on the property, all of which have declined across their distribution in the United States:
    - Vesper Sparrow
    - White-crowned Sparrow
    - Lark Sparrow
    - Savannah Sparrow

- The environmental significance of the proposed park site goes beyond state or federally listed species. This site represents a fragment of the small amount of remaining native grassland in San Diego, and the construction of the park as is will not only impact listed species. Therefore, DPR must purpose to do comprehensive biological surveys of mammals, birds, reptiles, amphibians, insects, and plants. Many of the species that can be found on the site have declined in San Diego County because of projects like this park, which have slowly chipped away at the edges of remaining natural habitat.

- The impacts of the increased use of adjacent Wright’s Field have yet to be addressed by any stakeholders. The overflow effects of foot, bicycle, and equine travel from the park into Wright’s Field will have meaningful impacts on vegetation and wildlife, not to mention the potential increase in dog walking (on and off leash). Mounting research has demonstrated the negative impact of dogs on wildlife and this consideration is important in DPR’s environmental assessment.

- The fragmentation of the grassland that this park will cause will have implications for wildlife and plants that remain in the undeveloped edges of the county property. Negative edge effects are a well-studied subject in wildlife ecology and must be addressed by DPR given the sensitivity of the habitat community.

- Alpine’s historic upland habitat resembled the proposed park site and adjacent Wright’s Field, but urban sprawl has left this remaining habitat as the only remnant of what the area used to be. Thus, DPR must consider how this park will diminish the last of Alpine’s natural heritage.

- DPR must do no less comprehensive an impact assessment than that found in the previous assessments for the proposed Stagecoach Ranch housing development decades ago. Specifically, details of the assessment can be found in the Planning and Development document archive under Record ID PDS2011-39107714280 and PDS20103100-4974. If development decades ago was considered too detrimental to this sensitive environment, then it will be even more so today given that this habitat is even more threatened now than then.

- The projected timeline set forth by DPR is insufficient for thorough biological assessment given the time required to properly study wildlife and plant occurrence and abundance across each season of the year. By limiting surveys to a short segment of the year, DPR will ignore the reality of the location’s seasonal ecology. For example, unless surveys are conducted during the rains, Western Spadefoots will go undetected. The rushed timeline for the project will lead to inappropriate conclusions and sloppy science.

Thank you,
Jonah Gula

Anne Falasco Norton
2457 Avenida Canora
Alpine, CA 91901

April 2, 2021

County of San Diego
Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego, CA 92123
CountyParksCEQA@sdcounty.ca.gov
lorrie.bradley@sdcounty.ca.gov

Attn: Alpine County Park Environmental Review

Dear Ms. Bradley,

I appreciate the opportunity to provide information for the Notice of Preparation (NOP) of the Environmental Impact Report (EIR) on the Alpine County Park Project (Project).

This proposed park as it is presently planned will forever alter and change the character and ambiance of its bordering neighborhoods. Our home of over 30 years is part of Palo Verde Ranch and abuts South Grade Road, separated only by one residence. We have an elevated view of the proposed Project. Instead of the peaceful atmospheric views we now enjoy, the land will be defaced with man-made activities, permanently eliminating the valuable natural resource that it is today. these impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

Direct impacts to our neighbors and ourselves include increased noise for the activities within the park and noise generated from the drastic increase of traffic to reach this destination park. Barking from dogs, constant sounds of skateboards against hard concrete and the tires creating dust from the bike skills area will be a constant annoyance to the neighbors and certain deterrents to the wildlife who make this area a safe animal pathway. Noise from all the activities will resound throughout the neighborhood directly impacting the area…non-stop…til dusk due us part… These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

Dog-transmitted diseases, some of them airborne, and the stench of poo and urine will permeate the dog park grounds adding to the risks of disease and serious dog fights typical at such sites. These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

We pride ourselves in being part of a Dark Sky zone. People throughout the county come to Alpine to view stellar phenomena. Having a permanent on-site trailer/home generating light and the additional lighting within the park to deter crime will totally end this treasure. God forbid when the County allows lighted ballparks….total destruction. These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

We have a working well which may be directly impacted by the draw of water use needed at the Project. Chemicals used to treat the lawns can cause air-borne allergies and affect ground water contamination. These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

The Project will draw the need for more police protection from our Sheriff Substation which spills over with increased crime that directly affects the Project's neighbors who presently see very little crime. This impact should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

Traffic along South Grade will increase substantially with no reasonable mitigation offered. With this comes the increase of air pollution and safety issues. The parking allotment within the park indicates the county's plans for a high volume park. Overflow parking along South Grade and into the county-owned residential streets next to the park will be inundated during the "big events" that will be scheduled at the Project. Parking will remain a high concern because inevitably, parking within the project will have a price tag and Alpiners will not pay the price (nor should they). Therefore, we will continue to see the residents of Alpine park along South Grade and the nearby residential streets. All of this points to a heavily increased use of and heavily increase of danger and safety on South Grade Road which was not built for such volume. These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

The change of topography in order to achieve all the activities will drastically be altered when a "berm" will be constructed that will in effect halt all views of the park from the road. One of the beautiful and calming aspects of the existing property is that one can drive past the very open fields and with just glancing, obtain the sense of outdoors. These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

Presently, the Project effectively eliminates all access to Wright's Field (WF). One will be forced to travel through the Project in order to enter WF. By doing this, the County just added another layer of hindrance, effectively deterring its own residents from access to this wonderful gem. The other access area to the park is via a private road abutting Joan McQueen Middle School. No one is allowed to park on this private road and no designated spots exist to accommodate WF enthusiasts at Joan McQueen. The other "access" is at the end of Olivewood Lane with no adequate public parking. These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

This project will hands-down substantially degrade the quality of the environment for all Alpine residents but more importantly: our dwindling wildlife habitat. It will further destroy a huge chunk of one of the last remaining grasslands in our county and State. These numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance.

In previous statements to the County and to the Alpine Community Planning Group (ACPG) and in published Letters of the Editor of the Alpine Sun I have made it quite clear that ideally the Project's land use should remain passive. Where the land is presently disturbed, only that area should be designed for parking and minimal facilities. The active portions of the Project should be removed and other locations should be identified. This alternative should be analyzed in the EIR.

In addition, at last week's ACPG meeting I offered an alternative location for many of the Project's activities that are not suitable to the Project's location: Alpine Elementary School (AES) in the heart of Alpine. It is an historical site sitting idle and empty. This site could be the perfect fit with regards to providing the activities in the park (the skateboard and bike parks, the playing fields, the community garden and the dog park) that ought to be clustered within the higher populated area of Alpine. This higher populated area is our village center. If designed properly, AES could become a stalwart example of incorporating historical value with the present needs of our community. AES already has the infrastructure. It has playing fields. It has reasonable off-street parking. It has existing electrical, water and sewage hookups. It addresses the traffic flow. Fields could be lighted without causing light pollution. Situated at the school, in the heart of town, the bike, skate and dog parks would not cause noise pollution. This is the location where these types of activities belong and are best served. This alternative should be analyzed in the EIR.

Another alternative park site in the heart of Alpine is the old Alpine School District's offices which also has similar amenities that are suitable for the active portion of the Project. This alternative should be analyzed in the EIR.

It is a great disappointment to have to continue to address to the County that this property is not suitable because of the magnitude of the Project. The County should be the steward of our precious environment. Instead the County leaves the undeniable impression that paving over sensitive and diminishing lands to build more ball fields and whimsical structures to satisfy the short-sighted needs of the public is of utmost importance. This Project continues with the "Slash and Burn" attitude, denuding what is left of our natural resources.

All of my above concerns with the numerous impacts should be analyzed in the EIR. These impacts should be avoided or mitigated below the level of significance. The Project alternatives should be given serious study and review.

Sincerely,

Annie Norton

Appendix C

Air Quality, Greenhouse Gas, and Energy Modeling Files

Appendix B: Air Quality, Greenhouse Gas, and Energy Modeling Files

B-1: Construction AQ & GHG Emissions

Emissions Summary

Regional Emissions (ONSITE + OFFSITE)

				Regional Emissions (Onsite + Offsite)					
				ROG	**NO_X**	**CO**	**SO_X**	**PM_{10} Total**	**$PM_{2.5}$ Total**
Source	**Start Date**	**End Date**	**# of Workdays**	**lb/day**					
3.2 Grubbing/Land Clearing - 2022	10/1/2022	10/15/2022	10	1.76	**20.41**	10.74	**0.03**	**2.53**	**0.93**
3.3 Grading/Excavation - 2022	10/1/2022	12/31/2022	65	4.13	**46.19**	29.99	**0.08**	**3.11**	**1.86**
3.3 Grading/Excavation - 2023	1/1/2023	5/31/2023	108	3.84	40.79	**29.17**	0.08	2.84	1.67
3.4 Sewer Line Installation - 2022	10/1/2022	12/31/2022	65	0.60	**5.78**	7.80	**0.01**	**0.42**	**0.29**
3.4 Sewer Line Installation - 2023	1/1/2023	6/1/2023	109	0.55	5.17	**7.75**	0.01	0.38	0.26
3.5 Drainage/Utilities/Subgrade - 2023	5/1/2023	8/31/2023	89	1.27	11.10	**15.69**	0.03	0.77	0.57
3.6 Construction - 2023	6/1/2023	12/31/2023	152	**1.67**	15.35	16.90	0.03	1.09	0.78
3.6 Construction - 2024	1/1/2024	1/31/2024	23	1.57	14.32	16.78	0.03	1.32	0.77
3.7 Paving - 2023	11/30/2023	12/31/2023	22	**0.75**	5.57	7.70	0.01	0.40	0.27
3.7 Paving - 2024	1/1/2024	1/31/2024	23	0.72	5.23	7.70	0.01	0.37	0.25
3.8 Architectural Coating - 2023	12/14/2023	12/31/2023	12	**12.58**	2.20	2.65	0.01	0.17	0.12
3.8 Architectural Coating - 2024	1/1/2024	1/31/2024	23	12.57	2.08	2.64	0.01	0.16	0.10
Maximum Daily Emissions				***15.00***	***72.38***	***52.61***	***0.13***	***6.05***	***3.08***
SDAPCD Significance Thresholds				75	250	550	250	100	55
Exceeds Threshold?				**No**	**No**	**No**	**No**	**No**	**No**

Regional Emissions	Onsite Emissions										Offsite Emissions									
Summer	ROG	NO_X	CO	SO_X	PM_{10} Fugitive	PM_{10} Exhaust	PM_{10} Total	$PM_{2.5}$ Fugitive	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Total	ROG	NO_X	CO	SO_X	PM_{10} Fugitive	PM_{10} Exhaust	PM_{10} Total	$PM_{2.5}$ Fugitive	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Total
Source	lb/day										lb/day									
3.2 Grubbing/Land Clearing - 2022	1.68	19.80	10.20	0.03	1.59	0.77	2.36	0.17	0.70	0.88	0.07	0.61	0.54	0.00	0.17	0.00	0.17	0.05	0.00	0.05
3.3 Grading/Excavation - 2022	3.94	44.11	28.58	0.07	0.77	1.76	2.53	0.09	1.61	1.70	0.18	2.06	1.41	0.01	0.57	0.01	0.58	0.15	0.01	0.16
3.3 Grading/Excavation - 2023	3.67	39.29	27.86	0.07	0.77	1.57	2.35	0.09	1.45	1.54	0.15	1.49	1.31	0.01	0.49	0.00	0.49	0.13	0.00	0.13
3.4 Sewer Line Installation - 2022	0.53	5.18	7.35	0.01	0.00	0.28	0.28	0.00	0.25	0.25	0.06	0.60	0.44	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.4 Sewer Line Installation - 2023	0.49	4.69	7.34	0.01	0.00	0.24	0.24	0.00	0.22	0.22	0.05	0.48	0.41	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.5 Drainage/Utilities/Subgrade - 2023	1.17	10.60	15.01	0.02	0.00	0.53	0.53	0.00	0.50	0.50	0.09	0.50	0.68	0.00	0.24	0.00	0.24	0.06	0.00	0.07
3.6 Construction - 2023	1.52	14.22	15.82	0.03	0.00	0.71	0.71	0.00	0.67	0.67	0.13	1.12	1.09	0.01	0.38	0.00	0.38	0.10	0.00	0.10
3.6 Construction - 2024	1.43	13.22	15.74	0.03	0.00	0.62	0.62	0.00	0.59	0.59	0.13	1.09	1.04	0.01	0.70	0.00	0.70	0.18	0.00	0.18
3.7 Paving - 2023	0.69	5.10	7.29	0.01	0.00	0.26	0.26	0.00	0.23	0.23	0.05	0.48	0.41	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.7 Paving - 2024	0.67	4.76	7.31	0.01	0.00	0.23	0.23	0.00	0.22	0.22	0.05	0.47	0.39	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.8 Architectural Coating - 2023	12.56	1.74	2.41	0.00	0.00	0.09	0.09	0.00	0.09	0.09	0.03	0.46	0.23	0.00	0.07	0.00	0.07	0.02	0.00	0.02
3.8 Architectural Coating - 2024	12.54	1.63	2.41	0.00	0.00	0.08	0.08	0.00	0.08	0.08	0.02	0.46	0.22	0.00	0.07	0.00	0.07	0.02	0.00	0.02

	Regional Emissions (Onsite + Offsite)									
Summer	ROG	NO_X	CO	SO_X	PM_{10} Fugitive	PM_{10} Exhaust	PM_{10} Total	$PM_{2.5}$ Fugitive	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Total
Source	lb/day									
3.2 Grubbing/Land Clearing - 2022	1.75	20.41	10.74	0.03	1.76	0.77	2.53	0.22	0.71	0.92
3.3 Grading/Excavation - 2022	4.12	46.17	29.99	0.08	1.34	1.76	3.11	0.24	1.62	1.86
3.3 Grading/Excavation - 2023	3.82	40.78	29.17	0.08	1.26	1.58	2.84	0.22	1.45	1.67
3.4 Sewer Line Installation - 2022	0.59	5.78	7.80	0.01	0.14	0.28	0.42	0.04	0.26	0.29
3.4 Sewer Line Installation - 2023	0.54	5.17	7.75	0.01	0.14	0.24	0.38	0.04	0.22	0.26
3.5 Drainage/Utilities/Subgrade - 2023	1.25	11.10	15.69	0.03	0.24	0.53	0.77	0.06	0.50	0.57
3.6 Construction - 2023	1.65	15.34	16.90	0.03	0.38	0.72	1.09	0.10	0.68	0.78
3.6 Construction - 2024	1.55	14.32	16.78	0.03	0.70	0.63	1.32	0.18	0.59	0.77
3.7 Paving - 2023	0.74	5.57	7.70	0.01	0.14	0.26	0.40	0.04	0.24	0.27
3.7 Paving - 2024	0.72	5.23	7.70	0.01	0.14	0.24	0.37	0.04	0.22	0.25
3.8 Architectural Coating - 2023	12.58	2.20	2.64	0.01	0.07	0.10	0.17	0.02	0.10	0.12
3.8 Architectural Coating - 2024	12.57	2.08	2.63	0.01	0.07	0.08	0.16	0.02	0.08	0.10

Regional Emissions

Winter	Onsite Emissions										Offsite Emissions									
	ROG	NO_X	CO	SO_X	PM_{10} Fugitive	PM_{10} Exhaust	PM_{10} Total	$PM_{2.5}$ Fugitive	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Total	ROG	NO_X	CO	SO_X	PM_{10} Fugitive	PM_{10} Exhaust	PM_{10} Total	$PM_{2.5}$ Fugitive	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Total
Source	lb/day										lb/day									
3.2 Grubbing/Land Clearing - 2022	1.68	19.80	10.20	0.03	1.59	0.77	2.36	0.17	0.70	0.88	0.08	0.61	0.53	0.00	0.17	0.00	0.17	0.05	0.00	0.05
3.3 Grading/Excavation - 2022	3.94	44.11	28.58	0.07	0.77	1.76	2.53	0.09	1.61	1.70	0.19	2.07	1.39	0.01	0.57	0.01	0.58	0.15	0.01	0.16
3.3 Grading/Excavation - 2023	3.67	39.29	27.86	0.07	0.77	1.57	2.35	0.09	1.45	1.54	0.17	1.50	1.29	0.01	0.49	0.00	0.49	0.13	0.00	0.13
3.4 Sewer Line Installation - 2022	0.53	5.18	7.35	0.01	0.00	0.28	0.28	0.00	0.25	0.25	0.06	0.60	0.44	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.4 Sewer Line Installation - 2023	0.49	4.69	7.34	0.01	0.00	0.24	0.24	0.00	0.22	0.22	0.06	0.48	0.41	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.5 Drainage/Utilities/Subgrade - 2023	1.17	10.60	15.01	0.02	0.00	0.53	0.53	0.00	0.50	0.50	0.10	0.50	0.66	0.00	0.24	0.00	0.24	0.06	0.00	0.07
3.6 Construction - 2023	1.52	14.22	15.82	0.03	0.00	0.71	0.71	0.00	0.67	0.67	0.15	1.13	1.06	0.01	0.38	0.00	0.38	0.10	0.00	0.10
3.6 Construction - 2024	1.43	13.22	15.74	0.03	0.00	0.62	0.62	0.00	0.59	0.59	0.14	1.10	1.02	0.01	0.70	0.00	0.70	0.18	0.00	0.18
3.7 Paving - 2023	0.69	5.10	7.29	0.01	0.00	0.26	0.26	0.00	0.23	0.23	0.06	0.48	0.41	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.7 Paving - 2024	0.67	4.76	7.31	0.01	0.00	0.23	0.23	0.00	0.22	0.22	0.05	0.47	0.38	0.00	0.14	0.00	0.14	0.04	0.00	0.04
3.8 Architectural Coating - 2023	12.56	1.74	2.41	0.00	0.00	0.09	0.09	0.00	0.09	0.09	0.03	0.46	0.23	0.00	0.07	0.00	0.07	0.02	0.00	0.02
3.8 Architectural Coating - 2024	12.54	1.63	2.41	0.00	0.00	0.08	0.08	0.00	0.08	0.08	0.03	0.45	0.22	0.00	0.07	0.00	0.07	0.02	0.00	0.02

Winter	Regional Emissions (Onsite + Offsite)									
	ROG	NO_X	CO	SO_X	PM_{10} Fugitive	PM_{10} Exhaust	PM_{10} Total	$PM_{2.5}$ Fugitive	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Total
Source	lb/day									
3.2 Grubbing/Land Clearing - 2022	1.76	20.41	10.73	0.03	1.76	0.77	2.53	0.22	0.71	0.93
3.3 Grading/Excavation - 2022	4.13	46.19	29.97	0.08	1.34	1.76	3.11	0.24	1.62	1.86
3.3 Grading/Excavation - 2023	3.84	40.79	29.14	0.08	1.26	1.58	2.84	0.22	1.45	1.67
3.4 Sewer Line Installation - 2022	0.60	5.78	7.80	0.01	0.14	0.28	0.42	0.04	0.26	0.29
3.4 Sewer Line Installation - 2023	0.55	5.17	7.75	0.01	0.14	0.24	0.38	0.04	0.22	0.26
3.5 Drainage/Utilities/Subgrade - 2023	1.27	11.10	15.67	0.03	0.24	0.53	0.77	0.06	0.50	0.57
3.6 Construction - 2023	1.67	15.35	16.88	0.03	0.38	0.72	1.09	0.10	0.68	0.78
3.6 Construction - 2024	1.57	14.32	16.76	0.03	0.70	0.63	1.32	0.18	0.59	0.77
3.7 Paving - 2023	0.75	5.57	7.70	0.01	0.14	0.26	0.40	0.04	0.24	0.27
3.7 Paving - 2024	0.72	5.23	7.70	0.01	0.14	0.24	0.37	0.04	0.22	0.25
3.8 Architectural Coating - 2023	12.58	2.20	2.65	0.01	0.07	0.10	0.17	0.02	0.10	0.12
3.8 Architectural Coating - 2024	12.57	2.08	2.64	0.01	0.07	0.08	0.16	0.02	0.08	0.10

Alpine Park Project-Construction

San Diego County APCD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	131.20	1000sqft	3.01	131,200.00	0
City Park	22.55	Acre	22.55	982,278.00	0
Health Club	7.32	1000sqft	0.17	7,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2023
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Health club land used was used to represent park amenities that include buidlings.

Trips and VMT - Water trucks included for dust control.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	7320	2570
tblAreaCoating	Area_Nonresidential_Interior	21960	7710
tblConstructionPhase	NumDays	440.00	174.00
tblConstructionPhase	NumDays	440.00	89.00
tblConstructionPhase	NumDays	440.00	175.00
tblConstructionPhase	NumDays	45.00	173.00
tblConstructionPhase	NumDays	35.00	45.00
tblConstructionPhase	NumDays	20.00	10.00
tblFleetMix	HHD	0.02	0.00
tblFleetMix	LDA	0.60	0.00
tblFleetMix	LDT1	0.04	0.00
tblFleetMix	LDT2	0.18	0.00
tblFleetMix	LHD1	0.01	0.00
tblFleetMix	LHD2	5.4350e-003	0.00
tblFleetMix	MCY	5.9380e-003	0.00
tblFleetMix	MDV	0.10	0.00
tblFleetMix	MH	1.0560e-003	0.00
tblFleetMix	MHD	0.02	0.00
tblFleetMix	OBUS	1.9340e-003	0.00
tblFleetMix	SBUS	7.5700e-004	0.00
tblFleetMix	UBUS	1.8880e-003	0.00
tblGrading	AcresOfGrading	605.50	112.50
tblGrading	MaterialExported	0.00	45,900.00
tblGrading	MaterialImported	0.00	54,144.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblSolidWaste	SolidWasteGenerationRate	1.94	1.95
tblTripsAndVMT	HaulingTripNumber	12,506.00	1,036.00
tblTripsAndVMT	HaulingTripNumber	0.00	656.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	WorkerTripNumber	10.00	16.00
tblTripsAndVMT	WorkerTripNumber	23.00	36.00
tblTripsAndVMT	WorkerTripNumber	471.00	12.00
tblTripsAndVMT	WorkerTripNumber	471.00	24.00
tblTripsAndVMT	WorkerTripNumber	471.00	32.00
tblTripsAndVMT	WorkerTripNumber	8.00	12.00
tblTripsAndVMT	WorkerTripNumber	94.00	4.00
tblWater	OutdoorWaterUseRate	26,867,904.43	27,070,456.26

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	6.4522	72.3611	48.5278	0.1250	3.2454	2.8077	6.0532	0.4940	2.5834	3.0774	0.0000	12,232.6246	12,232.6246	3.5585	0.0000	12,321.5863
2023	14.9766	57.0466	52.6133	0.1194	1.6365	2.3484	3.9848	0.3191	2.1784	2.4975	0.0000	11,669.3469	11,669.3469	3.0951	0.0000	11,746.7250
2024	14.8358	21.6264	27.1107	0.0533	0.9092	0.9445	1.8537	0.2380	0.8909	1.1289	0.0000	5,234.9507	5,234.9507	1.0122	0.0000	5,260.2548
Maximum	**14.9766**	**72.3611**	**52.6133**	**0.1250**	**3.2454**	**2.8077**	**6.0532**	**0.4940**	**2.5834**	**3.0774**	**0.0000**	**12,232.6246**	**12,232.6246**	**3.5585**	**0.0000**	**12,321.5863**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	6.4522	72.3611	48.5278	0.1250	1.8048	2.8077	4.6126	0.3363	2.5834	2.9197	0.0000	12,232.6246	12,232.6246	3.5585	0.0000	12,321.5863
2023	14.9766	57.0466	52.6133	0.1194	1.1663	2.3484	3.5146	0.2662	2.1784	2.4446	0.0000	11,669.3469	11,669.3469	3.0951	0.0000	11,746.7250
2024	14.8358	21.6264	27.1107	0.0533	0.9092	0.9445	1.8537	0.2380	0.8909	1.1289	0.0000	5,234.9507	5,234.9507	1.0122	0.0000	5,260.2548
Maximum	**14.9766**	**72.3611**	**52.6133**	**0.1250**	**1.8048**	**2.8077**	**4.6126**	**0.3363**	**2.5834**	**2.9197**	**0.0000**	**12,232.6246**	**12,232.6246**	**3.5585**	**0.0000**	**12,321.5863**

	ROG	**NOx**	**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**	**33.00**	**0.00**	**16.07**	**20.04**	**0.00**	**3.14**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grubbing/Land Clearing	Site Preparation	10/1/2022	10/15/2022	5	10	
2	Grading/Excavation	Grading	10/1/2022	5/31/2023	5	173	
3	Sewer Line Installation	Building Construction	10/1/2022	6/1/2023	5	174	
4	Drainage/Utilities/Subgrade	Building Construction	5/1/2023	8/31/2023	5	89	
5	Construction	Building Construction	6/1/2023	1/31/2024	5	175	
6	Paving	Paving	11/30/2023	1/31/2024	5	45	
7	Architectural Coating	Architectural Coating	12/14/2023	1/31/2024	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 3.01

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 21,960; Non-Residential Outdoor: 7,320; Striped Parking Area:

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grubbing/Land Clearing	Crawler Tractors	3	8.00	212	0.43
Grubbing/Land Clearing	Excavators	1	8.00	158	0.38
Grading/Excavation	Crawler Tractors	3	8.00	212	0.43
Grading/Excavation	Excavators	1	8.00	158	0.38
Grading/Excavation	Rollers	1	8.00	80	0.38
Grading/Excavation	Rubber Tired Loaders	1	8.00	203	0.36
Grading/Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading/Excavation	Scrapers	2	8.00	367	0.48
Drainage/Utilities/Subgrade	Air Compressors	1	8.00	78	0.48
Drainage/Utilities/Subgrade	Generator Sets	1	8.00	84	0.74
Drainage/Utilities/Subgrade	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Sewer Line Installation	Excavators	1	8.00	158	0.38
Sewer Line Installation	Rollers	1	8.00	80	0.38
Sewer Line Installation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Construction	Air Compressors	1	8.00	78	0.48
Construction	Cranes	1	8.00	231	0.29
Construction	Forklifts	3	8.00	89	0.20
Construction	Generator Sets	1	8.00	84	0.74
Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	8.00	80	0.38
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grubbing/Land Clearing	4	16.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading/Excavation	9	36.00	6.00	1,036.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Drainage/Utilities/Sub grade	6	24.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Sewer Line Installation	3	12.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction	8	32.00	6.00	656.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	3	12.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	4.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grubbing/Land Clearing - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5908	0.0000	1.5908	0.1718	0.0000	0.1718			0.0000			0.0000
Off-Road	1.6782	19.8005	10.1996	0.0287		0.7661	0.7661		0.7048	0.7048		2,777.1123	2,777.1123	0.8982		2,799.5667
Total	**1.6782**	**19.8005**	**10.1996**	**0.0287**	**1.5908**	**0.7661**	**2.3568**	**0.1718**	**0.7048**	**0.8765**		**2,777.1123**	**2,777.1123**	**0.8982**		**2,799.5667**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0169	0.5774	0.1475	1.6100e-003	0.0406	1.1000e-003	0.0417	0.0117	1.0600e-003	0.0128		173.1683	173.1683	0.0121		173.4710
Worker	0.0523	0.0328	0.3946	1.2600e-003	0.1314	8.9000e-004	0.1323	0.0349	8.2000e-004	0.0357		125.5296	125.5296	3.4100e-003		125.6148
Total	**0.0692**	**0.6102**	**0.5421**	**2.8700e-003**	**0.1721**	**1.9900e-003**	**0.1740**	**0.0466**	**1.8800e-003**	**0.0484**		**298.6978**	**298.6978**	**0.0155**		**299.0858**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6204	0.0000	0.6204	0.0670	0.0000	0.0670			0.0000			0.0000
Off-Road	1.6782	19.8005	10.1996	0.0287		0.7661	0.7661		0.7048	0.7048	0.0000	2,777.1123	2,777.1123	0.8982		2,799.5667
Total	**1.6782**	**19.8005**	**10.1996**	**0.0287**	**0.6204**	**0.7661**	**1.3864**	**0.0670**	**0.7048**	**0.7718**	**0.0000**	**2,777.1123**	**2,777.1123**	**0.8982**		**2,799.5667**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0169	0.5774	0.1475	1.6100e-003	0.0406	1.1000e-003	0.0417	0.0117	1.0600e-003	0.0128		173.1683	173.1683	0.0121		173.4710
Worker	0.0523	0.0328	0.3946	1.2600e-003	0.1314	8.9000e-004	0.1323	0.0349	8.2000e-004	0.0357		125.5296	125.5296	3.4100e-003		125.6148
Total	**0.0692**	**0.6102**	**0.5421**	**2.8700e-003**	**0.1721**	**1.9900e-003**	**0.1740**	**0.0466**	**1.8800e-003**	**0.0484**		**298.6978**	**298.6978**	**0.0155**		**299.0858**

3.3 Grading/Excavation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7709	0.0000	0.7709	0.0868	0.0000	0.0868			0.0000			0.0000
Off-Road	3.9390	44.1140	28.5807	0.0710		1.7554	1.7554		1.6149	1.6149		6,878.7072	6,878.7072	2.2247		6,934.3251
Total	**3.9390**	**44.1140**	**28.5807**	**0.0710**	**0.7709**	**1.7554**	**2.5262**	**0.0868**	**1.6149**	**1.7017**		**6,878.7072**	**6,878.7072**	**2.2247**		**6,934.3251**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0417	1.4047	0.3732	4.5500e-003	0.2362	3.9700e-003	0.2402	0.0610	3.8000e-003	0.0648		499.8240	499.8240	0.0443		500.9313
Vendor	0.0169	0.5774	0.1475	1.6100e-003	0.0406	1.1000e-003	0.0417	0.0117	1.0600e-003	0.0128		173.1683	173.1683	0.0121		173.4710
Worker	0.1177	0.0738	0.8879	2.8300e-003	0.2957	2.0000e-003	0.2977	0.0784	1.8400e-003	0.0803		282.4415	282.4415	7.6700e-003		282.6333
Total	**0.1763**	**2.0559**	**1.4086**	**8.9900e-003**	**0.5725**	**7.0700e-003**	**0.5796**	**0.1511**	**6.7000e-003**	**0.1578**		**955.4338**	**955.4338**	**0.0641**		**957.0356**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3007	0.0000	0.3007	0.0338	0.0000	0.0338			0.0000			0.0000
Off-Road	3.9390	44.1140	28.5807	0.0710		1.7554	1.7554		1.6149	1.6149	0.0000	6,878.7072	6,878.7072	2.2247		6,934.3250
Total	**3.9390**	**44.1140**	**28.5807**	**0.0710**	**0.3007**	**1.7554**	**2.0560**	**0.0338**	**1.6149**	**1.6488**	**0.0000**	**6,878.7072**	**6,878.7072**	**2.2247**		**6,934.3250**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0417	1.4047	0.3732	4.5500e-003	0.2362	3.9700e-003	0.2402	0.0610	3.8000e-003	0.0648		499.8240	499.8240	0.0443		500.9313
Vendor	0.0169	0.5774	0.1475	1.6100e-003	0.0406	1.1000e-003	0.0417	0.0117	1.0600e-003	0.0128		173.1683	173.1683	0.0121		173.4710
Worker	0.1177	0.0738	0.8879	2.8300e-003	0.2957	2.0000e-003	0.2977	0.0784	1.8400e-003	0.0803		282.4415	282.4415	7.6700e-003		282.6333
Total	**0.1763**	**2.0559**	**1.4086**	**8.9900e-003**	**0.5725**	**7.0700e-003**	**0.5796**	**0.1511**	**6.7000e-003**	**0.1578**		**955.4338**	**955.4338**	**0.0641**		**957.0356**

3.3 Grading/Excavation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7709	0.0000	0.7709	0.0868	0.0000	0.0868			0.0000			0.0000
Off-Road	3.6703	39.2896	27.8561	0.0710		1.5749	1.5749		1.4489	1.4489		6,876.4237	6,876.4237	2.2240		6,932.0231
Total	**3.6703**	**39.2896**	**27.8561**	**0.0710**	**0.7709**	**1.5749**	**2.3458**	**0.0868**	**1.4489**	**1.5357**		**6,876.4237**	**6,876.4237**	**2.2240**		**6,932.0231**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0298	0.9685	0.3516	4.3800e-003	0.1523	1.7900e-003	0.1541	0.0404	1.7100e-003	0.0421		482.8698	482.8698	0.0424		483.9294
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.1115	0.0674	0.8248	2.7200e-003	0.2957	1.9600e-003	0.2977	0.0784	1.8000e-003	0.0803		271.6442	271.6442	7.0200e-003		271.8197
Total	**0.1543**	**1.4905**	**1.3115**	**8.6600e-003**	**0.4886**	**4.2900e-003**	**0.4929**	**0.1305**	**4.0200e-003**	**0.1345**		**923.3042**	**923.3042**	**0.0605**		**924.8164**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3007	0.0000	0.3007	0.0338	0.0000	0.0338			0.0000			0.0000
Off-Road	3.6703	39.2896	27.8561	0.0710		1.5749	1.5749		1.4489	1.4489	0.0000	6,876.4237	6,876.4237	2.2240		6,932.0231
Total	**3.6703**	**39.2896**	**27.8561**	**0.0710**	**0.3007**	**1.5749**	**1.8755**	**0.0338**	**1.4489**	**1.4827**	**0.0000**	**6,876.4237**	**6,876.4237**	**2.2240**		**6,932.0231**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0298	0.9685	0.3516	4.3800e-003	0.1523	1.7900e-003	0.1541	0.0404	1.7100e-003	0.0421		482.8698	482.8698	0.0424		483.9294
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.1115	0.0674	0.8248	2.7200e-003	0.2957	1.9600e-003	0.2977	0.0784	1.8000e-003	0.0803		271.6442	271.6442	7.0200e-003		271.8197
Total	**0.1543**	**1.4905**	**1.3115**	**8.6600e-003**	**0.4886**	**4.2900e-003**	**0.4929**	**0.1305**	**4.0200e-003**	**0.1345**		**923.3042**	**923.3042**	**0.0605**		**924.8164**

3.4 Sewer Line Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5334	5.1785	7.3534	0.0109		0.2755	0.2755		0.2535	0.2535		1,055.3580	1,055.3580	0.3413		1,063.8911
Total	**0.5334**	**5.1785**	**7.3534**	**0.0109**		**0.2755**	**0.2755**		**0.2535**	**0.2535**		**1,055.3580**	**1,055.3580**	**0.3413**		**1,063.8911**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0169	0.5774	0.1475	1.6100e-003	0.0406	1.1000e-003	0.0417	0.0117	1.0600e-003	0.0128		173.1683	173.1683	0.0121		173.4710
Worker	0.0392	0.0246	0.2960	9.4000e-004	0.0986	6.7000e-004	0.0992	0.0262	6.1000e-004	0.0268		94.1472	94.1472	2.5600e-003		94.2111
Total	**0.0561**	**0.6020**	**0.4434**	**2.5500e-003**	**0.1392**	**1.7700e-003**	**0.1410**	**0.0378**	**1.6700e-003**	**0.0395**		**267.3154**	**267.3154**	**0.0147**		**267.6821**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5334	5.1785	7.3534	0.0109		0.2755	0.2755		0.2535	0.2535	0.0000	1,055.3580	1,055.3580	0.3413		1,063.8911
Total	**0.5334**	**5.1785**	**7.3534**	**0.0109**		**0.2755**	**0.2755**		**0.2535**	**0.2535**	**0.0000**	**1,055.3580**	**1,055.3580**	**0.3413**		**1,063.8911**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0169	0.5774	0.1475	1.6100e-003	0.0406	1.1000e-003	0.0417	0.0117	1.0600e-003	0.0128		173.1683	173.1683	0.0121		173.4710
Worker	0.0392	0.0246	0.2960	9.4000e-004	0.0986	6.7000e-004	0.0992	0.0262	6.1000e-004	0.0268		94.1472	94.1472	2.5600e-003		94.2111
Total	**0.0561**	**0.6020**	**0.4434**	**2.5500e-003**	**0.1392**	**1.7700e-003**	**0.1410**	**0.0378**	**1.6700e-003**	**0.0395**		**267.3154**	**267.3154**	**0.0147**		**267.6821**

3.4 Sewer Line Installation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4938	4.6944	7.3413	0.0109		0.2402	0.2402		0.2210	0.2210		1,055.7898	1,055.7898	0.3415		1,064.3264
Total	**0.4938**	**4.6944**	**7.3413**	**0.0109**		**0.2402**	**0.2402**		**0.2210**	**0.2210**		**1,055.7898**	**1,055.7898**	**0.3415**		**1,064.3264**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0372	0.0225	0.2749	9.1000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		90.5481	90.5481	2.3400e-003		90.6066
Total	**0.0502**	**0.4770**	**0.4100**	**2.4700e-003**	**0.1392**	**1.1900e-003**	**0.1404**	**0.0378**	**1.1100e-003**	**0.0390**		**259.3383**	**259.3383**	**0.0134**		**259.6739**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4938	4.6944	7.3413	0.0109		0.2402	0.2402		0.2210	0.2210	0.0000	1,055.7898	1,055.7898	0.3415		1,064.3264
Total	**0.4938**	**4.6944**	**7.3413**	**0.0109**		**0.2402**	**0.2402**		**0.2210**	**0.2210**	**0.0000**	**1,055.7898**	**1,055.7898**	**0.3415**		**1,064.3264**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0372	0.0225	0.2749	9.1000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		90.5481	90.5481	2.3400e-003		90.6066
Total	**0.0502**	**0.4770**	**0.4100**	**2.4700e-003**	**0.1392**	**1.1900e-003**	**0.1404**	**0.0378**	**1.1100e-003**	**0.0390**		**259.3383**	**259.3383**	**0.0134**		**259.6739**

3.5 Drainage/Utilities/Subgrade - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1669	10.5956	15.0095	0.0230		0.5260	0.5260		0.5017	0.5017		2,204.6046	2,204.6046	0.4400		2,215.6047
Total	**1.1669**	**10.5956**	**15.0095**	**0.0230**		**0.5260**	**0.5260**		**0.5017**	**0.5017**		**2,204.6046**	**2,204.6046**	**0.4400**		**2,215.6047**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0743	0.0449	0.5499	1.8200e-003	0.1972	1.3100e-003	0.1985	0.0523	1.2000e-003	0.0535		181.0961	181.0961	4.6800e-003		181.2131
Total	**0.0873**	**0.4995**	**0.6849**	**3.3800e-003**	**0.2378**	**1.8500e-003**	**0.2396**	**0.0640**	**1.7100e-003**	**0.0657**		**349.8863**	**349.8863**	**0.0158**		**350.2805**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1669	10.5956	15.0095	0.0230		0.5260	0.5260		0.5017	0.5017	0.0000	2,204.6046	2,204.6046	0.4400		2,215.6047
Total	**1.1669**	**10.5956**	**15.0095**	**0.0230**		**0.5260**	**0.5260**		**0.5017**	**0.5017**	**0.0000**	**2,204.6046**	**2,204.6046**	**0.4400**		**2,215.6047**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0743	0.0449	0.5499	1.8200e-003	0.1972	1.3100e-003	0.1985	0.0523	1.2000e-003	0.0535		181.0961	181.0961	4.6800e-003		181.2131
Total	**0.0873**	**0.4995**	**0.6849**	**3.3800e-003**	**0.2378**	**1.8500e-003**	**0.2396**	**0.0640**	**1.7100e-003**	**0.0657**		**349.8863**	**349.8863**	**0.0158**		**350.2805**

3.6 Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5232	14.2188	15.8156	0.0271		0.7116	0.7116		0.6725	0.6725		2,604.3634	2,604.3634	0.5693		2,618.5957
Total	**1.5232**	**14.2188**	**15.8156**	**0.0271**		**0.7116**	**0.7116**		**0.6725**	**0.6725**		**2,604.3634**	**2,604.3634**	**0.5693**		**2,618.5957**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0187	0.6063	0.2201	2.7400e-003	0.0730	1.1200e-003	0.0741	0.0198	1.0700e-003	0.0209		302.2610	302.2610	0.0265		302.9243
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0991	0.0599	0.7332	2.4200e-003	0.2629	1.7400e-003	0.2646	0.0697	1.6000e-003	0.0713		241.4615	241.4615	6.2400e-003		241.6175
Total	**0.1308**	**1.1207**	**1.0883**	**6.7200e-003**	**0.3765**	**3.4000e-003**	**0.3799**	**0.1012**	**3.1800e-003**	**0.1044**		**712.5127**	**712.5127**	**0.0439**		**713.6092**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5232	14.2188	15.8156	0.0271		0.7116	0.7116		0.6725	0.6725	0.0000	2,604.3634	2,604.3634	0.5693		2,618.5957
Total	**1.5232**	**14.2188**	**15.8156**	**0.0271**		**0.7116**	**0.7116**		**0.6725**	**0.6725**	**0.0000**	**2,604.3634**	**2,604.3634**	**0.5693**		**2,618.5957**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0187	0.6063	0.2201	2.7400e-003	0.0730	1.1200e-003	0.0741	0.0198	1.0700e-003	0.0209		302.2610	302.2610	0.0265		302.9243
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0991	0.0599	0.7332	2.4200e-003	0.2629	1.7400e-003	0.2646	0.0697	1.6000e-003	0.0713		241.4615	241.4615	6.2400e-003		241.6175
Total	**0.1308**	**1.1207**	**1.0883**	**6.7200e-003**	**0.3765**	**3.4000e-003**	**0.3799**	**0.1012**	**3.1800e-003**	**0.1044**		**712.5127**	**712.5127**	**0.0439**		**713.6092**

3.6 Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4283	13.2210	15.7412	0.0271		0.6238	0.6238		0.5892	0.5892		2,604.7319	2,604.7319	0.5659		2,618.8794
Total	**1.4283**	**13.2210**	**15.7412**	**0.0271**		**0.6238**	**0.6238**		**0.5892**	**0.5892**		**2,604.7319**	**2,604.7319**	**0.5659**		**2,618.8794**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0184	0.5910	0.2223	2.7100e-003	0.3930	1.1000e-003	0.3941	0.0983	1.0500e-003	0.0994		300.1456	300.1456	0.0267		300.8123
Vendor	0.0126	0.4482	0.1309	1.5500e-003	0.0406	5.2000e-004	0.0411	0.0117	5.0000e-004	0.0122		167.7046	167.7046	0.0110		167.9785
Worker	0.0941	0.0549	0.6855	2.3300e-003	0.2629	1.7100e-003	0.2646	0.0697	1.5700e-003	0.0713		231.9479	231.9479	5.7400e-003		232.0913
Total	**0.1250**	**1.0942**	**1.0386**	**6.5900e-003**	**0.6965**	**3.3300e-003**	**0.6999**	**0.1798**	**3.1200e-003**	**0.1829**		**699.7980**	**699.7980**	**0.0434**		**700.8821**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4283	13.2210	15.7412	0.0271		0.6238	0.6238		0.5892	0.5892	0.0000	2,604.7319	2,604.7319	0.5659		2,618.8794
Total	**1.4283**	**13.2210**	**15.7412**	**0.0271**		**0.6238**	**0.6238**		**0.5892**	**0.5892**	**0.0000**	**2,604.7319**	**2,604.7319**	**0.5659**		**2,618.8794**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0184	0.5910	0.2223	2.7100e-003	0.3930	1.1000e-003	0.3941	0.0983	1.0500e-003	0.0994		300.1456	300.1456	0.0267		300.8123
Vendor	0.0126	0.4482	0.1309	1.5500e-003	0.0406	5.2000e-004	0.0411	0.0117	5.0000e-004	0.0122		167.7046	167.7046	0.0110		167.9785
Worker	0.0941	0.0549	0.6855	2.3300e-003	0.2629	1.7100e-003	0.2646	0.0697	1.5700e-003	0.0713		231.9479	231.9479	5.7400e-003		232.0913
Total	**0.1250**	**1.0942**	**1.0386**	**6.5900e-003**	**0.6965**	**3.3300e-003**	**0.6999**	**0.1798**	**3.1200e-003**	**0.1829**		**699.7980**	**699.7980**	**0.0434**		**700.8821**

3.7 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5164	5.0958	7.2921	0.0114		0.2551	0.2551		0.2347	0.2347		1,103.7921	1,103.7921	0.3570		1,112.7168
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6916**	**5.0958**	**7.2921**	**0.0114**		**0.2551**	**0.2551**		**0.2347**	**0.2347**		**1,103.7921**	**1,103.7921**	**0.3570**		**1,112.7168**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0372	0.0225	0.2749	9.1000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		90.5481	90.5481	2.3400e-003		90.6066
Total	**0.0502**	**0.4770**	**0.4100**	**2.4700e-003**	**0.1392**	**1.1900e-003**	**0.1404**	**0.0378**	**1.1100e-003**	**0.0390**		**259.3383**	**259.3383**	**0.0134**		**259.6739**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5164	5.0958	7.2921	0.0114		0.2551	0.2551		0.2347	0.2347	0.0000	1,103.7921	1,103.7921	0.3570		1,112.7168
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6916**	**5.0958**	**7.2921**	**0.0114**		**0.2551**	**0.2551**		**0.2347**	**0.2347**	**0.0000**	**1,103.7921**	**1,103.7921**	**0.3570**		**1,112.7168**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0372	0.0225	0.2749	9.1000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		90.5481	90.5481	2.3400e-003		90.6066
Total	**0.0502**	**0.4770**	**0.4100**	**2.4700e-003**	**0.1392**	**1.1900e-003**	**0.1404**	**0.0378**	**1.1100e-003**	**0.0390**		**259.3383**	**259.3383**	**0.0134**		**259.6739**

3.7 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4941	4.7623	7.3129	0.0114		0.2343	0.2343		0.2155	0.2155		1,103.7736	1,103.7736	0.3570		1,112.6982
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6693**	**4.7623**	**7.3129**	**0.0114**		**0.2343**	**0.2343**		**0.2155**	**0.2155**		**1,103.7736**	**1,103.7736**	**0.3570**		**1,112.6982**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0126	0.4482	0.1309	1.5500e-003	0.0406	5.2000e-004	0.0411	0.0117	5.0000e-004	0.0122		167.7046	167.7046	0.0110		167.9785
Worker	0.0353	0.0206	0.2571	8.7000e-004	0.0986	6.4000e-004	0.0992	0.0262	5.9000e-004	0.0267		86.9805	86.9805	2.1500e-003		87.0343
Total	**0.0478**	**0.4688**	**0.3879**	**2.4200e-003**	**0.1392**	**1.1600e-003**	**0.1404**	**0.0378**	**1.0900e-003**	**0.0389**		**254.6850**	**254.6850**	**0.0131**		**255.0128**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4941	4.7623	7.3129	0.0114		0.2343	0.2343		0.2155	0.2155	0.0000	1,103.7736	1,103.7736	0.3570		1,112.6982
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6693**	**4.7623**	**7.3129**	**0.0114**		**0.2343**	**0.2343**		**0.2155**	**0.2155**	**0.0000**	**1,103.7736**	**1,103.7736**	**0.3570**		**1,112.6982**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0126	0.4482	0.1309	1.5500e-003	0.0406	5.2000e-004	0.0411	0.0117	5.0000e-004	0.0122		167.7046	167.7046	0.0110		167.9785
Worker	0.0353	0.0206	0.2571	8.7000e-004	0.0986	6.4000e-004	0.0992	0.0262	5.9000e-004	0.0267		86.9805	86.9805	2.1500e-003		87.0343
Total	**0.0478**	**0.4688**	**0.3879**	**2.4200e-003**	**0.1392**	**1.1600e-003**	**0.1404**	**0.0378**	**1.0900e-003**	**0.0389**		**254.6850**	**254.6850**	**0.0131**		**255.0128**

3.8 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944		375.2641	375.2641	0.0225		375.8253
Total	**12.5555**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**		**375.2641**	**375.2641**	**0.0225**		**375.8253**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0124	7.4900e-003	0.0916	3.0000e-004	0.0329	2.2000e-004	0.0331	8.7200e-003	2.0000e-004	8.9200e-003		30.1827	30.1827	7.8000e-004		30.2022
Total	**0.0254**	**0.4620**	**0.2267**	**1.8600e-003**	**0.0735**	**7.6000e-004**	**0.0742**	**0.0204**	**7.1000e-004**	**0.0211**		**198.9729**	**198.9729**	**0.0119**		**199.2695**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944	0.0000	375.2641	375.2641	0.0225		375.8253
Total	**12.5555**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**	**0.0000**	**375.2641**	**375.2641**	**0.0225**		**375.8253**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0130	0.4546	0.1351	1.5600e-003	0.0406	5.4000e-004	0.0412	0.0117	5.1000e-004	0.0122		168.7902	168.7902	0.0111		169.0674
Worker	0.0124	7.4900e-003	0.0916	3.0000e-004	0.0329	2.2000e-004	0.0331	8.7200e-003	2.0000e-004	8.9200e-003		30.1827	30.1827	7.8000e-004		30.2022
Total	**0.0254**	**0.4620**	**0.2267**	**1.8600e-003**	**0.0735**	**7.6000e-004**	**0.0742**	**0.0204**	**7.1000e-004**	**0.0211**		**198.9729**	**198.9729**	**0.0119**		**199.2695**

3.8 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812		375.2641	375.2641	0.0211		375.7923
Total	**12.5410**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**		**375.2641**	**375.2641**	**0.0211**		**375.7923**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0126	0.4482	0.1309	1.5500e-003	0.0406	5.2000e-004	0.0411	0.0117	5.0000e-004	0.0122		167.7046	167.7046	0.0110		167.9785
Worker	0.0118	6.8700e-003	0.0857	2.9000e-004	0.0329	2.1000e-004	0.0331	8.7200e-003	2.0000e-004	8.9100e-003		28.9935	28.9935	7.2000e-004		29.0114
Total	**0.0243**	**0.4551**	**0.2166**	**1.8400e-003**	**0.0735**	**7.3000e-004**	**0.0742**	**0.0204**	**7.0000e-004**	**0.0211**		**196.6981**	**196.6981**	**0.0117**		**196.9899**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812	0.0000	375.2641	375.2641	0.0211		375.7923
Total	**12.5410**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**	**0.0000**	**375.2641**	**375.2641**	**0.0211**		**375.7923**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0126	0.4482	0.1309	1.5500e-003	0.0406	5.2000e-004	0.0411	0.0117	5.0000e-004	0.0122		167.7046	167.7046	0.0110		167.9785
Worker	0.0118	6.8700e-003	0.0857	2.9000e-004	0.0329	2.1000e-004	0.0331	8.7200e-003	2.0000e-004	8.9100e-003		28.9935	28.9935	7.2000e-004		29.0114
Total	**0.0243**	**0.4551**	**0.2166**	**1.8400e-003**	**0.0735**	**7.3000e-004**	**0.0742**	**0.0204**	**7.0000e-004**	**0.0211**		**196.6981**	**196.6981**	**0.0117**		**196.9899**

Alpine Park Project-Construction

San Diego County APCD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	131.20	1000sqft	3.01	131,200.00	0
City Park	22.55	Acre	22.55	982,278.00	0
Health Club	7.32	1000sqft	0.17	7,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2023
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Health club land used was used to represent park amenities that include buidlings.

Trips and VMT - Water trucks included for dust control.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	7320	2570
tblAreaCoating	Area_Nonresidential_Interior	21960	7710
tblConstructionPhase	NumDays	440.00	174.00
tblConstructionPhase	NumDays	440.00	89.00
tblConstructionPhase	NumDays	440.00	175.00
tblConstructionPhase	NumDays	45.00	173.00
tblConstructionPhase	NumDays	35.00	45.00
tblConstructionPhase	NumDays	20.00	10.00
tblFleetMix	HHD	0.02	0.00
tblFleetMix	LDA	0.60	0.00
tblFleetMix	LDT1	0.04	0.00
tblFleetMix	LDT2	0.18	0.00
tblFleetMix	LHD1	0.01	0.00
tblFleetMix	LHD2	5.4350e-003	0.00
tblFleetMix	MCY	5.9380e-003	0.00
tblFleetMix	MDV	0.10	0.00
tblFleetMix	MH	1.0560e-003	0.00
tblFleetMix	MHD	0.02	0.00
tblFleetMix	OBUS	1.9340e-003	0.00
tblFleetMix	SBUS	7.5700e-004	0.00
tblFleetMix	UBUS	1.8880e-003	0.00
tblGrading	AcresOfGrading	605.50	112.50
tblGrading	MaterialExported	0.00	45,900.00
tblGrading	MaterialImported	0.00	54,144.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblSolidWaste	SolidWasteGenerationRate	1.94	1.95
tblTripsAndVMT	HaulingTripNumber	12,506.00	1,036.00
tblTripsAndVMT	HaulingTripNumber	0.00	656.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	WorkerTripNumber	10.00	16.00
tblTripsAndVMT	WorkerTripNumber	23.00	36.00
tblTripsAndVMT	WorkerTripNumber	471.00	12.00
tblTripsAndVMT	WorkerTripNumber	471.00	24.00
tblTripsAndVMT	WorkerTripNumber	471.00	32.00
tblTripsAndVMT	WorkerTripNumber	8.00	12.00
tblTripsAndVMT	WorkerTripNumber	94.00	4.00
tblWater	OutdoorWaterUseRate	26,867,904.43	27,070,456.26

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	6.4848	72.3818	48.5025	0.1245	3.2454	2.8080	6.0534	0.4940	2.5836	3.0776	0.0000	12,179.6403	12,179.6403	3.5613	0.0000	12,268.6727
2023	15.0001	57.0606	52.5634	0.1189	1.6365	2.3485	3.9850	0.3191	2.1786	2.4977	0.0000	11,614.6452	11,614.6452	3.0973	0.0000	11,692.0768
2024	14.8586	21.6325	27.0912	0.0530	0.9092	0.9446	1.8538	0.2380	0.8910	1.1290	0.0000	5,195.6110	5,195.6110	1.0141	0.0000	5,220.9629
Maximum	**15.0001**	**72.3818**	**52.5634**	**0.1245**	**3.2454**	**2.8080**	**6.0534**	**0.4940**	**2.5836**	**3.0776**	**0.0000**	**12,179.6403**	**12,179.6403**	**3.5613**	**0.0000**	**12,268.6727**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	6.4848	72.3818	48.5025	0.1245	1.8048	2.8080	4.6128	0.3363	2.5836	2.9199	0.0000	12,179.6403	12,179.6403	3.5613	0.0000	12,268.6727
2023	15.0001	57.0606	52.5634	0.1189	1.1663	2.3485	3.5147	0.2662	2.1786	2.4447	0.0000	11,614.6452	11,614.6452	3.0973	0.0000	11,692.0768
2024	14.8586	21.6325	27.0912	0.0530	0.9092	0.9446	1.8538	0.2380	0.8910	1.1290	0.0000	5,195.6110	5,195.6110	1.0141	0.0000	5,220.9629
Maximum	**15.0001**	**72.3818**	**52.5634**	**0.1245**	**1.8048**	**2.8080**	**4.6128**	**0.3363**	**2.5836**	**2.9199**	**0.0000**	**12,179.6403**	**12,179.6403**	**3.5613**	**0.0000**	**12,268.6727**

	ROG	**NOx**	**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**	**33.00**	**0.00**	**16.07**	**20.04**	**0.00**	**3.14**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grubbing/Land Clearing	Site Preparation	10/1/2022	10/15/2022	5	10	
2	Grading/Excavation	Grading	10/1/2022	5/31/2023	5	173	
3	Sewer Line Installation	Building Construction	10/1/2022	6/1/2023	5	174	
4	Drainage/Utilities/Subgrade	Building Construction	5/1/2023	8/31/2023	5	89	
5	Construction	Building Construction	6/1/2023	1/31/2024	5	175	
6	Paving	Paving	11/30/2023	1/31/2024	5	45	
7	Architectural Coating	Architectural Coating	12/14/2023	1/31/2024	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 3.01

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 21,960; Non-Residential Outdoor: 7,320; Striped Parking Area:

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grubbing/Land Clearing	Crawler Tractors	3	8.00	212	0.43
Grubbing/Land Clearing	Excavators	1	8.00	158	0.38
Grading/Excavation	Crawler Tractors	3	8.00	212	0.43
Grading/Excavation	Excavators	1	8.00	158	0.38
Grading/Excavation	Rollers	1	8.00	80	0.38
Grading/Excavation	Rubber Tired Loaders	1	8.00	203	0.36
Grading/Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading/Excavation	Scrapers	2	8.00	367	0.48
Drainage/Utilities/Subgrade	Air Compressors	1	8.00	78	0.48
Drainage/Utilities/Subgrade	Generator Sets	1	8.00	84	0.74

Drainage/Utilities/Subgrade	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Sewer Line Installation	Excavators	1	8.00	158	0.38
Sewer Line Installation	Rollers	1	8.00	80	0.38
Sewer Line Installation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Construction	Air Compressors	1	8.00	78	0.48
Construction	Cranes	1	8.00	231	0.29
Construction	Forklifts	3	8.00	89	0.20
Construction	Generator Sets	1	8.00	84	0.74
Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	8.00	80	0.38
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grubbing/Land Clearing	4	16.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading/Excavation	9	36.00	6.00	1,036.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Drainage/Utilities/Subgrade	6	24.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Sewer Line Installation	3	12.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction	8	32.00	6.00	656.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	3	12.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	4.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grubbing/Land Clearing - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5908	0.0000	1.5908	0.1718	0.0000	0.1718			0.0000			0.0000
Off-Road	1.6782	19.8005	10.1996	0.0287		0.7661	0.7661		0.7048	0.7048		2,777.1123	2,777.1123	0.8982		2,799.5667
Total	**1.6782**	**19.8005**	**10.1996**	**0.0287**	**1.5908**	**0.7661**	**2.3568**	**0.1718**	**0.7048**	**0.8765**		**2,777.1123**	**2,777.1123**	**0.8982**		**2,799.5667**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0178	0.5754	0.1642	1.5700e-003	0.0406	1.1500e-003	0.0418	0.0117	1.1000e-003	0.0128		168.6616	168.6616	0.0128		168.9826
Worker	0.0595	0.0368	0.3702	1.1800e-003	0.1314	8.9000e-004	0.1323	0.0349	8.2000e-004	0.0357		117.8441	117.8441	3.2200e-003		117.9245
Total	**0.0773**	**0.6122**	**0.5343**	**2.7500e-003**	**0.1721**	**2.0400e-003**	**0.1741**	**0.0466**	**1.9200e-003**	**0.0485**		**286.5057**	**286.5057**	**0.0161**		**286.9072**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6204	0.0000	0.6204	0.0670	0.0000	0.0670			0.0000			0.0000
Off-Road	1.6782	19.8005	10.1996	0.0287		0.7661	0.7661		0.7048	0.7048	0.0000	2,777.1123	2,777.1123	0.8982		2,799.5667
Total	**1.6782**	**19.8005**	**10.1996**	**0.0287**	**0.6204**	**0.7661**	**1.3864**	**0.0670**	**0.7048**	**0.7718**	**0.0000**	**2,777.1123**	**2,777.1123**	**0.8982**		**2,799.5667**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0178	0.5754	0.1642	1.5700e-003	0.0406	1.1500e-003	0.0418	0.0117	1.1000e-003	0.0128		168.6616	168.6616	0.0128		168.9826
Worker	0.0595	0.0368	0.3702	1.1800e-003	0.1314	8.9000e-004	0.1323	0.0349	8.2000e-004	0.0357		117.8441	117.8441	3.2200e-003		117.9245
Total	**0.0773**	**0.6122**	**0.5343**	**2.7500e-003**	**0.1721**	**2.0400e-003**	**0.1741**	**0.0466**	**1.9200e-003**	**0.0485**		**286.5057**	**286.5057**	**0.0161**		**286.9072**

3.3 Grading/Excavation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7709	0.0000	0.7709	0.0868	0.0000	0.0868			0.0000			0.0000
Off-Road	3.9390	44.1140	28.5807	0.0710		1.7554	1.7554		1.6149	1.6149		6,878.7072	6,878.7072	2.2247		6,934.3251
Total	**3.9390**	**44.1140**	**28.5807**	**0.0710**	**0.7709**	**1.7554**	**2.5262**	**0.0868**	**1.6149**	**1.7017**		**6,878.7072**	**6,878.7072**	**2.2247**		**6,934.3251**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0429	1.4152	0.3957	4.4700e-003	0.2362	4.0600e-003	0.2403	0.0610	3.8800e-003	0.0649		491.1016	491.1016	0.0457		492.2438
Vendor	0.0178	0.5754	0.1642	1.5700e-003	0.0406	1.1500e-003	0.0418	0.0117	1.1000e-003	0.0128		168.6616	168.6616	0.0128		168.9826
Worker	0.1338	0.0828	0.8329	2.6600e-003	0.2957	2.0000e-003	0.2977	0.0784	1.8400e-003	0.0803		265.1492	265.1492	7.2400e-003		265.3302
Total	**0.1945**	**2.0735**	**1.3927**	**8.7000e-003**	**0.5725**	**7.2100e-003**	**0.5798**	**0.1511**	**6.8200e-003**	**0.1579**		**924.9124**	**924.9124**	**0.0658**		**926.5566**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3007	0.0000	0.3007	0.0338	0.0000	0.0338			0.0000			0.0000
Off-Road	3.9390	44.1140	28.5807	0.0710		1.7554	1.7554		1.6149	1.6149	0.0000	6,878.7072	6,878.7072	2.2247		6,934.3250
Total	**3.9390**	**44.1140**	**28.5807**	**0.0710**	**0.3007**	**1.7554**	**2.0560**	**0.0338**	**1.6149**	**1.6488**	**0.0000**	**6,878.7072**	**6,878.7072**	**2.2247**		**6,934.3250**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0429	1.4152	0.3957	4.4700e-003	0.2362	4.0600e-003	0.2403	0.0610	3.8800e-003	0.0649		491.1016	491.1016	0.0457		492.2438
Vendor	0.0178	0.5754	0.1642	1.5700e-003	0.0406	1.1500e-003	0.0418	0.0117	1.1000e-003	0.0128		168.6616	168.6616	0.0128		168.9826
Worker	0.1338	0.0828	0.8329	2.6600e-003	0.2957	2.0000e-003	0.2977	0.0784	1.8400e-003	0.0803		265.1492	265.1492	7.2400e-003		265.3302
Total	**0.1945**	**2.0735**	**1.3927**	**8.7000e-003**	**0.5725**	**7.2100e-003**	**0.5798**	**0.1511**	**6.8200e-003**	**0.1579**		**924.9124**	**924.9124**	**0.0658**		**926.5566**

3.3 Grading/Excavation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7709	0.0000	0.7709	0.0868	0.0000	0.0868			0.0000			0.0000
Off-Road	3.6703	39.2896	27.8561	0.0710		1.5749	1.5749		1.4489	1.4489		6,876.4237	6,876.4237	2.2240		6,932.0231
Total	**3.6703**	**39.2896**	**27.8561**	**0.0710**	**0.7709**	**1.5749**	**2.3458**	**0.0868**	**1.4489**	**1.5357**		**6,876.4237**	**6,876.4237**	**2.2240**		**6,932.0231**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0307	0.9722	0.3678	4.3000e-003	0.1523	1.8500e-003	0.1541	0.0404	1.7700e-003	0.0421		474.4570	474.4570	0.0435		475.5450
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.1271	0.0756	0.7720	2.5600e-003	0.2957	1.9600e-003	0.2977	0.0784	1.8000e-003	0.0803		255.0226	255.0226	6.6200e-003		255.1881
Total	**0.1715**	**1.5003**	**1.2880**	**8.3800e-003**	**0.4886**	**4.3800e-003**	**0.4930**	**0.1305**	**4.1100e-003**	**0.1346**		**893.9213**	**893.9213**	**0.0618**		**895.4669**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3007	0.0000	0.3007	0.0338	0.0000	0.0338			0.0000			0.0000
Off-Road	3.6703	39.2896	27.8561	0.0710		1.5749	1.5749		1.4489	1.4489	0.0000	6,876.4237	6,876.4237	2.2240		6,932.0231
Total	**3.6703**	**39.2896**	**27.8561**	**0.0710**	**0.3007**	**1.5749**	**1.8755**	**0.0338**	**1.4489**	**1.4827**	**0.0000**	**6,876.4237**	**6,876.4237**	**2.2240**		**6,932.0231**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0307	0.9722	0.3678	4.3000e-003	0.1523	1.8500e-003	0.1541	0.0404	1.7700e-003	0.0421		474.4570	474.4570	0.0435		475.5450
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.1271	0.0756	0.7720	2.5600e-003	0.2957	1.9600e-003	0.2977	0.0784	1.8000e-003	0.0803		255.0226	255.0226	6.6200e-003		255.1881
Total	**0.1715**	**1.5003**	**1.2880**	**8.3800e-003**	**0.4886**	**4.3800e-003**	**0.4930**	**0.1305**	**4.1100e-003**	**0.1346**		**893.9213**	**893.9213**	**0.0618**		**895.4669**

3.4 Sewer Line Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5334	5.1785	7.3534	0.0109		0.2755	0.2755		0.2535	0.2535		1,055.3580	1,055.3580	0.3413		1,063.8911
Total	**0.5334**	**5.1785**	**7.3534**	**0.0109**		**0.2755**	**0.2755**		**0.2535**	**0.2535**		**1,055.3580**	**1,055.3580**	**0.3413**		**1,063.8911**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0178	0.5754	0.1642	1.5700e-003	0.0406	1.1500e-003	0.0418	0.0117	1.1000e-003	0.0128		168.6616	168.6616	0.0128		168.9826
Worker	0.0446	0.0276	0.2776	8.9000e-004	0.0986	6.7000e-004	0.0992	0.0262	6.1000e-004	0.0268		88.3831	88.3831	2.4100e-003		88.4434
Total	**0.0624**	**0.6030**	**0.4418**	**2.4600e-003**	**0.1392**	**1.8200e-003**	**0.1410**	**0.0378**	**1.7100e-003**	**0.0396**		**257.0446**	**257.0446**	**0.0153**		**257.4260**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5334	5.1785	7.3534	0.0109		0.2755	0.2755		0.2535	0.2535	0.0000	1,055.3580	1,055.3580	0.3413		1,063.8911
Total	**0.5334**	**5.1785**	**7.3534**	**0.0109**		**0.2755**	**0.2755**		**0.2535**	**0.2535**	**0.0000**	**1,055.3580**	**1,055.3580**	**0.3413**		**1,063.8911**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0178	0.5754	0.1642	1.5700e-003	0.0406	1.1500e-003	0.0418	0.0117	1.1000e-003	0.0128		168.6616	168.6616	0.0128		168.9826
Worker	0.0446	0.0276	0.2776	8.9000e-004	0.0986	6.7000e-004	0.0992	0.0262	6.1000e-004	0.0268		88.3831	88.3831	2.4100e-003		88.4434
Total	**0.0624**	**0.6030**	**0.4418**	**2.4600e-003**	**0.1392**	**1.8200e-003**	**0.1410**	**0.0378**	**1.7100e-003**	**0.0396**		**257.0446**	**257.0446**	**0.0153**		**257.4260**

3.4 Sewer Line Installation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4938	4.6944	7.3413	0.0109		0.2402	0.2402		0.2210	0.2210		1,055.7898	1,055.7898	0.3415		1,064.3264
Total	**0.4938**	**4.6944**	**7.3413**	**0.0109**		**0.2402**	**0.2402**		**0.2210**	**0.2210**		**1,055.7898**	**1,055.7898**	**0.3415**		**1,064.3264**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0424	0.0252	0.2573	8.5000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		85.0075	85.0075	2.2100e-003		85.0627
Total	**0.0561**	**0.4777**	**0.4056**	**2.3700e-003**	**0.1392**	**1.2200e-003**	**0.1404**	**0.0378**	**1.1400e-003**	**0.0390**		**249.4491**	**249.4491**	**0.0139**		**249.7965**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4938	4.6944	7.3413	0.0109		0.2402	0.2402		0.2210	0.2210	0.0000	1,055.7898	1,055.7898	0.3415		1,064.3264
Total	**0.4938**	**4.6944**	**7.3413**	**0.0109**		**0.2402**	**0.2402**		**0.2210**	**0.2210**	**0.0000**	**1,055.7898**	**1,055.7898**	**0.3415**		**1,064.3264**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0424	0.0252	0.2573	8.5000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		85.0075	85.0075	2.2100e-003		85.0627
Total	**0.0561**	**0.4777**	**0.4056**	**2.3700e-003**	**0.1392**	**1.2200e-003**	**0.1404**	**0.0378**	**1.1400e-003**	**0.0390**		**249.4491**	**249.4491**	**0.0139**		**249.7965**

3.5 Drainage/Utilities/Subgrade - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1669	10.5956	15.0095	0.0230		0.5260	0.5260		0.5017	0.5017		2,204.6046	2,204.6046	0.4400		2,215.6047
Total	**1.1669**	**10.5956**	**15.0095**	**0.0230**		**0.5260**	**0.5260**		**0.5017**	**0.5017**		**2,204.6046**	**2,204.6046**	**0.4400**		**2,215.6047**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0847	0.0504	0.5147	1.7100e-003	0.1972	1.3100e-003	0.1985	0.0523	1.2000e-003	0.0535		170.0151	170.0151	4.4100e-003		170.1254
Total	**0.0984**	**0.5029**	**0.6629**	**3.2300e-003**	**0.2378**	**1.8800e-003**	**0.2396**	**0.0640**	**1.7400e-003**	**0.0657**		**334.4567**	**334.4567**	**0.0161**		**334.8592**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1669	10.5956	15.0095	0.0230		0.5260	0.5260		0.5017	0.5017	0.0000	2,204.6046	2,204.6046	0.4400		2,215.6047
Total	**1.1669**	**10.5956**	**15.0095**	**0.0230**		**0.5260**	**0.5260**		**0.5017**	**0.5017**	**0.0000**	**2,204.6046**	**2,204.6046**	**0.4400**		**2,215.6047**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0847	0.0504	0.5147	1.7100e-003	0.1972	1.3100e-003	0.1985	0.0523	1.2000e-003	0.0535		170.0151	170.0151	4.4100e-003		170.1254
Total	**0.0984**	**0.5029**	**0.6629**	**3.2300e-003**	**0.2378**	**1.8800e-003**	**0.2396**	**0.0640**	**1.7400e-003**	**0.0657**		**334.4567**	**334.4567**	**0.0161**		**334.8592**

3.6 Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5232	14.2188	15.8156	0.0271		0.7116	0.7116		0.6725	0.6725		2,604.3634	2,604.3634	0.5693		2,618.5957
Total	**1.5232**	**14.2188**	**15.8156**	**0.0271**		**0.7116**	**0.7116**		**0.6725**	**0.6725**		**2,604.3634**	**2,604.3634**	**0.5693**		**2,618.5957**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0192	0.6085	0.2302	2.6900e-003	0.0730	1.1600e-003	0.0742	0.0198	1.1100e-003	0.0209		296.9949	296.9949	0.0272		297.6760
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.1129	0.0672	0.6862	2.2700e-003	0.2629	1.7400e-003	0.2646	0.0697	1.6000e-003	0.0713		226.6868	226.6868	5.8800e-003		226.8338
Total	**0.1459**	**1.1282**	**1.0647**	**6.4800e-003**	**0.3765**	**3.4700e-003**	**0.3800**	**0.1012**	**3.2500e-003**	**0.1045**		**688.1233**	**688.1233**	**0.0448**		**689.2436**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5232	14.2188	15.8156	0.0271		0.7116	0.7116		0.6725	0.6725	0.0000	2,604.3634	2,604.3634	0.5693		2,618.5957
Total	**1.5232**	**14.2188**	**15.8156**	**0.0271**		**0.7116**	**0.7116**		**0.6725**	**0.6725**	**0.0000**	**2,604.3634**	**2,604.3634**	**0.5693**		**2,618.5957**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0192	0.6085	0.2302	2.6900e-003	0.0730	1.1600e-003	0.0742	0.0198	1.1100e-003	0.0209		296.9949	296.9949	0.0272		297.6760
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.1129	0.0672	0.6862	2.2700e-003	0.2629	1.7400e-003	0.2646	0.0697	1.6000e-003	0.0713		226.6868	226.6868	5.8800e-003		226.8338
Total	**0.1459**	**1.1282**	**1.0647**	**6.4800e-003**	**0.3765**	**3.4700e-003**	**0.3800**	**0.1012**	**3.2500e-003**	**0.1045**		**688.1233**	**688.1233**	**0.0448**		**689.2436**

3.6 Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4283	13.2210	15.7412	0.0271		0.6238	0.6238		0.5892	0.5892		2,604.7319	2,604.7319	0.5659		2,618.8794
Total	**1.4283**	**13.2210**	**15.7412**	**0.0271**		**0.6238**	**0.6238**		**0.5892**	**0.5892**		**2,604.7319**	**2,604.7319**	**0.5659**		**2,618.8794**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0189	0.5931	0.2321	2.6700e-003	0.3930	1.1300e-003	0.3942	0.0983	1.0800e-003	0.0994		294.9533	294.9533	0.0274		295.6370
Vendor	0.0132	0.4462	0.1436	1.5100e-003	0.0406	5.5000e-004	0.0412	0.0117	5.2000e-004	0.0122		163.4141	163.4141	0.0115		163.7026
Worker	0.1076	0.0616	0.6406	2.1800e-003	0.2629	1.7100e-003	0.2646	0.0697	1.5700e-003	0.0713		217.7638	217.7638	5.4000e-003		217.8988
Total	**0.1397**	**1.1010**	**1.0162**	**6.3600e-003**	**0.6965**	**3.3900e-003**	**0.6999**	**0.1798**	**3.1700e-003**	**0.1830**		**676.1312**	**676.1312**	**0.0443**		**677.2384**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4283	13.2210	15.7412	0.0271		0.6238	0.6238		0.5892	0.5892	0.0000	2,604.7319	2,604.7319	0.5659		2,618.8794
Total	**1.4283**	**13.2210**	**15.7412**	**0.0271**		**0.6238**	**0.6238**		**0.5892**	**0.5892**	**0.0000**	**2,604.7319**	**2,604.7319**	**0.5659**		**2,618.8794**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0189	0.5931	0.2321	2.6700e-003	0.3930	1.1300e-003	0.3942	0.0983	1.0800e-003	0.0994		294.9533	294.9533	0.0274		295.6370
Vendor	0.0132	0.4462	0.1436	1.5100e-003	0.0406	5.5000e-004	0.0412	0.0117	5.2000e-004	0.0122		163.4141	163.4141	0.0115		163.7026
Worker	0.1076	0.0616	0.6406	2.1800e-003	0.2629	1.7100e-003	0.2646	0.0697	1.5700e-003	0.0713		217.7638	217.7638	5.4000e-003		217.8988
Total	**0.1397**	**1.1010**	**1.0162**	**6.3600e-003**	**0.6965**	**3.3900e-003**	**0.6999**	**0.1798**	**3.1700e-003**	**0.1830**		**676.1312**	**676.1312**	**0.0443**		**677.2384**

3.7 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5164	5.0958	7.2921	0.0114		0.2551	0.2551		0.2347	0.2347		1,103.7921	1,103.7921	0.3570		1,112.7168
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6916**	**5.0958**	**7.2921**	**0.0114**		**0.2551**	**0.2551**		**0.2347**	**0.2347**		**1,103.7921**	**1,103.7921**	**0.3570**		**1,112.7168**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0424	0.0252	0.2573	8.5000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		85.0075	85.0075	2.2100e-003		85.0627
Total	**0.0561**	**0.4777**	**0.4056**	**2.3700e-003**	**0.1392**	**1.2200e-003**	**0.1404**	**0.0378**	**1.1400e-003**	**0.0390**		**249.4491**	**249.4491**	**0.0139**		**249.7965**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5164	5.0958	7.2921	0.0114		0.2551	0.2551		0.2347	0.2347	0.0000	1,103.7921	1,103.7921	0.3570		1,112.7168
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6916**	**5.0958**	**7.2921**	**0.0114**		**0.2551**	**0.2551**		**0.2347**	**0.2347**	**0.0000**	**1,103.7921**	**1,103.7921**	**0.3570**		**1,112.7168**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0424	0.0252	0.2573	8.5000e-004	0.0986	6.5000e-004	0.0992	0.0262	6.0000e-004	0.0268		85.0075	85.0075	2.2100e-003		85.0627
Total	**0.0561**	**0.4777**	**0.4056**	**2.3700e-003**	**0.1392**	**1.2200e-003**	**0.1404**	**0.0378**	**1.1400e-003**	**0.0390**		**249.4491**	**249.4491**	**0.0139**		**249.7965**

3.7 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4941	4.7623	7.3129	0.0114		0.2343	0.2343		0.2155	0.2155		1,103.7736	1,103.7736	0.3570		1,112.6982
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6693**	**4.7623**	**7.3129**	**0.0114**		**0.2343**	**0.2343**		**0.2155**	**0.2155**		**1,103.7736**	**1,103.7736**	**0.3570**		**1,112.6982**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0132	0.4462	0.1436	1.5100e-003	0.0406	5.5000e-004	0.0412	0.0117	5.2000e-004	0.0122		163.4141	163.4141	0.0115		163.7026
Worker	0.0404	0.0231	0.2402	8.2000e-004	0.0986	6.4000e-004	0.0992	0.0262	5.9000e-004	0.0267		81.6614	81.6614	2.0300e-003		81.7121
Total	**0.0536**	**0.4693**	**0.3838**	**2.3300e-003**	**0.1392**	**1.1900e-003**	**0.1404**	**0.0378**	**1.1100e-003**	**0.0390**		**245.0756**	**245.0756**	**0.0136**		**245.4146**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4941	4.7623	7.3129	0.0114		0.2343	0.2343		0.2155	0.2155	0.0000	1,103.7736	1,103.7736	0.3570		1,112.6982
Paving	0.1753					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6693**	**4.7623**	**7.3129**	**0.0114**		**0.2343**	**0.2343**		**0.2155**	**0.2155**	**0.0000**	**1,103.7736**	**1,103.7736**	**0.3570**		**1,112.6982**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0132	0.4462	0.1436	1.5100e-003	0.0406	5.5000e-004	0.0412	0.0117	5.2000e-004	0.0122		163.4141	163.4141	0.0115		163.7026
Worker	0.0404	0.0231	0.2402	8.2000e-004	0.0986	6.4000e-004	0.0992	0.0262	5.9000e-004	0.0267		81.6614	81.6614	2.0300e-003		81.7121
Total	**0.0536**	**0.4693**	**0.3838**	**2.3300e-003**	**0.1392**	**1.1900e-003**	**0.1404**	**0.0378**	**1.1100e-003**	**0.0390**		**245.0756**	**245.0756**	**0.0136**		**245.4146**

3.8 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944		375.2641	375.2641	0.0225		375.8253
Total	**12.5555**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**		**375.2641**	**375.2641**	**0.0225**		**375.8253**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0141	8.4000e-003	0.0858	2.8000e-004	0.0329	2.2000e-004	0.0331	8.7200e-003	2.0000e-004	8.9200e-003		28.3359	28.3359	7.4000e-004		28.3542
Total	**0.0279**	**0.4609**	**0.2341**	**1.8000e-003**	**0.0735**	**7.9000e-004**	**0.0743**	**0.0204**	**7.4000e-004**	**0.0212**		**192.7775**	**192.7775**	**0.0124**		**193.0881**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944	0.0000	375.2641	375.2641	0.0225		375.8253
Total	**12.5555**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**	**0.0000**	**375.2641**	**375.2641**	**0.0225**		**375.8253**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0137	0.4525	0.1483	1.5200e-003	0.0406	5.7000e-004	0.0412	0.0117	5.4000e-004	0.0122		164.4416	164.4416	0.0117		164.7338
Worker	0.0141	8.4000e-003	0.0858	2.8000e-004	0.0329	2.2000e-004	0.0331	8.7200e-003	2.0000e-004	8.9200e-003		28.3359	28.3359	7.4000e-004		28.3542
Total	**0.0279**	**0.4609**	**0.2341**	**1.8000e-003**	**0.0735**	**7.9000e-004**	**0.0743**	**0.0204**	**7.4000e-004**	**0.0212**		**192.7775**	**192.7775**	**0.0124**		**193.0881**

3.8 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812		375.2641	375.2641	0.0211		375.7923
Total	**12.5410**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**		**375.2641**	**375.2641**	**0.0211**		**375.7923**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0132	0.4462	0.1436	1.5100e-003	0.0406	5.5000e-004	0.0412	0.0117	5.2000e-004	0.0122		163.4141	163.4141	0.0115		163.7026
Worker	0.0135	7.7000e-003	0.0801	2.7000e-004	0.0329	2.1000e-004	0.0331	8.7200e-003	2.0000e-004	8.9100e-003		27.2205	27.2205	6.8000e-004		27.2374
Total	**0.0267**	**0.4539**	**0.2236**	**1.7800e-003**	**0.0735**	**7.6000e-004**	**0.0742**	**0.0204**	**7.2000e-004**	**0.0211**		**190.6346**	**190.6346**	**0.0122**		**190.9399**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.3000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812	0.0000	375.2641	375.2641	0.0211		375.7923
Total	**12.5410**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**	**0.0000**	**375.2641**	**375.2641**	**0.0211**		**375.7923**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0132	0.4462	0.1436	1.5100e-003	0.0406	5.5000e-004	0.0412	0.0117	5.2000e-004	0.0122		163.4141	163.4141	0.0115		163.7026
Worker	0.0135	7.7000e-003	0.0801	2.7000e-004	0.0329	2.1000e-004	0.0331	8.7200e-003	2.0000e-004	8.9100e-003		27.2205	27.2205	6.8000e-004		27.2374
Total	**0.0267**	**0.4539**	**0.2236**	**1.7800e-003**	**0.0735**	**7.6000e-004**	**0.0742**	**0.0204**	**7.2000e-004**	**0.0211**		**190.6346**	**190.6346**	**0.0122**		**190.9399**

Construction Emissions

Construction Year	**$MTCO_2e$/year**
2022	285
2023	798
2024	55
Total	**1,137**
30-year Amortization	**38**

Alpine Park Project-Construction

San Diego County APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	131.20	1000sqft	3.01	131,200.00	0
City Park	22.55	Acre	22.55	982,278.00	0
Health Club	7.32	1000sqft	0.17	7,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2023
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Health club land used was used to represent park amenities that include buidlings.

Trips and VMT - Water trucks included for dust control.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	7320	2570
tblAreaCoating	Area_Nonresidential_Interior	21960	7710
tblConstructionPhase	NumDays	440.00	174.00
tblConstructionPhase	NumDays	440.00	89.00
tblConstructionPhase	NumDays	440.00	175.00
tblConstructionPhase	NumDays	45.00	173.00
tblConstructionPhase	NumDays	35.00	45.00
tblConstructionPhase	NumDays	20.00	10.00
tblFleetMix	HHD	0.02	0.00
tblFleetMix	LDA	0.60	0.00
tblFleetMix	LDT1	0.04	0.00
tblFleetMix	LDT2	0.18	0.00
tblFleetMix	LHD1	0.01	0.00
tblFleetMix	LHD2	5.4350e-003	0.00
tblFleetMix	MCY	5.9380e-003	0.00
tblFleetMix	MDV	0.10	0.00
tblFleetMix	MH	1.0560e-003	0.00
tblFleetMix	MHD	0.02	0.00
tblFleetMix	OBUS	1.9340e-003	0.00
tblFleetMix	SBUS	7.5700e-004	0.00
tblFleetMix	UBUS	1.8880e-003	0.00
tblGrading	AcresOfGrading	605.50	112.50
tblGrading	MaterialExported	0.00	45,900.00
tblGrading	MaterialImported	0.00	54,144.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblSolidWaste	SolidWasteGenerationRate	1.94	1.95
tblTripsAndVMT	HaulingTripNumber	12,506.00	1,036.00
tblTripsAndVMT	HaulingTripNumber	0.00	656.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	184.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	WorkerTripNumber	10.00	16.00
tblTripsAndVMT	WorkerTripNumber	23.00	36.00
tblTripsAndVMT	WorkerTripNumber	471.00	12.00
tblTripsAndVMT	WorkerTripNumber	471.00	24.00
tblTripsAndVMT	WorkerTripNumber	471.00	32.00
tblTripsAndVMT	WorkerTripNumber	8.00	12.00
tblTripsAndVMT	WorkerTripNumber	94.00	4.00
tblWater	OutdoorWaterUseRate	26,867,904.43	27,070,456.26

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1617	1.7920	1.2802	3.1900e-003	0.0981	0.0701	0.1682	0.0146	0.0645	0.0791	0.0000	283.0933	283.0933	0.0821	0.0000	285.1469
2023	0.5016	4.2213	4.0748	8.9300e-003	0.1401	0.1797	0.3198	0.0273	0.1675	0.1948	0.0000	792.7016	792.7016	0.1941	0.0000	797.5532
2024	0.1706	0.2490	0.3113	6.1000e-004	0.0102	0.0109	0.0211	2.6700e-003	0.0103	0.0129	0.0000	54.3472	54.3472	0.0106	0.0000	54.6113
Maximum	**0.5016**	**4.2213**	**4.0748**	**8.9300e-003**	**0.1401**	**0.1797**	**0.3198**	**0.0273**	**0.1675**	**0.1948**	**0.0000**	**792.7016**	**792.7016**	**0.1941**	**0.0000**	**797.5532**

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	0.1617	1.7920	1.2802	3.1900e-003	0.0525	0.0701	0.1227	9.5000e-003	0.0645	0.0740	0.0000	283.0930	283.0930	0.0821	0.0000	285.1466
2023	0.5016	4.2213	4.0748	8.9300e-003	0.0994	0.1797	0.2791	0.0227	0.1675	0.1902	0.0000	792.7008	792.7008	0.1941	0.0000	797.5524
2024	0.1706	0.2490	0.3113	6.1000e-004	0.0102	0.0109	0.0211	2.6700e-003	0.0103	0.0129	0.0000	54.3471	54.3471	0.0106	0.0000	54.6113
Maximum	**0.5016**	**4.2213**	**4.0748**	**8.9300e-003**	**0.0994**	**0.1797**	**0.2791**	**0.0227**	**0.1675**	**0.1902**	**0.0000**	**792.7008**	**792.7008**	**0.1941**	**0.0000**	**797.5524**

	ROG	**NOx**	**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**	**34.71**	**0.00**	**16.94**	**21.73**	**0.00**	**3.38**	**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)**
3	**7-3-2022**	**10-2-2022**	0.0563	0.0563
4	**10-3-2022**	**1-2-2023**	1.9613	1.9613
5	**1-3-2023**	**4-2-2023**	1.6185	1.6185
6	**4-3-2023**	**7-2-2023**	1.5344	1.5344
7	**7-3-2023**	**10-2-2023**	0.8230	0.8230
8	**10-3-2023**	**1-2-2024**	0.7403	0.7403
9	**1-3-2024**	**4-2-2024**	0.3779	0.3779
		Highest	1.9613	1.9613

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grubbing/Land Clearing	Site Preparation	10/1/2022	10/15/2022	5	10	
2	Grading/Excavation	Grading	10/1/2022	5/31/2023	5	173	
3	Sewer Line Installation	Building Construction	10/1/2022	6/1/2023	5	174	
4	Drainage/Utilities/Subgrade	Building Construction	5/1/2023	8/31/2023	5	89	
5	Construction	Building Construction	6/1/2023	1/31/2024	5	175	
6	Paving	Paving	11/30/2023	1/31/2024	5	45	
7	Architectural Coating	Architectural Coating	12/14/2023	1/31/2024	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 3.01

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 21,960; Non-Residential Outdoor: 7,320; Striped Parking Area:

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grubbing/Land Clearing	Crawler Tractors	3	8.00	212	0.43
Grubbing/Land Clearing	Excavators	1	8.00	158	0.38
Grading/Excavation	Crawler Tractors	3	8.00	212	0.43
Grading/Excavation	Excavators	1	8.00	158	0.38
Grading/Excavation	Rollers	1	8.00	80	0.38
Grading/Excavation	Rubber Tired Loaders	1	8.00	203	0.36
Grading/Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading/Excavation	Scrapers	2	8.00	367	0.48
Drainage/Utilities/Subgrade	Air Compressors	1	8.00	78	0.48
Drainage/Utilities/Subgrade	Generator Sets	1	8.00	84	0.74
Drainage/Utilities/Subgrade	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Sewer Line Installation	Excavators	1	8.00	158	0.38
Sewer Line Installation	Rollers	1	8.00	80	0.38
Sewer Line Installation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Construction	Air Compressors	1	8.00	78	0.48
Construction	Cranes	1	8.00	231	0.29
Construction	Forklifts	3	8.00	89	0.20
Construction	Generator Sets	1	8.00	84	0.74
Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	8.00	80	0.38
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grubbing/Land Clearing	4	16.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading/Excavation	9	36.00	6.00	1,036.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Drainage/Utilities/Subgrade	6	24.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Sewer Line Installation	3	12.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction	8	32.00	6.00	656.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	3	12.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	4.00	6.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grubbing/Land Clearing - 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					7.9500e-003	0.0000	7.9500e-003	8.6000e-004	0.0000	8.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.3900e-003	0.0990	0.0510	1.4000e-004		3.8300e-003	3.8300e-003		3.5200e-003	3.5200e-003	0.0000	12.5968	12.5968	4.0700e-003	0.0000	12.6986
Total	**8.3900e-003**	**0.0990**	**0.0510**	**1.4000e-004**	**7.9500e-003**	**3.8300e-003**	**0.0118**	**8.6000e-004**	**3.5200e-003**	**4.3800e-003**	**0.0000**	**12.5968**	**12.5968**	**4.0700e-003**	**0.0000**	**12.6986**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.0000e-005	2.9100e-003	7.8000e-004	1.0000e-005	2.0000e-004	1.0000e-005	2.0000e-004	6.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.7769	0.7769	6.0000e-005	0.0000	0.7783
Worker	2.6000e-004	1.8000e-004	1.8600e-003	1.0000e-005	6.4000e-004	0.0000	6.5000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5399	0.5399	1.0000e-005	0.0000	0.5402
Total	**3.5000e-004**	**3.0900e-003**	**2.6400e-003**	**2.0000e-005**	**8.4000e-004**	**1.0000e-005**	**8.5000e-004**	**2.3000e-004**	**1.0000e-005**	**2.3000e-004**	**0.0000**	**1.3168**	**1.3168**	**7.0000e-005**	**0.0000**	**1.3185**

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					3.1000e-003	0.0000	3.1000e-003	3.3000e-004	0.0000	3.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.3900e-003	0.0990	0.0510	1.4000e-004		3.8300e-003	3.8300e-003		3.5200e-003	3.5200e-003	0.0000	12.5968	12.5968	4.0700e-003	0.0000	12.6986
Total	**8.3900e-003**	**0.0990**	**0.0510**	**1.4000e-004**	**3.1000e-003**	**3.8300e-003**	**6.9300e-003**	**3.3000e-004**	**3.5200e-003**	**3.8500e-003**	**0.0000**	**12.5968**	**12.5968**	**4.0700e-003**	**0.0000**	**12.6986**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.0000e-005	2.9100e-003	7.8000e-004	1.0000e-005	2.0000e-004	1.0000e-005	2.0000e-004	6.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.7769	0.7769	6.0000e-005	0.0000	0.7783
Worker	2.6000e-004	1.8000e-004	1.8600e-003	1.0000e-005	6.4000e-004	0.0000	6.5000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5399	0.5399	1.0000e-005	0.0000	0.5402
Total	**3.5000e-004**	**3.0900e-003**	**2.6400e-003**	**2.0000e-005**	**8.4000e-004**	**1.0000e-005**	**8.5000e-004**	**2.3000e-004**	**1.0000e-005**	**2.3000e-004**	**0.0000**	**1.3168**	**1.3168**	**7.0000e-005**	**0.0000**	**1.3185**

3.3 Grading/Excavation - 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					0.0667	0.0000	0.0667	7.5100e-003	0.0000	7.5100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1280	1.4337	0.9289	2.3100e-003		0.0571	0.0571		0.0525	0.0525	0.0000	202.8084	202.8084	0.0656	0.0000	204.4482
Total	**0.1280**	**1.4337**	**0.9289**	**2.3100e-003**	**0.0667**	**0.0571**	**0.1237**	**7.5100e-003**	**0.0525**	**0.0600**	**0.0000**	**202.8084**	**202.8084**	**0.0656**	**0.0000**	**204.4482**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.3700e-003	0.0465	0.0125	1.5000e-004	7.4900e-003	1.3000e-004	7.6200e-003	1.9400e-003	1.2000e-004	2.0600e-003	0.0000	14.6286	14.6286	1.3200e-003	0.0000	14.6617
Vendor	5.6000e-004	0.0189	5.0600e-003	5.0000e-005	1.2900e-003	4.0000e-005	1.3300e-003	3.7000e-004	3.0000e-005	4.1000e-004	0.0000	5.0498	5.0498	3.7000e-004	0.0000	5.0590
Worker	3.8500e-003	2.6500e-003	0.0271	9.0000e-005	9.3800e-003	6.0000e-005	9.4500e-003	2.4900e-003	6.0000e-005	2.5500e-003	0.0000	7.8957	7.8957	2.2000e-004	0.0000	7.9010
Total	**5.7800e-003**	**0.0680**	**0.0447**	**2.9000e-004**	**0.0182**	**2.3000e-004**	**0.0184**	**4.8000e-003**	**2.1000e-004**	**5.0200e-003**	**0.0000**	**27.5740**	**27.5740**	**1.9100e-003**	**0.0000**	**27.6217**

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					0.0260	0.0000	0.0260	2.9300e-003	0.0000	2.9300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1280	1.4337	0.9289	2.3100e-003		0.0571	0.0571		0.0525	0.0525	0.0000	202.8082	202.8082	0.0656	0.0000	204.4480
Total	**0.1280**	**1.4337**	**0.9289**	**2.3100e-003**	**0.0260**	**0.0571**	**0.0831**	**2.9300e-003**	**0.0525**	**0.0554**	**0.0000**	**202.8082**	**202.8082**	**0.0656**	**0.0000**	**204.4480**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.3700e-003	0.0465	0.0125	1.5000e-004	7.4900e-003	1.3000e-004	7.6200e-003	1.9400e-003	1.2000e-004	2.0600e-003	0.0000	14.6286	14.6286	1.3200e-003	0.0000	14.6617
Vendor	5.6000e-004	0.0189	5.0600e-003	5.0000e-005	1.2900e-003	4.0000e-005	1.3300e-003	3.7000e-004	3.0000e-005	4.1000e-004	0.0000	5.0498	5.0498	3.7000e-004	0.0000	5.0590
Worker	3.8500e-003	2.6500e-003	0.0271	9.0000e-005	9.3800e-003	6.0000e-005	9.4500e-003	2.4900e-003	6.0000e-005	2.5500e-003	0.0000	7.8957	7.8957	2.2000e-004	0.0000	7.9010
Total	**5.7800e-003**	**0.0680**	**0.0447**	**2.9000e-004**	**0.0182**	**2.3000e-004**	**0.0184**	**4.8000e-003**	**2.1000e-004**	**5.0200e-003**	**0.0000**	**27.5740**	**27.5740**	**1.9100e-003**	**0.0000**	**27.6217**

3.3 Grading/Excavation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0667	0.0000	0.0667	7.5100e-003	0.0000	7.5100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1982	2.1216	1.5042	3.8400e-003		0.0850	0.0850		0.0782	0.0782	0.0000	336.8621	336.8621	0.1090	0.0000	339.5858
Total	**0.1982**	**2.1216**	**1.5042**	**3.8400e-003**	**0.0667**	**0.0850**	**0.1517**	**7.5100e-003**	**0.0782**	**0.0858**	**0.0000**	**336.8621**	**336.8621**	**0.1090**	**0.0000**	**339.5858**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.6300e-003	0.0531	0.0194	2.3000e-004	8.0400e-003	1.0000e-004	8.1300e-003	2.1300e-003	9.0000e-005	2.2300e-003	0.0000	23.4817	23.4817	2.1000e-003	0.0000	23.5342
Vendor	7.2000e-004	0.0247	7.6600e-003	8.0000e-005	2.1500e-003	3.0000e-005	2.1800e-003	6.2000e-004	3.0000e-005	6.5000e-004	0.0000	8.1792	8.1792	5.6000e-004	0.0000	8.1931
Worker	6.0600e-003	4.0100e-003	0.0418	1.4000e-004	0.0156	1.1000e-004	0.0157	4.1400e-003	1.0000e-004	4.2400e-003	0.0000	12.6178	12.6178	3.3000e-004	0.0000	12.6260
Total	**8.4100e-003**	**0.0818**	**0.0689**	**4.5000e-004**	**0.0258**	**2.4000e-004**	**0.0260**	**6.8900e-003**	**2.2000e-004**	**7.1200e-003**	**0.0000**	**44.2788**	**44.2788**	**2.9900e-003**	**0.0000**	**44.3534**

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					0.0260	0.0000	0.0260	2.9300e-003	0.0000	2.9300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1982	2.1216	1.5042	3.8400e-003		0.0850	0.0850		0.0782	0.0782	0.0000	336.8617	336.8617	0.1090	0.0000	339.5854
Total	**0.1982**	**2.1216**	**1.5042**	**3.8400e-003**	**0.0260**	**0.0850**	**0.1111**	**2.9300e-003**	**0.0782**	**0.0812**	**0.0000**	**336.8617**	**336.8617**	**0.1090**	**0.0000**	**339.5854**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.6300e-003	0.0531	0.0194	2.3000e-004	8.0400e-003	1.0000e-004	8.1300e-003	2.1300e-003	9.0000e-005	2.2300e-003	0.0000	23.4817	23.4817	2.1000e-003	0.0000	23.5342
Vendor	7.2000e-004	0.0247	7.6600e-003	8.0000e-005	2.1500e-003	3.0000e-005	2.1800e-003	6.2000e-004	3.0000e-005	6.5000e-004	0.0000	8.1792	8.1792	5.6000e-004	0.0000	8.1931
Worker	6.0600e-003	4.0100e-003	0.0418	1.4000e-004	0.0156	1.1000e-004	0.0157	4.1400e-003	1.0000e-004	4.2400e-003	0.0000	12.6178	12.6178	3.3000e-004	0.0000	12.6260
Total	**8.4100e-003**	**0.0818**	**0.0689**	**4.5000e-004**	**0.0258**	**2.4000e-004**	**0.0260**	**6.8900e-003**	**2.2000e-004**	**7.1200e-003**	**0.0000**	**44.2788**	**44.2788**	**2.9900e-003**	**0.0000**	**44.3534**

3.4 Sewer Line Installation - 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	0.0173	0.1683	0.2390	3.5000e-004		8.9500e-003	8.9500e-003		8.2400e-003	8.2400e-003	0.0000	31.1157	31.1157	0.0101	0.0000	31.3672
Total	**0.0173**	**0.1683**	**0.2390**	**3.5000e-004**		**8.9500e-003**	**8.9500e-003**		**8.2400e-003**	**8.2400e-003**	**0.0000**	**31.1157**	**31.1157**	**0.0101**	**0.0000**	**31.3672**

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	5.6000e-004	0.0189	5.0600e-003	5.0000e-005	1.2900e-003	4.0000e-005	1.3300e-003	3.7000e-004	3.0000e-005	4.1000e-004	0.0000	5.0498	5.0498	3.7000e-004	0.0000	5.0590
Worker	1.2800e-003	8.8000e-004	9.0500e-003	3.0000e-005	3.1300e-003	2.0000e-005	3.1500e-003	8.3000e-004	2.0000e-005	8.5000e-004	0.0000	2.6319	2.6319	7.0000e-005	0.0000	2.6337
Total	**1.8400e-003**	**0.0198**	**0.0141**	**8.0000e-005**	**4.4200e-003**	**6.0000e-005**	**4.4800e-003**	**1.2000e-003**	**5.0000e-005**	**1.2600e-003**	**0.0000**	**7.6817**	**7.6817**	**4.4000e-004**	**0.0000**	**7.6927**

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	0.0173	0.1683	0.2390	3.5000e-004		8.9500e-003	8.9500e-003		8.2400e-003	8.2400e-003	0.0000	31.1156	31.1156	0.0101	0.0000	31.3672
Total	**0.0173**	**0.1683**	**0.2390**	**3.5000e-004**		**8.9500e-003**	**8.9500e-003**		**8.2400e-003**	**8.2400e-003**	**0.0000**	**31.1156**	**31.1156**	**0.0101**	**0.0000**	**31.3672**

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	5.6000e-004	0.0189	5.0600e-003	5.0000e-005	1.2900e-003	4.0000e-005	1.3300e-003	3.7000e-004	3.0000e-005	4.1000e-004	0.0000	5.0498	5.0498	3.7000e-004	0.0000	5.0590
Worker	1.2800e-003	8.8000e-004	9.0500e-003	3.0000e-005	3.1300e-003	2.0000e-005	3.1500e-003	8.3000e-004	2.0000e-005	8.5000e-004	0.0000	2.6319	2.6319	7.0000e-005	0.0000	2.6337
Total	**1.8400e-003**	**0.0198**	**0.0141**	**8.0000e-005**	**4.4200e-003**	**6.0000e-005**	**4.4800e-003**	**1.2000e-003**	**5.0000e-005**	**1.2600e-003**	**0.0000**	**7.6817**	**7.6817**	**4.4000e-004**	**0.0000**	**7.6927**

3.4 Sewer Line Installation - 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	0.0269	0.2559	0.4001	5.9000e-004		0.0131	0.0131		0.0120	0.0120	0.0000	52.1999	52.1999	0.0169	0.0000	52.6220
Total	**0.0269**	**0.2559**	**0.4001**	**5.9000e-004**		**0.0131**	**0.0131**		**0.0120**	**0.0120**	**0.0000**	**52.1999**	**52.1999**	**0.0169**	**0.0000**	**52.6220**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.3000e-004	0.0249	7.7300e-003	8.0000e-005	2.1700e-003	3.0000e-005	2.2000e-003	6.3000e-004	3.0000e-005	6.6000e-004	0.0000	8.2550	8.2550	5.6000e-004	0.0000	8.2690
Worker	2.0400e-003	1.3500e-003	0.0141	5.0000e-005	5.2400e-003	4.0000e-005	5.2800e-003	1.3900e-003	3.0000e-005	1.4300e-003	0.0000	4.2449	4.2449	1.1000e-004	0.0000	4.2476
Total	**2.7700e-003**	**0.0263**	**0.0218**	**1.3000e-004**	**7.4100e-003**	**7.0000e-005**	**7.4800e-003**	**2.0200e-003**	**6.0000e-005**	**2.0900e-003**	**0.0000**	**12.4998**	**12.4998**	**6.7000e-004**	**0.0000**	**12.5166**

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	0.0269	0.2559	0.4001	5.9000e-004		0.0131	0.0131		0.0120	0.0120	0.0000	52.1998	52.1998	0.0169	0.0000	52.6219
Total	**0.0269**	**0.2559**	**0.4001**	**5.9000e-004**		**0.0131**	**0.0131**		**0.0120**	**0.0120**	**0.0000**	**52.1998**	**52.1998**	**0.0169**	**0.0000**	**52.6219**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.3000e-004	0.0249	7.7300e-003	8.0000e-005	2.1700e-003	3.0000e-005	2.2000e-003	6.3000e-004	3.0000e-005	6.6000e-004	0.0000	8.2550	8.2550	5.6000e-004	0.0000	8.2690
Worker	2.0400e-003	1.3500e-003	0.0141	5.0000e-005	5.2400e-003	4.0000e-005	5.2800e-003	1.3900e-003	3.0000e-005	1.4300e-003	0.0000	4.2449	4.2449	1.1000e-004	0.0000	4.2476
Total	**2.7700e-003**	**0.0263**	**0.0218**	**1.3000e-004**	**7.4100e-003**	**7.0000e-005**	**7.4800e-003**	**2.0200e-003**	**6.0000e-005**	**2.0900e-003**	**0.0000**	**12.4998**	**12.4998**	**6.7000e-004**	**0.0000**	**12.5166**

3.5 Drainage/Utilities/Subgrade - 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	0.0519	0.4715	0.6679	1.0200e-003		0.0234	0.0234		0.0223	0.0223	0.0000	88.9993	88.9993	0.0178	0.0000	89.4433
Total	**0.0519**	**0.4715**	**0.6679**	**1.0200e-003**		**0.0234**	**0.0234**		**0.0223**	**0.0223**	**0.0000**	**88.9993**	**88.9993**	**0.0178**	**0.0000**	**89.4433**

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	5.9000e-004	0.0204	6.3100e-003	7.0000e-005	1.7700e-003	2.0000e-005	1.8000e-003	5.1000e-004	2.0000e-005	5.3000e-004	0.0000	6.7403	6.7403	4.6000e-004	0.0000	6.7517
Worker	3.3300e-003	2.2000e-003	0.0230	8.0000e-005	8.5600e-003	6.0000e-005	8.6200e-003	2.2800e-003	5.0000e-005	2.3300e-003	0.0000	6.9320	6.9320	1.8000e-004	0.0000	6.9365
Total	**3.9200e-003**	**0.0226**	**0.0293**	**1.5000e-004**	**0.0103**	**8.0000e-005**	**0.0104**	**2.7900e-003**	**7.0000e-005**	**2.8600e-003**	**0.0000**	**13.6723**	**13.6723**	**6.4000e-004**	**0.0000**	**13.6883**

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	0.0519	0.4715	0.6679	1.0200e-003		0.0234	0.0234		0.0223	0.0223	0.0000	88.9992	88.9992	0.0178	0.0000	89.4432
Total	**0.0519**	**0.4715**	**0.6679**	**1.0200e-003**		**0.0234**	**0.0234**		**0.0223**	**0.0223**	**0.0000**	**88.9992**	**88.9992**	**0.0178**	**0.0000**	**89.4432**

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	5.9000e-004	0.0204	6.3100e-003	7.0000e-005	1.7700e-003	2.0000e-005	1.8000e-003	5.1000e-004	2.0000e-005	5.3000e-004	0.0000	6.7403	6.7403	4.6000e-004	0.0000	6.7517
Worker	3.3300e-003	2.2000e-003	0.0230	8.0000e-005	8.5600e-003	6.0000e-005	8.6200e-003	2.2800e-003	5.0000e-005	2.3300e-003	0.0000	6.9320	6.9320	1.8000e-004	0.0000	6.9365
Total	**3.9200e-003**	**0.0226**	**0.0293**	**1.5000e-004**	**0.0103**	**8.0000e-005**	**0.0104**	**2.7900e-003**	**7.0000e-005**	**2.8600e-003**	**0.0000**	**13.6723**	**13.6723**	**6.4000e-004**	**0.0000**	**13.6883**

3.6 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	0.1158	1.0806	1.2020	2.0600e-003		0.0541	0.0541		0.0511	0.0511	0.0000	179.5605	179.5605	0.0393	0.0000	180.5418
Total	**0.1158**	**1.0806**	**1.2020**	**2.0600e-003**		**0.0541**	**0.0541**		**0.0511**	**0.0511**	**0.0000**	**179.5605**	**179.5605**	**0.0393**	**0.0000**	**180.5418**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4400e-003	0.0467	0.0171	2.1000e-004	5.4300e-003	9.0000e-005	5.5200e-003	1.4700e-003	8.0000e-005	1.5600e-003	0.0000	20.6872	20.6872	1.8500e-003	0.0000	20.7335
Vendor	1.0100e-003	0.0348	0.0108	1.2000e-004	3.0300e-003	4.0000e-005	3.0700e-003	8.7000e-004	4.0000e-005	9.1000e-004	0.0000	11.5115	11.5115	7.8000e-004	0.0000	11.5311
Worker	7.5800e-003	5.0200e-003	0.0523	1.7000e-004	0.0195	1.3000e-004	0.0196	5.1800e-003	1.2000e-004	5.3000e-003	0.0000	15.7853	15.7853	4.1000e-004	0.0000	15.7955
Total	**0.0100**	**0.0865**	**0.0802**	**5.0000e-004**	**0.0280**	**2.6000e-004**	**0.0282**	**7.5200e-003**	**2.4000e-004**	**7.7700e-003**	**0.0000**	**47.9840**	**47.9840**	**3.0400e-003**	**0.0000**	**48.0600**

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	0.1158	1.0806	1.2020	2.0600e-003		0.0541	0.0541		0.0511	0.0511	0.0000	179.5603	179.5603	0.0393	0.0000	180.5416
Total	**0.1158**	**1.0806**	**1.2020**	**2.0600e-003**		**0.0541**	**0.0541**		**0.0511**	**0.0511**	**0.0000**	**179.5603**	**179.5603**	**0.0393**	**0.0000**	**180.5416**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4400e-003	0.0467	0.0171	2.1000e-004	5.4300e-003	9.0000e-005	5.5200e-003	1.4700e-003	8.0000e-005	1.5600e-003	0.0000	20.6872	20.6872	1.8500e-003	0.0000	20.7335
Vendor	1.0100e-003	0.0348	0.0108	1.2000e-004	3.0300e-003	4.0000e-005	3.0700e-003	8.7000e-004	4.0000e-005	9.1000e-004	0.0000	11.5115	11.5115	7.8000e-004	0.0000	11.5311
Worker	7.5800e-003	5.0200e-003	0.0523	1.7000e-004	0.0195	1.3000e-004	0.0196	5.1800e-003	1.2000e-004	5.3000e-003	0.0000	15.7853	15.7853	4.1000e-004	0.0000	15.7955
Total	**0.0100**	**0.0865**	**0.0802**	**5.0000e-004**	**0.0280**	**2.6000e-004**	**0.0282**	**7.5200e-003**	**2.4000e-004**	**7.7700e-003**	**0.0000**	**47.9840**	**47.9840**	**3.0400e-003**	**0.0000**	**48.0600**

3.6 Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0164	0.1520	0.1810	3.1000e-004		7.1700e-003	7.1700e-003		6.7800e-003	6.7800e-003	0.0000	27.1742	27.1742	5.9000e-003	0.0000	27.3218
Total	**0.0164**	**0.1520**	**0.1810**	**3.1000e-004**		**7.1700e-003**	**7.1700e-003**		**6.7800e-003**	**6.7800e-003**	**0.0000**	**27.1742**	**27.1742**	**5.9000e-003**	**0.0000**	**27.3218**

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	2.1000e-004	6.8900e-003	2.6100e-003	3.0000e-005	4.4000e-003	1.0000e-005	4.4100e-003	1.1000e-003	1.0000e-005	1.1100e-003	0.0000	3.1086	3.1086	2.8000e-004	0.0000	3.1156
Vendor	1.5000e-004	5.1900e-003	1.5800e-003	2.0000e-005	4.6000e-004	1.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7308	1.7308	1.2000e-004	0.0000	1.7337
Worker	1.0900e-003	7.0000e-004	7.3900e-003	3.0000e-005	2.9500e-003	2.0000e-005	2.9700e-003	7.8000e-004	2.0000e-005	8.0000e-004	0.0000	2.2945	2.2945	6.0000e-005	0.0000	2.2960
Total	**1.4500e-003**	**0.0128**	**0.0116**	**8.0000e-005**	**7.8100e-003**	**4.0000e-005**	**7.8400e-003**	**2.0100e-003**	**4.0000e-005**	**2.0500e-003**	**0.0000**	**7.1339**	**7.1339**	**4.6000e-004**	**0.0000**	**7.1453**

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	0.0164	0.1520	0.1810	3.1000e-004		7.1700e-003	7.1700e-003		6.7800e-003	6.7800e-003	0.0000	27.1742	27.1742	5.9000e-003	0.0000	27.3218
Total	**0.0164**	**0.1520**	**0.1810**	**3.1000e-004**		**7.1700e-003**	**7.1700e-003**		**6.7800e-003**	**6.7800e-003**	**0.0000**	**27.1742**	**27.1742**	**5.9000e-003**	**0.0000**	**27.3218**

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	2.1000e-004	6.8900e-003	2.6100e-003	3.0000e-005	4.4000e-003	1.0000e-005	4.4100e-003	1.1000e-003	1.0000e-005	1.1100e-003	0.0000	3.1086	3.1086	2.8000e-004	0.0000	3.1156
Vendor	1.5000e-004	5.1900e-003	1.5800e-003	2.0000e-005	4.6000e-004	1.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7308	1.7308	1.2000e-004	0.0000	1.7337
Worker	1.0900e-003	7.0000e-004	7.3900e-003	3.0000e-005	2.9500e-003	2.0000e-005	2.9700e-003	7.8000e-004	2.0000e-005	8.0000e-004	0.0000	2.2945	2.2945	6.0000e-005	0.0000	2.2960
Total	**1.4500e-003**	**0.0128**	**0.0116**	**8.0000e-005**	**7.8100e-003**	**4.0000e-005**	**7.8400e-003**	**2.0100e-003**	**4.0000e-005**	**2.0500e-003**	**0.0000**	**7.1339**	**7.1339**	**4.6000e-004**	**0.0000**	**7.1453**

3.7 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.6800e-003	0.0561	0.0802	1.3000e-004		2.8100e-003	2.8100e-003		2.5800e-003	2.5800e-003	0.0000	11.0148	11.0148	3.5600e-003	0.0000	11.1038
Paving	1.9300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.6100e-003**	**0.0561**	**0.0802**	**1.3000e-004**		**2.8100e-003**	**2.8100e-003**		**2.5800e-003**	**2.5800e-003**	**0.0000**	**11.0148**	**11.0148**	**3.5600e-003**	**0.0000**	**11.1038**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	5.0300e-003	1.5600e-003	2.0000e-005	4.4000e-004	1.0000e-005	4.4000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	1.6661	1.6661	1.1000e-004	0.0000	1.6690
Worker	4.1000e-004	2.7000e-004	2.8400e-003	1.0000e-005	1.0600e-003	1.0000e-005	1.0700e-003	2.8000e-004	1.0000e-005	2.9000e-004	0.0000	0.8568	0.8568	2.0000e-005	0.0000	0.8573
Total	**5.6000e-004**	**5.3000e-003**	**4.4000e-003**	**3.0000e-005**	**1.5000e-003**	**2.0000e-005**	**1.5100e-003**	**4.1000e-004**	**2.0000e-005**	**4.2000e-004**	**0.0000**	**2.5229**	**2.5229**	**1.3000e-004**	**0.0000**	**2.5263**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.6800e-003	0.0561	0.0802	1.3000e-004		2.8100e-003	2.8100e-003		2.5800e-003	2.5800e-003	0.0000	11.0148	11.0148	3.5600e-003	0.0000	11.1038
Paving	1.9300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.6100e-003**	**0.0561**	**0.0802**	**1.3000e-004**		**2.8100e-003**	**2.8100e-003**		**2.5800e-003**	**2.5800e-003**	**0.0000**	**11.0148**	**11.0148**	**3.5600e-003**	**0.0000**	**11.1038**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	5.0300e-003	1.5600e-003	2.0000e-005	4.4000e-004	1.0000e-005	4.4000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	1.6661	1.6661	1.1000e-004	0.0000	1.6690
Worker	4.1000e-004	2.7000e-004	2.8400e-003	1.0000e-005	1.0600e-003	1.0000e-005	1.0700e-003	2.8000e-004	1.0000e-005	2.9000e-004	0.0000	0.8568	0.8568	2.0000e-005	0.0000	0.8573
Total	**5.6000e-004**	**5.3000e-003**	**4.4000e-003**	**3.0000e-005**	**1.5000e-003**	**2.0000e-005**	**1.5100e-003**	**4.1000e-004**	**2.0000e-005**	**4.2000e-004**	**0.0000**	**2.5229**	**2.5229**	**1.3000e-004**	**0.0000**	**2.5263**

3.7 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.6800e-003	0.0548	0.0841	1.3000e-004		2.6900e-003	2.6900e-003		2.4800e-003	2.4800e-003	0.0000	11.5153	11.5153	3.7200e-003	0.0000	11.6084
Paving	2.0200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.7000e-003**	**0.0548**	**0.0841**	**1.3000e-004**		**2.6900e-003**	**2.6900e-003**		**2.4800e-003**	**2.4800e-003**	**0.0000**	**11.5153**	**11.5153**	**3.7200e-003**	**0.0000**	**11.6084**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	5.1900e-003	1.5800e-003	2.0000e-005	4.6000e-004	1.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7308	1.7308	1.2000e-004	0.0000	1.7337
Worker	4.1000e-004	2.6000e-004	2.7700e-003	1.0000e-005	1.1100e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	0.8605	0.8605	2.0000e-005	0.0000	0.8610
Total	**5.6000e-004**	**5.4500e-003**	**4.3500e-003**	**3.0000e-005**	**1.5700e-003**	**2.0000e-005**	**1.5700e-003**	**4.2000e-004**	**2.0000e-005**	**4.4000e-004**	**0.0000**	**2.5913**	**2.5913**	**1.4000e-004**	**0.0000**	**2.5947**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.6800e-003	0.0548	0.0841	1.3000e-004		2.6900e-003	2.6900e-003		2.4800e-003	2.4800e-003	0.0000	11.5152	11.5152	3.7200e-003	0.0000	11.6084
Paving	2.0200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.7000e-003**	**0.0548**	**0.0841**	**1.3000e-004**		**2.6900e-003**	**2.6900e-003**		**2.4800e-003**	**2.4800e-003**	**0.0000**	**11.5152**	**11.5152**	**3.7200e-003**	**0.0000**	**11.6084**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	5.1900e-003	1.5800e-003	2.0000e-005	4.6000e-004	1.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7308	1.7308	1.2000e-004	0.0000	1.7337
Worker	4.1000e-004	2.6000e-004	2.7700e-003	1.0000e-005	1.1100e-003	1.0000e-005	1.1100e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	0.8605	0.8605	2.0000e-005	0.0000	0.8610
Total	**5.6000e-004**	**5.4500e-003**	**4.3500e-003**	**3.0000e-005**	**1.5700e-003**	**2.0000e-005**	**1.5700e-003**	**4.2000e-004**	**2.0000e-005**	**4.4000e-004**	**0.0000**	**2.5913**	**2.5913**	**1.4000e-004**	**0.0000**	**2.5947**

3.8 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0738					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.5300e-003	0.0104	0.0145	2.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	2.0426	2.0426	1.2000e-004	0.0000	2.0457
Total	**0.0753**	**0.0104**	**0.0145**	**2.0000e-005**		**5.7000e-004**	**5.7000e-004**		**5.7000e-004**	**5.7000e-004**	**0.0000**	**2.0426**	**2.0426**	**1.2000e-004**	**0.0000**	**2.0457**

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	8.0000e-005	2.7400e-003	8.5000e-004	1.0000e-005	2.4000e-004	0.0000	2.4000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.9088	0.9088	6.0000e-005	0.0000	0.9104
Worker	7.0000e-005	5.0000e-005	5.2000e-004	0.0000	1.9000e-004	0.0000	1.9000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.1558	0.1558	0.0000	0.0000	0.1559
Total	**1.5000e-004**	**2.7900e-003**	**1.3700e-003**	**1.0000e-005**	**4.3000e-004**	**0.0000**	**4.3000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**1.0646**	**1.0646**	**6.0000e-005**	**0.0000**	**1.0662**

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	0.0738					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.5300e-003	0.0104	0.0145	2.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	2.0426	2.0426	1.2000e-004	0.0000	2.0457
Total	**0.0753**	**0.0104**	**0.0145**	**2.0000e-005**		**5.7000e-004**	**5.7000e-004**		**5.7000e-004**	**5.7000e-004**	**0.0000**	**2.0426**	**2.0426**	**1.2000e-004**	**0.0000**	**2.0457**

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	8.0000e-005	2.7400e-003	8.5000e-004	1.0000e-005	2.4000e-004	0.0000	2.4000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.9088	0.9088	6.0000e-005	0.0000	0.9104
Worker	7.0000e-005	5.0000e-005	5.2000e-004	0.0000	1.9000e-004	0.0000	1.9000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.1558	0.1558	0.0000	0.0000	0.1559
Total	**1.5000e-004**	**2.7900e-003**	**1.3700e-003**	**1.0000e-005**	**4.3000e-004**	**0.0000**	**4.3000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**1.0646**	**1.0646**	**6.0000e-005**	**0.0000**	**1.0662**

3.8 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1415					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.7700e-003	0.0187	0.0278	5.0000e-005		9.3000e-004	9.3000e-004		9.3000e-004	9.3000e-004	0.0000	3.9150	3.9150	2.2000e-004	0.0000	3.9205
Total	**0.1442**	**0.0187**	**0.0278**	**5.0000e-005**		**9.3000e-004**	**9.3000e-004**		**9.3000e-004**	**9.3000e-004**	**0.0000**	**3.9150**	**3.9150**	**2.2000e-004**	**0.0000**	**3.9205**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	5.1900e-003	1.5800e-003	2.0000e-005	4.6000e-004	1.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7308	1.7308	1.2000e-004	0.0000	1.7337
Worker	1.4000e-004	9.0000e-005	9.2000e-004	0.0000	3.7000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.2868	0.2868	1.0000e-005	0.0000	0.2870
Total	**2.9000e-004**	**5.2800e-003**	**2.5000e-003**	**2.0000e-005**	**8.3000e-004**	**1.0000e-005**	**8.3000e-004**	**2.3000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**2.0176**	**2.0176**	**1.3000e-004**	**0.0000**	**2.0207**

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	0.1415					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.7700e-003	0.0187	0.0278	5.0000e-005		9.3000e-004	9.3000e-004		9.3000e-004	9.3000e-004	0.0000	3.9150	3.9150	2.2000e-004	0.0000	3.9205
Total	**0.1442**	**0.0187**	**0.0278**	**5.0000e-005**		**9.3000e-004**	**9.3000e-004**		**9.3000e-004**	**9.3000e-004**	**0.0000**	**3.9150**	**3.9150**	**2.2000e-004**	**0.0000**	**3.9205**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	5.1900e-003	1.5800e-003	2.0000e-005	4.6000e-004	1.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7308	1.7308	1.2000e-004	0.0000	1.7337
Worker	1.4000e-004	9.0000e-005	9.2000e-004	0.0000	3.7000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.2868	0.2868	1.0000e-005	0.0000	0.2870
Total	**2.9000e-004**	**5.2800e-003**	**2.5000e-003**	**2.0000e-005**	**8.3000e-004**	**1.0000e-005**	**8.3000e-004**	**2.3000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**2.0176**	**2.0176**	**1.3000e-004**	**0.0000**	**2.0207**

B-2: Operations AQ & GHG Emissions

Regional Operational Emissions-2024

SUMMER	**ROG**	**NO_X**	**CO**	**SO_X**	**PM_{10} Total**	**$PM_{2.5}$ Total**
Category	**Emissions (lb/day)**					
Area	0.530	0.000	0.016	0.000	0.000	0.000
Mobile	0.623	2.259	6.560	0.024	2.191	0.597
Total	**1.152**	**2.259**	**6.576**	**0.024**	**2.191**	**0.597**

WINTER	**ROG**	**NO_X**	**CO**	**SO_X**	**PM_{10} Total**	**$PM_{2.5}$ Total**
Category	**Emissions (lb/day)**					
Area	0.530	0.000	0.016	0.000	0.000	0.000
Mobile	0.601	2.310	6.517	0.023	2.191	0.598
Total	**1.131**	**2.310**	**6.534**	**0.023**	**2.191**	**0.598**

MAXIMUM	**ROG**	**NO_X**	**CO**	**SO_X**	**PM_{10} Total**	**$PM_{2.5}$ Total**
Category	**Emissions (lb/day)**					
Area	0.530	0.000	0.016	0.000	0.000	0.000
Mobile	0.623	2.310	6.560	0.024	2.191	0.598
Project Emissions	**1.152**	**2.310**	**6.576**	**0.024**	**2.191**	**0.598**
SDAPCD Significance Thresholds	75	250	550	250	100	55
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

Alpine Park Project-Operations

San Diego County APCD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	131.20	1000sqft	3.01	131,200.00	0
City Park	22.55	Acre	22.55	982,278.00	0
Health Club	7.32	1000sqft	0.17	7,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	478.64	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor based on SDG&E RPS projections for 2024.

Land Use - Health club land use was used to represent park amenities that include buildings.

Vehicle Trips - Trip rate adjusted to be consistent with daily trips in Traffic Impact Study.

Energy Use - Project would not consume natural gas.

Water And Wastewater - City Park water consumption based on landscape report. No outdoor water consumption for health club, only indoor to represent building water consumption

Solid Waste - Only city park land use would generate solid waste.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	NT24NG	7.25	0.00
tblEnergyUse	T24NG	4.31	0.00
tblProjectCharacteristics	CO2IntensityFactor	720.49	478.64
tblVehicleTrips	ST_TR	22.75	21.29
tblVehicleTrips	ST_TR	20.87	0.00
tblVehicleTrips	SU_TR	16.74	21.29
tblVehicleTrips	SU_TR	26.73	0.00
tblVehicleTrips	WD_TR	1.89	21.29
tblVehicleTrips	WD_TR	32.93	0.00
tblWater	OutdoorWaterUseRate	26,867,904.43	13,846,272.80
tblWater	OutdoorWaterUseRate	265,342.85	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.6226	2.2591	6.5597	0.0238	2.1729	0.0180	2.1909	0.5807	0.0167	0.5974		2,420.0453	2,420.0453	0.1196		2,423.0341
Total	**1.1520**	**2.2592**	**6.5762**	**0.0238**	**2.1729**	**0.0180**	**2.1909**	**0.5807**	**0.0168**	**0.5974**		**2,420.0806**	**2,420.0806**	**0.1196**	**0.0000**	**2,423.0717**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.6226	2.2591	6.5597	0.0238	2.1729	0.0180	2.1909	0.5807	0.0167	0.5974		2,420.0453	2,420.0453	0.1196		2,423.0341
Total	**1.1520**	**2.2592**	**6.5762**	**0.0238**	**2.1729**	**0.0180**	**2.1909**	**0.5807**	**0.0168**	**0.5974**		**2,420.0806**	**2,420.0806**	**0.1196**	**0.0000**	**2,423.0717**

	ROG	**NOx**	**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**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.6226	2.2591	6.5597	0.0238	2.1729	0.0180	2.1909	0.5807	0.0167	0.5974		2,420.0453	2,420.0453	0.1196		2,423.0341
Unmitigated	0.6226	2.2591	6.5597	0.0238	2.1729	0.0180	2.1909	0.5807	0.0167	0.5974		2,420.0453	2,420.0453	0.1196		2,423.0341

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	480.09	480.09	480.09	1,024,920	1,024,920
Health Club	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	480.09	480.09	480.09	1,024,920	1,024,920

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-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998
Health Club	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998
Parking Lot	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

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

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr						lb/day							lb/day			
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Health Club	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr						lb/day							lb/day			
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Health Club	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Unmitigated	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4100					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5200e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Total	**0.5295**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0353**	**0.0353**	**9.0000e-005**		**0.0376**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4100					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5200e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Total	**0.5295**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0353**	**0.0353**	**9.0000e-005**		**0.0376**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Alpine Park Project-Operations

San Diego County APCD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	131.20	1000sqft	3.01	131,200.00	0
City Park	22.55	Acre	22.55	982,278.00	0
Health Club	7.32	1000sqft	0.17	7,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	478.64	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor based on SDG&E RPS projections for 2024.

Land Use - Health club land use was used to represent park amenities that include buildings.

Vehicle Trips - Trip rate adjusted to be consistent with daily trips in Traffic Impact Study.

Energy Use - Project would not consume natural gas.

Water And Wastewater - City Park water consumption based on landscape report. No outdoor water consumption for health club, only indoor to represent building water consumption

Solid Waste - Only city park land use would generate solid waste.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	NT24NG	7.25	0.00
tblEnergyUse	T24NG	4.31	0.00
tblProjectCharacteristics	CO2IntensityFactor	720.49	478.64
tblVehicleTrips	ST_TR	22.75	21.29
tblVehicleTrips	ST_TR	20.87	0.00
tblVehicleTrips	SU_TR	16.74	21.29
tblVehicleTrips	SU_TR	26.73	0.00
tblVehicleTrips	WD_TR	1.89	21.29
tblVehicleTrips	WD_TR	32.93	0.00
tblWater	OutdoorWaterUseRate	26,867,904.43	13,846,272.80
tblWater	OutdoorWaterUseRate	265,342.85	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.6012	2.3096	6.5174	0.0225	2.1729	0.0181	2.1910	0.5807	0.0168	0.5975		2,295.3423	2,295.3423	0.1208		2,298.3616
Total	**1.1307**	**2.3098**	**6.5338**	**0.0225**	**2.1729**	**0.0182**	**2.1910**	**0.5807**	**0.0169**	**0.5975**		**2,295.3776**	**2,295.3776**	**0.1209**	**0.0000**	**2,298.3991**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.6012	2.3096	6.5174	0.0225	2.1729	0.0181	2.1910	0.5807	0.0168	0.5975		2,295.3423	2,295.3423	0.1208		2,298.3616
Total	**1.1307**	**2.3098**	**6.5338**	**0.0225**	**2.1729**	**0.0182**	**2.1910**	**0.5807**	**0.0169**	**0.5975**		**2,295.3776**	**2,295.3776**	**0.1209**	**0.0000**	**2,298.3991**

	ROG	**NOx**	**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**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.6012	2.3096	6.5174	0.0225	2.1729	0.0181	2.1910	0.5807	0.0168	0.5975		2,295.3423	2,295.3423	0.1208		2,298.3616
Unmitigated	0.6012	2.3096	6.5174	0.0225	2.1729	0.0181	2.1910	0.5807	0.0168	0.5975		2,295.3423	2,295.3423	0.1208		2,298.3616

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	480.09	480.09	480.09	1,024,920	1,024,920
Health Club	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	480.09	480.09	480.09	1,024,920	1,024,920

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
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998
Health Club	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998
Parking Lot	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

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

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Health Club	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Health Club	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Unmitigated	0.5295	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4100					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5200e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Total	**0.5295**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0353**	**0.0353**	**9.0000e-005**		**0.0376**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4100					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5200e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0353	0.0353	9.0000e-005		0.0376
Total	**0.5295**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0353**	**0.0353**	**9.0000e-005**		**0.0376**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Project Operations GHG Summary-Buildout Year 2024 Emissions

Source Category	$MTCO_2e$/year
Area	0.003
Electricity	23.298
Mobile	383.354
Waste	21.957
Water	35.393
Construction	37.910
Total Project Emissions	**501.91**

Alpine Park Project-Operations

San Diego County APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	131.20	1000sqft	3.01	131,200.00	0
City Park	22.55	Acre	22.55	982,278.00	0
Health Club	7.32	1000sqft	0.17	7,320.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	478.64	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor based on SDG&E RPS projections for 2024.

Land Use - Health club land use was used to represent park amenities that include buildings.

Vehicle Trips - Trip rate adjusted to be consistent with daily trips in Traffic Impact Study.

Energy Use - Project would not consume natural gas.

Water And Wastewater - City Park water consumption based on landscape report. No outdoor water consumption for health club, only indoor to represent building water consumption.

Solid Waste - Only city park land use would generate solid waste.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	NT24NG	7.25	0.00
tblEnergyUse	T24NG	4.31	0.00
tblProjectCharacteristics	CO2IntensityFactor	720.49	478.64
tblVehicleTrips	ST_TR	22.75	21.29
tblVehicleTrips	ST_TR	20.87	0.00
tblVehicleTrips	SU_TR	16.74	21.29
tblVehicleTrips	SU_TR	26.73	0.00
tblVehicleTrips	WD_TR	1.89	21.29
tblVehicleTrips	WD_TR	32.93	0.00
tblWater	OutdoorWaterUseRate	26,867,904.43	13,846,272.80
tblWater	OutdoorWaterUseRate	265,342.85	0.00

2.0 Emissions Summary

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	0.0965	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8800e-003	2.8800e-003	1.0000e-005	0.0000	3.0700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	23.1761	23.1761	1.4000e-003	2.9000e-004	23.2977
Mobile	0.1066	0.4217	1.1701	4.1400e-003	0.3862	3.2800e-003	0.3895	0.1034	3.0500e-003	0.1065	0.0000	382.8613	382.8613	0.0197	0.0000	383.3536
Waste						0.0000	0.0000		0.0000	0.0000	8.8626	0.0000	8.8626	0.5238	0.0000	21.9567
Water						0.0000	0.0000		0.0000	0.0000	0.1374	34.6220	34.7593	0.0162	7.7000e-004	35.3930
Total	**0.2031**	**0.4217**	**1.1716**	**4.1400e-003**	**0.3862**	**3.2900e-003**	**0.3895**	**0.1034**	**3.0600e-003**	**0.1065**	**8.9999**	**440.6622**	**449.6622**	**0.5611**	**1.0600e-003**	**464.0041**

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	0.0965	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8800e-003	2.8800e-003	1.0000e-005	0.0000	3.0700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	23.1761	23.1761	1.4000e-003	2.9000e-004	23.2977
Mobile	0.1066	0.4217	1.1701	4.1400e-003	0.3862	3.2800e-003	0.3895	0.1034	3.0500e-003	0.1065	0.0000	382.8613	382.8613	0.0197	0.0000	383.3536
Waste						0.0000	0.0000		0.0000	0.0000	8.8626	0.0000	8.8626	0.5238	0.0000	21.9567
Water						0.0000	0.0000		0.0000	0.0000	0.1374	34.6220	34.7593	0.0162	7.7000e-004	35.3930
Total	**0.2031**	**0.4217**	**1.1716**	**4.1400e-003**	**0.3862**	**3.2900e-003**	**0.3895**	**0.1034**	**3.0600e-003**	**0.1065**	**8.9999**	**440.6622**	**449.6622**	**0.5611**	**1.0600e-003**	**464.0041**

	ROG	**NOx**	**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**

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	0.1066	0.4217	1.1701	4.1400e-003	0.3862	3.2800e-003	0.3895	0.1034	3.0500e-003	0.1065	0.0000	382.8613	382.8613	0.0197	0.0000	383.3536
Unmitigated	0.1066	0.4217	1.1701	4.1400e-003	0.3862	3.2800e-003	0.3895	0.1034	3.0500e-003	0.1065	0.0000	382.8613	382.8613	0.0197	0.0000	383.3536

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	480.09	480.09	480.09	1,024,920	1,024,920
Health Club	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	480.09	480.09	480.09	1,024,920	1,024,920

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-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998
Health Club	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998
Parking Lot	0.606234	0.039465	0.179154	0.102641	0.014368	0.005395	0.016820	0.024508	0.001929	0.001857	0.005869	0.000761	0.000998

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	23.1761	23.1761	1.4000e-003	2.9000e-004	23.2977
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	23.1761	23.1761	1.4000e-003	2.9000e-004	23.2977
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Health Club	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr					tons/yr									MT/yr		
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Health Club	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Health Club	60829.2	13.2065	8.0000e-004	1.7000e-004	13.2758
Parking Lot	45920	9.9696	6.0000e-004	1.2000e-004	10.0219
Total		**23.1760**	**1.4000e-003**	**2.9000e-004**	**23.2977**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Health Club	60829.2	13.2065	8.0000e-004	1.7000e-004	13.2758
Parking Lot	45920	9.9696	6.0000e-004	1.2000e-004	10.0219
Total		**23.1760**	**1.4000e-003**	**2.9000e-004**	**23.2977**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0965	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8800e-003	2.8800e-003	1.0000e-005	0.0000	3.0700e-003
Unmitigated	0.0965	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8800e-003	2.8800e-003	1.0000e-005	0.0000	3.0700e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0215					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0748					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8800e-003	2.8800e-003	1.0000e-005	0.0000	3.0700e-003
Total	**0.0965**	**1.0000e-005**	**1.4800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.8800e-003**	**2.8800e-003**	**1.0000e-005**	**0.0000**	**3.0700e-003**

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	0.0215					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0748					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8800e-003	2.8800e-003	1.0000e-005	0.0000	3.0700e-003
Total	**0.0965**	**1.0000e-005**	**1.4800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.8800e-003**	**2.8800e-003**	**1.0000e-005**	**0.0000**	**3.0700e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	34.7593	0.0162	7.7000e-004	35.3930
Unmitigated	34.7593	0.0162	7.7000e-004	35.3930

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 13.8463	33.3981	2.0200e-003	4.2000e-004	33.5734
Health Club	0.432928 / 0	1.3612	0.0142	3.5000e-004	1.8196
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**34.7593**	**0.0162**	**7.7000e-004**	**35.3930**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 13.8463	33.3981	2.0200e-003	4.2000e-004	33.5734
Health Club	0.432928 / 0	1.3612	0.0142	3.5000e-004	1.8196
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**34.7593**	**0.0162**	**7.7000e-004**	**35.3930**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	8.8626	0.5238	0.0000	21.9567
Unmitigated	8.8626	0.5238	0.0000	21.9567

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	1.94	0.3938	0.0233	0.0000	0.9756
Health Club	41.72	8.4688	0.5005	0.0000	20.9811
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**8.8626**	**0.5238**	**0.0000**	**21.9567**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	1.94	0.3938	0.0233	0.0000	0.9756
Health Club	41.72	8.4688	0.5005	0.0000	20.9811
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**8.8626**	**0.5238**	**0.0000**	**21.9567**

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

B-3: Construction Energy Analysis

PROJECT Fuel Consumption Summary

	Fuel Consumption (gal)	
Source Category	**Diesel**	**Gasoline**
Offroad Equipment	106,444	
Haul Trucks	5,969	
Vendor Trucks	4,943	
Workers		7,350
Total Fuel Consumption	**117,355**	**7,350**

Construction Duration (years)	1.33
Average Annual Diesel	**87,956.35**
Average Annual Gasoline	**5,508.57**

County Fuel Consumption (2019) [1]

County: San Diego

Source	**Fuel Type**	**Gallons (Retail + Non-Retail**	**Percent of Project Compared to County**
Workers	Gas	1,325,000,000	0.0004%
Off-Road/Haul & Vendor Trucks	Diesel	229,166,667	0.038%

Notes:

1. California Energy Commission, California Annual Retail Fuel Outlet Report Results (CEC-A15), 2010-2019
https://www.energy.ca.gov/sites/default/files/2020-10/2010-2019%20CEC-A15%20Results%20and%20Analysis.xlsx
Accessed November 2020. Diesel is adjusted to account for retail (48%) and non-retail (52%) diesel sales

Off-Road Equipment

Fuel Consumption: Equipment ≤ 100HP	Value
Brake Specific Fuel Consumption Factor (lb/hp-hr)[1]	0.408
Fuel Density (lb/gal)[1]	7.11
Consumption Factor (gal/hp-hr)	0.0574
Total HP-HR <100	693,270
Total Diesel Fuel (gal)	**39,788**

Fuel Consumption: Equipment > 100HP	Value
Brake Specific Fuel Consumption Factor (lb/hp-hr)[1]	0.367
Fuel Density (lb/gal)[1]	7.11
Consumption Factor (gal/hp-hr)	0.0516
Total HP-HR ≥100	1,291,152
Total Diesel Fuel (gal)	**66,655**

Total diesel gallons (off-road equipment): 106,444

Phase Name	Equipment	# of Equipment	Hours/Day	HP	Load Factor	Days	Total HP-HR
Grubbing/Land Clearing	Crawler Tractors	3	8	212	0.43	10	21,878.40
Grubbing/Land Clearing	Excavators	1	8	158	0.38	10	4,803.20
Grading/Excavation	Crawler Tractors	3	8	212	0.43	173	378,496.32
Grading/Excavation	Excavators	1	8	158	0.38	173	83,095.36
Grading/Excavation	Rollers	1	8	80	0.38	173	42,073.60
Grading/Excavation	Rubber Tired Loaders	1	8	203	0.36	173	101,142.72
Grading/Excavation	Tractors/Loaders/Backhoes	1	8	97	0.37	173	49,671.76
Grading/Excavation	Scrapers	2	8	367	0.48	173	487,610.88
Drainage/Utilities/Subgrade	Air Compressors	1	8	78	0.48	89	26,657.28
Drainage/Utilities/Subgrade	Generator Sets	1	8	84	0.74	89	44,257.92
Drainage/Utilities/Subgrade	Tractors/Loaders/Backhoes	4	8	97	0.37	89	102,214.72
Sewer Line Installation	Excavators	1	8	158	0.38	174	83,575.68
Sewer Line Installation	Rollers	1	8	80	0.38	174	42,316.80
Sewer Line Installation	Tractors/Loaders/Backhoes	1	8	97	0.37	174	49,958.88
Construction	Air Compressors	1	8	78	0.48	175	52,416.00
Construction	Cranes	1	8	231	0.29	175	93,786.00
Construction	Forklifts	3	8	89	0.2	175	74,760.00
Construction	Generator Sets	1	8	84	0.74	175	87,024.00
Construction	Tractors/Loaders/Backhoes	2	8	97	0.37	175	100,492.00
Paving	Pavers	1	8	130	0.42	45	19,656.00
Paving	Paving Equipment	1	8	132	0.36	45	17,107.20
Paving	Rollers	1	8	80	0.38	45	10,944.00
Architectural Coating	Air Compressors	1	8	78	0.48	35	10,483.20
						Total ≥100HP	1,291,151.76
						Total <100HP	693,270.16

Notes:
1. CARB, 2017 Off-road Diesel Emission Factors
https://ww3.arb.ca.gov/msei/ordiesel/ordas_ef_fcf_2017_v7.xlsx

Haul Trucks

Onroad Travel Consumption	**Value**
EMFAC2021 Diesel Fuel Consumption Factor (gal/mi):[1]	0.176
Total VMT (mi):	33,840
Total diesel gallons	**5,953**
Idling Consumption	**Value**
Idling Fuel Consumption Factor (gal/hr):[2]	0.6400
Total Idle-Hours per Year:	71
Total diesel gallons	**16**

Total diesel gallons: 5,969

Phase	Total Truck Trips	Trip Length (miles)	Vehicle Category	VMT	Idle Hours
Grubbing/Land Clearing	0	20	HHDT	0	0
Grading/Excavation	1036	20	HHDT	20,720	86
Drainage/Utilities/Subgrade	0	20	HHDT	0	0
Sewer Line Installation	0	20	HHDT	0	0
Construction	656	20	HHDT	13,120	55
Paving	0	20	HHDT	0	0
Architectural Coating	0	20	HHDT	0	0
			Total VMT:	**33,840**	
			Total Idle-Hours:		**71**

1. CARB, EMFAC2021 (SDAPCD; HHDT; Annual; CY 2022; Aggregate MY; Aggregate Speed,DSL)
2. Department of Energy, Fact #861, 2015 Idle Fuel Consumption for Selected Gasoline and Diesel Vehicles, February 23, 2015.
   https://www.energy.gov/eere/vehicles/fact-861-february-23-2015-idle-fuel-consumption-selected-gasoline-and-diesel-vehicles

Vendor Trucks

Onroad Travel Consumption	Value
EMFAC2021 Diesel Fuel Consumption Factor (gal/mi):[1]	0.160
Total VMT (mi):	30,704
Total diesel gallons	**4,902**
Idling Consumption	**Value**
Idling Fuel Consumption Factor (gal/hr):[2]	0.6400
Total Idle-Hours per Year:	175
Total diesel gallons	**40**

Total diesel gallons: 4,943

Phase	Days/year	Truck Trips per Day (In/Out)	Trip Length (miles)	Vehicle Category	VMT	Idle Hours
Grubbing/Land Clearing	10	6	7.3	HHDT/MHDT	438	5
Grading/Excavation	173	6	7.3	HHDT/MHDT	7,577	87
Drainage/Utilities/Subgrade	89	6	7.3	HHDT/MHDT	3,898	45
Sewer Line Installation	174	6	7.3	HHDT/MHDT	7,621	87
Construction	175	6	7.3	HHDT/MHDT	7,665	88
Paving	45	6	7.3	HHDT/MHDT	1,971	23
Architectural Coating	35	6	7.3	HHDT/MHDT	1,533	18
				Total VMT:	**30,704**	
				Total Idle-Hours:		**175**

1. CARB, EMFAC2021 (SDAPCD; MHDT/HHDT; Annual; CY 2022; Aggregate MY; Aggregate Speed,DSL)
2. Department of Energy, Fact #861, 2015 Idle Fuel Consumption for Selected Gasoline and Diesel Vehicles, February 23, 2015. https://www.energy.gov/eere/vehicles/fact-861-february-23-2015-idle-fuel-consumption-selected-gasoline-and-diesel-vehicles

Workers

Onroad Travel Consumption	Value
EMFAC2021 Gasoline Fuel Consumption Factor (gal/mi):[1]	0.0403
Total VMT (mi):	182,434
Total gasoline gallons	**7,350**

Phase	Days/year	Vehicle Trips per day (In/Out)	Trip Length (miles)	Vehicle Category	VMT
Grubbing/Land Clearing	10	16	10.8	LD Fleet Mix	1,728
Grading/Excavation	173	36	10.8	LD Fleet Mix	67,262
Drainage/Utilities/Subgrade	89	24	10.8	LD Fleet Mix	23,069
Sewer Line Installation	174	12	10.8	LD Fleet Mix	22,550
Construction	175	32	10.8	LD Fleet Mix	60,480
Paving	45	12	10.8	LD Fleet Mix	5,832
Architectural Coating	35	4	10.8	LD Fleet Mix	1,512
				Total VMT:	**182,434**

1. CARB, EMFAC2021 (SDAPCD; LDA/LDT1/LDT2; Annual; CY 2022; Aggregate MY; Aggregate Speed,GAS)

Idling Fuel Consumption Factors

Column1	Column2	Column3	Column4	Column5
VEHICLE TYPE	FUEL TYPE	ENGINE SIZE	GROSS VEHICLE WEIGHT	IDLING FUEL USE
		(LITER)	(GVW) (LBS)	(GAL/HR WITH NO LOAD)
Compact Sedan	Gas	2	-	0.16
Large Sedan	Gas	4.6	-	0.39
Compact Sedan	Diesel	2	-	0.17
Medium Heavy Truck	Gas	7-May	19,700-26,000	0.84
Delivery Truck	Diesel	-	19,500	0.84
Tow Truck	Diesel	-	26,000	0.59
Medium Heavy Truck	Diesel	10-Jun	23,000-33,000	0.44
Transit Bus	Diesel	-	30,000	0.97
Combination Truck	Diesel	-	32,000	0.49
Bucket Truck	Diesel	-	37,000	0.9
Tractor-Semitrailer	Diesel	-	80,000	0.64

Department of Energy, Fact #861, 2015 Idle Fuel Consumption for Selected Gasoline and Diesel Vehicles, February 23, 2015.
https://www.energy.gov/eere/vehicles/fact-861-february-23-2015-idle-fuel-consumption-selected-gasoline-and-diesel-vehicles

Region	San Diego County APCD
Calendar Year	2022
Model Year	Aggregate
Speed	Aggregate
Fuel	Gasoline

Row Labels	Sum of Total VMT	Sum of Fuel Consumption
LDA	46651921.79	1723.6896
LDT1	4651323.272	207.139018
LDT2	21817861.26	1015.035547
Grand Total	**73121106.32**	**2945.864165**

Worker Fuel Consumption Factors

Vehicle Category	VMT (mi/day)	Fuel Consumption (1000gal/day)	Fuel Consumption Factor (gal/mi)	Fuel Economy (mi/gal)	Distribution of Trips	gal/mi
LDA	46651921.79	1723.6896	0.037	27.1	64%	0.040
LDT1	4651323.272	207.139018	0.045	22.5	6%	
LDT2	21817861.26	1015.035547	0.047	21.5	30%	

Region	San Diego County APCD
Calendar Year	2022
Model Year	Aggregate
Speed	Aggregate
Fuel	Diesel

Row Labels	Sum of Total VMT	Sum of Fuel Consumption
HHDT	1811813.427	318.7189632
MHDT	736028.0774	88.09465902
Grand Total	**2547841.504**	**406.8136222**

Truck Fuel Consumption Factors

Vehicle Category	VMT (miles/day)	Fuel Consumption (1000 gal/day)	Fuel Consumption Factor (gal/mi)	Fuel Economy (mi/gal)	Distribution of Trips	Vendor Fuel Factor (gal/mi)
HHDT	1811813.427	318.7189632	0.176	5.68	71%	0.160
MHDT	736028.0774	88.09465902	0.120	8.35	29%	

B-4: Operations Energy Analysis

Operations Energy Consumption Summary

Transportation Fuel

Fuel Type	Gallons/Year
GAS	42,038
DSL	5,982

County: San Diego

Fuel Type	Gallons (Retail + Non-Retail	Percent of Project Compared to County
Gas	1,325,000,000	0.003%
Diesel	229,166,667	0.003%

Electricity

Comparison	GWh/year
SDG&E 2019 Electricity Sales	17,880
Project Electricity	0.29
Project % of Sales	0.002%

Utility Consumption

Electricity[3]

Land Use	kWh/year	GWh/year
City Park	0	0.000
Health Club	60829.2	0.061
Parking Lot	45920	0.046
Total	**0**	**0.107**

Comparison	GWh/year
SDG&E 2019 Electricity Sales[1]	17,880
Project Electricity	0.29
Project % of Sales	0.0016%

Water Consumption[2]

Land Use	Mgal/yr	
City Park	14	
Health Club	0	
Parking Lot	0	
Total	**14**	
Electricity Intensity Factors	**kWh/Mgal**	
Electricity Factor - Supply	9,727.00	
Electricity Factor - Treat	111.00	
Electricity Factor - Distribute	1,272.00	
Electricity Factor - Wastewater Treatment	1,911.00	
Total	**13021.0**	
Electricity from Water Demand	**kWh/yr**	**GWh/yr**
Total	**185,929.83**	**0.19**

Notes:

1 2020 Sempra Energy Sustainability Report
https://www.sempra.com/sites/default/files/content/files/node-report/2020/SempraEnergy_2020_Corporate-Sustainability-Report.pdf

2 Electricity and water values from CalEEMod Annual Output file

3 Health Club used to account for electricity and indoor water consumption from buildings.

Region	San Diego County APCD
Model Year	Aggregate
Speed	Aggregate
Calendar Year	2024

Row Labels	Vehicle Category	Sum of Total VMT	Sum of Fuel Consumption
Diesel	HHDT	1859684.668	317.7018708
Diesel	LDA	172212.5896	4.324711617
Diesel	LDT1	887.9331638	0.039484997
Diesel	LDT2	87677.92127	2.966871759
Diesel	LHDT1	1194852.754	74.30238324
Diesel	LHDT2	483249.1016	36.24370561
Diesel	MDV	235562.3085	10.53542862
Diesel	MH	39601.90723	4.218298391
Diesel	MHDT	748443.1077	88.58979522
Diesel	OBUS	47363.04896	7.009053046
Diesel	SBUS	45339.0525	5.595751568
Gasoline	HHDT	492.454592	0.135558299
Gasoline	LDA	46842847.47	1675.082383
Gasoline	LDT1	4429822.548	192.2938286
Gasoline	LDT2	22430753.47	1003.629579
Gasoline	LHDT1	1671762.223	172.8674945
Gasoline	LHDT2	231444.1973	26.98225132
Gasoline	MCY	430235.858	11.02982364
Gasoline	MDV	13160207.11	715.8291652
Gasoline	MH	93222.28885	21.13678274
Gasoline	MHDT	196459.3898	41.45910634
Gasoline	OBUS	56792.68216	11.88069266
Gasoline	SBUS	15743.27221	1.588112369
Gasoline	UBUS	13564.69797	1.570833898
Grand Total		**94488222.06**	**4427.012966**

Fuel Type	Vehicle Category	VMT (mi/day)	Fuel Consumption (1000gal/day)
Diesel	HHDT	1859684.67	317.70
Diesel	LDA	172212.59	4.32
Diesel	LDT1	887.93	0.04
Diesel	LDT2	87677.92	2.97
Diesel	LHDT1	1194852.75	74.30
Diesel	LHDT2	483249.10	36.24
Diesel	MDV	235562.31	10.54
Diesel	MH	39601.91	4.22
Diesel	MHDT	748443.11	88.59
Diesel	OBUS	47363.05	7.01
Diesel	SBUS	45339.05	5.60
Gasoline	HHDT	492.45	0.14
Gasoline	LDA	46842847.47	1675.08
Gasoline	LDT1	4429822.55	192.29
Gasoline	LDT2	22430753.47	1003.63
Gasoline	LHDT1	1671762.22	172.87
Gasoline	LHDT2	231444.20	26.98
Gasoline	MCY	430235.86	11.03
Gasoline	MDV	13160207.11	715.83
Gasoline	MH	93222.29	21.14
Gasoline	MHDT	196459.39	41.46
Gasoline	OBUS	56792.68	11.88
Gasoline	SBUS	15743.27	1.59
Gasoline	UBUS	13564.70	1.57

Annual Miles
1,024,920.37

Project Fuel Consumption

	Fuel Consumption Factor (gal/mi)		Fuel Distribution		Fleet Mix	Miles/Vehicle Category	Gallons of Fuel	
Vehicle Category	**DSL**	**GAS**	**DSL**	**GAS**			**DSL**	**GAS**
HHDT	0.17	0.28	99.97%	0.03%	2.0%	20,177.47	3,446.13	1.47
LDA	0.03	0.04	0.37%	99.63%	49.8%	509,975.66	46.91	18,169.74
LDT1	0.04	0.04	0.02%	99.98%	4.7%	48,060.23	0.43	2,085.82
LDT2	0.03	0.04	0.39%	99.61%	23.8%	244,259.01	32.18	10,886.44
LHDT1	0.06	0.10	41.68%	58.32%	3.0%	31,094.37	805.96	1,875.11
LHDT2	0.08	0.12	67.62%	32.38%	0.8%	7,752.33	393.14	292.68
MCY	0.00	0.03	0.00%	100.00%	0.5%	4,666.80	0.00	119.64
MDV	0.04	0.05	1.76%	98.24%	14.2%	145,304.85	114.28	7,764.65
MH	0.11	0.23	29.82%	70.18%	0.1%	1,440.75	45.76	229.27
MHDT	0.12	0.21	79.21%	20.79%	1.0%	10,249.42	960.94	449.71
OBUS	0.15	0.21	45.47%	54.53%	0.1%	1,129.78	76.03	128.87
SBUS	0.12	0.10	74.23%	25.77%	0.1%	662.56	60.70	17.23
UBUS	0.00	0.12	0.00%	100.00%	0.0%	147.14	0.00	17.04
					Project	**1,024,920.37**	**5,982.46**	**42,037.66**

*Annual miles from CalEEMod Annual Operations output

EMFAC2021, SDAPCD, Aggregate Speed, Aggregate Model Year, Calendar Year 2024

Appendix E

Phase I Cultural Resources Survey and Phase II Testing and Evaluation of the 98-acre Alpine Park Project

Phase I Cultural Resources Survey and Phase II Testing and Evaluation of the 98-acre Alpine Park Project, San Diego County, California

Prepared for:

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Department of Parks and Recreation
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Principal Investigator

August 2021

ICF. 2020. *Phase I Cultural Resources Survey and Phase II Test and Evaluation of the 98-Acre Alpine Park Project*. August. (ICF 150.19.) San Diego, California. Prepared for the County of San Diego, Department of Parks and Recreation, San Diego, California.

NATIONAL ARCHAEOLOGICAL DATABASE INFORMATION

Author:	Patrick McGinnis, MA, RPA
Oversight:	Crawford, Karen, MA, RPA
Consulting Firm:	ICF 525 B Street, Suite 1700 San Diego, California 92101
Client:	County of San Diego, Department of Parks and Recreation
Report Date:	August 2021
Report Title:	*Phase I Cultural Resources Survey and Inventory of 98-Acre Alpine Park Project, San Diego County, California*
Type of Study:	Phase I Survey and Inventory
New Sites:	0
Updated Sites:	P-37-005199/CA-SDI-5199, P-37-030429/CA-SDI-19332, P-37-030430/CA-SDI-19333, P-37-012236/CA-SDI-12236
USGS Quadrangle:	Alpine, California: 7.5' series (1:24,000)
Acreage:	98 acres (92 acres intensively surveyed; 6 acres visually inspected)
Keywords:	Phase I and II Survey and Testing; pedestrian survey; Phase II Test and Evaluation; Wright's Field; Alpine Park; flaked stone; ground stone; bedrock milling

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Contents

Tables and Figures

Acronyms and Abbreviations

B.P.	before present
ca.	circa
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
cimuL	consanguineal kin group
CRHR	California Register of Historical Resources
DPR	County of San Diego Department of Parks and Recreation
GPS	Global Positioning System
NAHC	Native American Heritage Commission
NHPA	National Historical Preservation Act
NRHP	National Register of Historic Places
Property	Assessor's Parcel Number 404-170-61-00
RMP	Resource Management Plan
SCIC	South Coastal Information Center
SLF	Sacred Lands File
USGS	United States Geological Survey

Executive Summary

ICF has completed a Phase I cultural resources survey and inventory of Assessor's Parcel Number 404-170-61-00 (Property), totaling approximately 98 acres in support of the effort to create a community park tentatively called Alpine Park within the community of Alpine in east San Diego County (Project). The Property is adjacent to the Back Country Land Trust's Wright Field Preserve on South Grade Road. The County acquired the Property in early 2019. The current cultural resource survey was completed to identify and map existing resources within the Property and to provide the County of San Diego's Department of Parks and Recreation (DPR) with management information for handling potentially significant cultural resources. These measures include preservation recommendations, protective measures, and potential interpretive and educational opportunities.

The Phase I inventory and Phase II test and evaluation was conducted in compliance with the California Environmental Quality Act (CEQA) and guidance from the County of San Diego's *Cultural Resources Report Format and Guidelines for Determining Significance* (2007). The purpose of this report is to provide an inventory of cultural resources located within the Property and to provide future management considerations for potentially significant cultural resources. The Phase I inventory involved a records search, literature review, archival research, Native American consultation, historic map checks, field surveys, and resource documentation. Areas exceeding 20 percent slope were surveyed based on professional judgment; accordingly, the areas principally surveyed were those with a slope gradient of less than 20 percent. Only the 5.83 acres at the northeast corner of the property were too steep to safely survey on foot. Field notes and digital photographs detailing conditions and survey results are on file at the San Diego office of ICF.

ICF conducted a cultural resources records search at the South Coastal Information Center (SCIC) at San Diego State University on April 24, 2019. The SCIC cultural resources records search indicated that 26 cultural resources have been recorded within 0.25 mile of the Property, 4 of which are plotted within the Property. Of these 26 resources, 20 are prehistoric resources, 5 are historic period resource, and 1 is a multicomponent resource.

The survey of the property relocated the four previously recorded cultural resources and did not identify any new cultural resources. The four resources reported within the Property consist of three prehistoric resources—bedrock milling sites (CA-SDI-5199, CA-SDI-19332 and CA-SDI-19333)—and one historic house complex archaeological site (CA-SDI-12236). One of the prehistoric resources (CA-SDI-5199) has been previously tested and determined to be ineligible for the National Register of Historic Places (NRHP) or California Register of Historical Resources (CRHR). The remaining two (CA-SDI-19332 and CA-SDI-19333) were tested and evaluated to determine whether subsurface deposits are present, to define site boundaries and assess resource significance. No subsurface deposits or other related artifacts or features were identified during testing and the resources are evaluated as not eligible for the NRHP, CRHR or Local Register of Historical Resources (Local Register). Historic site CA-SDI-12236 was relocated and found to be in poor condition. The presence and nature of any subsurface component of the site CA-SDI-12236 is unknown; therefore, their potential significance is unknown until testing is conducted at the site. Field notes and photographs are on file at ICF. No artifacts were collected during this survey. DPR forms for each resource, documented in Appendix D of this report, will be submitted to the SCIC of the California Historical Resources Information System (CHRIS) at San Diego State University when the report is finalized.

Chapter 1
Introduction

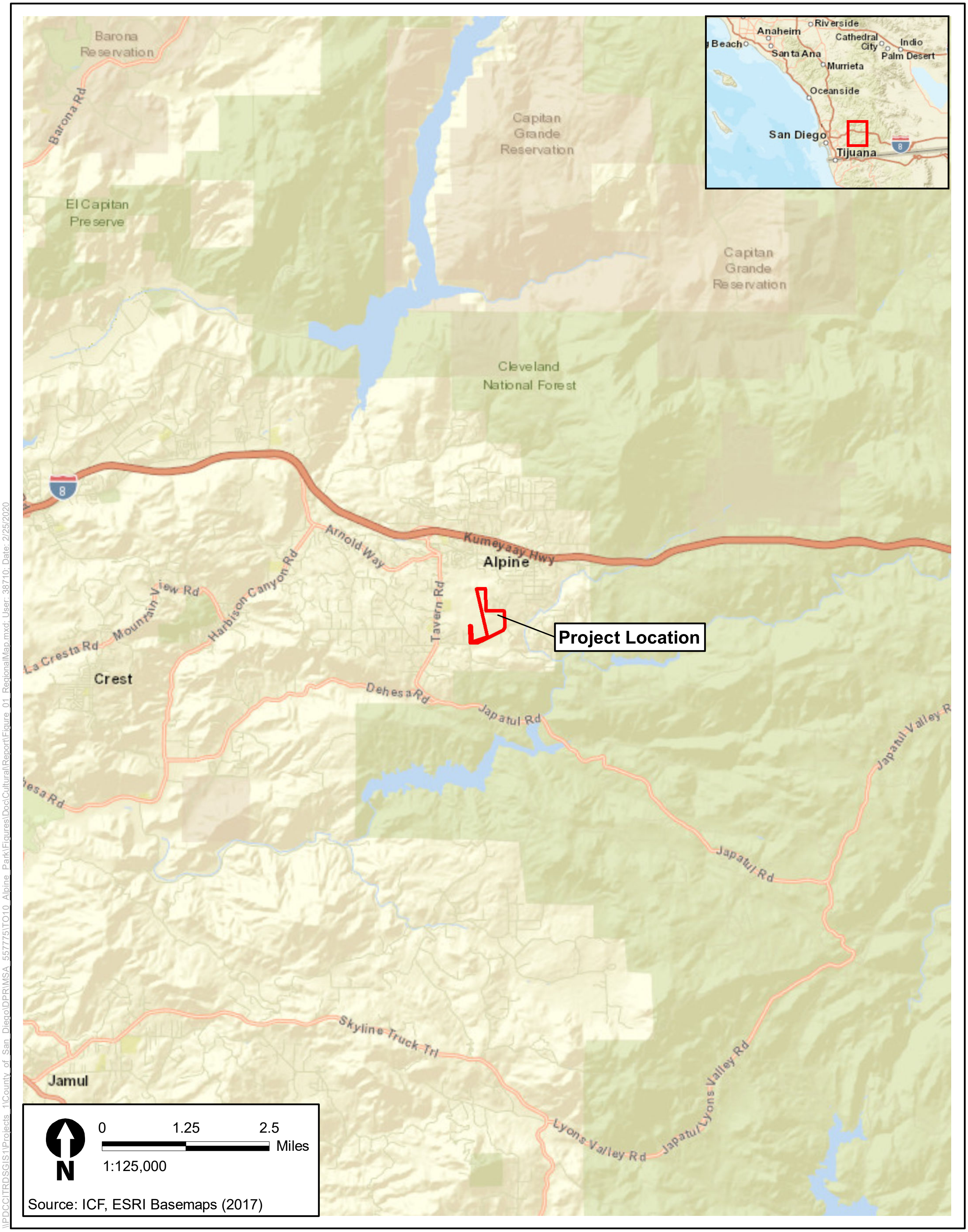
1.1 Project Description

ICF has completed a Phase I cultural resources survey and Phase II test and evaluation of Assessor's Parcel Number 404-170-61-00 (Property), totaling approximately 98 acres, in support of an effort to create a community park, tentatively called Alpine Park, within the community of Alpine in east San Diego County (Project). The Property is adjacent to the Back Country Land Trust's Wright Field Preserve on South Grade Road. The County acquired the Property in early 2019.

The Property is located within the Alpine 7.5 minute United States Geological Survey (USGS) quadrangle in Township 15 South, Range 2 East, in section 34.

The Phase I study consisted of archival research, Native American consultation, and archaeological field surveys. ICF archaeologists were able to survey a total of 92 acres (approximately 94 percent) of the Property. By contract agreement, attempts to survey areas exceeding 20 percent slope were based on professional judgment that considered safety issues and the probability that resources would not be present on steep slopes. Approximately 6 acres (5.8 percent) of the Property have slopes greater than 20 percent. However, some of these areas were included in the survey to gain access to other areas with less than 20 percent slope. Identified resources were recorded, and previously recorded sites were updated using State of California Department of Parks and Recreation 523 Primary Record and Location Map forms, as stipulated by the contract. The Phase II test and evaluation conducted test excavations to evaluate the potential significance of two prehistoric resources for their eligibility for the NRHP, CRHR, and Local Register.

Four previously recorded resources were identified within the Property, and they were all relocated during the current survey. No new or previously unidentified cultural resources were found during the current survey. Significance testing was not performed on any of the identified resources because at this time it is not known if any sites will be impacted because of property improvements or management decisions. However, this report contains management guidelines for potentially significant cultural resources, including preservation recommendations, protective measures, and potential interpretive and educational opportunities.

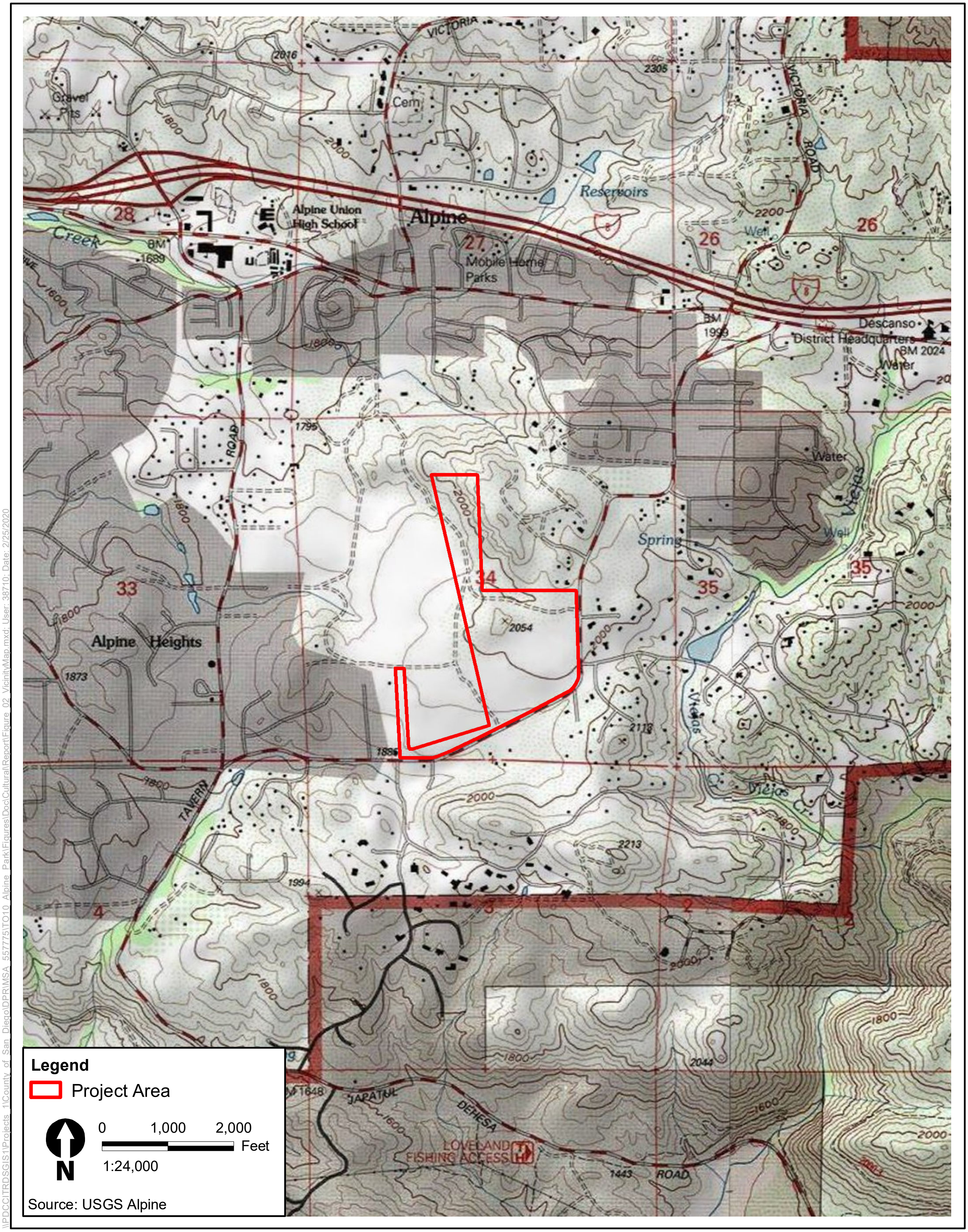


Source: ICF, ESRI Basemaps (2017)

\\PDCCITRDSGIS1\Projects_1\County_of_San_Diego\DPR\MSA_557775\TO10_Alpine_Park\Figures\Doc\Cultural\Report\Figure_01_RegionalMap.mxd; User: 38710; Date: 2/25/2020

ICF

Figure 1
Regional Location Map
Alpine Park Project



Source: USGS Alpine

\PDCCITRDSGIS1\Projects_1\County_of_San_Diego\DPR\MSA_557775\TO10_Alpine_Park\Figures\Doc\Cultural\Report\Figure_02_VicinityMap.mxd; User: 38710; Date: 2/25/2020

Figure 2
Project Vicinity Map
Alpine Park Project

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Chapter 2
Background

2.1 Existing Conditions

2.1.1 Geography

The Property is located at elevations ranging from approximately 1,886 to 2,054 feet above mean sea level. The geography of the Property includes steep hills with rolling knoll tops on the eastern half and abundant bedrock outcrops (Figures 2 and 3). The Property also includes rolling grasslands, and openings in coastal sage scrub and Engelmann oak woodlands.

2.1.2 Geology and Soils

The Property lies within the Peninsular Ranges geomorphic province of California, a region characterized by northwest-trending faults and structural blocks with intervening valleys. Regional geologic maps for the area indicate that bedrock underlying the Property is situated atop three distinct geologic categories: pre-Cretaceous metamorphic rocks, Cretaceous granitic rocks, and Eocene sedimentary rocks. The pre-Cretaceous rocks consist of various metamorphic types. The granitic rocks, consisting of granite, granodiorite, and gabbro, are part of the southern California batholith in the area.

The Project is within a small area of Eocene non-marine sedimentary rock (e.g., Poway conglomerate), surrounded by Mesozoic basic intrusive rock (gabbro and diorite) and Mesozoic granitic rocks (Kennedy and Larson 1975). The soils mapped for the Property are Bosanko stony clay, 5 to 9 percent slopes; Fallbrook rocky sandy loam, 9 to 30 percent slopes, eroded; Cienaba very rocky coarse sandy loam, 30 to 75 percent slopes; and Cienaba-Fallbrook rock sandy loams, 9 to 30 percent slopes, eroded (USDA 1973). These soils generally support annual grasses and forbs, flattop buckwheat, chamise, California sagebrush, and oak or broadleaf chaparral (USDA 1973).

2.1.3 Biology

As noted above, the Property includes rolling grasslands, and openings in coastal sage scrub and Engelmann oak woodlands. Prehistorically, animal life in and within the vicinity of the Property likely included large to medium mammals, such as grizzly bear (*Ursus arctos horribilis*) and black bear (*Ursus americanus*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), badger (*Taxidea taxus*), ringtail (*Bassariscus asutus*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). Numerous species of smaller mammals were also present, including jack rabbit (*Lepus californicus*), brush rabbit (*Sylvilagus bachmani*), cottontail rabbit (*Sylvilagus audubonii*), ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), and several species of mice and rats (Burt and Grossenheider 1976). Other animals included numerous predatory bird species, such as red-tailed hawks (*Buteo jamaicensis*) and golden eagles (*Aquila chrysaetos*), as well as western pond turtles (*Clemmys marmorata*) and several species of lizards and snakes (Peterson 1961;

Stebbins 1966). During the current survey, ground squirrels (Marmotini sp.) and several red-tailed hawk and other bird species were observed.

2.2 Cultural Setting

The following cultural history outlines and briefly describes the area's known prehistoric cultural traditions, its historic occupation and land use, and an historic overview of the Property.

2.2.1 Prehistoric Period

The approximately 10,000 years of documented prehistory of the San Diego region has often been divided into three periods: the Early Prehistoric Period (San Dieguito complex), Archaic Period (Millingstone Horizon, Encinitas tradition, La Jolla and Pauma complexes), and Late Prehistoric Period (Cuyamaca and San Luis Rey complexes).

Early Prehistoric Period Complexes

The Early Prehistoric Period encompasses the earliest documented human habitation in the region; the San Dieguito complex is the earliest reliably dated occupation of the area. The assemblage of artifacts associated with this complex has been studied and elaborated upon extensively (Rogers 1939, 1945, 1966; Warren and True (1961), Warren (1967); Moriarty (1969, 1987). The complex correlates with Wallace's (1955) Early Man Horizon, and Warren subsequently defined a broader San Dieguito tradition (1968). The earliest component of the Harris Site (CA-SDI-149/316/4935B) is located along the San Dieguito River northwest of the Property and is characteristic of the San Dieguito complex (Warren 1966, 1967; Warren and True 1961). Artifacts from the lower levels of the site include leaf-shaped knives, ovoid bifaces, flake tools, choppers, core, and pebble hammerstones, and several types of scrapers, crescents, and short-bladed shouldered points (Warren and True 1961, Warren 1966). Little evidence for the San Dieguito Complex/Early Man Horizon has been discovered north of San Diego County.

Some researchers interpret the San Dieguito complex as having a primarily, but not exclusively, hunting subsistence orientation (Warren 1967, 1968, 1987; Warren et al. 1998). Others see a more diversified San Dieguito subsistence system as possibly ancestral to, or as a developmental stage for, the subsequent, predominantly gathering-oriented complex denoted as the La Jolla/Pauma complex (cf. Bull 1983; Ezell 1987; Gallegos 1985, 1987, 1991; Koerper et al. 1991).

Archaic Period Complexes

In the southern coastal region of California, the Archaic Period dates from circa (ca.) 8600 years before present (BP) to ca. 1300 BP (Warren et al. 1998). Archaic Period La Jolla/Pauma complexes have been identified from the content of archaeological site assemblages found dating to this period. These assemblages occur at a range of coastal and inland sites and appear to indicate that a relatively stable and sedentary hunting and gathering complex, possibly associated with one people, was present in the coastal and immediately inland areas of San Diego County for more than 7,000 years. La Jolla/Pauma complex sites are considered to be part of Warren's (1968) Encinitas tradition and Wallace's (1955) Millingstone Horizon. The inland, or Pauma complex, aspect of this culture lacks shellfish remains, but is otherwise similar to the coastal La Jolla complex and may, therefore, simply represent a non-coastal expression of the La Jolla complex (True 1958, 1980; True and Beemer 1982).

The content of Archaic Period La Jolla/Pauma site assemblages is characterized by manos and metates, shell middens, terrestrial and marine mammal remains, burials, rock features, cobble-based tools at coastal sites, and the increased presence of hunting equipment and quarry-based tools at inland sites. Artifact assemblages can also include bone tools, doughnut stones, discoidals, stone balls, plummets, biface points/knives, Elko-eared dart points, and beads made of stone, bone, and shell. Beginning approximately 5500 BP and continuing during the latter half of the Archaic Period, evidence of hunting and the gathering and processing of acorns gradually increases through the area. The evidence in the archaeological record consists of artifacts such as dart points and the mortar and pestle, which are essentially absent during the early Archaic Period. The initial and subsequent increasing use of these technologies during the middle and late Archaic Period constitutes a major transition in how the prehistoric populations interacted with their environment in the southern coastal region. The period of this shift, from ca. 4000 to 1300 BP, has been designated as the Final Archaic Period (Warren et al. 1998).

Late Prehistoric Period Complexes

In the San Diego area, the Late Prehistoric Period has been described as a time characterized by an increased number of sites, as well as “many technological innovations, and new patterns in material culture and belief systems” (McDonald and Eighmey 1998:III-1). This description, in fact, aptly describes the period for the entire San Diego County area. The archaeological record documents changes in tool and ornament types, burial practices, and site location choices that vary from those documented for the earlier periods, as described below.

As with the earlier periods, archaeologists have defined distinctive complexes for the Late Prehistoric Period prehistoric cultures of the area. Two complexes have been defined for the protohistoric occupants of the area: San Luis Rey is identified in the southern Orange, western Riverside, and northern San Diego Counties area; the Cuyamaca is identified in southern San Diego County (Meighan 1954; True 1966, 1970; True et al. 1974). The San Luis Rey complex is believed to be the progenitor of the Shoshonean-speaking peoples (Luiseño/Juaneño culture) living in the area at the time of historic contact in northern San Diego County, referred to as San Luis Rey of Shoshonean origin (Koerper 1979). Peoples of southern San Diego County (Cuyamaca, Yuman) are believed to be the ancestors of the Hokan-speaking Diegueño or Kumeyaay (Ipai/Tipai) occupying southern San Diego County at contact. The demarcation line between the San Luis Rey complex and the Cuyamaca complex is believed to be near the historic separation of the tribal territories of the Luiseño/Juaneño and Diegueño. It is highly unlikely, however, that the boundary remained static over time. During late prehistoric times, the Property would have been within the area commonly associated with the archaeologically defined Cuyamaca complex.

2.2.2 Historic Period

By common convention, prehistory ended and historic cultural activities began within what is now San Diego County between the late 1500s and mid-1770s. These cultural activities provide a record of Spanish, Mexican, and American rule, occupation, and land use. An abbreviated history of this area is presented to provide a background on the presence, chronological significance, and historical relationship of cultural resources within the Property.

Spanish Period

The historic period in California began with the early explorations of Juan Cabrillo in 1542. Cabrillo came ashore on what is now Point Loma to claim the land for Spain and gave it the name San Miguel. Sixty years passed before another European, Sebastían Vizcaíno, entered the bay on November 10, 1602, and gave it the name San Diego (Pourade 1960:49, 66). Although both expeditions encountered native inhabitants, there appears to have been little or no interaction. Kumeyaay oral tradition does not offer a native perspective on these encounters.

The Spanish period extended from 1769 to 1821. It encompassed early exploration and subsequent establishment of the Presidio of San Diego and Mission San Diego (1769), Mission San Juan Capistrano (1776), and Mission San Luis Rey (1798). During this period, Spanish colonists introduced horses, cattle, sheep, pigs, corn, wheat, olives, and other agricultural goods and implements, as well as new architecture and methods of building construction. Located on Presidio Hill, San Diego's original Spanish settlement consisted of a presidio (fort) and a chapel that also served as Alta California's first mission. In 1769 an expedition headed by Gaspar de Portolá traveled north from the Presidio de San Diego to extend the Spanish Empire from Baja California into Alta California by seeking out locations for a chain of presidios and missions in the area. From its original outpost on what is now Presidio Hill, Mission San Diego de Alcalá was moved to roughly its current site in Mission Valley in 1774. In November 1774, the mission was attacked by Tipay warriors from south of the San Diego River who razed the mission and killed Father Luis Jayme and two others. The mission was rebuilt in 1775, and although it was one of the least successful missions in the chain of California missions, it firmly established Spain's presence in the region (Sandos 2004:42–43, 56–68).

Despite such expansion, and amid the growing wealth accumulated by the missions, Spanish colonists maintained an ultimately tenuous grip on the region. While missions such as San Diego and San Luis Rey flourished economically, threats from within and without increasingly undermined political stability. Indigenous populations declined dramatically due to disease, overwork, and the missions' campaigns to end native ways of life. Instances of native resistance to Spanish authority multiplied across Alta California. Mariners with allegiances to competing colonial powers and trapper-explorers from the east and north increasingly challenged the authority of officials and priests whose problems were of little interest to officials in Spain, which was embroiled in European conflict and declining as a major power. (Pourade 1961:176-177; Bean and Rawls 2003:48–52, 54–56.)

Mexican Period

The Mexican Period in San Diego began with Mexico's independence from Spain in 1821 and ended in 1848 with the conclusion of the Mexican-American War and the signing of the Treaty of Guadalupe Hidalgo. During this period, most Spanish laws and practices continued until shortly before secularization of the missions in the mid-1830s. Former Presidio soldiers became civilian residents who populated the Pueblo of San Diego, which was established during this period. Transportation routes were expanded. Economic activity centered upon agriculture and livestock-raising for subsistence and localized markets, as well as hide and tallow production for the international market. (Pourade 1961:171,182–186; Pourade 1963:11–16; Sherman 2001:23.)

Approximately 500 private rancho land grants were made under Mexican rule by Governors Juan Batista Alvarado, Manuel Micheltorena, and Pío Pico, mostly after secularization of the missions.

Although many Native Americans were forced to work on Mexican ranchos they lived near, those living farther inland and away from the ranchos were able to maintain their way of life longer. Some former mission neophytes organized pueblos and attempted to live within Mexican law and society. The most successful of these was the Pueblo of San Pasqual, established in the San Pasqual Valley, south of the Project area, by Kumeyaay who were no longer able to live at the Mission San Diego de Alcalá (Farris 1997; Bean and Rawls 2003:58–63). Two ranchos were established south of the Property, including the 12,653-acre El Rincón del Diablo Rancho, which appears to have been granted in 1843 to Don Juan Batista Alvarado, a prominent government official, and Rancho Los Vallecitos De San Marcos, granted in 1840 to Don José María Alvarado (Moyer 1969:22, 44).

American Period

In principle, the Treaty of Guadalupe Hidalgo protected the rights of the Hispanic population of Californios who owned property during the Mexican period. In practice, however, the legal process for vetting land claims that was set into motion by the Land Commission established in 1851, combined with the mounting debts of many rancho owners, allowed American and other newcomers to take possession of nearly all the rancho lands originally granted to Californios (Bean and Rawls 2003:142–147).

The first reservations in San Diego County, the San Pasqual, and Pala Reservations, were established in the 1870s and served to offset encroachment by an increasing number of Anglo-American settlers who fenced land for farms and ranches that Native Americans had traditionally used for hunting and gathering. As an alternative to moving to reservations, some of the region’s native peoples acculturated to Anglo-Americans’ comparatively sedentary and increasingly dominant agricultural way of life (Carrico 2008).

The Viejas Reservation is located 3 miles northeast of the Property and the Sycuan Reservation is located 4 miles to the southwest. The Sycuan Reservation was established by Executive Order in 1875 on a 1-square-mile tract in Dehesa Valley west of the Property. The Viejas Reservation was established in 1934 on the former Baron Long Ranch after the Kumeyaay were evicted from the Capitan Grande Reservation (est. 1875) after politicians from San Diego successfully lobbied Congress to remove the people to create El Capitan Reservoir for the City of San Diego. Viejas was one of two reservations established for the former Capitan Grande people, the other being Barona Reservation (Carrico 2008).

2.2.3 Historic Overview of the Property

Research yielded no evidence of substantial built-environment resource development within the Property area during the historic period. The first historic ownership of the Property was when it was incorporated into the mission lands of Mission San Diego Alcala. Mission lands were appropriated for use as grazing land and growing crops. A map of the area from 1846 indicates the Property was at that time being used for growing grain. After the secularization of the missions in the 1830s, the mission lands were divided among those favored by the Mexican Governors of California. In 1846 a land grant that included all of Alpine was granted to Ramon and Leandro Osuna as part of a 13,000-acre rancho called Rancho Valle de las Viejas y Mesa del Arroz. However, the Osunas were absentee landholders and unable to establish their claim, and 8,877 acres were sold to Don Jose Antonio Aguirre, who retained ownership until 1862. The land went through several owners in the years afterwards, and settlement in Alpine did not become seriously established until the arrival of German and Swiss immigrants in the1880s. The Property remained undeveloped until it was purchased as part of a larger farm by Sydney and Anna Wright in 1920. The Wrights lived on the property until 1957. The remains of their home are in the northwest corner of the Property. Since that time the Property has been subject to a variety of proposed development plans that were never brought to fruition. The Property remains undeveloped and has been used for years as unofficial recreational open space by nearby residents.

2.3 Ethnography

2.3.1 Kumeyaay

The Property is situated in the traditional territory of the people known to the Spaniards as the Diegueño, a term derived from the San Diego Mission Alcalá, with which these people came to be associated. This term was later adopted by anthropologists (Kroeber 1925) and further divided into the southern and northern Diegueño. Shipek (1982) initiated use of a Yuman language term, "Kumeyaay," for the people formerly designated as the Diegueño. The Kumeyaay are traditionally considered to be a collector/hunting society characterized by central-based nomadism.

The linguistic and language boundaries, as seen by Shipek (1982), subsume the Yuman speakers into a single nomenclature, the Kumeyaay, a name applied previously to the mountain Tipai or Southern Diegueño by Lee (1937), while Almstedt (1974:1) noted that Ipai applied to the Northern Diegueño with Tipai and Kumeyaay for the Southern Diegueño. However, Luomala (1978:592) has suggested that while these groups consisted of over 30 patrilineal clans, no singular tribal name was used, and thus referred to the Yuman-speaking people as Ipai/Tipai (Carrico 1998:V-3–V-7).

As with most hunting-gathering societies (Service 1966:33), Kumeyaay social organization was formed in terms of kinship. More specifically, the Kumeyaay possessed a patrilocal type of band organization with band exogamy (marriage outside of one's band) and virilocal marital residence (the married couple integrates into the male's band). The band is often considered as synonymous with a village or ranchería, which is a political entity. Following White (1963), Almstedt (1980:45) has suggested that the term ranchería be applied to both a social and geographical unit, as well as to the particular population and territory held in common by a native group or band. She also stressed that the territory for a ranchería might comprise a 30-square-mile area. Many households would constitute a village or ranchería, and several villages were part of a much larger social system, usually referred to as a consanguineal kin group (cimuL). The cimuL is typically an exogamous, multilocal, patrilineal descent unit, often widely dispersed in local lineage. The members of the cimuL do not intermarry because of their presumed common ancestry, but they maintain close relations and often share territory and resources (Sahlins 1968:23; Service 1971:105–106; Luomala 1963:287–289).

Other researchers have designated the San Diego River as a natural feature that divides the Kumeyaay between those people living north of it, the Ipai (Northern Diegueño), and those south of it and into Baja California, the Tipai (Southern Diegueño) (Langdon 1975:64–70; Hedges 1975:71–83). With a history stretching back at least 2,000 years, the Kumeyaay, at the point of contact, were, as described by Carrico, settled in permanent villages or rancherías with strong alliances. Carrico has indicated the possible locations for a number of these villages in the San Diego County area (Carrico 1998).

Although the Kumeyaay exploited a large variety of terrestrial and marine food sources, emphasis was placed on acorn procurement and processing, as well as the capture of rabbit and deer. Shipek (1989) has strongly suggested that the Kumeyaay, or at least some bands of the Kumeyaay, were practicing proto-agriculture at the time of Spanish contact. While Shipek's evidence is difficult to verify, the Kumeyaay were certainly adept land and resource managers, with a history of intensive plant husbandry.

The Kumeyaay practiced many forms of spiritualism with the assistance of shamans (kuessay) and cimuL leaders. Spiritual leaders were not elected, nor did they inherit their position; they achieved status because they knew all the songs involved in ceremonies (Shipek 1991) and had an inclination toward the supernatural. Important Kumeyaay ceremonies included male and female puberty rites, the fire ceremony, the whirling dance, the eclipse ceremony, the eagle dance, and the cremation ceremony, as well as the yearly mourning ceremony (Spier 1923:311–326). The primary ceremonial direction among the Kumeyaay is east, with rock art and entrances to ceremonial enclosures usually facing this direction (Kroeber 1925:717). The Kumeyaay are the only California tribe known to possess a color-direction system, with white representing the east, green-blue the south, black the west, and red the north (Kroeber 1925:717).

2.4 Previous Research in the Area

2.4.1 Prominent Studies

Previous research in the area has included both archaeological and historical studies. In addition to early historical accounts, several of which were cited above in Section 2.2, *Cultural Setting*, cultural resources studies associated with regulatory compliance for CEQA and/or for federal regulations, such as the National Historical Preservation Act (NHPA), have been conducted on, or in the vicinity of, the Property.

The results from these local studies indicate a temporary occupation of the local area over a long period of time. It seems probable that the prehistoric sites and isolates already recorded within the Property represent elements of a settlement pattern connected with the repeated occupation, through time, of the areas of the Property and the surrounding vicinity, from the Archaic Period through the Late Prehistoric Period.

2.4.2 Research Context

Previous research conducted in the local area, as well as in the San Diego region in general, provides a basis for understanding the cultural resources present within the Property. It also provides criteria for assessing the significance of these resources relative to the value of the scientific information they contain and the answers they may be able to provide to unresolved historical and archaeological research questions. To this end, this previous research allows for the delineation of particular research topic areas or "realms." For prehistoric resources, these topic realms often focus on categories of research such as settlement patterning or trade. Patterns of prehistoric subsistence and settlement have, for example, been a topic area of particular focus by several researchers. Regionally, Christenson (1990) has proposed and implemented a systems approach for the analysis of settlement and subsistence patterns in the San Diego County area during the Late Prehistoric period. In her study, Christenson made use of various environmental and cultural variables, many of which are frequently contained within topic areas or realms often proposed for assessing a site's potential to provide important research information. Laylander (2006) has discussed and critiqued the use of some settlement systems approaches in analyzing the prehistoric hunter-gatherers of the San Diego region. He proposed an alternative approach, like that used by Christenson, utilizing the correlation of archaeological variables, at the regional, site, and artifact/ecofact/feature levels, with settlement system dimensions.

Recently, several researchers have defined and discussed research topic areas considered relevant to the prehistory of the area (e.g., Laylander 2006), both regionally (San Diego County) and locally. Specifically, in the northern County area, for a large survey of the lower Santa Margarita River Valley, Schroth et al. (1996: Section 2, pp. 10–21) proposed five general topic areas considered applicable for the investigation of the prehistory of their study area: (1) prehistoric time-depth and chronology, (2) subsistence strategies, (3) settlement patterning, (4) trade and travel, and (5) tool technology. These topic areas are relative to sites throughout San Diego County and these same topic areas or realms were also used to assess the research value of sites encountered in large surveys in the southern County, in the Otay Mesa area (Gallegos et al. 1998). In the Ramona area, Carrico and Cooley (2005) have previously described four similarly broad research topic areas: chronology, settlement, lithic raw material procurement, and technological/environmental change.

Such broad topic realms allow for site type and content to be understood and evaluated in the broader context of both the region and the local area, providing the basis for site content to be translated into research questions that can help explain the nature of past life ways. How, for example, do sites fit, or not fit, into the prehistoric settlement pattern as it is currently understood? How are they located relative to their environmental setting? Do any of the sites represent more substantial habitation locations, such as villages or major campsites? Such sites often contain the greatest variety of associated cultural materials, thereby providing the context with which to better explain their function and relevance to each other. Can sites with ceremonial and/or ritual content be identified? Are special-use sites present, such as quarries, lithic workshops, milling stations, and seed storage locations? Do any sites contain exotic artifacts or materials that may indicate trade with other areas? Are the raw lithic or food material remains observed at the sites indicative of having been locally obtained, or do they indicate procurement from greater distance? Do the sites contain elements that can be used to ascertain their age, either by radiometric dating or by the presence of time sensitive artifacts?

The previous prehistoric research studies detail some of the information that has already been obtained from the area. Results from the current survey, should they yield new information about sites discovered on the Property, could then be used in conjunction with the existing data to expand current knowledge within some or all the topic realms described.

Chapter 3
Records Search Results

ICF staff archaeologist, Nara Cox, BA conducted a cultural resources records search at the South Coastal Information Center (SCIC) at San Diego State University on April 24, 2019. The purpose of the search was to identify any previously recorded cultural resources inside or within 0.25 mile of the Property and to assess the potential for certain resource types within the Property. Also included in the search were those cultural resources studies that have been conducted inside or within 0.25 mile of the Property. The records search results can be found in Appendix A. Details on the records search results are presented below.

3.1 Previous Studies

In addition to the three reports requested by the County of San Diego Department of Parks and Recreation (DPR), 27 cultural resources studies are on record at the SCIC as having occurred inside or within 0.25 mile of the Property (see Table 1, below). Twenty-two reports were designated as unmappable but were identified as a result of the record search and are not listed below. Six of the mapped reports covered a portion of the Property, including three (Cook 1977; McIntyre 1993; Robbins-Wade and Giletti 2008) that covered the Property in its entirety (marked by an asterisk, see shaded studies in Table 1).

Table 1. Previous Studies Inside or Within a 0.25-mile Radius of the Property

Report #	Date	Author	Report Title
SD-00583	1978	Carrico, Richard L. and Keith D. Rhodes	Archaeological Investigations at Palo Verde Ranch, Units 1 and 2, Alpine California.
SD-01298	1982	Phillips, Roxana	Phase I Archaeological Investigation for Palo Verde Ranch Developments Units 2 Through 10.
SD-01713	1979	Quillen, Dennis K. and Richard L. Carrico	Archaeological Investigations for the Reimetz Lot Split at W-1856 Alpine, California
SD-02023	1978	Advance Planning & Research Associates	Alpine Ranch Subdivision TM #3796, EAD Log # 77-14-280 Alpine, California
SD-02228	1991	Smith, Brian F.	An Archaeological Survey of the Victoria Ranch Estates Projects
SD-02717*	1977	Cook, John	An Archaeological Reconnaissance of the Proposed Alpine Ranch Subdivision
SD-03310	1998	Schaefer, Jerry	Alpine School District Middle School - Cultural Resources Constraints Assessment
SD-03386*	1993	McIntyre, M. Bruce	Environmental Impact Report for the Proposed Stagecoach Ranch Specific Plan SP 91-002, TM 4974 LOG No. 91-14-13
SD-03463	1997	Smith, Brian F. and Alex N Kirkish	An Archaeological Survey of the Boulder Oaks Project, Alpine, County of San Diego
SD-06425	1990	Carrico, Richard, Susan H. Carrico,	Historic Resources Inventory Sweetwater Valley

Report #	Date	Author	Report Title
		Kathleen A. Crawford, and S. Kathleen Flanigan	
SD-07544	1990	Robbins-Wade, Mary	Cultural Resources Inventory for the Eltinge Drive Lot Split Alpine, San Diego County
SD-07582	1999	Wade, Sue and Stephen Van Wormer	Alpine Estates Subdivision an Inventory and Evaluation of Prehistoric and Historic Resources Alpine, Ca
SD-08500	2000	Robbins-Wade, Mary	Cultural Resources Report for the Gonya Property Grading Permit L1400 Alpine, San Diego County, California
SD-10454	1994	Gross, Timothy G., Mary Robbins-Wade, and Ruth C. Atter	Confidential Appendices to Archaeological Survey and Assessment for the South Grade Road Parcel Alpine, San Diego County, California
SD-10482	1978	Van Horn, David M.	Surface Collection and Test Excavation at the Alpine Sites SDI 5199, 5200 Archaeological Associates
SD-10486	1984	Banks, Thomas J.	TPM 18201, LOG 84-14-23
SD-10551	2006	Arrington, Cindy	Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California
SD-10555	1989	Roth, Linda	Results of Archaeological Survey and Initial Test Excavations of 12 Acre Mosiman Project, Alpine, San Diego County, California
SD-10997	2003	Carrico, Richard L., Theodore G. Cooley, and Laura J. Barrie	Final Archaeological Overview for the Cleveland National Forest California
SD-11758*	2008	Robbins-Wade, Mary and Andrew Giletti	Archaeological Resources Study, Park Alpine, Alpine, San Diego County, California, TM 5433
SD-13016	2006	Robbins-Wade, Mary	Cultural Resources Assessment for Alpine Oaks Estates (TM 5330), Alpine, San Diego County, California
SD-13391	2011	Whitaker, James E.	ETS #21744, Cultural Resources Monitoring for the Wood Pole Intrusive Inspections, 45 Poles, Alpine Project, San Diego, California (HDR #168414)
SD-13748	2011	Bowden-Renna, Cheryl	Letter Report: ETS 21763- Cultural Resources Survey for the Replacement of Pole P273807, Alpine, San Diego County, California- IO7011102
SD-14206	2011	Bowden-Renna, Cheryl	Letter Report: ETS 21763- Cultural Resources Monitoring for the Replacement of Pole P273807, Alpine, San Diego County, California- IO 7011102
SD-15291	2014	Tennesen, Kristin	ETS #26491, Cultural Resources Survey P373230 Replace Damaged Pole, San Diego County, California
SD-16812	2016	Pigniolo, Andrew R., Serr, Carol, And James, Del	Cultural Resource Survey for the San Diego Back Country Fuel Reduction Project, Alpine, San Diego County, California
SD-17338	2017	Robbins-Wade, Mary and Nicole Falvey	Cultural Resources Inventory and Evaluation Update: Rancho Sierra Alpine, San Diego County, California

Note: Shaded resources are located within or directly adjacent to the Property.

3.2 Previous Recorded Resources Inside or Adjacent to the Study Area

The SCIC cultural resources records search indicated that 26 cultural resources have been recorded within 0.25 mile of the Property, four of which are plotted within the Property (see Table 2, below). Of these 26 resources, 20 are prehistoric resources, 5 are historic period resource, 1 is a multicomponent resource.

The four resources reported within the Property consist of three prehistoric resources—bedrock milling sites (CA-SDI-5199, CA-SDI-19332, and CA-SDI-19333)—and one historic house complex archaeological site (CA-SDI-12236).

Table 2. Previously Recorded Sites Inside or Within a 0.25-mile Radius of the Property

P Number	Trinomial	Type	Dimensions	Reference
P-37-004290	CA-SDI-004290	Bedrock milling site	60 m x 25 m	Berryman 1975
P-37-004656	CA-SDI-004656	Bedrock milling site	130 m x 120 m	Elmore 1974
P-37-005199	CA-SDI-005199	Bedrock milling site	320 m x 255 m	Roth 1991
P-37-005200	CA-SDI-005200	Prehistoric temporary campsite	320 m x 125 m	Affinis 2008
P-37-005840	CA-SDI-005840	Prehistoric temporary campsite	330 m x 35 m	May 1978
P-37-005876	CA-SDI-005876	Bedrock milling site	80 m x 40 m	Rhodes 1978
P-37-011209	CA-SDI-011209	Lithic scatter	90 m x 30 m	Roth 1989
P-37-012230	CA-SDI-012230	Bedrock milling site	146 m x 85 m	Roth 1991
P-37-012235	CA-SDI-012235	Historic rock corral	740 ft x 600 ft	Roth 1991
P-37-012236	CA-SDI-012236	Historic house complex	85 ft x 70 ft	Roth 1991
P-37-012237	CA-SDI-012237	Historic house complex	300 ft x 150 ft	Roth 1991
P-37-012238	CA-SDI-012238	Historic stacked rock feature	55 ft x 10 ft	Roth 1991
P-37-012239	CA-SDI-012239	Bedrock milling site	4 m x 2 m	Roth 1991
P-37-013242	CA-SDI-013242	Multicomponent site	200 m x 120 m	Affinis 1992
P-37-013243	CA-SDI-013243	Sparse lithic scatter	32 m x 24 m	Affinis 1992
P-37-013244	CA-SDI-013244	Bedrock milling site	35 m x 45 m	Affinis 1992

P Number	Trinomial	Type	Dimensions	Reference
P-37-013245	CA-SDI-013245	Historic refuse deposit	20 ft x 50 ft	Affinis 1992
P-37-013246	CA-SDI-013246	Historic homestead site	400 ft x 240 ft	Affinis 1992
P-37-028099	CA-SDI-018284	Bedrock milling site	30 m x 20 m	James 2016
P-37-028100	CA-SDI-018285	Bedrock milling site with midden	10 m x 20 m	Hector 2006
P-37-028101	CA-SDI-018286	Bedrock milling site	10 m x 10 m	Hector 2006
P-37-028102	CA-SDI-018287	Bedrock milling site	10 m x 10 m	Hector 2006
P-37-028103	CA-SDI-018288	Bedrock milling site	5 m x 5 m	Hector 2006
P-37-030429	CA-SDI-019332	Bedrock milling site	3 m x 3 m	Cooley 2006
P-37-030430	CA-SDI-019333	Bedrock milling site	3 m x 3 m	Cooley 2006
P-37-036106	N/A	Isolate pot sherd	N/A	James 2016

Note: Shaded resources are located within or directly adjacent to the Property.
ft = feet; m = meters

3.3 Other Historical Research

Historical research was also conducted for this study. Information on the earliest property owners was gathered using the 1912 County Plat Book and the document search portal at the webpage of the General Land Office, Bureau of Land Management, U.S. Department of the Interior. Historic topographic maps were gathered at the USGS Topoview website. ICF cultural resources staff gathered historic aerial photographs from the National Environmental Title Research, LLC, historicaerials.com website. Digital historical newspaper searches for individuals who owned land in the study area and historical themes pertaining to the Project site were conducted using two database services to which ICF subscribes: Newspapers.com and Genealogybank.com.

Chapter 4
Field Methods

Patrick McGinnis, MA, RPA, of ICF, served as principal investigator for the Project. ICF archaeologist Nara Cox, BA, served as archaeological field director, and ICF archaeologist Jordan Menvielle, BA, participated as crew in the archaeological survey. Justin Linton of Red Tail Monitoring, Inc. acted as the Native American monitor, representing the Kumeyaay, during the archaeological survey. This document was co-authored by Patrick McGinnis and Nara Cox with contributions from Karolina Chmiel and Rachel Droessler.

4.1 Field Surveys and Test and Evaluation Methods

A formal pedestrian survey was conducted by a team of archaeologists on August 22 and 23, 2019. The field survey methods for this Project consisted of either systematic intensive pedestrian survey or reconnaissance survey. Intensive pedestrian survey was the preferred method and was utilized in all areas where feasible. Intensive pedestrian survey methods consisted of a team of three people (two ICF archaeologists and one Native American monitor) walking in 15-meter transects in any areas where slope, vegetation, and/or terrain would allow transects to be maintained. Team members checked all bedrock outcrops and areas cleared of vegetation or disturbed by rodents along and between the transect lines.

Intensive survey methods utilizing transects were not suitable for some of the Property. Instead, reconnaissance survey methods were used where transect coverage was precluded by the presence of dense vegetation, large boulder outcrops, or steep, rugged terrain. Consequently, such areas could not be covered consistently using a 15-meter transect methodology. Reconnaissance survey methods consisted of surveying the visible areas where present and/or accessible. Bedrock outcrops within all surveyed areas were examined thoroughly for evidence of prehistoric milling activity or other discernible human modification. Within the reconnaissance survey areas, if bedrock outcrops were identified that had a potential to contain bedrock milling features, rock shelters, or rock art, specific attempts were made to reach these outcrops to determine if such resources were present.

Testing was be conducted within the boundaries of two sites to determine the vertical and horizontal boundaries of the site and assist in the determination of its significance. A combination of surface collection and subsurface testing methods was employed at each site dependent upon the site's individual characteristics. The sites were intensively surveyed; however, no surface artifacts were identified at either site. After surface mapping, shovel test units (STUs) were placed across each site. The number of STUs excavated were determined by site size and complexity. Each STU measured approximately 40 centimeters by 40 centimeters and was carried out to determine if the sites contained subsurface deposits. All material from the STUs was screened through 1/8-inch mesh.

An Apple iPad using a Global Positioning System (GPS) receiver with submeter accuracy was used to track the survey transects and coverage and record cultural resources that were identified within the Property. Notes on resource details were collected to meet or exceed site recordation guidelines based on the California Office of Historic Preservation's 1995 *California Archaeological Inventory Handbook for Completing an Archaeological Site Record* and the SCIC recommendations.

ICF archaeologists were able to survey most of the Property. By contract agreement, attempts to survey areas exceeding 20 percent slope were based on professional judgment that considered safety issues and the probability that resources would not be present on steep slopes. Only the 5.83 acres at the northeast corner of the property were too steep to safely survey on foot. This area was visually inspected while surveying the area at the base of the slope. See Figure 3.

Ground visibility was fair to poor throughout most of the Property, ranging from 10–90 percent (averaging 50 percent) in the uplands, 0–20 percent (averaging 15 percent) in the chaparral along the drainages and slopes, and 10–40 percent (averaging 25 percent) in grassy meadows.

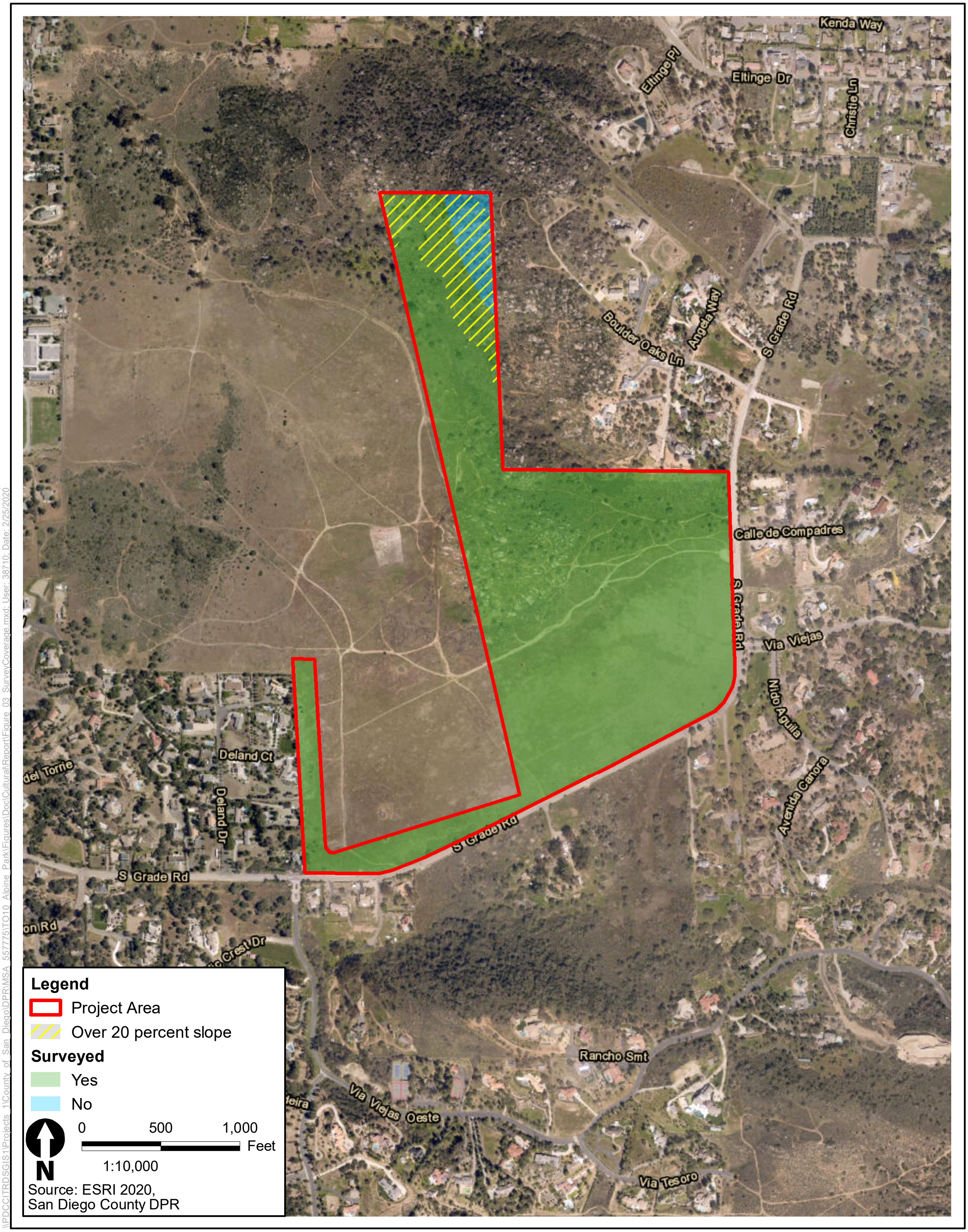

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Figure 3
Survey Coverage
Alpine Park Project

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Chapter 5
Archaeological Resources

Four archaeological resources were identified during the current survey. The sites include three prehistoric sites—two bedrock milling sites without associated surface artifacts, and one large bedrock milling site with associated lithic and ground stone artifacts. The lone historic-era archaeological site is the remains of a house and associated features. All four sites were previously recorded, and no newly identified cultural resources were discovered during the survey. Details on each identified resource are presented below and their locations are shown on Figure 4 in Confidential Appendix B.

5.1 Prehistoric Archaeological Sites

During the survey, no previously unrecorded prehistoric resources were identified, and the locations of the three previously recorded prehistoric resources were visited and updated. Below are descriptions of the prehistoric sites identified during the survey.

5.1.1 Previously Recorded Prehistoric Archaeological Resources

P-37-005199/CA-SDI-005199

This resource consists of a knoll/outcrop containing at least 15–22 bedrock milling features with at least 42 milling elements: 7 basins and 35 milling slicks. Bedrock is granitic rock; granodiorite and tonalite. The site also contains a thin scatter of ceramics and lithic debitage. The site was originally recorded in 1977 by Cook and described as two knolls with over 100 milling elements and an extensive low density lithic scatter with approximately 75 artifacts. In 1978 the site was excavated by Van Horn. The site was cleared of vegetation and the artifacts surface collected, resulting in the recovery of 321 artifacts including a single mano, four cores, six scrapers, a blade, a drill point, and a small amount of faunal bone. Three pottery sherds were also recovered. Eight 1- by 1-meter units were excavated, resulting in the recovery of 120 artifacts, most within the top 10 centimeters of the soil.

Roth and Berryman evaluated the site in 1990, excavating two 1- by 1-meter units and 24 shovel test pits, resulting in the recovery of few artifacts (1 pottery fragment and 15 flakes). The study led to a reduction in the size of the site’s boundaries. Based on the limited number of artifacts recovered during excavation and disturbance since 1978 the site was considered to have no further research potential and recommended as not significant.

The site was updated and evaluated in 2008 by Robbins-Wade and Giletti for a proposed residential development and found to be in the same condition as the 1990 excavations, with nothing found to contradict the conclusion that the research potential of the site has been fulfilled by the previous work conducted by Cook, Van Horn, and Roth and Berryman.

The current survey found the site in similar condition to the survey conducted in 2009. The site is fairly disturbed by several bike and pedestrian trails. Much of the bedrock milling surfaces were found to be in poor condition due to heavy exfoliation. Over 100 flakes and two tools of metavolcanic material were identified within the site's previously recorded boundaries, mostly in disturbed pathways on the southeast side of the site. The sites boundaries were not expanded and appear to be consistent with the site as recorded when updated in 2009 rather than with the larger area identified in 1978.

P-37-030429/CA-SDI-019332

This resource consists of one bedrock milling feature with one slick. The bedrock is dark granitic rock; tonalite or gabbro. The current effort found the resource to be in poor condition, the milling surface has undergone severe exfoliation. An additional milling feature was found on a small boulder (1 meter [m] by 0.5 m) approximately 5 m from the originally recorded milling feature (Photo 1). This new milling feature contains a slick that measures approximately 17 centimeters (cm) x 6 cm. The milling features are now referred to as MF#1 and MF #2. No artifacts or midden soils were identified in the vicinity of the resource.

P-37-030430/CA-SDI-019333

This resource consists of one granitic bedrock milling feature with one slick. The current survey relocated the resource—40 meters due south of the location recorded at the SCIC—and found the surface of the rock to be highly exfoliated. The surveyors verified that the identified rock is the same as that recorded in 2006 by comparing the subject (rock) and background of the photo in the 2006 DPR form. One small area, approximately 2 centimeters by 2 centimeters appeared to retain a slick remnant. The originally recorded slick is in very poor condition as of the 2019 survey. No artifacts or midden soils were identified in the vicinity of the resource.

5.1.2 Testing and Evaluation Results P-37-030429/CA-SDI-019332 and P-37-030430/CA-SDI-019333

ICF archaeologists and a Native American monitor conducted subsurface testing at two archaeological sites within the 98-acre Project area in January 2021. The purpose of the testing was to determine if the sites contained subsurface deposits and to evaluate the resources potential to qualify as historical resources or unique archaeological resources under CEQA and the County of San Diego Historical Resources Guidelines.

Prior to commencing subsurface investigation, the areas surrounding the site were intensively surveyed for surface artifacts that might identify potential cultural deposits in addition to the bedrock milling features. Surface visibility was fair to poor, averaging less than 50 percent due to the presence of low grasses. No artifacts were identified on the ground surface near either of the bedrock milling sites when they were originally recorded or during subsequent investigations. Therefore, shovel test pit (STP) locations were selected arbitrarily within 5 m of each milling feature. Five STPs were excavated at site CA-SDI-19333 and four were excavated at site CA-SDI-19332. If the STPs were positive, additional STPs were to be placed radiating outward from the site to establish the site's subsurface boundaries and determine the depth of deposit.

STPs were excavated to a minimum depth of 40 cm and would have been excavated to two sterile levels below the level of the last recovered artifacts had artifacts been recovered. All excavated soil was passed through sifting screens with 1/8-inch mesh.

Soils within the STPs tended to be consistent with an upper layer of loose dark brown loamy, organic, root-matted soil ranging anywhere from 5-10 cm in thickness followed by a layer of compact dark gray-brown silty clay with some gravel and occasional large granitic cobbles. The soil became more compact with depth and some pockets and layers of hard compact decomposing granite were encountered below 30 cm in depth. All nine of the STPs excavated at sites CA-SDI-019332 and CA-SDI-019333 were negative for cultural materials or ecofacts and it is worth noting that no types of stone normally associated with stone tool making were identified in the STPs other than chunks of granite.

Nine STPs were excavated at sites CA-SDI-19333 and CA-SDI-19332. None of the STPs contained artifacts or other cultural materials. Prehistoric bedrock milling sites do not possess the qualities that would make them eligible for the CRHR under Criteria 1-3 or the Local Register under Criteria 1-3. However, bedrock milling sites when associated with deposits that have potential to yield additional information or exist as part of large habitation site or district may be eligible under CRHR Criterion 4 or Local Register Criterion 4. Both CA-SDI-19333 and CA-SDI-19332 are isolated bedrock milling sites with no evidence of additional activities taking place in the immediate vicinity. The sites may be outliers related to the larger bedrock milling complex at CA-SDI-5199 which has been found to not be eligible for the CRHR. These site types are thought to reflect late prehistoric resource collection and processing activities by the Kumeyaay people. These sites occur in an area with abundant evidence of prehistoric land use and are a very common site type in the area. Based on the results of the shovel probe survey, no subsurface components are associated with these sites, and they are unlikely to yield significant information that would warrant consideration for the CRHR under Criterion 4 or Local Register. The recording and testing of CA-SDI-19333 and CA-SDI-19332 has exhausted their research potential and therefore, the Project would have no impact on historical resources.

5.2 Historic Archaeological Sites

During the survey, no previously unrecorded historic resources were identified, and the location of the one previously recorded historic resource was visited and updated. Below is a description of the historic site identified during the survey

5.2.1 Previously Recorded Historic Archaeological Sites

P-37-012236/CA-SDI-012236

This historic house complex recorded in 1991 includes a house foundation, garage, fish pond, and associated modern trash, as well as a cement water storage tank. These may be associated with 1920–1957 Wright family ownership. Recorded artifacts included roofing material, wood, asphalt shingles, brick, cement rubble, cement foundations, rock walls, chimney remains, a concrete water tank, and one highly disturbed trash pit with white ware fragments, blue glass shards, and an iron frying pan. The site was identified during the 2008 study by Robbins-Wade and Giletti in much the same condition and was not evaluated as it was to be placed in open space and left undisturbed.

The far eastern portion of the site was revisited during the current survey. Several concrete and cobble foundations were consistent with the conditions recorded from 2008, although it appears that the site may have been further disturbed by public access to the area, and visibility was poor due to dense grasses. No artifacts were identified within the surveyed portion of the resource.

5.3 Prehistoric Synthesis

Although limited by the relatively few number of prehistoric resources identified, the results of the study do offer some insight into prehistoric settlement patterns and individual site function. The number of artifacts and features, as well as the number of artifact types, suggests that the resources represent a series of campsites or resource-processing stations related to the unnamed drainage that prehistorically would have been a tributary to Alpine Creek. The three identified prehistoric sites are small bedrock milling sites or a large bedrock milling site with associated lithic scatter showing relatively short-term and low intensity use.

The prehistoric sites in the Property appear to represent locations at which special tasks and/or specific resource procurement activities occurred. Based on surface indications alone, the sites do not appear to represent loci of a dispersed village pattern of settlement, such as has been proposed for the Late Prehistoric Kumeyaay in the Ramona area by Carrico and Cooley (2005), but appear to represent more minimal vestiges of remote resource procurement and/or processing activities away from habitation areas.

This pattern may be part of an overall fission/fusion settlement pattern model for the Kumeyaay (Ipai/Tipai), described by Carrico (2003) for the southern San Diego County area during Late Prehistoric times, which reflected seasonal movements by local prehistoric groups to maximize resource utilization. Carrico envisioned a bipolar pattern for a single village group. In the model, fusion involves two large, concentrated sites, located a considerable distance apart with low site densities. Fission involves a few smaller, more densely populated habitation sites distributed over the area between the two large, concentrated sites. The two large-scale habitation sites would have been seasonally occupied, while the smaller sites were inhabited as the village split up and moved in smaller groups between the two major site locations. At these smaller sites, focused activities took place to exploit particular resources in that site vicinity. Carrico proposed that one such village group moved between a main site seasonal location, Pámu near Ramona (summer/fall), to another, Tukumak at Mesa Grande (winter/early spring) some 32 kilometers away. Willey et al. (2002:127) speculate that site CA-SDI-122 and the complex of smaller sites in proximity to it in the San Vicente Creek Valley may represent a similar main site location for another bipolar village arrangement similar to that proposed by Carrico for Pámu/Tukumak. If so, then the site loci located on the Property may represent either part of the dispersed main village, or fusion point, in the pattern, with the smaller, more intensely occupied resource exploitation sites representing the fission part of the pattern.

Based on the limited survey data in the Property, it appears that future archaeological investigations at the sites could possibly contribute data to better define Late Prehistoric Period settlement and subsistence patterns, not only for the East County area, but also for southern San Diego County in general. Data recovered from the sites on the Property could be analyzed in conjunction with those from surrounding known sites to test whether Carrico's postulated fission/fusion pattern is an adequate model for the region's Late Prehistoric settlement and subsistence patterns (Carrico 2003).

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Chapter 6
Native American Participation/Consultation

Letters were sent to the Native American Heritage Commission (NAHC) by ICF and on behalf of the DPR on April 19, 2019, requesting a review of the Sacred Lands File (SLF) and a list of contacts. A response letter from Steven Quinn of the NAHC, dated May 3, 2019, was received, and noted that the SLF search was positive and recommended contacting the Sycuan Band of Kumeyaay Nation and the Viejas Band of Kumeyaay Indians (Viejas Band) in addition to 17 other contacts. Letters requesting information and comment were sent to the listed contacts by ICF on May 21, 2019. A response by Clint Linton of the Iipay Nation of Santa Ysabel was received via email on May 22, 2019. Mr. Linton deferred comment to the Viejas Band and supports any comments or requests made by them. The Viejas Band responded by letter on June 5, 2019, stating that the Project site has cultural significance to the Tribe and requested that a Kumeyaay monitor be present on site for ground-disturbing activities and to be informed of any new developments such as inadvertent discoveries. No other responses were received. Native American correspondence is located Appendix C.

DPR staff responded to a request to consult under AB 52 from the Viejas Band of Kumeyaay Indians (Viejas Band). During consultation on March 10, 2021, Viejas Band requested a Kumeyaay Cultural Monitor be on-site for ground-disturbing activities and to be informed of any new developments such as inadvertent discovery of cultural artifacts, cremation sites, or human remains. Lorrie Bradley of DPR sent an email on July 11, 2021 following up to see if consultation could be concluded and stating the project would have cultural monitors, including a Kumeyaay monitor, on-site during disturbance of native soil. AB-52 was concluded with Viejas on July 28, 2021, with the following request that the County agrees to, "Viejas requested that any ground disturbance and not just native soils have monitoring. With this inclusion in project conditioning, Viejas agreed to conclude consultation."

Justin Linton of Red Tail Monitoring, Inc. acted as the Native American monitor, representing the Kumeyaay, during the archaeological survey and Caesar Welch of the Viejas Band of Kumeyaay Indians served as Native American monitor during test excavations.

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Chapter 7

Impacts, Significance, and Management Recommendations

There are four cultural resources within or directly adjacent to the Property. It is anticipated that the County is to include the Property baseline information and management directives in preparation of executing a Resource Management Plan (RMP). The present study, including both historical context for the Property and the cultural resource inventory, provides the County with a framework for the development of an RMP. Although staging areas and potential trail development are anticipated, no other development is currently proposed. When trails, staging areas, and any potential future development or other construction are proposed in the future, these activities may have a significant impact on potentially significant resources documented within the Property. Additionally, vegetation management efforts and future public access may cause impacts on archaeological resources through vegetation removal, ground-disturbing activities, and increased potential for the public to encounter and damage significant cultural resources.

The County of San Diego's preferred management of cultural resources is avoidance and preservation incorporated into project design. However, it is recommended that, prior to development of any trails, access roads, staging areas, or other facilities and prior to implementation of revegetation plans, any of the recorded archaeological sites that cannot be preserved through project design and avoidance should be tested and evaluated for significance. As summarized in Table 3, below, four cultural resources were recorded within the Property. One of the prehistoric resources (CA-SDI-5199) has been previously tested and determined to be ineligible for the NRHP or CRHR. The two other prehistoric resources (CA-SDI-19332 and CA-SDI-19333) were tested as part of the current effort and found to lack subsurface deposits or significance that would make them eligible for either the CRHR or the Local Register.

Site CA-SDI-12236 was relocated and found to be in poor condition. However, testing could be undertaken to identify if substantial subsurface deposits are present within the site's boundaries. The presence and nature of any subsurface component of the site is unknown; therefore, its potential significance is unknown until testing is conducted at the site. For the purposes of this inventory, it is assumed that the resource has low to moderate potential for site significance.

Native American representatives should be present to monitor prehistoric archaeological testing activities and be involved in the assessment of prehistoric site significance.

Table 3. Potential Significance of Cultural Resources within the Property

Resource	Type	Description	Potential Significance for NRHP/CRHR	Reasoning
P-37-005199/ CA-SDI-5199	Prehistoric	Bedrock milling temporary campsite	Evaluated, Recommended not eligible	Previously evaluated
P-37-030429/ CA-SDI-19332	Prehistoric	Bedrock milling	Evaluated, Recommended not eligible	Lack of surface artifacts and midden
P-37-030430/ CA-SDI-19333	Prehistoric	Bedrock milling	Evaluated, Recommended not eligible	Lack of surface artifacts and midden
P-37-012236/ CA-SDI-12236	Historic	Historic era home site	Unevaluated, likely ineligible	Structures razed, and surrounding area disturbed

Three of the cultural resources identified during the survey have been tested and evaluated for listing in the CRHR. If testing and evaluation of the single unevaluated resource within the Property is not possible or desired by the County, mitigation measures should be developed to protect or treat this resource. Recommended mitigation measures include site avoidance or, if avoidance is not possible, the development and completion of an archaeological data recovery program for sites that have been evaluated and found eligible for the NRHP or CRHR. The development of recreational activities must take into consideration potential impacts on cultural resources resulting from public access and increased public use at the entire Property. It is recommended that the County avoid as much as possible developing trails, staging areas, or other recreation areas that would allow for an increase in public access to or through sites. Trail development and maintenance activities may impact subsurface deposits, and the increase in traffic and accessibility may create direct impacts through vandalism, looting, or the inadvertent destruction of artifacts and site integrity. Any eligible sites that cannot be avoided in the development of the Property should be capped as a preservation measure.

Drawing the public’s attention to sites containing any or substantial subsurface and surface deposits of artifacts is not recommended, as this may encourage site looting and impacts on site integrity. Offsite interpretation would be the preferred means to provide public education while protecting the sites.

It is essential to reiterate that specific potential impacts on significant resources cannot be identified until resource significance has been determined through testing and evaluation. Until evaluation of the identified resources’ importance has been completed, mitigation measures and/or design considerations involving impacts on cultural resources cannot be formulated. While the County considers preservation of cultural resources through project design the preferred mitigation strategy to avoid impacts, should avoidance not prove feasible at any site determined to be significant, a data recovery program for archaeological resources, or a documentation program of historic period structures and features, must be developed in coordination with the County of San Diego and executed prior to the proposed activities. The following mitigation measure are recommended to reduce potential impacts to cultural resources to a less than significant level.

MM-CUL-1: Prepare and Implement a Cultural Resources Monitoring and Discovery Plan. Prior to the commencement of any ground-disturbing activities within previously undisturbed soils within the project area, the County DPR shall retain a qualified archaeologist (pre-approved by County DPR) who meets the Secretary of the Interior's Professional Qualification Standards (36 Code of Federal Regulations [CFR], Part 61) to prepare a Cultural Resources Monitoring and Discovery Plan (CRMDP) for the project area. Procedures to follow in the event of an unanticipated discovery apply to all project components. The CRMDP shall be submitted to the County DPR, as applicable based on the jurisdiction wherein the project component is located, and shall be reviewed and approved by County DPR, the relevant agency. If County DPR does not have in-house expertise to review the CRMDP, they shall respectively hire an expert who meets the Secretary of the Interior's Professional Qualification Standards (36 CFR 61) and the County DPR shall pay for said expert prior to the commencement of any ground-disturbing activities within the areas requiring archaeological monitoring.

County DPR's CRMDP review shall ensure that appropriate procedures to monitor construction and treat unanticipated discoveries are in place. County DPR's review and approval of the CRMDP shall occur prior to the commencement of any construction activities subject to the requirements of the CRMDP. The CRMDP shall include required qualifications for archaeological monitors and supervising archaeologists and shall lay out protocols to be followed in relation to cultural resources, including both archaeological and tribal cultural resources. The CRMDP shall provide a summary of sensitivity for buried cultural resources. In addition, it shall describe the roles and responsibilities of archaeological and Native American monitors, County DPR, and construction personnel. The CRMDP shall describe specific field procedures to be followed for archaeological monitoring, including field protocol and methods to be followed should there be an unanticipated archaeological discovery. Evaluation of resources, consultation with Native American individuals, tribes and organizations, treatment of cultural remains and artifacts, curation, and reporting requirements shall also be described. The CRMDP shall also delineate the requirements, procedures, and notification processes in the event that unanticipated human remains are encountered.

The CRMDP shall delineate the area(s) that require archaeological monitoring. Mapping of the area(s) shall be made available to the County DPR, who shall incorporate this information into the respective construction specifications for the project.

MM-CUL-2: Prepare and Implement a Cultural Resources Awareness Training Prior to Project Construction. Prior to, and for the duration of, project-related ground disturbance County DPR shall hire a qualified archaeologist, who meets the Secretary of the Interior's Professional Qualifications Standards (36 CFR 61) and approved by County DPR to provide cultural resources awareness training to project construction personnel. The training shall include a discussion of applicable laws and penalties under the law; samples or visual representations of artifacts that might be found in the project vicinity; and the steps that must be taken if cultural resources are encountered during construction, including the authority of archaeological monitors, if required to be on site during the project, to halt construction in the area of a discovery.

The cultural resources awareness training shall be conducted by a qualified archaeologist. A hard copy summary of cultural resources laws, discovery procedures, and contact information shall be provided to all construction workers. Completion of the training shall be documented for all construction personnel, who shall be required to sign a form confirming they have completed the training. The form shall be retained by County DPR to demonstrate compliance with this mitigation measure.

MM-CUL-3: Conduct Archaeological and Native American Monitoring.

An archaeological monitor or cross-trained archaeological/paleontological monitor and a Native American monitor shall be retained to observe all initial ground-disturbing activities, including brush clearance, vegetation removal, grubbing, grading, and excavation, within the recorded boundaries of P-36-005695. The archaeological monitor shall meet the qualification standards of the California Office of Historic Preservation and will be overseen by an archaeological principal investigator. The Native American monitor shall be selected from amongst the Native American groups identified by the NAHC as having affiliation with the Project area. Prior to start of ground-disturbing activities, the archaeological monitor shall conduct paleontological and cultural resources sensitivity training for all construction personnel. The Native American monitor or a representative shall be given the opportunity to participate. Construction personnel shall be informed of the types of paleontological or archaeological resources that may be encountered, and of the proper procedures to be enacted in the event of an inadvertent discovery of fossils, archaeological resources, or human remains. The County shall ensure that construction personnel are made available for and attend the training and retain documentation demonstrating attendance.

Archaeological monitoring shall be conducted by an archaeologist familiar with the types of archaeological resources that could be encountered within the Project site and that is cross trained in paleontological resource identification. The qualified archaeologist, in coordination with the County and Native American monitor, may reduce or discontinue monitoring if it is determined that the possibility of encountering buried archaeological deposits is low based on observations of soil stratigraphy or other factors. Both the archaeologist and Native American monitor shall be empowered to halt or redirect ground-disturbing activities away from the vicinity of a discovery until the qualified archaeologist or paleontologist has evaluated the discovery and determined appropriate treatment. If prehistoric archaeological materials are encountered, the Native American monitor shall participate in any discussions involving treatment and subsequent mitigation.

The archaeological monitor shall keep daily logs detailing the types of activities and soils observed, and any discoveries. After monitoring has been completed, the qualified archaeologist shall prepare a monitoring report that details the results of monitoring. The report shall be submitted to the County any Native American groups who request a copy. A copy of the final report shall be filed at the SCIC. Monitoring actions and procedures shall be completed per the CRMDP described in **MM-CUL-1**.

Chapter 8

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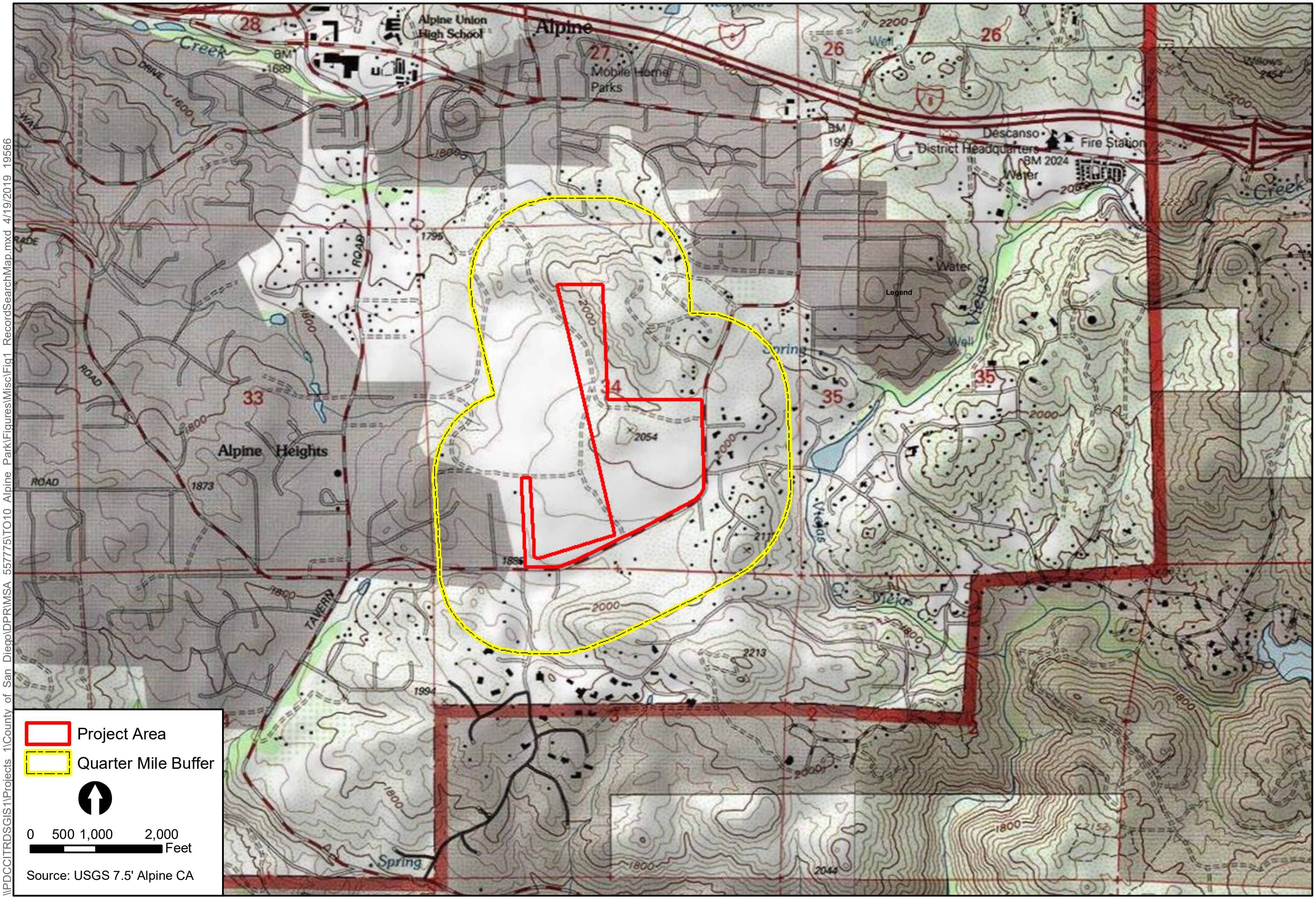
Appendix A

Records Search Confirmation



Source: USGS 7.5' Alpine CA

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Figure 1
Record Search Map
Alpine Park (676.18)

27 mapped reports within 1/4 mile of project area. 21 unmappable reports returned by search.Studies which encompass all (2023, 2717,3386, 6425, 11758) encompass portions (10482, 10551) or intersect (none). got a copy of 11758, could request 10482 if more info is needed regarding 37-005199.

26 resources within 1/4 mile. resources wthin or partially within (12236, 5199, 30430, and 30429)

ALPINE PARK RECORD SEARCH 4/24/2019

# PA	PDF	(26) RESOURCES	STUDIES	EXCEL	
2	✓	36106	583, 1298	✓ ✓	
4	✓	4290	~~[illegible]~~ 1713	✓	
6	✓	4656	* 2023, 2717		
17	✓	5199	3463	✓	
7	✓	5200	2228	-	
6	✓	5840	3310	-	
4	✓	5876	* 3386	-	
3	✓	11209	• 6425 - SWATH TO S. OF LINE	-	
14	✓	12230	7544	-	
4	✓	12235	7582	-	
6	✓	12236	8500, 10454	- -	
8	✓	12237	• 10482	-	
4	✓	12238	10486	-	
3	✓	12239	• 10551	-	
28	✓	13242 (2 OVERLAPPING POLYS)	10555	-	
4	✓	13243	10997	-	
4	✓	13244	* 11758 ~~[illegible]~~	-	64p.
4	✓	13245	13016	-	
4	✓	13246	13391 - NOT MAPPED		
5	✓	28099 (2 OVERLAPPING POLYS)	13748, 14206 - SEVERAL SMALL POINTS NOT IN PROJ. AREA		
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STUDIES N.C. 4/24/19 1/s

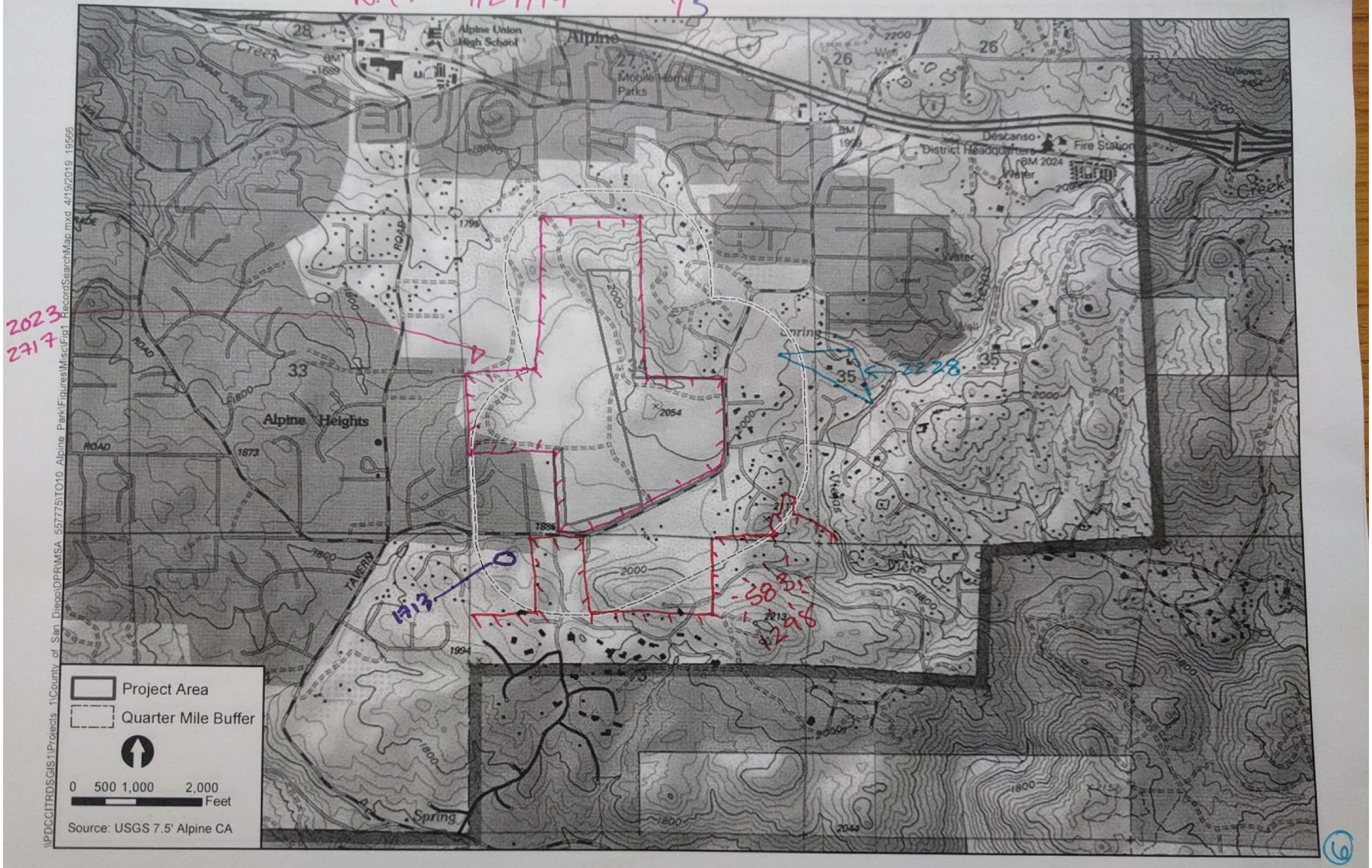

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Figure 1
Record Search Map
Alpine Park (676.18)

STUDIES N.C. 4/24/19 2/5

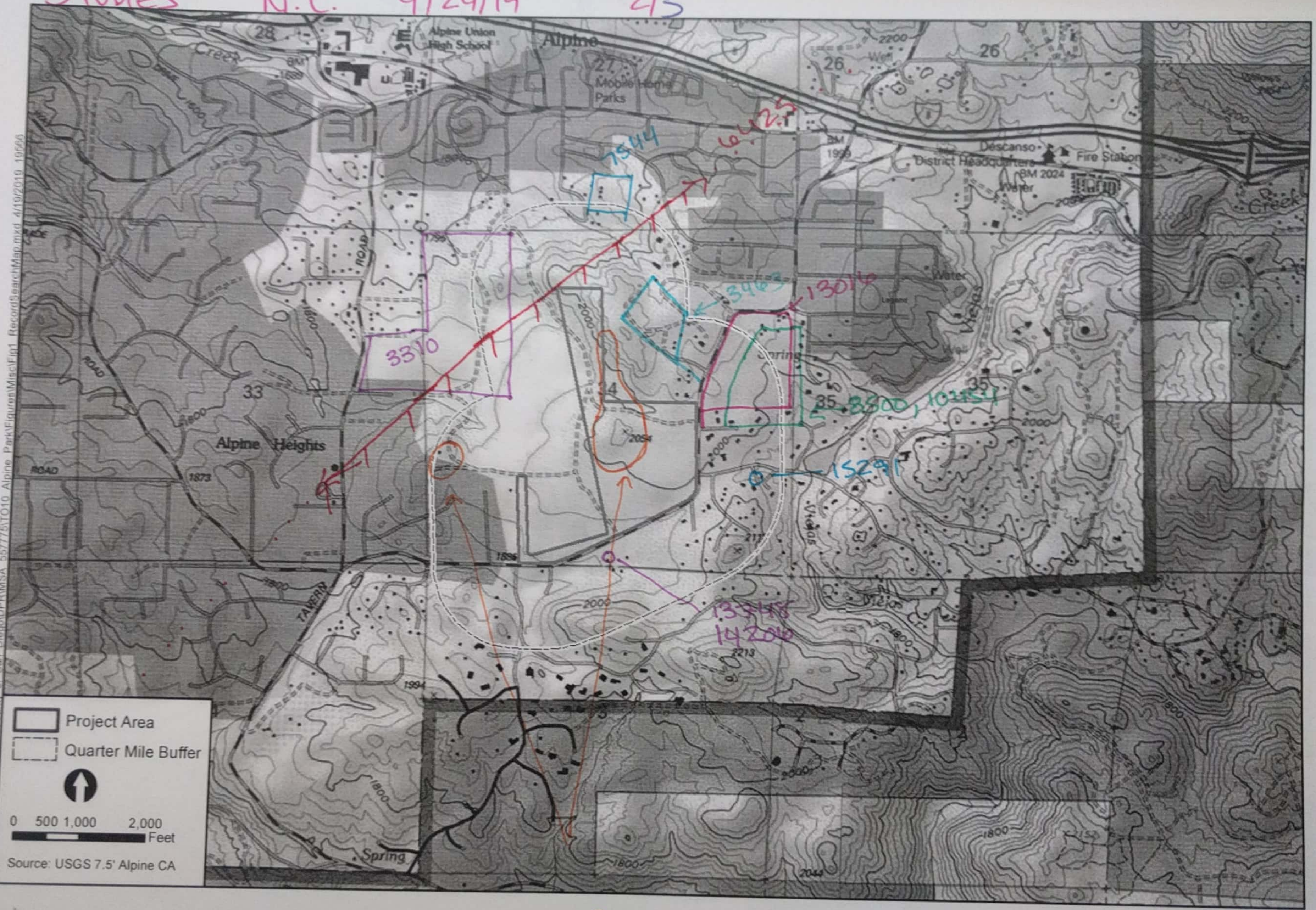

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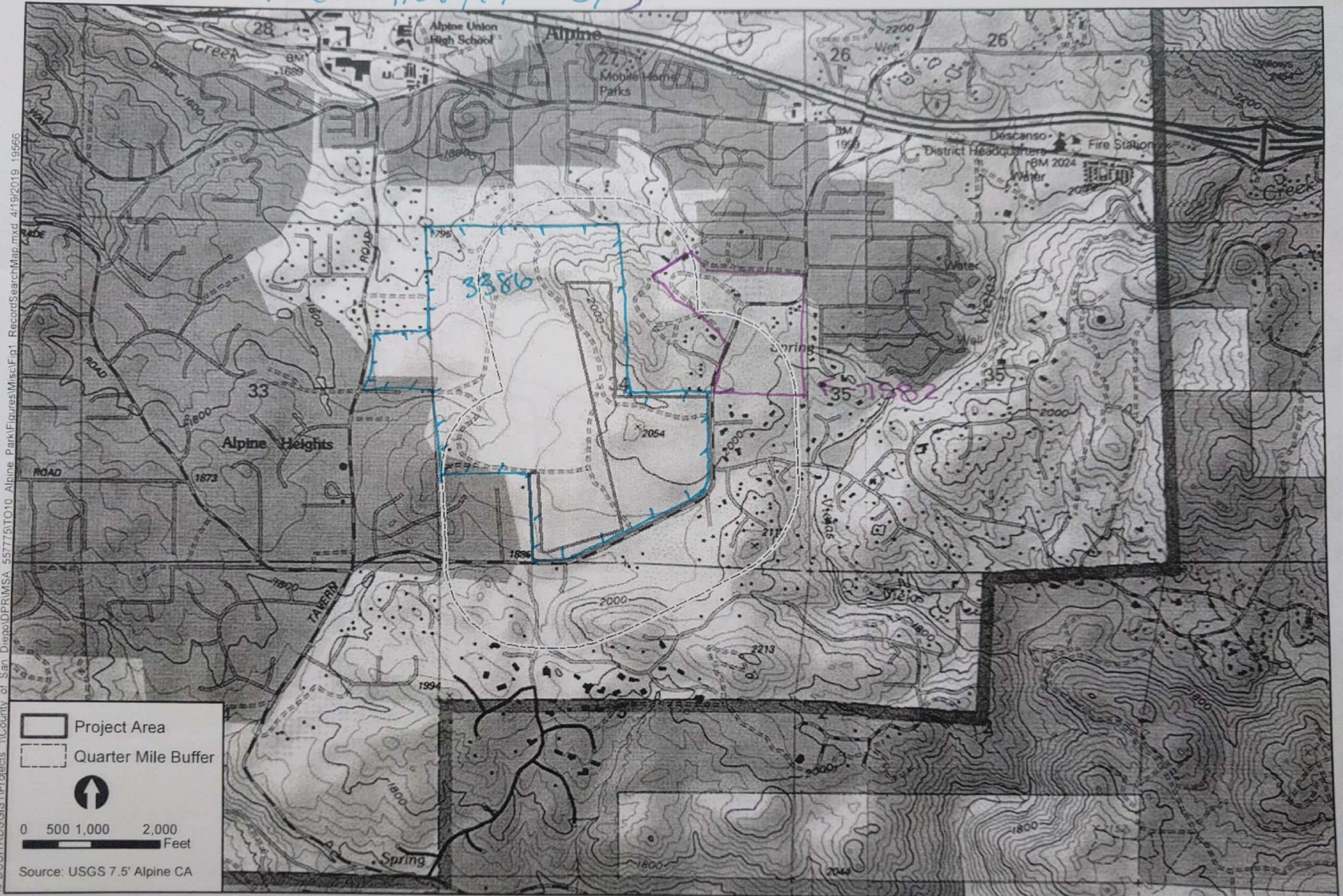
Figure 1
Record Search Map
Alpine Park (676.18)

STUDIES N.C. 4/28/19 3/S



Source: USGS 7.5' Alpine CA

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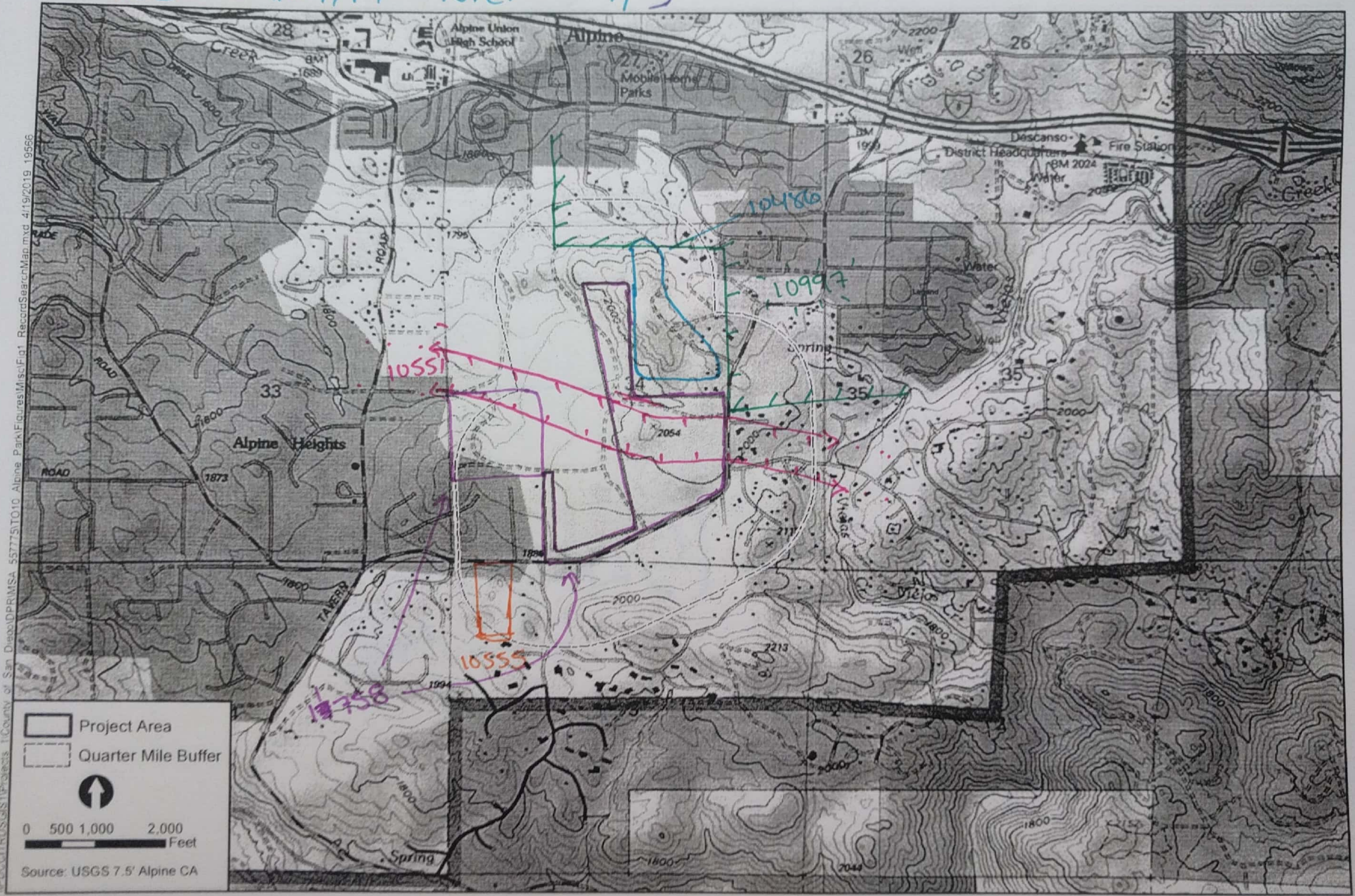
Figure 1
Record Search Map
Alpine Park (676.18)

STUDIES 4/24/19 N.C. 4/5



Source: USGS 7.5' Alpine CA

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Figure 1
Record Search Map
Alpine Park (676.18)

STUDIES N.C. 4/24/19 5/5

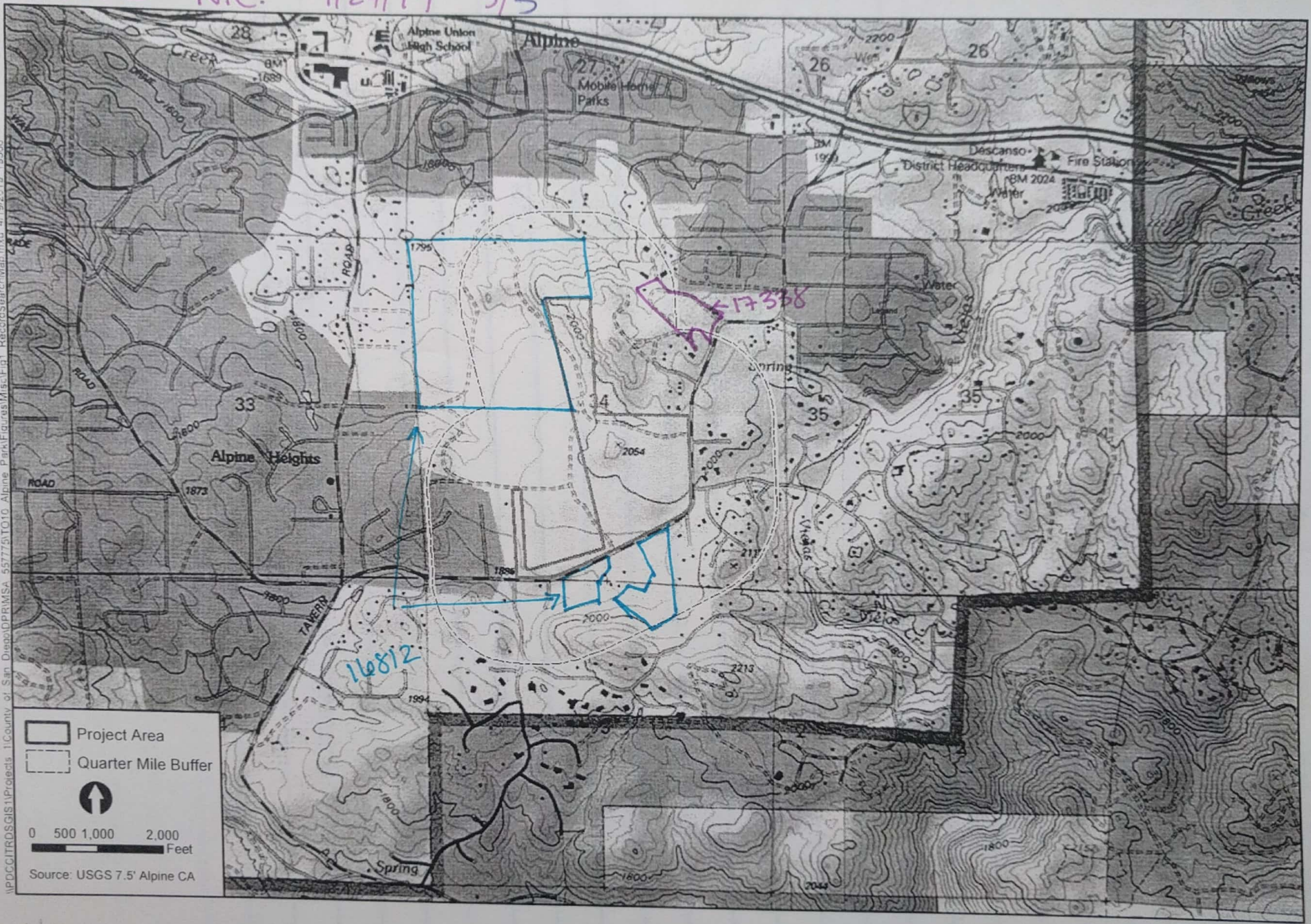

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Figure 1
Record Search Map
Alpine Park (676.18)

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Appendix B

CONFIDENTIAL

Figure 4 – Site Location Map

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Appendix C

Native American Consultation

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95501
(916) 373-3710
(916) 373-5471 – Fax
nahc@nahc.ca.gov

Information Below is Required for a Sacred Lands File Search

Project: Alpine Park Project – Environmental

County: San Diego

USGS Quadrangle

Name: Alpine

Township: 15 South Range: 2 East Section(s): 34 and 3

Company/Firm/Agency:

ICF

Contact Person: Patrick McGinnis

Street Address: 525 B St. #1700

City: San Diego Zip: 92101

Phone: (858) 444-3947 Extension:

Fax: (858) 578-0573

Email: Patrick.McGinnis@ICF.com

Project Description:

The County of San Diego proposes to develop approximately 102 acres as a public park. ICF has been retained to conduct a Phase I cultural resources inventory, and prepare a memorandum documenting the environmental surveys and CEQA reporting required to develop a park at the site. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The property is located adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine.

☑ Project Location Map is attached

\\PDCCITRDSGIS1\Projects 1\County of San Diego\DPR\MSA 557775\TO10 Alpine Park\Figures\Misc\Fig1 ProjectLocation NAHC.mxd 4/19/2019 19566

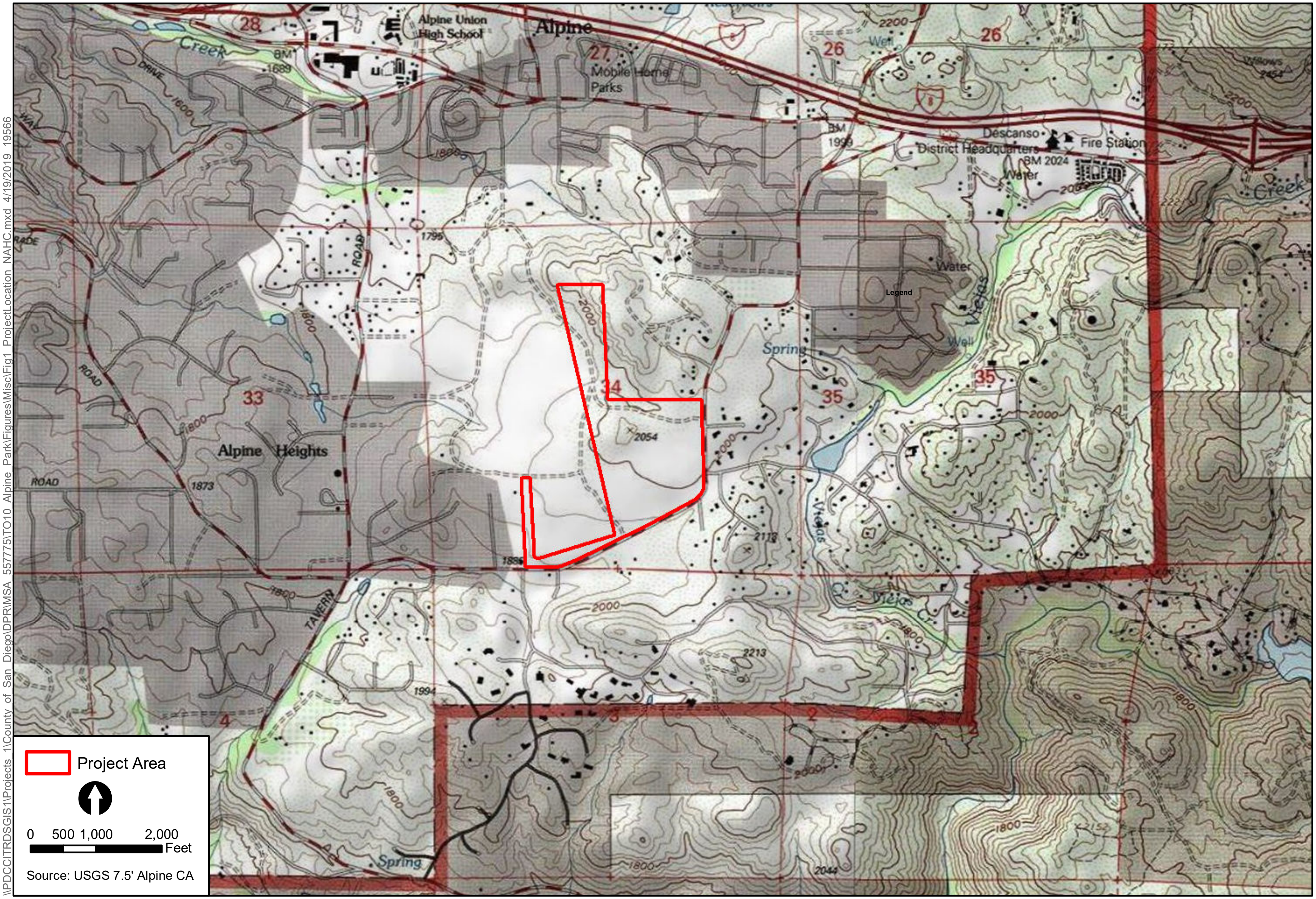

Figure 1
Project Location
Alpine Park

STATE OF CALIFORNIA **Gavin Newsom, Governor**

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691 Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

May 3, 2019

Patrick McGinnis
ICF

VIA Email to: Patrick.mcginnis@icf.com

RE: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Alpine Park Project, San Diego County

Dear Mr. McGinnis:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

> Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

    - A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;

    - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;

    - Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and

    - If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

    - Any report that may contain site forms, site significance, and suggested mitigation measures.

      All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the NAHC was <u>positive</u>. Please contact the Sycuan Band of Kumeyaay Nation and the Viejas Band of Kumeyaay Indians on the attached list for more information.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: steven.quinn@nahc.ca.gov.

Sincerely,

Steven Quinn

Steven Quinn
Associate Governmental Program Analyst

Attachment

Native American Heritage Commission
Native American Contact List
San Diego County
5/3/2019

Barona Group of the Capitan Grande
Edwin Romero, Chairperson
1095 Barona Road Diegueno
Lakeside, CA, 92040
Phone: (619) 443 - 6612
Fax: (619) 443-0681
cloyd@barona-nsn.gov

Campo Band of Diegueno Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 Diegueno
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Tribe
Robert Pinto, Chairperson
4054 Willows Road Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
wmicklin@leaningrock.net

Ewiiaapaayp Tribe
Michael Garcia, Vice Chairperson
4054 Willows Road Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
michaelg@leaningrock.net

Iipay Nation of Santa Ysabel
Virgil Perez, Chairperson
P.O. Box 130 Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 765 - 0845
Fax: (760) 765-0320

Iipay Nation of Santa Ysabel
Clint Linton, Director of Cultural Resources
P.O. Box 507 Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 803 - 5694
cjlinton73@aol.com

Inaja-Cosmit Band of Indians
Rebecca Osuna, Chairperson
2005 S. Escondido Blvd. Diegueno
Escondido, CA, 92025
Phone: (760) 737 - 7628
Fax: (760) 747-8568

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612 Diegueno
Jamul, CA, 91935
Phone: (619) 669 - 4785
Fax: (619) 669-4817
epinto@jiv-nsn.gov

Kwaaymii Laguna Band of Mission Indians
Carmen Lucas,
P.O. Box 775 Kwaaymii
Pine Valley, CA, 91962 Diegueno
Phone: (619) 709 - 4207

La Posta Band of Diegueno Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com

La Posta Band of Diegueno Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302 Diegueno
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Alpine Park Project, San Diego County.

Native American Heritage Commission
Native American Contact List
San Diego County
5/3/2019

Mesa Grande Band of Diegueno Mission Indians
Michael Linton, Chairperson
P.O Box 270 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 782 - 3818
Fax: (760) 782-9092
mesagrandeband@msn.com

San Pasqual Band of Diegueno Mission Indians
Allen Lawson, Chairperson
P.O. Box 365 — Diegueno
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
allenl@sanpasqualtribe.org

San Pasqual Band of Diegueno Mission Indians
John Flores, Environmental Coordinator
P. O. Box 365 — Diegueno
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
johnf@sanpasqualtribe.org

Sycuan Band of the Kumeyaay Nation
Cody J. Martinez, Chairperson
1 Kwaaypaay Court — Kumeyaay
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov

Sycuan Band of the Kumeyaay Nation
Lisa Haws, Cultural Resources Manager
1 Kwaaypaay Court — Kumeyaay
El Cajon, CA, 92019
Phone: (619) 312 - 1935
lhaws@sycuan-nsn.gov

Viejas Band of Kumeyaay Indians
Robert Welch, Chairperson
1 Viejas Grade Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337

Viejas Band of Kumeyaay Indians
Ernest Pingleton, Tribal Historic Officer, Resource Management
1 Viejas Grade Road — Diegueno
Alpine, CA, 91901
Phone: (619) 659 - 2314
epingleton@viejas-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Alpine Park Project, San Diego County.

May 21, 2019

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302
Boulevard, CA 91905

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Ms. Elliott Santos:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

ICF has been retained to support DPR in further identifying the opportunities and constraints on the subject property. ICF will conduct a Phase I cultural resources inventory, and prepare a memorandum documenting the environmental surveys and CEQA reporting in support of the project. To accomplish this objective, ICF cultural resources personnel performed a records search, archival research, and a Sacred Lands File search. Archival research refers to both written and oral history including record searches at the South Central Information Center (SCIC), the Native American Heritage Commission (NAHC), as well as Native American consultation. Prehistoric sites have been identified directly within the project area as a result the record search.

The NAHC completed a search of the Sacred Lands File which did indicate the presence of Native American sacred lands within the project area. The NAHC identify you as a person who may have concerns or knowledge of cultural resources in the project area. Any information you might be able to share about the project area would greatly enhance the study and would be most appreciated.

If you would like to participate in the consultation process, or if you have any recommendations regarding the Project, please address them to me so that I can incorporate them into our draft report. As required by State law, all site data and other culturally sensitive information will not be released to the general public and will be kept strictly confidential. This outreach is for due diligence and not under AB52 or Section 106. I can be reached at 858-444-3947, or by email at Patrick.McGinnis@icf.com.

Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

San Pasqual Band of Diegueno Mission Indians
John Flores, Environmental Coordinator
P.O. Box 365
Valley Center, CA 92082

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Mr. Flores:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Ewiiaapaayp Band of Kumeyaay Indians
Michael Garcia, Vice Chairperson
4054 Willows Road
Alpine, CA 91901

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Mr. Garcia:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Campo Band of Diegueno Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1
Campo, CA 91906

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Mr. Goff:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

ICF

May 21, 2019

Sycuan Band of the Kumeyaay Nation
Kristie Orosco, Cultural Resources Manager
1 Kwaaypaay Court
El Cajon, CA 92019

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Ms. Orosco:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

ICF

May 21, 2019

San Pasqual Band of Diegueno Mission Indians
Allen Lawson, Chairperson
P.O. Box 365
Valley Center, CA 92082

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Mr. Lawson:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

ICF

May 21, 2019

Iipay Nation of Santa Ysabel
Clint Linton, Director of Cultural Resources
P.O. Box 507
Santa Ysabel, CA 92070

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Mr. Linton:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Mesa Grande Band of Diegueno Mission Indians
Michael Linton, Chairperson
P.O. Box 270
Santa Ysabel, CA 92070

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Mr. Linton:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Kwaaymii Laguna Band of Mission Indians
Carmen Lucas
P.O. Box 775
Pine Valley, CA 91962

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Ms. Lucas:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Sycuan Band of the Kumeyaay Nation
Cody J. Martinez, Chairperson
1 Kwaaypaay Court
El Cajon, CA 92019

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Mr. Martinez:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

La Posta Band of Diegueno Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road
Boulevard, CA 91905

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Mr. Miller:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Inaja-Cosmit Band of Indians
Rebecca Osuna, Chairperson
2005 S. Escondido Blvd.
Escondido, CA 92025

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Ms. Osuna:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

La Posta Band of Diegueno Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road
Boulevard, CA 91905

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Ms. Parada:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Iipay Nation of Santa Ysabel
Virgil Perez, Chairperson
P.O. Box 130
Santa Ysabel, CA 92070

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Mr. Perez:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Viejas Band of Kumeyaay Indians
Ernest Pingleton, Tribal Historic Officer, Resource Management
1 Viejas Grade Road
Alpine, CA 91901

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Mr. Pingleton:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Ewiiaapaayp Tribal Office
Robert Pinto, Chairperson
4054 Willows Road
Alpine, CA 91901

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Mr. Pinto:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612
Jamul, CA 91935

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Ms. Pinto:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Barona Group of the Capitan Grande
Edwin Romero, Chairperson
1095 Barona Road
Lakeside, CA 92040

Subject: **Alpine Park Project- Environmental – Due Diligence Outreach**

Dear Mr. Romero:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

May 21, 2019

Viejas Band of Kumeyaay Indians
Robert Welch, Chairperson
1 Viejas Grade Road
Alpine, CA 91901

Subject: Alpine Park Project- Environmental – Due Diligence Outreach

Dear Mr. Welch:

The County of San Diego Department of Parks and Recreation (DPR) has acquired approximately 102 acres adjacent to the Back Country Land Trust's Wright's Field Preserve on South Grade Road in Alpine, and intends to develop a new park facility within its confines. The new park facility would consist of a community park, an open space preserve or a combination of the two. The proposed project is within a parcel identified as Assessor's Parcel Number (APN) 404-170-61-00. The Project is within Sections 34 and 3 of Township 15 South, Range 2 East, and appears on the *Alpine*, California USGS 7.5-minute series topographic map (Figure 1).

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Sincerely,

Patrick McGinnis

Patrick McGinnis, MA
Archaeologist

Encl. Figure 1

VIEJAS
TRIBAL GOVERNMENT

P.O. Box 908
Alpine, CA 91903
#1 Viejas Grade Road
Alpine, CA 91901

Phone: 6194453810
Fax: 6194455337
viejas.com

June 5, 2019

Patrick McGinnis
Archaeologist
ICF
525 B Street, Suite 1700
San Diego, CA 92101

RE: Alpine Park Project

Dear Mr. McGinnis,

The Viejas Band of Kumeyaay Indians ("Viejas") has reviewed the proposed project and at this time we have determined that the project site has cultural significance or ties to Viejas.

Viejas Band request that a Kumeyaay Cultural Monitor be on site for ground disturbing activities to inform us of any new developments such as inadvertent discovery of cultural artifacts, cremation sites, or human remains.

Please call me at 619-659-2312 or Ernest Pingleton at 619-659-2314 or email, rteran@viejas-nsn.gov or epingleton@viejas-nsn.gov , for scheduling. Thank you.

Sincerely,

Ray Teran, Resource Management
VIEJAS BAND OF KUMEYAAY INDIANS

From: Cox, Nara
To: Clint Linton
Cc: McGinnis, Patrick
Subject: Re: Alpine Park Project- Environmental – Due Diligence Outreach
Date: Wednesday, May 22, 2019 9:16:55 AM
Attachments: image003.png

Thanks Clint. We'll make a note of that.

On May 22, 2019 8:04 AM, Clint Linton <clint@redtailenvironmental.com> wrote:
Thanks Nara. For this project i would like to defer to and support the comments and requests of the Viejas Band. Thanks again, clint

On Tue, May 21, 2019 at 2:57 PM Cox, Nara <Nara.Cox@icf.com> wrote:

> Hi Clint-
>
> Please see attached regarding outreach for the Alpine Park Project.
>
> Hope all is well,
>
> **NARA COX** | Archaeologist – Southern California | +1.714.337.0769 mobile | nara.cox@icf.com| icf.com
>
> **ICF** | 525 B Street, Suite 1700, San Diego, CA 92101 USA
>
> Connect with us on social media.

--
Clint Linton, President
Cell: (760) 803-5694
Clint@redtailenvironmental.com
P.O. Box 507 Santa Ysabel, CA 92070

DBE MBE SLBE

Appendix D

CONFIDENTIAL

Department of Parks and Recreation 523 Forms

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Appendix E

Alpine Park Cultural Resources Testing Report

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Memorandum

To:	Lorrie Bradley Department of Parks and Recreation County of San Diego 5500 Overland Avenue, Suite 410 San Diego, CA 92123
From:	Patrick McGinnis, M.A., RPA Archaeologist ICF 525 B St. Suite 1700 San Diego CA, 92101
Date:	April 30, 2021
Re:	**Alpine Park Cultural Resources Testing Report**

The County of San Diego Department of Parks and Recreation (DPR) retained ICF to perform as-needed cultural resources services in support of planning efforts for Alpine Park (Project). The Project is being conducted in compliance with the California Environmental Quality Act of 1970 (CEQA) and the County of San Diego Resource Protection Ordinance (RPO). Patrick McGinnis, M.A., RPA served as the Principal Investigator and author of the report for the Project. Kent Smolik and Hector Galvez served as archaeological field crew. A Native American monitor was provided by Red Tail Environmental and present during the field effort.

ICF archaeologists and a Native American monitor conducted subsurface testing at two archaeological sites within the 98-acre Project area. The purpose of the testing was to determine if the sites contained subsurface deposits and to evaluate the resources potential to qualify as historical resources or unique archaeological resources under CEQA and the County of San Diego RPO and Historical Resources Guidelines.

Project Location

The study area is Assessor’s Parcel Number 404-170-61-00 (Property), totaling approximately 98 acres. The County plans to create a community park on the Property, tentatively called Alpine Park, within the community of Alpine in east San Diego County. The Property is adjacent to the Back Country Land Trust’s Wright Field Preserve on South Grade Road. The County acquired the Property in early 2019.

The Property is located within the Alpine 7.5 minute United States Geological Survey (USGS) quadrangle in Township 15 South, Range 2 East, in section 34 (Figures 1 and 2, attached).

Records Search

ICF staff archaeologist, Nara Cox, B.A. conducted a cultural resources records search at the South Coastal Information Center (SCIC) at San Diego State University on April 24, 2019. The purpose of the search was to identify previously recorded cultural resources inside or within 0.25 mile of the Property and to assess the potential for certain resource types within the Property. Also included in the search were cultural resources studies that have been conducted inside or within 0.25 mile of the Property.

Records Search Results

A total of 30 cultural resources studies are on record at the SCIC as having occurred inside or within 0.25 mile of the Property. Of these, 22 reports were designated as unmappable but were identified because of the record search. Six of the mapped reports covered a portion of the Property, including three that covered the Property in its entirety. The SCIC cultural resources records search indicated that 26 cultural resources have been recorded within 0.25 mile of the Property, four of which are plotted within the Property. Of these 26 resources, 20 are prehistoric resources, five are historic period resource, and one is a multicomponent resource.

The four resources reported within the Property consist of three prehistoric resources—bedrock milling sites (CA-SDI-5199, CA-SDI-19332, and CA-SDI-19333)—and one historic house complex archaeological site (CA-SDI-12236). A survey of the Property was conducted in August 2019. During the survey, four previously recorded cultural resources were relocated, and no new cultural resources were identified.

Two of the three prehistoric sites, CA-SDI-19332, and CA-SDI-19333, have not been previously evaluated for eligibility for the California Register of Historical Resources (CRHR) and are in areas where proposed park construction of landscaped berm screens could impact the sites. Site CA-SDI-5199 consists of a knoll/outcrop containing at least 15–22 bedrock milling features with at least 42 milling elements: 7 basins and 35 milling slicks. Bedrock is granitic rock; granodiorite and tonalite. The site also contains a thin scatter of ceramics and lithic debitage. The site was originally recorded in 1977 and described as two knolls with over 100 milling elements and an extensive low density lithic scatter with approximately 75 artifacts. CA-SDI-5199 was later tested and evaluated multiple times. The site has previously been evaluated and found to lack enough subsurface information to be considered eligible for the CRHR. Most of this site including the bedrock milling elements will be avoided and are outside proposed park improvements. The historic house complex archaeological site, CA-SDI-12236, is in an area proposed to be left as open space and was not evaluated for this current effort. Due to the potential for impacts to sites CA-SDI-19332 and CA-SDI-19333, subsurface testing was conducted at both sites to identify if subsurface deposits were present and in turn evaluate the sites for their eligibility for the CRHR and the San Diego County Local Register of Historical Resources (Local Register). Descriptions of the two tested sites are below.

P-37-030429/CA-SDI-19332

This resource was originally recorded as one bedrock milling feature with one slick. The bedrock is dark granitic rock, possibly tonalite or gabbro. The current effort found the resource to be in poor condition, the milling surface has undergone severe exfoliation. An additional milling feature was found on a small boulder (1 meter [m] by 0.5 m) approximately 5 m from the originally recorded milling feature (Photo 1). This new milling feature contains a slick that measures approximately 17 centimeters (cm) x 6 cm. The milling features are now referred to as MF#1 and MF #2. No artifacts or midden soils were identified in the vicinity of the resource.

Photo 1. Additional milling feature (MF#2) identified at CA-SDI-19333 with testing excavation in the background near originally recorded milling feature.

P-37-030430/CA-SDI-19333

This resource consists of one granitic bedrock milling feature with one slick. The 2019 survey relocated the resource—40 m due south of the location recorded at the SCIC—and found the surface of the rock to be highly exfoliated. One small area, approximately 2 cm by 2 cm, appeared to retain a slick remnant. The originally recorded slick is in very poor condition. No artifacts or midden soils were identified in the vicinity of the resource.

Testing Methods and Results

Prior to commencing subsurface investigation, the areas surrounding the site were intensively surveyed for surface artifacts that might identify potential cultural deposits in addition to the bedrock milling features. Surface visibility was fair to poor, averaging less than 50 percent due to the presence of low grasses. No artifacts were identified on the ground surface near either of the bedrock milling sites when they were originally recorded or during subsequent investigations. Therefore, shovel test pit (STP) locations were selected arbitrarily within 5 m of each milling feature. Five STPs were excavated at site CA-SDI-19333 and four were excavated at site CA-SDI-19332. If the STPs were positive, additional STPs were to be placed radiating outward from the site to establish the site's subsurface boundaries and determine the depth of deposit (Figure 3).

STPs were excavated to a minimum depth of 40 cm and would have been excavated to two sterile levels below the level of the last recovered artifacts had artifacts been recovered. All excavated soil was passed through sifting screens with 1/8-inch mesh.

Photo 2. STP 2 at terminal 40 cm level with granitic cobbles present, CA-SDI-19332

Soils within the STPs tended to be consistent with an upper layer of loose d ark brown loamy, organic, root-matted soil ranging anywhere from 5-10 cm in thickness followed by a layer of compact dark gray-brown silty clay with some gravel and occasional large granitic cobbles. The soil became more compact with depth and some pockets and layers of hard compact decomposing granite were encountered below 30 cm in depth. All nine of the STPs excavated at sites CA-SDI-019332 and CA-SDI-019333 were negative for cultural materials or ecofacts and it is worth noting that no types of stone normally associated with stone tool making were identified in the STPs other than chunks of granite.

Guidelines for Determining Significance

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

California Environmental Quality Act

According to CEQA Section 15064.5a, the term “historical resource” includes the following:

A resource listed in or determined to be eligible by the State Historical Resources Commission for listing in, the CRHR (Public Resources Code Section 5024.1; 14 CCR 4850 et seq.).

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 a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, shall be presumed to be historically of 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.

Any object, building, structure, site, area, place, record, or manuscript that 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 a 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 in the CRHR (Public Resources Code Section 5024.1, 14 CCR 4852), including the following:

Criterion 1: Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage;

Criterion 2: Is associated with the lives of persons important in our past;

Criterion 3: Embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values; or

Criterion 4: Has yielded, or may be likely to yield, information important in prehistory or history.

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 a historical resources survey (meeting the criteria in Section 5024.1(g) of the Public Resource Code) does not preclude a lead agency from determining that the resource may be a historical resource, as defined in Public Resources Code Sections 5020.1(j) or 5024.1.

According to CEQA Section 15064.5b, a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment. CEQA defines a substantial adverse change as follows:

Substantial adverse change in the significance of a historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired.

The significance of a historical resource is materially impaired when a project:

Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR; or

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 a 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

Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and 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: When a project will affect an archaeological site, a lead agency shall first determine whether the site is a historical resource, as defined in subsection (a).

If a lead agency determines that the archaeological site is a historical resource, it shall refer to the provisions of Section 21084.1 of the Public Resources Code, and this section, Section 15126.4 of the CEQA Guidelines, and the limits contained in Section 21083.2 of the Public Resources Code do not apply.

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 a project location contains unique archaeological resources.

If an archaeological resource is neither a unique archaeological resource nor a historical resource, the effects of a 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.

Sections 15064.5(d) and (e) contain additional provisions regarding human remains. Regarding Native American human remains, paragraph (d) provides the following:

(d) When an initial study identifies the existence, or the probable likelihood, of Native American human remains within a project area, a lead agency shall work with the appropriate Native Americans, as identified by the NAHC, and provided in Public Resources Code Section 5097.98. 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 requirement of CEQA and the Coastal Act.

San Diego County Local Register of Historical Resources

The County of San Diego requires that resource importance be assessed not only at the state level, as required by CEQA, but at the local level as well. If a resource meets any one of the following criteria, as outlined in the Local Register, it will be considered an important resource. A cultural resource is significant at the local level if it:

Is associated with events that have made a significant contribution to the broad patterns of San Diego County's history and cultural heritage;

Is associated with the lives of persons important to the history of San Diego County or its communities;

Embodies the distinctive characteristics of a type, period, San Diego County region, or method of construction; represents the work of an important creative individual; or possesses high artistic values; or

Has yielded, or may be likely to yield, information important in prehistory or history.

Resource Importance and Evaluation

Nine STPs were excavated at sites CA-SDI-19333 and CA-SDI-19332. None of the STPs contained artifacts or other cultural materials. Prehistoric bedrock milling sites do not possess the qualities that would make them eligible for the CRHR under Criteria 1-3 or the Local Register under Criteria 1-3. However, bedrock milling sites when associated with deposits that have potential to yield additional information or exist as part of large habitation site or district may be eligible under CRHR Criterion 4 or Local Register Criterion 4. Both CA-SDI-19333 and CA-SDI-19332 are isolated bedrock milling sites with no evidence of additional activities taking place in the immediate vicinity. The sites may be outliers related to the larger bedrock milling complex at CA-SDI-5199 which has been found not be eligible for the CRHR. These site types are thought to reflect late prehistoric resource collection and processing activities by the Kumeyaay people. These sites occur in an area with abundant evidence of prehistoric land use and are a very common site type in the area. Based on the results of the shovel probe survey, no subsurface components are associated with these sites, and they are unlikely to yield significant information that would warrant consideration for the CRHR under Criterion 4 or Local Register. The recording and testing of CA-SDI-19333 and CA-SDI-19332 has exhausted their research potential and therefore, the Project would have no impact on historical resources.

Recommendations

The County of San Diego's preferred management method for cultural resources is to incorporate avoidance and preservation into project designs. Although no cultural resources eligible for the CRHR or Local Register have been identified in the Project the possibility exists that potentially significant subsurface deposits may exist within the Project Area. Because of the nature of the prehistoric and historic sites in the Project Area, signage could be provided to emphasize the prehistoric and ethnographic activity represented by the resources and discuss the connection between these features and the original ecological context of the area. Signage would provide an opportunity to tie the Project Area into the larger regional landscape, along with interpretive programs and displays to illustrate how the Project Area is connected to patterns of Native American subsistence.

The following mitigation measure is recommended to reduce potential impacts to cultural resources.

MM-CUL-1: Archaeological Monitoring. The County Department of Parks and Recreation (DPR) will retain a qualified archaeologist to monitor all proposed ground-disturbing activities related to the implementation of the proposed project in order to minimize disturbance of subsurface archaeological deposits. Specifically, the following measures will be implemented to reduce impacts:

- All proposed ground disturbance, including grading and excavation for the project, will be monitored by a qualified archaeologist(s) who meets the Secretary of the Interior's Professional Qualifications Standards, as promulgated in Code of Federal Regulations (CFR), Title 36, Section 61 or in the City's Land Development Code.

- Prior to the start of construction, a monitoring plan will be prepared that describes the nature of the archaeological monitoring work, procedures to follow in the event of an unanticipated discovery, and reporting requirements.

- The archaeologist will be invited to the preconstruction meeting to inform all personnel of the high probability of archaeological materials being encountered during construction.

- If intact subsurface deposits are identified during construction, the archaeologist will be empowered to divert construction activities away from the find and will be given sufficient time and compensation to investigate the find and determine its significance. No soil will be exported off site until a determination can be made regarding the significance of the resource, especially if Native American resources are encountered.

- Recovered items will be treated in accordance with current professional standards by being properly provenienced, cleaned, analyzed, researched, and reported. Curation of recovered items in a collection facility meeting the Secretary of the Interior's Standards, as promulgated in 36 CFR 79, such as the San Diego Archaeological Center is the preferred final disposition of any recovered assemblage. The costs for curation would be included in the budget for recovery of the archaeological remains. Conversely, if the assemblage is minimal, once the recovered items have been appropriately recorded and analyzed they may be reburied on the project site as near as possible to their original depth and location when originally recovered. The artifacts will be identified to indicate that they are secondary deposition. The location will be recorded and submitted to the SCIC for their records.

- A final Cultural Resources Monitoring report will be produced, which will discuss the monitoring program and its results and will provide interpretations of any recovered cultural materials.

Although there is no evidence to suggest the presence of human remains, in the unlikely event that human remains are encountered during future ground disturbing activities, all work will cease and the requirements of California Health and Safety Code § 7050.5(a) (b) shall be followed and the County coroner will be contacted. Should the remains be identified as Native American, the coroner will contact the NAHC within 24 hours and the Native American Heritage Commission will designate a Most Likely Descendent (MLD) within 48 hours. The MLD and the County will work together to determine appropriate treatment of the human remains.

Sincerely,

Patrick McGinnis

Patrick McGinnis, M.A., RPA
Senior Archaeologist

Attachments Attachment 1: Figures 1, 2, and 3
Attachment 2: Updated DPR forms (Confidential)

ATTACHMENT 1: Figures 1-3 (Figure 3 is Confidential and Not for Public Review)

ATTACHMENT 2: Updated DPR Forms (Confidential)

Appendix F

Geotechnical Evaluation

Geotechnical Evaluation

Alpine Community Park
Alpine, California

MW Peltz & Associates
143 South Cedros Avenue, Suite B104 | Solana Beach, California 92075

December 30, 2020 | Project No. 109107001

Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

Geotechnical Evaluation

Alpine Community Park
Alpine, California

Mr. Mike Peltz
MW Peltz & Associates
143 South Cedros Avenue, Suite B104 | Solana Beach, California 92075

December 30, 2020 | Project No. 109107001

Christina Tretinjak, PG, CEG
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1 INTRODUCTION

In accordance with your request and authorization, we have prepared this geotechnical evaluation report for the proposed Alpine Community Park in Alpine, California (Figure 1). Presented in this report are the results of our background review, field exploration, and geotechnical laboratory testing along with our conclusions regarding the geotechnical conditions at the site and our recommendations for the design and earthwork construction aspects of this project.

2 SCOPE OF SERVICES

Ninyo & Moore's scope of services for this project included review of pertinent background data, performance of a geologic reconnaissance, subsurface exploration, and engineering analysis with regard to the proposed construction. These services generally follow the scope outlined in our proposal dated April 3, 2020. Specifically, we performed the following tasks:

- Reviewing readily available pertinent information including published in-house geotechnical literature, topographic maps, geologic maps, and fault maps, historic stereoscopic aerial photographs, and project conceptual drawings (MW Peltz + Associates, 2020).

- Performing a field reconnaissance to observe site conditions and to mark the locations of our exploratory test pits.

- Coordinating with Underground Service Alert (USA) for utility clearance at our test pit locations.

- Performing a subsurface exploration consisting of the excavating, logging, and sampling of 15 exploratory test pits. The test pits were excavated to depths of up to approximately 7.2 feet using a rubber-tire backhoe. Bulk samples of the materials encountered were collected at selected intervals from the test pits and transported to our in-house geotechnical laboratory for testing.

- Performing infiltration testing using the simple open pit test method within seven of the test pits. Infiltration testing was performed in general conformance with the guidelines presented in the 2020 County of San Diego BMP Design Manual.

- Performing geotechnical laboratory testing on representative samples to evaluate soil parameters for design and classification purposes.

- Performing engineering analyses of the site geotechnical conditions based on data obtained from our background review, field exploration, and laboratory testing.

- Preparing this geotechnical evaluation report describing the findings and conclusions of our study and providing recommendations for design and construction of the proposed improvements.

3 SITE AND PROJECT DESCRIPTION

The site is located on the western and northern sides of South Grade Road at its intersections with Calle de Compadres and Via Viejas in Alpine, California (Figure 1). The project site consists of undeveloped land with a gentle gradient down to the southeast, with a cross slope inclined toward the southeast. Onsite elevations range from approximately 2,030 feet above mean sea level (MSL) in the northeastern portion of the site to approximately 1,970 feet above MSL in the southwestern portion of the site. The project site is generally undeveloped and sparsely vegetated with grasses, shrubs, and trees. Several dirt roads and trails transect portions of the site.

Based on our review of project conceptual drawings (MW Peltz + Associates, 2020), we understand that the project will consist of the construction of a new County of San Diego park. The park improvements are to include new administration, restroom, and storage buildings, shade structures, a skate park, basketball courts, pickle-ball courts, sports fields, a bike park, a dog park, and a community garden. Additional improvements are anticipated to consist of parking and drive areas, picnic tables, underground utilities, American with Disabilities Act (ADA) access walkways and ramps, landscaping, and signage.

4 SUBSURFACE EXPLORATION

Our subsurface exploration was conducted on November 18 and 19, 2020, and included the excavating, logging, and sampling of 15 exploratory test pits (TP-1 through TP-15). Prior to commencing the subsurface exploration, USA was notified for marking of the existing site utilities. The purpose of the test pits was to evaluate subsurface conditions and to collect soil samples for laboratory testing.

The test pits were excavated to depths ranging from approximately 3 feet to 7.2 feet using a rubber-tire backhoe. Ninyo & Moore personnel logged the borings in general accordance with the Unified Soil Classification System (USCS) and ASTM International (ASTM) Test Method D 2488 by observing cuttings and bulk samples. Representative bulk and in-place soil samples were obtained from the test pits. The samples were then transported to our in-house geotechnical laboratory for testing. The approximate locations of the exploratory test pits are shown on Figure 2. Logs of the test pits are included in Appendix A.

5 INFILTRATION TESTING

Field infiltration testing was performed on November 18 and 19, 2020 in general accordance with the County of San Diego BMP Design Manual (2020) using the simple open pit test method. The infiltration tests IT-1 through IT-7 were performed within exploratory test pits TP-1, TP-2, TP-7, TP-9, TP-12, TP-14 and TP-15). An approximately 2 foot by 2 foot, square hole that was approximately 1-foot-deep was manually excavated within each of the noted test pits. For testing, the test holes were filled with 6 to 12 inches of water and the depth to the water was measured at 10 minute intervals for a span of 1 hour and then the test at each location was repeated another 2 times for total of 3 hours of testing per location. The test holes were refilled after the respective intervals as needed to restore the initial water level.

Infiltration rates were calculated using the Porchet method and an equivalent radius for the square holes. Infiltration tests IT-1 through IT-4 indicated that the observed (i.e., unfactored) infiltration rates ranged from a no infiltration condition to very slow variable infiltration rates. Per the County of San Diego BMP Design Manual (2020) Appendix D Section D.2-3 the safety factor must be between 2.0 and 9.0, and per Table D.2-3 a safety factor of 2.25 was selected. Completed Tables D.1-1: Consideration for Geotechnical Analysis of Infiltration Restrictions and D.2-3: Determination of Safety Factor are presented in Appendix D. Infiltration test results and calculations are included in Appendix C and summarized in Table 1 below.

Table 1 – Infiltration Test Results Summary

Infiltration Test	Approximate Test Depth (feet)	Description	Observed Infiltration Rate (in/hr)	Suitability Assessment Safety Factor[1]	Reliable/ Factored Infiltration Rate[2] (in/hr)
IT-1	3.3	Decomposed Granitic Rock	0.17[3]	2.25	0.07[3]
IT-2	3.8	Decomposed Granitic Rock	DNI	2.25	DNI
IT-3	3.2	Decomposed Granitic Rock	DNI	2.25	DNI
IT-4	4.2	Decomposed Granitic Rock	DNI	2.25	DNI
IT-5	3.8	Decomposed Granitic Rock	0.21[3]	2.25	0.09[3]
IT-6	3.6	Decomposed Granitic Rock	DNI	2.25	DNI
IT-7	4.9	Decomposed Granitic Rock	DNI	2.25	DNI

Notes:
DNI = did not infiltrate
in/hr = inches per hour
[1] Design safety factor to be determined by the design engineer in accordance with Appendix D of the County of San Diego BMP Design Manual (2019)
[2] Factored infiltration rate shall be divided by the design safety factor to obtain the design infiltration rate.
[3] Infiltration rates ranged from a no infiltration condition to very slow variable rates. The listed rates are approximations based on interpretation of the test results presented in Appendix C.

We note that the in-situ infiltration rates presented in Table 1 represent the infiltration rates at the specific locations and depths indicated in the table. Variation in the infiltration rates can be expected at different depths and/or locations from those shown in the table.

6 LABORATORY TESTING

Geotechnical laboratory testing was performed on representative soil samples collected from our subsurface exploration. Testing included an evaluation of gradation (sieve) analysis, expansion index, soil corrosivity, and R-value. Descriptions of the geotechnical laboratory test methods and the results of the geotechnical laboratory tests performed are presented in Appendix B.

7 GEOLOGY AND SUBSURFACE CONDITIONS

Our findings regarding regional and site geology and groundwater conditions are provided in the following sections.

7.1 Regional Geologic Setting

The project is situated in the coastal foothill section of the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip of Baja California (Norris and Webb, 1990; Harden, 2004). The province varies in width from approximately 30 to 100 miles. In general, the province consists of rugged mountains underlain by Jurassic metavolcanic and metasedimentary rocks, and Cretaceous igneous rocks of the southern California batholith. The portion of the province in San Diego County that includes the project area consists generally of Cretaceous age sedimentary and granitic rock.

The Peninsular Ranges Province is traversed by a group of sub-parallel faults and fault zones trending approximately northwest. Several of these faults, shown on Figure 3, are considered active faults (Jennings, 2010). The Elsinore, San Jacinto, and San Andreas are active fault systems located northeast of the project area and the Rose Canyon, Coronado Bank, San Diego Trough, and San Clemente faults are active fault located west of the project area. The Elsinore fault zone is the nearest active fault system and has been mapped approximately 21 miles east of the project site. Major tectonic activity associated with these and other faults within this regional tectonic framework consists primarily of right-lateral, strike-slip movement. Further discussion of faulting relative to the site is provided in the Faulting and Seismicity section of this report

7.2 Site Geology

The geology of the site vicinity is shown on Figure 3. Geologic units encountered during our site reconnaissance and subsurface exploration included topsoil and decomposed granitic rock. Generalized descriptions of the earth units encountered during our field reconnaissance and subsurface exploration and mapped in the vicinity of the project site are provided in the subsequent sections (Todd, 2004). Additional descriptions of the subsurface units are provided on the test pit logs in Appendix A.

7.2.1 Topsoil

Topsoil was encountered in each of our test pits from the ground surface to depths of approximately 3.8 feet. As encountered, the topsoil generally consisted of dark brown, moist, stiff to very stiff, sandy clay and medium dense, clayey sand. Gravel, cobbles, and boulders were encountered in the topsoil.

7.2.2 Lusardi Formation

Although not encountered during our subsurface exploration, materials of the Cretaceous-age Lusardi Formation are mapped at the site. The Lusardi Formation generally consists of cobble and boulder conglomerate with thin lenses of sandstone.

7.2.3 Decomposed Granitic Rock

Decomposed granitic rock was encountered in each of our test pits underlying the topsoil and extended to the total depths explored. As encountered the decomposed granitic rock generally consisted of various shades of brown, yellow, and red, dry to moist, weathered, friable, fine- to medium-grained granitic rock with iron oxide staining. The granitic rock was observed to vary in degrees of weathering with the rock being less weathered with depth. Unweathered granitic rock corestones were encountered within out test pits and boulders were observed on the surface at numerous locations within the site.

7.3 Groundwater

Groundwater was not encountered during our evaluation and groundwater is not anticipated to be encountered during construction of the proposed improvements. However, perched groundwater or groundwater seepage may be encountered between the contact of topsoil and granitic rock or within fractures in the granitic rock. Fluctuations in groundwater typically occur due to variations in precipitation, ground surface topography, subsurface stratification, irrigation, groundwater pumping, flooding, and other factors.

7.4 Faulting and Seismicity

The numerous faults in southern California include active, potentially active, and inactive faults. As defined by the California Geological Survey, active faults are faults that have ruptured within Holocene time, or within approximately the last 11,000 years. Potentially active faults are those that show evidence of movement during Quaternary time (approximately the last 1.6 million years), but for which evidence of Holocene movement has not been established. Inactive faults have not ruptured in the last approximately 1.6 million years. The approximate locations of major active and potentially active faults in the vicinity of the site and their geographic relationship to the site are shown on Figure 4. Additionally, the site is not located within a State of California Earthquake Fault Zone (formerly known as Alquist-Priolo Special Studies Zone) (Hart and Bryant, 2007).

The site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion is considered significant during the design life of the proposed structures. Based on our review of the referenced geologic maps, as well as on our site reconnaissance, no faults are mapped as underlying the project site. The nearest known active fault is the Elsinore fault, located approximately 21 miles east of the site.

In general, hazards associated with seismic activity include strong ground motion, ground rupture, and liquefaction. These hazards, along with landsliding, are discussed in the following sections.

7.4.1 Ground Motion

The 2019 California Building Code (CBC) specifies that the Risk-Targeted, Maximum Considered Earthquake (MCE_R) ground motion response accelerations be used to evaluate seismic loads for design of buildings and other structures. The MCE_R ground motion response accelerations are based on the spectral response accelerations for 5 percent damping in the direction of maximum horizontal response and incorporate a target risk for structural collapse equivalent to 1 percent in 50 years with deterministic limits for near-source effects. The horizontal peak ground acceleration (PGA) that corresponds to the MCE_R for the site was calculated as 0.39g using the Structural Engineers Association of California (SEAOC) and Office of Statewide Health Planning and Development (OSHPD) (SEAOC and OSHPD, 2020) seismic design tool (web-based).

The 2019 CBC specifies that the potential for liquefaction and soil strength loss be evaluated, where applicable, for the Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration with adjustment for site class effects in accordance with the American Society of Civil Engineers (ASCE) 7-16 Standard. The MCE_G peak ground acceleration is based on the geometric mean peak ground acceleration with a 2 percent probability of exceedance in 50 years. The MCE_G peak ground acceleration with adjustment for site class effects (PGA_M) was calculated as 0.42g using the USGS (USGS, 2020) seismic design tool that yielded a mapped MCE_G peak ground acceleration of 0.35g for the site and a site coefficient (F_{PGA}) of 1.2 for Site Class C.

7.4.2 Ground Rupture

Based on our review of the referenced literature and our site reconnaissance, no active faults are known to cross the project vicinity. Therefore, the potential for ground rupture due to faulting at the site is considered low. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

7.4.3 Liquefaction and Seismically Induced Settlement

Liquefaction is the phenomenon in which loosely deposited granular soils with silt and clay contents of less than approximately 35 percent and non-plastic silts located below the water table undergo rapid loss of shear strength when subjected to strong earthquake-induced ground shaking. Ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid rise in pore water pressure, and causes the soil to behave as a fluid for a short period of time. Liquefaction is known generally to occur in saturated or near-saturated cohesionless soils at depths shallower than 60 feet below the ground surface. Factors known to influence liquefaction potential include composition and thickness of soil layers, grain size, relative density, groundwater level, degree of saturation, and both intensity and duration of ground shaking. Due to the dense nature of the underlying granitic rock at the site, liquefaction is not a design consideration.

7.4.4 Landsliding

Based on our review of referenced geologic maps, literature and topographic maps, and subsurface exploration, landslides or indications of deep-seated landsliding were not noted underlying the project site. In our opinion, the potential for significant large-scale slope instability at the site is not a design consideration.

7.5 Flood Hazards

Based on review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), the site is not located within mapped flood zones or floodplains. In our opinion, the potential for significant flooding at the site is not a design consideration.

8 CONCLUSIONS

Based on our review of the referenced background data, subsurface exploration, and geotechnical laboratory testing, it is our opinion that construction of the proposed improvements is feasible from a geotechnical standpoint. In general, the following conclusions were made:

- Based on the results of our field and laboratory evaluations, the subsurface soils at the project site consist of topsoil and decomposed granitic rock.
- The topsoil materials are loose and considered unsuitable for structural support in their present condition. Accordingly, recommendations are presented herein for remedial grading of these materials in preparation for new construction.
- Outcroppings of rock are exposed at the surface of the site. Excavations extending into granitic rock will encounter very difficult excavation conditions due to the presence of bedrock materials, boulders, and/or corestones. The contractor should be prepared for the use of heavy ripping, rock breaking, rock coring, and/or blasting techniques to perform onsite excavations.
- Groundwater was not encountered during our evaluation and is not anticipated to be a design and construction consideration.
- The project site is not located within a mapped floodplain or flood zone.
- No faults are mapped at the site. The closest known active fault, the Elsinore fault, has been mapped approximately 21 miles east of the site.
- Based on our field evaluation and a review of referenced maps, landslides are not present on the project site.
- Onsite excavations will generate oversized materials. Oversized materials should be screened, rock-picked, crushed, removed, or otherwise processed from the excavated materials prior to reuse as compacted fill.
- Based on the results of our laboratory testing, the topsoil possesses a medium to high potential for expansion. Accordingly, these expansive soils are not suitable for reuse as compacted fill beneath buildings, for retaining walls, or exterior concrete pedestrian flatwork. Remedial grading recommendations for these areas are presented herein.
- Based on the results of our soil corrosivity tests and Caltrans amended (2019) AASHTO (2017) corrosion criteria, the onsite soils would not be classified as corrosive.

9 RECOMMENDATIONS

The following recommendations are provided for the design and construction of the proposed project. These recommendations are based on our evaluation of the site geotechnical conditions and our assumptions regarding the planned development. The proposed site improvements should be constructed in accordance with the requirements of the applicable governing agencies.

9.1 Earthwork

In general, earthwork should be performed in accordance with the recommendations presented in this report. The geotechnical consultant should be contacted for questions regarding the recommendations or guidelines presented herein.

9.1.1 Pre-Construction Conference

We recommend that a pre-construction meeting be held prior to commencement of grading. The owner or his representative, the Project Inspector, the agency representatives, the architect, the civil engineer, Ninyo & Moore, and the contractor should attend to discuss the plans, the project, and the proposed construction schedule.

9.1.2 Site Preparation

Site preparation should begin with the removal of existing improvements, vegetation, utility lines, asphalt, concrete, and other deleterious debris from areas to be graded. Tree stumps and roots should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside of the proposed excavation and fill areas. The debris and unsuitable material generated during clearing and grubbing should be removed from areas to be graded and disposed of at a legal dumpsite away from the project area, unless noted otherwise in the following sections.

9.1.3 Excavation Characteristics

During our subsurface evaluation, we observed outcroppings of rocks at the surface and encountered decomposed granitic rock with corestones in varying states of weathering. Onsite excavations will encounter very difficult excavation conditions due to the presence of bedrock materials, boulders, and/or corestones. The contractor should be prepared for the use of heavy ripping, rock breaking, rock coring, and/or blasting techniques to perform onsite excavations.

Additionally, onsite excavations will generate oversize materials that should be screened, rock-picked, crushed, removed, or otherwise processed from the excavated materials prior to reuse as compacted fill.

9.1.4 Temporary Excavations

For temporary excavations, we recommend that the following Occupational Safety and Health Administration (OSHA) soil classifications be used:

Topsoil	*Type C*
Granitic Rock	*Type B*

Upon making the excavations, the soil classifications and excavation performance should be evaluated in the field in accordance with the OSHA regulations. Temporary excavations should be constructed in accordance with OSHA recommendations. For trench or other excavations, OSHA requirements regarding personnel safety should be met using appropriate shoring (including trench boxes) or by laying back the slopes to a slope ratio no steeper than 1½:1 (horizontal to vertical) in topsoil and 1:1 in granitic rock. Temporary excavations that encounter seepage may require shoring or may be stabilized by placing sandbags or gravel along the base of the seepage zone. Excavations encountering seepage should be evaluated on a case-by-case basis. Onsite safety of personnel is the responsibility of the contractor.

9.1.5 Remedial Grading – Structural Buildings

Based on the results of our laboratory testing presented in Appendix B, the existing topsoil possesses a medium to high potential for expansion. To mitigate for the effects of highly expansive onsite soils, we recommend the performance of the following remedial grading measures for buildings. Furthermore, recommendations to support the structures on deepened foundations, in conjunction with these remedial grading recommendations, are presented in following sections of this report.

We recommend that the existing near-surface topsoil within the building pad be removed down to competent decomposed granitic rock or 1 foot below the bottom of footings, whichever is deeper. This overexcavation should extend to the horizontal limits of the building pad. For the purposes of this report, the building pad is defined as the structural footprint (including foundations for attached overhangs, canopies, and other building appurtenances) plus a horizontal distance of 5 feet, where feasible. The lateral extents of the overexcavation may be modified in the field based on site constraints, such as property lines. The extent and depths of removals and overexcavations should be evaluated by Ninyo & Moore's representative in the field based on the materials exposed.

Subsequent to performance of the overxcavation removal, the resulting surface should be scarified to a depth of approximately 6 inches, moisture conditioned, and recompacted to a relative compaction of 90 percent as evaluated by the ASTM D 1557 prior to placing new fill. Once the resulting removal surface has been recompacted, the overexcavation should then be backfilled with compacted fill soils placed in accordance with the recommendations herein.

We recommend that the upper 2 feet of compacted fill soils placed within the building pads possess a very low to low potential for expansion (i.e. an expansion index of less than 50). As noted earlier, the onsite topsoil possesses a medium to high potential for expansion and are not considered suitable for reuse within the upper 2 feet of compacted fill soils with building pads. Accordingly, the upper 2 feet of compacted fill soils within building pads may consist of import soils, soils derived from onsite excavations into the decomposed granitic rock, or lime-treatment of onsite soils.

9.1.6 Remedial Grading – Retaining Walls

We recommend that the existing near-surface topsoil beneath retaining walls be removed down to a depth of 1 foot below the bottom of the retaining wall foundations. This overexcavation should extend a lateral distance of 1 foot beyond the horizontal limits of the foundation. The lateral extents of the overexcavation may be modified in the field based on site constraints. The extent and depths of removals and overexcavations should be evaluated by Ninyo & Moore's representative in the field based on the materials exposed.

Subsequent to performance of the overxcavation removal, the resulting surface should be scarified to a depth of approximately 6 inches, moisture conditioned, and recompacted to a relative compaction of 90 percent as evaluated by the ASTM D 1557 prior to placing new fill. Once the resulting removal surface has been recompacted, the overexcavation should then be backfilled with compacted fill soils placed in accordance with the recommendations herein.

We recommend that the upper 1 foot of compacted fill soils placed beneath retaining walls possess a very low to low potential for expansion (i.e., an expansion index of less than 50). As noted earlier, the onsite topsoil possesses a medium to high potential for expansion and are not considered suitable for reuse within the upper 1 foot of compacted fill soils beneath retaining walls. Accordingly, the upper 1 foot of compacted fill soils beneath retaining walls may consist of import soils, soils derived from onsite excavations into the decomposed granitic rock, or lime-treatment of onsite soils.

9.1.7 Remedial Grading – Exterior Pedestrian Concrete Flatwork

We recommend that the existing near-surface topsoil beneath exterior pedestrian concrete flatwork be removed down to a depth of 2 feet below the planned finished subgrade elevation. This overexcavation should extend a lateral distance of 1 foot beyond the horizontal limits of the flatwork. The lateral extents of the overexcavation may be modified in the field based on site constraints. The extent and depths of removals and overexcavations should be evaluated by Ninyo & Moore's representative in the field based on the materials exposed.

Subsequent to performance of the overxcavation removal, the resulting surface should be scarified to a depth of approximately 6 inches, moisture conditioned, and recompacted to a relative compaction of 90 percent as evaluated by the ASTM D 1557 prior to placing new fill. Once the resulting removal surface has been recompacted, the overexcavation should then be backfilled with compacted fill soils placed in accordance with the recommendations herein.

We recommend that the upper 2 feet of compacted fill soils placed beneath exterior pedestrian flatwork possess a very low to low potential for expansion (i.e. an expansion index of less than 50). As noted earlier, the onsite topsoil possesses a medium to high potential for expansion and are not considered suitable for reuse within the upper 2 feet of compacted fill soils beneath exterior pedestrian flatwork. Accordingly, the upper 2 feet of compacted fill soils beneath exterior pedestrian flatwork may consist of import soils, soils derived from onsite excavations into the decomposed granitic rock, or lime-treatment of onsite soils.

9.1.8 Materials for Fill

Materials for fill may be processed from onsite excavations or may consist of import materials. Onsite soils with an organic content of less than approximately 3 percent by volume (or 1 percent by weight) are suitable for reuse as general fill material. Fill soils should be free of trash, debris, roots, vegetation, organics, or other deleterious materials. Due to the shallow groundwater moisture conditioning of onsite materials, including drying and/or aerating, should be anticipated. Fill and utility trench backfill materials should not contain rocks or lumps over 3 inches, and not more than 30 percent larger than ¾ inch. Larger chunks, if generated during excavation, may be broken into acceptably sized pieces or disposed of offsite.

As noted earlier, expansion index testing presented in Appendix B indicates that some of the onsite topsoil possesses a medium to high potential for expansion. Soils that possess a medium to high potential for expansion (i.e., an expansion index of 50 or more) are not suitable for reuse within the upper 2 feet of building pads, in the upper 1 foot beneath retaining wall footings, as retaining wall backfill, or as the upper 2 feet of subgrade soils beneath pedestrian concrete flatwork.

Imported fill material should generally be granular soils with a very low to low expansion potential (i.e., an expansion index of 50 or less). Import fill material should also be non-corrosive in accordance with the Caltrans amended (2019) AASHTO (2017) corrosion criteria. Non-corrosive soils are soils that possess an electrical resistivity more than 1,100 ohm-centimeters (ohm-cm), a chloride content less than 500 parts per million (ppm), less than 0.15 percent sulfates, and a pH less than 5.5. Materials for use as fill should be evaluated by Ninyo & Moore's representative prior to filling or importing. To reduce the potential of importing contaminated materials to the site, prior to delivery, soil materials obtained from off-site sources should be sampled and tested in accordance with standard practice (DTSC, 2001). Soils that exhibit a known risk to human health, the environment, or both, should not be imported to the site.

9.1.9 Compacted Fill

Prior to placement of compacted fill, the contractor should request an evaluation of the exposed ground surface by Ninyo & Moore. Unless otherwise recommended, the exposed ground surface should then be scarified to a depth of approximately 8 inches and watered or dried, as needed, to achieve moisture contents generally at or slightly above the optimum moisture content. The scarified materials should then be compacted to a relative compaction of 90 percent as evaluated in accordance with the ASTM D 1557. The evaluation of compaction by the geotechnical consultant should not be considered to preclude any requirements for observation or approval by governing agencies. It is the contractor's responsibility to notify this office and the appropriate governing agency when project areas are ready for observation, and to provide reasonable time for that review.

Fill materials should be moisture conditioned to generally at or slightly above the laboratory optimum moisture content prior to placement. The optimum moisture content will vary with material type and other factors. Moisture conditioning of fill soils should be generally consistent within the soil mass.

Prior to placement of additional compacted fill material following a delay in the grading operations, the exposed surface of previously compacted fill should be prepared to receive fill. Preparation may include scarification, moisture conditioning, and recompaction.

Compacted fill should be placed in horizontal lifts of approximately 8 inches in loose thickness. Prior to compaction, each lift should be watered or dried as needed to achieve a moisture content generally at or slightly above the laboratory optimum, mixed, and then compacted by mechanical methods to a relative compaction of 90 percent as evaluated by ASTM D 1557. The upper 12 inches of the subgrade materials beneath vehicular pavements should be compacted to a relative compaction of 95 percent relative density as evaluated by ASTM D 1557. Successive lifts should be treated in a like manner until the desired finished grades are achieved.

9.1.10 Slopes

We anticipate that new cut and fill slopes will be constructed for the project. Unless otherwise recommended by our offices and approved by the regulating agencies, permanent cut and fill slopes should not be steeper than 2:1 (horizontal to vertical). Buildings, structures, and improvements should be set back from the top of slopes in accordance with the 2019 CBC. We recommend buildings and structures be set back 20 feet or more from the top of slopes.

Compaction of the face of fill slopes should be performed by backrolling at intervals of 4 feet or less in vertical slope height, or as dictated by the capability of the available equipment, whichever is less. Fill slopes should be overbuilt and cut back to finish grades. The placement, moisture conditioning, and compaction of fill slope materials should be done in accordance with the recommendations presented herein.

Site runoff should not be permitted to flow over the tops of slopes. Positive drainage should be established away from the top of slopes. This may be accomplished by utilizing brow ditches placed at the top of slopes to divert surface runoff away from the slope face where drainage devices are not otherwise available.

The onsite soils are susceptible to erosion. The project plans and specifications should contain design features and construction requirements to mitigate erosion of soils or contain a maintenance program to redress erosion features as they develop on a periodic basis.

9.1.11 Pipe Bedding and Modulus of Soil Reaction (*E'*)

It is our recommendation that new pipelines (pipes), where constructed in open excavations, be supported on 6 or more inches of granular bedding material. Granular pipe bedding should be provided to distribute vertical loads around the pipe. Bedding material and compaction requirements should be in accordance with this report. Pipe bedding typically consists of graded aggregate with a coefficient of uniformity of three or greater.

Pipe bedding and pipe zone backfill should have a Sand Equivalent of 30 or more, and be placed around the sides and the crown of the pipe. In addition, the pipe zone backfill should extend 1 foot or more above the crown of the pipe. Special care should be taken not to allow voids beneath and around the pipe. Compaction of the pipe zone backfill should proceed up both sides of the pipe.

It has been our experience that the voids within a crushed rock material are sufficiently large to allow fines to migrate into the voids, thereby creating the potential for sinkholes and depressions to develop at the ground surface. If open-graded gravel is utilized as pipe zone backfill, this material should be separated from the adjacent trench sidewalls and overlying trench backfill with a geosynthetic filter fabric.

The modulus of soil reaction (*E'*) is used to characterize the stiffness of soil backfill placed at the sides of buried flexible pipes for the purpose of evaluating deflection caused by the weight of the backfill over the pipe (Hartley and Duncan, 1987). A soil reaction modulus of 1,200 pounds per square inch (psi) may be used for an excavation depth of up to approximately 5 feet when backfilled with granular soil compacted to a relative compaction of 90 percent as evaluated by the ASTM D 1557. A soil reaction modulus of 1,500 psi may be used for trenches deeper than 5 feet.

9.1.12 Utility Trench Zone Backfill

Utility trench zone backfill should be free of organic material, clay lumps, debris, and meet the following recommendations. Trench backfill should not contain rocks or lumps over approximately 3 inches in diameter and not more than approximately 30 percent larger than ¾ inch. Backfill materials should be moisture-conditioned to generally at or slightly above the laboratory optimum. Trench backfill should be compacted to a relative compaction of 90 percent as evaluated by ASTM D 1557 except for the upper 12 inches of the backfill beneath pavement areas which should be compacted to a relative compaction of 95 percent as evaluated by ASTM D 1557. Wet soils should be allowed to dry to moisture contents near the optimum prior to their placement as backfill. Lift thickness for backfill will depend on the type of compaction equipment utilized, but fill should generally be placed in lifts not exceeding 8 inches in loose thickness. Special care should be exercised to avoid damaging the pipe during compaction of the backfill.

Note, the upper 2 feet of utility trench backfill beneath building pads, in the upper 1 foot beneath retaining wall footings, or within the upper 2 feet of subgrade soils beneath exterior pedestrian concrete flatwork should possess a medium to high potential for expansion (i.e., an expansion index of 50 or more).

9.1.13 Thrust Blocks

Thrust restraint for buried pipelines may be achieved by transferring the thrust force to the soil outside the pipe through a thrust block. Thrust blocks may be designed using the magnitude and distribution of passive lateral earth pressures presented on Figure 5. Thrust blocks should be backfilled following the recommendations presented in this report.

9.1.14 Drainage

Roof, pad, and slope drainage should be directed such that runoff water is diverted away from slopes and structures to suitable discharge areas by nonerodible devices (e.g., gutters, downspouts, concrete swales, etc.). Positive drainage adjacent to structures should be established and maintained. Positive drainage may be accomplished by providing drainage away from the foundations of the structure at a gradient of 2 percent or steeper for a distance of 5 feet or more outside building perimeters, and further maintained by a graded swale leading to an appropriate outlet, in accordance with the recommendations of the project civil engineer and/or landscape architect.

Surface drainage on the site should be provided so that water is not permitted to pond. A gradient of 2 percent or steeper should be maintained over the pad area and drainage patterns should be established to divert and remove water from the site to appropriate outlets.

Care should be taken by the contractor during final grading to preserve any berms, drainage terraces, interceptor swales or other drainage devices of a permanent nature on or adjacent to the property. Drainage patterns established at the time of final grading should be maintained for the life of the project. The property owner and the maintenance personnel should be made aware that altering drainage patterns might be detrimental to foundation performance.

9.2 Seismic Design Considerations

Design of the proposed improvements should be performed in accordance with the requirements of governing jurisdictions and applicable building codes. Table 2 presents the seismic design parameters for the site in accordance with the CBC (2019) guidelines and adjusted MCE_R spectral response acceleration parameters (SEAOC/OSHPD, 2020).

Table 2 – 2019 California Building Code Seismic Design Criteria

Seismic Design Factors	Value
Seismic Design Category	D
Site Class	C
Site Coefficient, F_a	1.2
Site Coefficient, F_v	1.5
Mapped Spectral Acceleration at 0.2-second Period, S_s	0.806g
Mapped Spectral Acceleration at 1.0-second Period, S_1	0.291g
Spectral Acceleration at 0.2-second Period Adjusted for Site Class, S_{MS}	0.967g
Spectral Acceleration at 1.0-second Period Adjusted for Site Class, S_{M1}	0.436g
Design Spectral Response Acceleration at 0.2-second Period, S_{DS}	0.645g
Design Spectral Response Acceleration at 1.0-second Period, S_{D1}	0.291g

9.3 Building Foundations

Based on our understanding of the project, site development will include the construction of various buildings. The new buildings are anticipated to be supported on shallow foundations. Recommendations for the shallow building foundations are presented in following sections. Foundations should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in the design of the structures.

9.3.1 Shallow Foundations

Shallow, spread or continuous footings supported on compacted fill or competent decomposed granitic rock may be designed using an allowable bearing capacity of 3,000 pounds per square foot (psf). The allowable bearing capacity may be increased by one-third when considering loads of short duration such as wind or seismic forces. We recommend that shallow foundations for the new buildings be founded 30 inches below the lowest adjacent grade to mitigate for the effects of the highly expansive soils onsite. Continuous footings should have a width of 18 inches and spread footings should be 24 inches in width. The footings should be reinforced in accordance with the recommendations of the project structural engineer.

9.3.2 Lateral Resistance

For resistance of footings to lateral loads, we recommend an allowable passive pressure of 300 psf per foot of depth be used with a value of up to 3,000 psf. This value assumes that the ground is horizontal for a distance of 10 feet, or three times the height generating the passive pressure, whichever is more. We recommend that the upper 1 foot of soil not protected by pavement or a concrete slab be neglected when calculating passive resistance.

For frictional resistance to lateral loads, we recommend a coefficient of friction of 0.2 be used between soil and concrete. The passive resistance values may be increased by one-third when considering loads of short duration such as wind or seismic forces.

9.3.3 Static Settlement

We estimate that the proposed structures, designed and constructed as recommended herein, and founded in compacted fill will undergo total settlement on the order of 1 inch. Differential settlement on the order of ½ inch over a horizontal span of 40 feet should be expected. These static settlements are considered to be in addition to the dynamic settlements presented in earlier sections of this report.

9.4 Interior Slabs-On-Grade

We recommend that interior concrete slabs-on-grade be underlain by 2 feet or more of compacted fill materials that generally possess a very low to low expansion potential (i.e. an expansion index of 50 or less). Interior concrete slabs-on-grade should be 5 inches thick. If moisture sensitive floor coverings are to be used, we recommend that slabs be underlain by a vapor retarder and capillary break system consisting of a 10-mil polyethylene (or equivalent) membrane placed over 4 inches of medium to coarse, clean sand or pea gravel. The slabs-on-grade should be reinforced with No. 4 reinforcing bars spaced 18 inches on center each way. The reinforcing bars should be placed near the middle of the slab. As a means to help reduce shrinkage cracks, we recommend that the slabs be provided with crack-control joints at intervals of approximately 12 feet each way. The slab reinforcement and expansion joint spacing should be designed by the project structural engineer.

9.5 Site Retaining Walls

If proposed, site retaining walls that are under 4 feet in height and are not a part of or are not connected to buildings may be supported on continuous footings bearing on compacted fill. The continuous footing should have a width of 24 inches or more and be embedded a depth of 18 inches or more. An allowable bearing capacity of 2,500 psf may be used for the design of site retaining wall foundations. The allowable bearing capacity may be increased by one-third when considering loads of short duration, such as wind or seismic forces.

For the design of a site yielding retaining wall that is not restrained against movement by rigid corners or structural connections, lateral pressures are presented on Figure 6. These pressures assume select backfill materials are used and free draining conditions. Select backfill materials should not contain rocks or lumps over 3 inches, and not more than 30 percent larger than ¾ inch, and possess a very low to low potential for expansion (i.e. an expansion index less than 50). Measures should be taken to reduce the potential for build-up of moisture behind the retaining walls. A drain should be provided behind the retaining wall as shown on Figure 7. The drain should be connected to an appropriate outlet.

9.6 Shade Structure, Light Pole and Backstop Foundations

Improvements such as shade structures, light poles, and backstop fencing are structures that typically impose relatively light axial loads on foundations and have more structural demands for lateral and uplift loading. Typically, we recommend that such structures be supported on cast-in-drilled-hole (CIDH) pile foundations. However, due to potential difficulty with drilling of these foundations due to the presence of corestones at the surface and within the decomposed granite rock, we are also providing alternative recommendations to support these structures on shallow spread footings.

9.6.1 Cast-in-Drilled-Hole (CIDH) Piles

Shade structures, light poles, and backstop fencing typically impose relatively light axial loads on foundations. Although we anticipate that pile dimensions will be generally controlled by the lateral load demand, we recommend that such drilled foundations have a diameter of 18 inches or more. Furthermore, to mitigate for the potential effects of the highly expansive onsite soils, CIDH pile foundations should extend to depths for 6 feet or more. The pile dimensions (i.e., diameter and embedment) should be evaluated by the project structural engineer.

The drilled pile construction should be observed by Ninyo & Moore during construction to evaluate if the piles have been extended to the design depths. It is the contractor's responsibility to (a) take appropriate measures for maintaining the integrity of the drilled holes, (b) see that the holes are cleaned and straight, and (c) see that sloughed loose soil is removed from the bottom of the hole prior to the placement of concrete. Drilled piles should be checked for alignment and plumbness during installation. The amount of acceptable misalignment of a pile is approximately 3 inches from the plan location. It is usually acceptable for a pile to be out of plumb by 1 percent of the depth of the pile. The center-to-center spacing of piles should be no less than three times the nominal diameter of the pile. If the CIDH piles extend into groundwater or seepage, the contractor should consider appropriate measures during construction to reduce the potential for caving of the drilled holes, including the use of steel casing and/or drilling mud. In addition, we recommend concrete be placed by tremie method, to see that the aggregate and cement do not segregate during concrete placement, on the same day the CIDH piles are drilled.

Due the variable nature and depth of the existing fill materials at the site, we recommend CIDH foundations be designed using an allowable passive pressure of 300 psf per foot of depth, with an upper bound value of up to 3,000 psf. This value assumes that the posts/poles are designed to tolerate ½ inch of deflection at the surface and that the ground is horizontal for a distance of 10 feet, or three times the height generating the passive pressure, whichever is greater. We recommend that the upper 1 foot of soil not protected by pavement or a concrete slab be neglected when calculating passive resistance.

For frictional resistance to lateral loads, we recommend a coefficient of friction of 0.3 be used between soil and concrete. The allowable lateral resistance values may be increased by 1/3 during short-term loading conditions, such as wind or seismic loading.

9.6.2 Shallow Spread Footings

Due to the potential drilling refusal on corestones that may be encountered within the decomposed granitic rock, we are providing alternative recommendations to support shade structures, light poles, and backstop fencing on shallow spread footings. To mitigate for the potential effects of the highly expansive onsite soils, spread footings for these types of structures should be embedded to depths for 3 feet or more. Foundations should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in the design of the structures.

Shallow, spread footings for shade structures, light poles, and backstop fencing bearing on compacted fill or competent site soils may be designed using an allowable bearing capacity of 2,000 psf. These allowable bearing capacities may be increased by one-third when considering loads of short duration such as wind or seismic forces. Spread footings should be 36 inches or more in width. The footings should be reinforced in accordance with the recommendations of the project structural engineer.

For resistance of spread footings to lateral loads, we recommend an allowable passive pressure of 300 psf per foot of depth be used with a value of up to 3,000 psf. This value assumes that the ground is horizontal for a distance of 10 feet, or three times the height generating the passive pressure, whichever is more. We recommend that the upper 1 foot of soil not protected by pavement or a concrete slab be neglected when calculating passive resistance.

For frictional resistance to lateral loads, we recommend a coefficient of friction of 0.2 be used between soil and concrete. The passive resistance values may be increased by one-third when considering loads of short duration such as wind or seismic forces.

9.7 Preliminary Flexible Pavement Design

We understand that the project will include the construction of new flexible AC pavements. Our laboratory testing of near surface soil samples at the project site indicated an R-values of less than 5. We have used an R-value of less than 5, along with estimated design Traffic Indices (TI) of 4.5, 5, 6, and 7 as the basis of our preliminary flexible pavement design. These assumed TIs should be evaluated by the Civil Engineer based on anticipated traffic loading at the site. Actual pavement recommendations should be based on R-value tests performed on bulk samples of the soils that are exposed at the finished subgrade elevations across the site at the completion of the grading operations. The preliminary recommended flexible pavement sections are presented in Table 3.

Table 3 – Recommended Preliminary Flexible Pavement Sections

Traffic Index (Pavement Usage)	Design R-Value	Asphalt Concrete Thickness (inches)	Aggregate Base Thickness (inches)
4.5 (Parking Stalls)	Less than 5	3	8
5 (Drive Aisles)	Less than 5	3	10
6 (Heavy Traffic Areas)	Less than 5	3	14
7 (Fire Lanes)	Less than 5	4	16

As indicated, these values assume TIs of 7.0 or less for site roads. If traffic loads are different from those assumed, the pavement design should be re-evaluated. In addition, we recommend that the upper 12 inches of the subgrade and aggregate base materials be compacted to a relative compaction of 95 percent relative density as evaluated by the current version of ASTM D 1557.

9.8 Preliminary Gravel Road Design

As part of the new construction, we anticipate that new gravel vehicular roads and parking areas will be constructed. Our laboratory testing of near surface soil samples at the project site indicated R-values of less than 5. This R-value, along with assumed design Traffic Indices (TI) of 4.5, 5, 6, and 7 has been the basis of our preliminary road design. These assumed TIs should be evaluated by the Civil Engineer based on anticipated traffic loading at the site. Actual gravel road recommendations should be based on R-value tests performed on bulk samples of the soils that are exposed at the finished subgrade elevations across the site at the completion of the grading operations. The preliminary recommended flexible pavement sections are presented in Table 4.

Table 4 – Recommended Preliminary Gravel Road Sections

Traffic Index (Pavement Usage)	Design R-Value	Aggregate Base Thickness (inches)
4.5 (Parking Stalls)	Less than 5	15
5 (Drive Aisles)	Less than 5	17
6 (Heavy Traffic Areas)	Less than 5	20
7 (Fire Access)	Less than 5	24

As indicated, these values assume TIs of 7.0 or less for site roads. If traffic loads are different from those assumed, the pavement design should be re-evaluated. In addition, we recommend that the upper 12 inches of the subgrade and aggregate base materials be compacted to a relative compaction of 95 percent relative density as evaluated by the current version of ASTM D 1557. Gravel access roads will require periodic maintenance.

9.9 Rigid Concrete Pavements

We understand that rigid concrete pavements may be used for the American with Disabilities Act (ADA) parking stalls and their associated walkways. We recommend that these ADA parking stalls and walkways be 6 inches in thickness and should be reinforced with No. 3 reinforcing bars placed at 18 inches on-center both ways. The concrete for the ADA parking stall and walkway should be underlain by 2 feet of compacted fill that possesses a very low to low potential for expansion (i.e. an expansion index of less than 50). To reduce the potential manifestation of distress to rigid concrete pavements due to movement of the underlying soil, we recommend that such flatwork be installed with crack-control joints at appropriate spacing as designed by the structural engineer. Positive drainage should be established and maintained adjacent to flatwork.

We also suggest that consideration be given to using Portland cement concrete pavements in areas where dumpsters will be stored and where refuse and delivery trucks will stop and load. Experience indicates that refuse and other heavy truck traffic can significantly shorten the useful life of AC or gravel road sections. We recommend that in these areas, a pavement section consisting of an 8-inch thickness of Portland cement concrete underlain by 8 inches of compacted aggregate base be placed. We recommend that the Portland cement concrete have a 600 pounds per square inch (psi) flexural strength and that it be reinforced with No. 4 bars that are placed 18 inches on center (both ways). The rigid pavement and aggregate base should be placed on compacted subgrade that is at a relative compaction of 95 percent as evaluated by ASTM D 1557.

9.10 Exterior Pedestrian Concrete Flatwork

We recommend that exterior pedestrian concrete flatwork be 5 inches in thickness and should be reinforced with No. 3 reinforcing bars placed at 24 inches on-center both ways. Exterior pedestrian concrete flatwork should be underlain by 2 feet of compacted fill soils that possess a very low to low potential for expansion (i.e. an expansion index of less than 50). A vapor retarder is not needed for exterior flatwork. To reduce the potential manifestation of distress to exterior concrete flatwork due to movement of the underlying soil, we recommend that such flatwork be installed with crack-control joints at appropriate spacing as designed by the civil engineer. Positive drainage should be established and maintained adjacent to flatwork.

9.11 Corrosion

Laboratory testing was performed on a select representative sample of the onsite earth materials to evaluate pH and electrical resistivity, as well as chloride and sulfate contents. The pH and electrical resistivity tests were performed in accordance with California Test (CT) 643 and the sulfate and chloride content tests were performed in accordance with CT 417 and CT 422, respectively. These laboratory test results are presented in Appendix B.

The results of the corrosivity testing indicated electrical resistivities of 630 to 1,600 ohm-cm, soil pH values of 7.4 to 7.5, chloride contents of 40 to 70 parts per million (ppm), and sulfate contents of 0.001 to 0.004 percent (i.e., 10 to 40 ppm). Based on a comparison with the California Department of Transportation amended (Caltrans, 2019) AASHTO (2017) corrosion criteria, the soils at the project site are classified as corrosive, which is defined as having earth materials with more than 500 ppm chlorides, more than 0.15 percent sulfates (i.e., 1,500 ppm), a pH less than 5.5, and/or an electrical resistivity less than 1,100 ohm-cm.

9.12 Concrete

Concrete in contact with soil or water that contains high concentrations of water-soluble sulfates that can be subject to premature chemical and/or physical deterioration. As noted, the soil samples tested in this evaluation indicated water-soluble sulfate contents of 0.001 to 0.004 percent by weight (i.e., 10 to 40 ppm). Based on the American Concrete Institute (ACI) 318 criteria, the site soils would correspond to exposure class S0. For this exposure class, ACI 318 recommends that normal weight concrete in contact with soil possess a compressive strength of 2,500 psi or more. Furthermore, due to the potential for variability of site soils, we also recommend that normal weight concrete in contact with soil use Type II, II/V, or V cement.

9.13 Storm Water BMPs

As previously discussed, the site subsurface soils at the project site had factored infiltration rates ranging from a no infiltration condition to very slow variable infiltration rates. Based on the geologic contact between the topsoil and the underlying granitic rock, attempts to infiltrate stormwater are anticipated to result in lateral movement, ponding, and/or mounding of stormwater and perched water conditions. Additionally, due to the presence of medium to highly expansive soils onsite, such conditions are anticipated to adversely affect surrounding improvements. Accordingly, we recommend that the project consider the use of pavement edge drains and cutoff curbs along the sides of infiltration devices to reduce the potential for lateral migration of water. Additionally, we recommend that permanent infiltration devices incorporate an overflow pipe that is connected to an appropriate outlet. Additional recommendations and/or considerations should be provided by the project civil engineer.

As previously noted, our testing was specific to the locations and depths documented herein. Other areas of the site may or may not accommodate infiltration of storm water. Additional infiltration testing would be needed in these other areas to evaluate whether infiltration in these areas/depths are feasible. Additionally, the horizontal separations between the proposed basins and existing improvements should be evaluated to check whether the setback requirements presented in County of San Diego BMP Design Manual (2020) are met.

10 PLAN REVIEW AND CONSTRUCTION OBSERVATION

The conclusions and recommendations presented in this report are based on analysis of observed conditions in widely spaced exploratory test pits. If conditions are found to vary from those described in this report, Ninyo & Moore should be notified, and additional recommendations will be provided upon request. Ninyo & Moore should review the final project drawings and specifications prior to the commencement of construction. Ninyo & Moore should perform the needed observation and testing services during construction operations.

The recommendations provided in this report are based on the assumption that Ninyo & Moore will provide geotechnical observation and testing services during construction. In the event that it is decided not to utilize the services of Ninyo & Moore during construction, we request that the selected consultant provide the client and Ninyo & Moore with a letter indicating that they fully understand Ninyo & Moore’s recommendations, and that they are in full agreement with the design parameters and recommendations contained in this report. Construction of proposed improvements should be performed by qualified subcontractors utilizing appropriate techniques and construction materials.

11 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

12 REFERENCES

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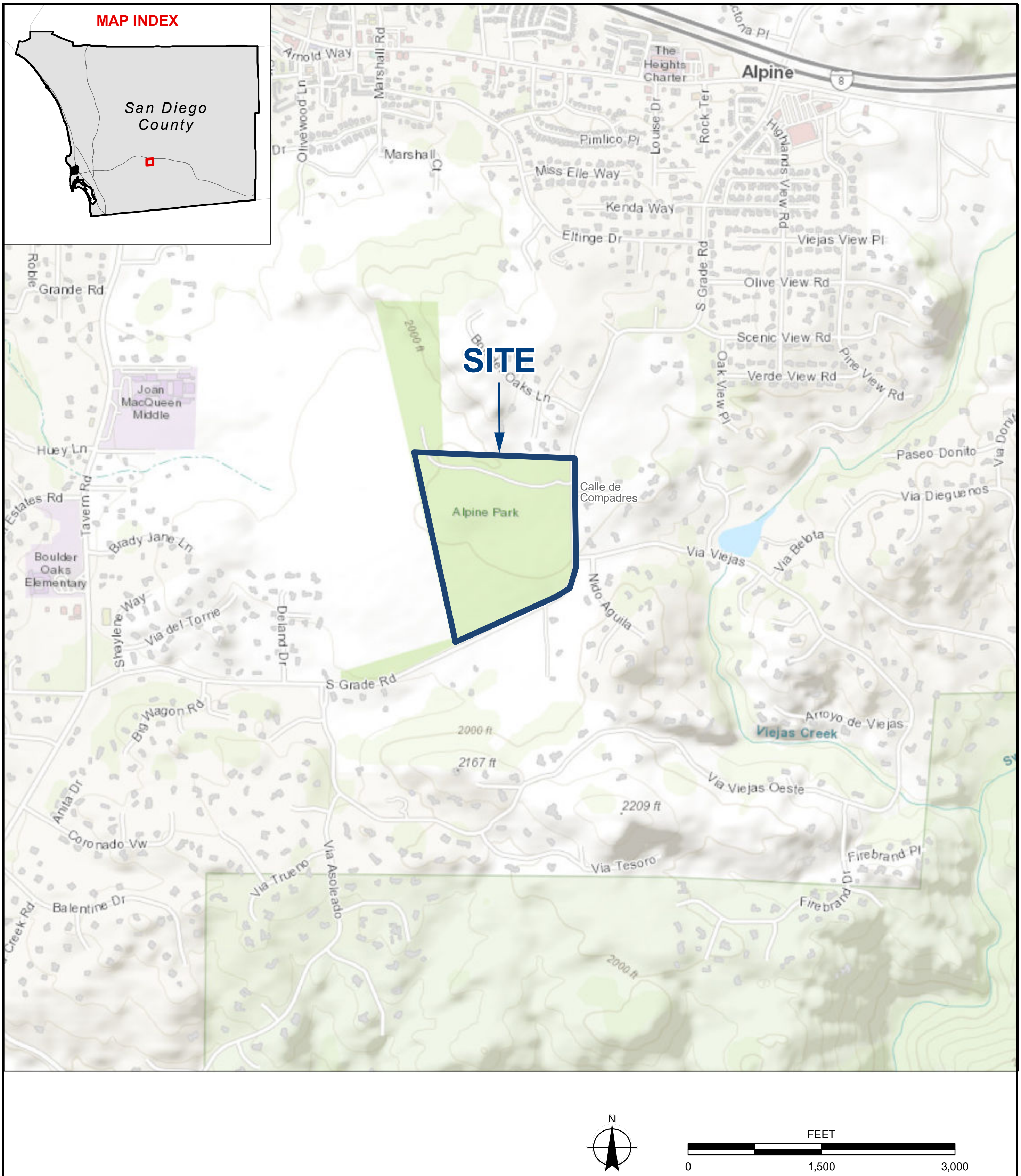
FIGURES



NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: ESRI WORLD TOPO, 2020

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FIGURE 1

SITE LOCATION

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

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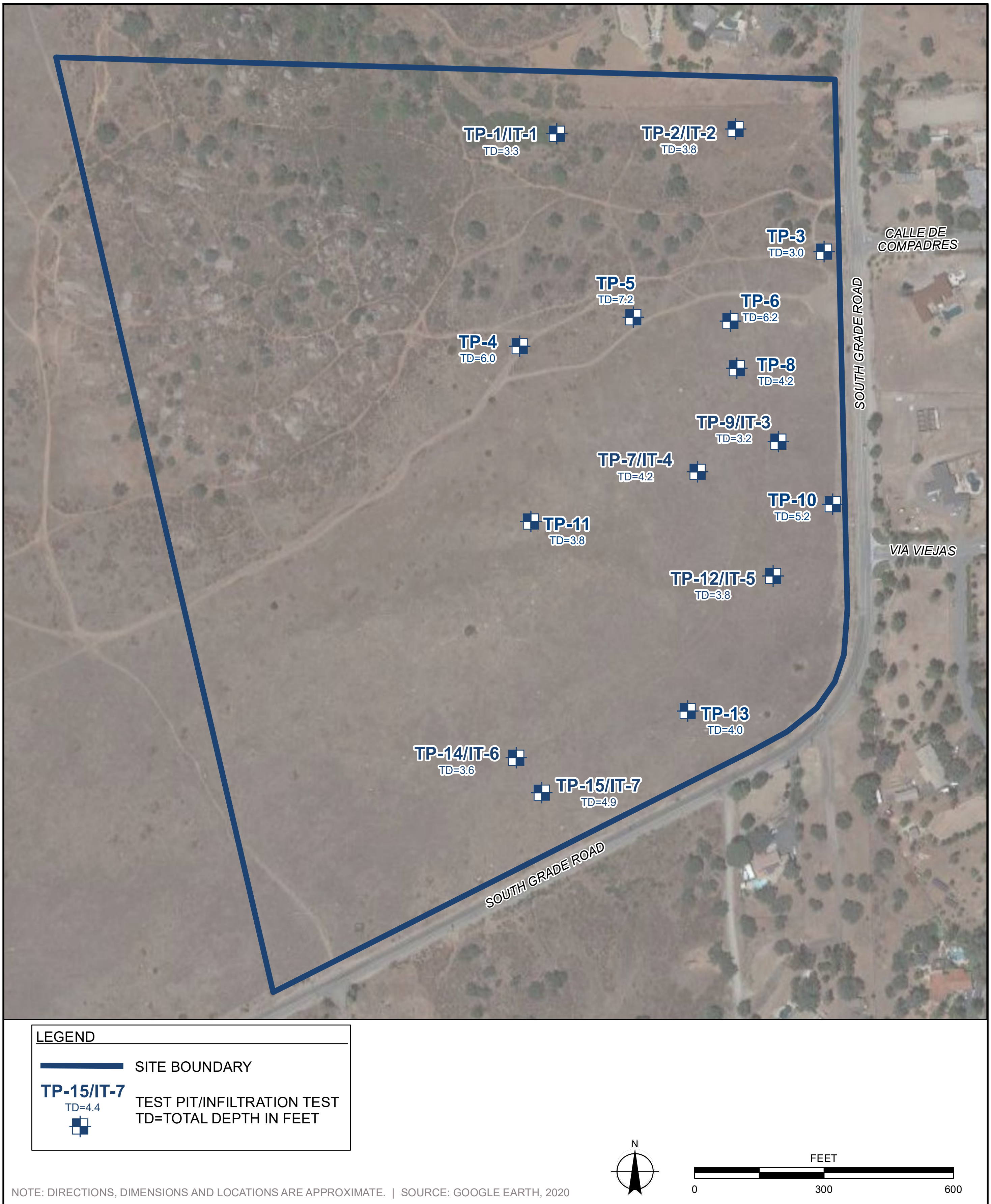
Geotechnical & Environmental Sciences Consultants



NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: GOOGLE EARTH, 2020

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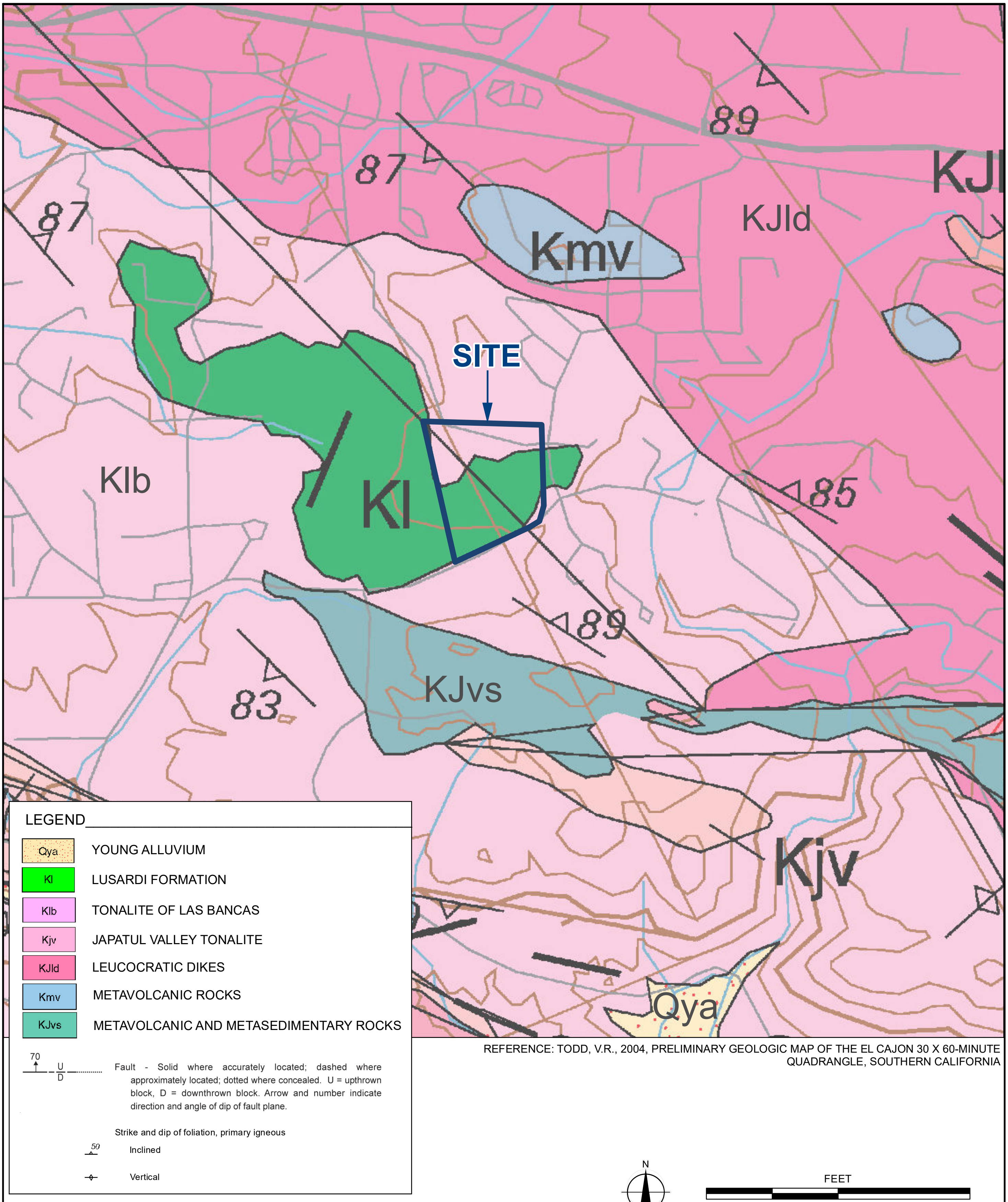
FIGURE 2

TEST PIT AND INFILTRATION TEST LOCATIONS

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants



REFERENCE: TODD, V.R., 2004, PRELIMINARY GEOLOGIC MAP OF THE EL CAJON 30 X 60-MINUTE QUADRANGLE, SOUTHERN CALIFORNIA

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

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FIGURE 3

GEOLOGY

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

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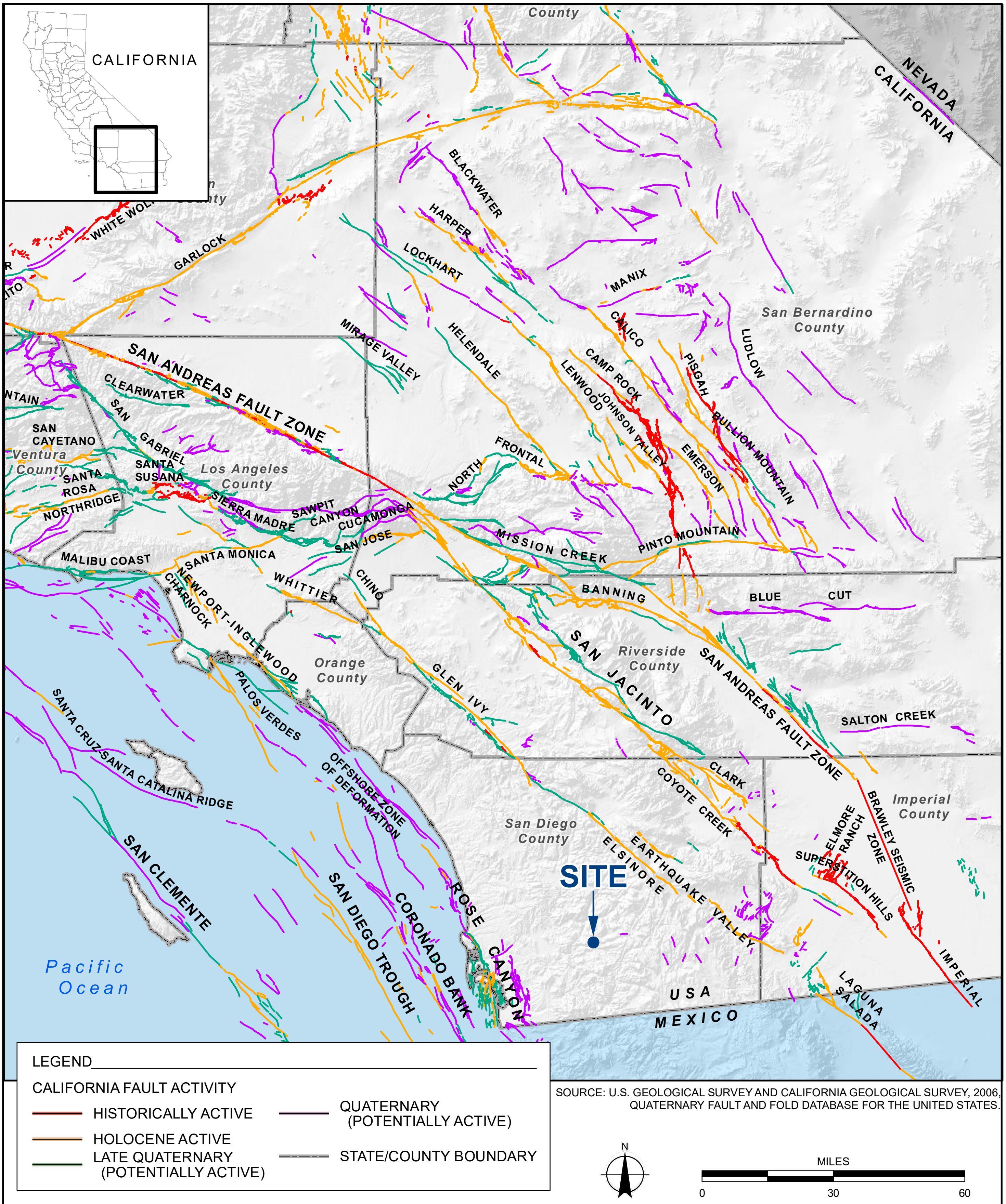
Geotechnical & Environmental Sciences Consultants



SOURCE: U.S. GEOLOGICAL SURVEY AND CALIFORNIA GEOLOGICAL SURVEY, 2006, QUATERNARY FAULT AND FOLD DATABASE FOR THE UNITED STATES.

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

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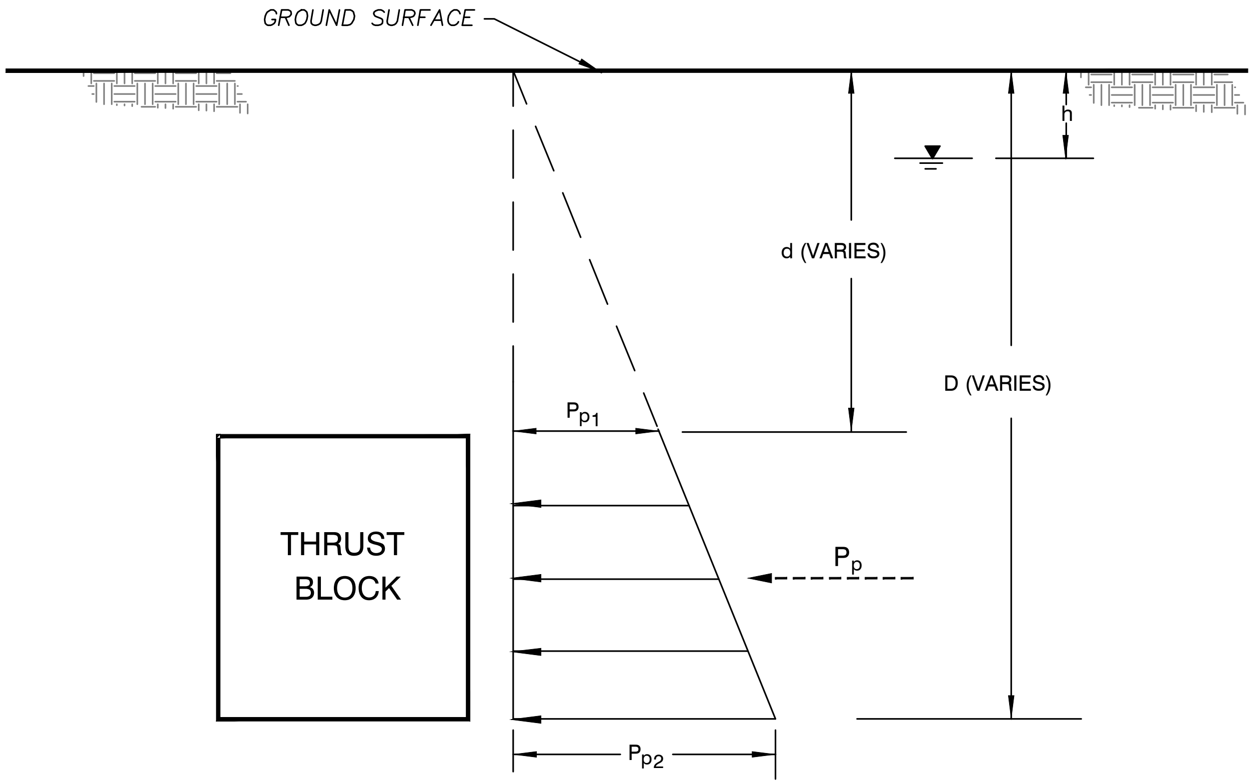
FIGURE 4

FAULT LOCATIONS

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants



NOTES:

1. GROUNDWATER BELOW BLOCK

   $P_p = 150\ (D^2 - d^2)$ lb/ft

2. ASSUMES BACKFILL IS GRANULAR MATERIAL

3. ASSUMES THRUST BLOCK IS ADJACENT TO COMPETENT MATERIAL

4. D, d AND h ARE IN FEET

NOT TO SCALE

109107001 DETAIL FIGS.DWG AOB

FIGURE 5

THRUST BLOCK LATERAL EARTH PRESSURE DIAGRAM

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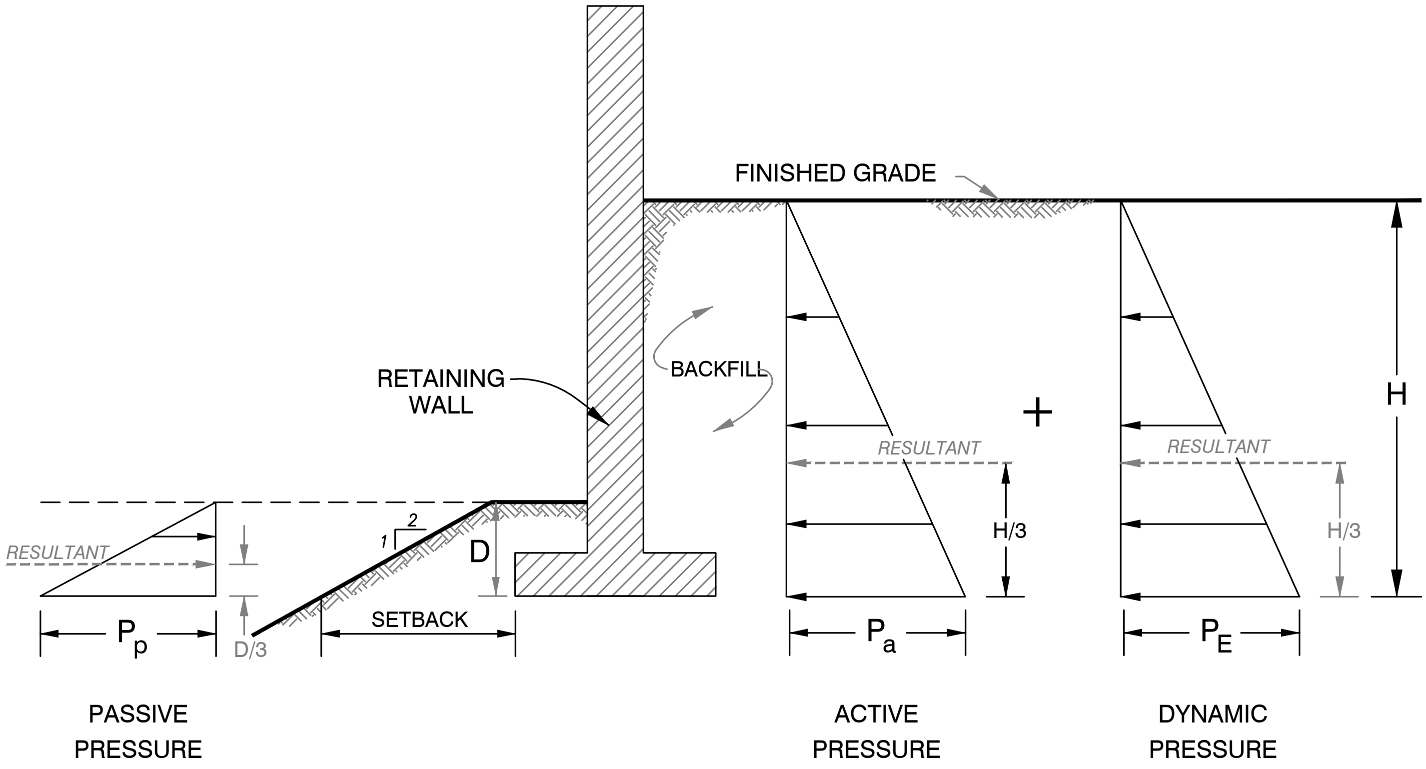
Geotechnical & Environmental Sciences Consultants

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 I 12/20



NOTES:

1. ASSUMES NO HYDROSTATIC PRESSURE BUILD-UP BEHIND THE RETAINING WALL
2. GRANULAR BACKFILL MATERIALS AS SPECIFIED IN SECTION 9.5 OF THE REPORT SHOULD BE USED FOR RETAINING WALL BACKFILL
3. DRAINS AS RECOMMENDED IN THE RETAINING WALL DRAINAGE DETAIL SHOULD BE INSTALLED BEHIND THE RETAINING WALL
4. SURCHARGE PRESSURES CAUSED BY VEHICLES OR NEARBY STRUCTURES ARE NOT INCLUDED
5. H AND D ARE IN FEET
6. SETBACK SHOULD BE IN ACCORDANCE WITH THE CBC

RECOMMENDED GEOTECHNICAL DESIGN PARAMETERS

Lateral Earth Pressure	Equivalent Fluid Pressure ($lb/ft^2/ft$)(1)	
P_a	Level Backfill with Granular Soils (2)	2H:1V Sloping Backfill with Granular Soils (2)
	40 H	65 H
P_p	Level Ground	2H:1V Descending Ground
	300 D	130 D

NOT TO SCALE

109107001 DETAIL FIGS.DWG AOB

FIGURE 6

LATERAL EARTH PRESSURES FOR YIELDING RETAINING WALLS

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

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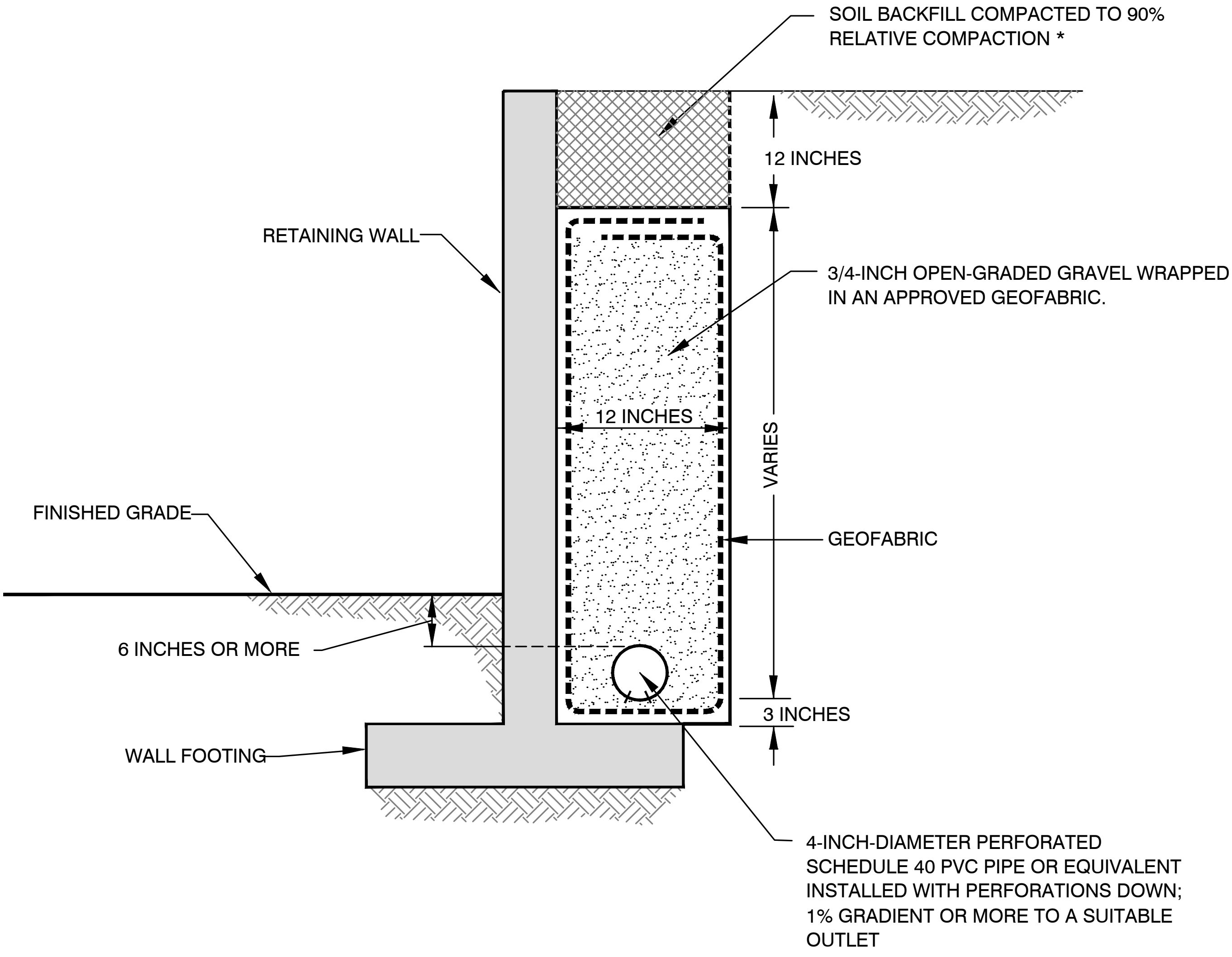
Geotechnical & Environmental Sciences Consultants

109107001 I 12/20



*BASED ON ASTM D1557

109107001 DETAIL FIGS.DWG AOB

NOT TO SCALE

FIGURE 7

RETAINING WALL DRAINAGE DETAIL

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 I 12/20

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Geotechnical & Environmental Sciences Consultants

APPENDIX A

Test Pit Logs

APPENDIX A

TEST PIT LOGS

Field Procedure for the Collection of Disturbed Samples
Disturbed soil samples were obtained in the field using the following method.

Bulk Samples
Bulk samples of representative earth materials were obtained from the exploratory test pits. The samples were bagged and transported to the laboratory for testing.

DATE EXCAVATED ____________________

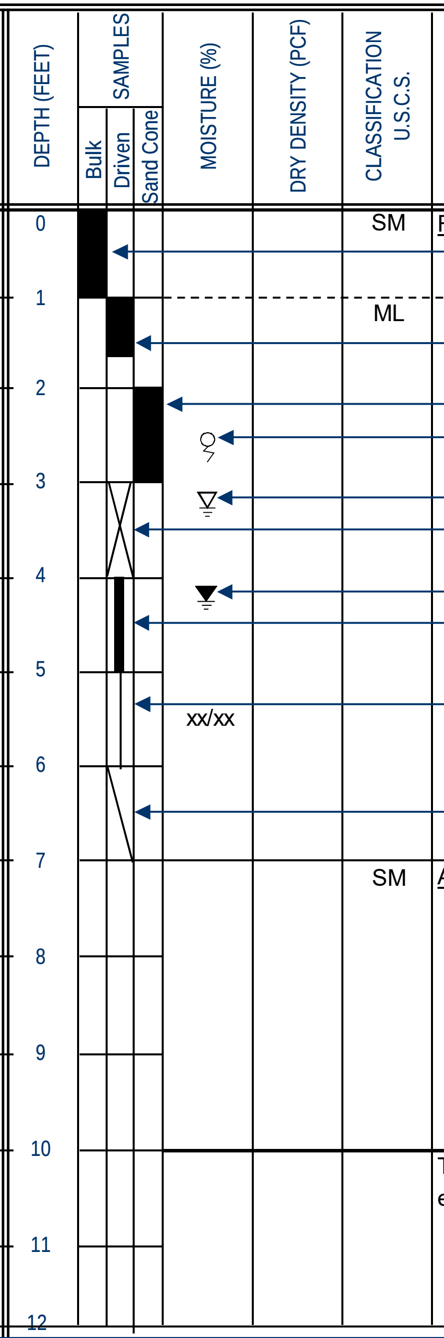
GROUND ELEVATION ____________________

METHOD OF EXCAVATION ____________________

EXCAVATION LOG
EXPLANATION SHEET

TEST PIT DIAGRAM

SCALE 1 inch = 2 feet



DESCRIPTION

FILL:

Bulk sample.

Dashed line denotes material change.

Drive sample.

Sand cone performed.

Seepage.

Groundwater encountered during excavation.

No recovery with drive sampler.

Groundwater encountered after excavation.

Sample retained by others.

Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.

No recovery with Shelby tube sampler.

ALLUVIUM:

Solid line denotes unit change.

Attitude: Strike/Dip

b: Bedding	s: Shear
c: Contact	bss: Basal Slide Surface
j: Joint	sf: Shear Fracture
f: Fracture	sz: Shear Zone
F: Fault	sbs: Sheared Bedding Surface
cs: Clay Seam	

The total depth is a solid line that is drawn at the bottom of the excavation log.

FIGURE B-1

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TEST PIT LOG
EXPLANATION OF TEST PIT, CORE, TRENCH AND HAND AUGER LOG SYMBOLS

Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

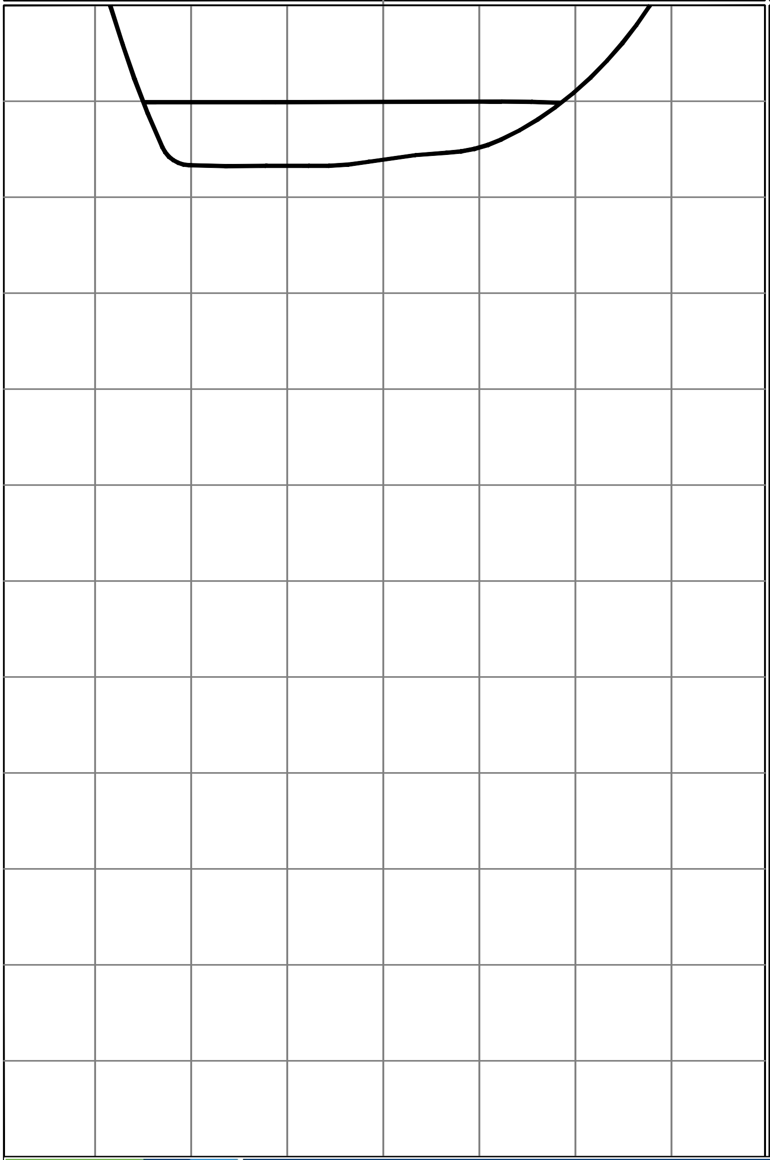
PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/19/2020 TEST PIT NO. TP-1 / IT-1

GROUND ELEVATION 2,002' ± (MSL) LOGGED BY BAB

METHOD OF EXCAVATION Backhoe

LOCATION Northwest Portion of Site



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SC	TOPSOIL: Dark brown, moist, medium dense, clayey SAND; with fine gravel.
	■						DECOMPOSED GRANITIC ROCK: Brownish/yellowish red, moist, weathered, friable, unconsolidated DECOMPOSED GRANITIC ROCK; iron oxide staining.
4							Total Depth = 3.3 feet. Groundwater not encountered during excavation. Backfilled on 11/19/2020.
8							
12							
16							
20							
24							

Notes: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./4 ft.

FIGURE A-1

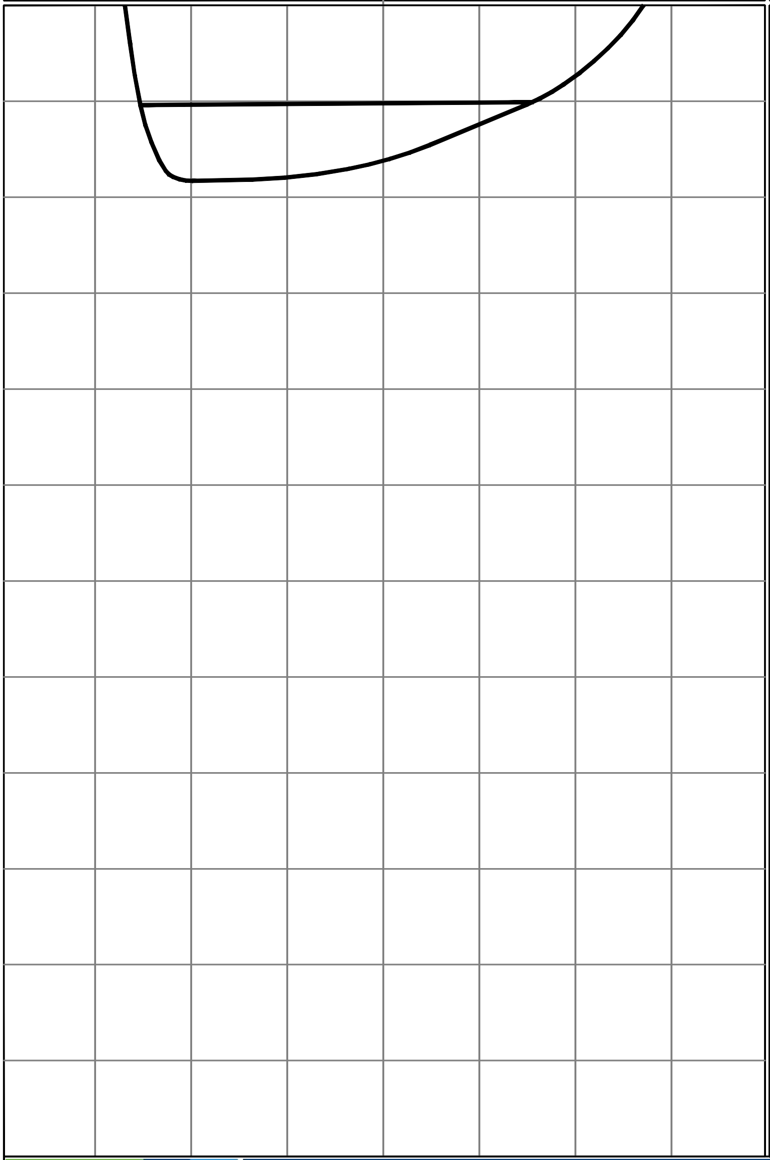
Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/19/2020
TEST PIT NO. TP-2 / IT-2
GROUND ELEVATION 2,020' ± (MSL)
LOGGED BY BAB
METHOD OF EXCAVATION Backhoe
LOCATION Northeast Portion of Site



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SM	<u>TOPSOIL</u>: Dark brown, moist, medium dense, silty SAND; micaceous.
	■						<u>DECOMPOSED GRANITIC ROCK</u>: Brownish, moist, DECOMPOSED GRANITIC ROCK; iron oxide staining.
4							Total Depth = 3.8 feet. Groundwater not encountered during excavation. Backfilled on 11/19/2020. <u>Notes:</u> Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
8							
12							
16							
20							
24							

SCALE = 1 in./4 ft.

FIGURE A-2

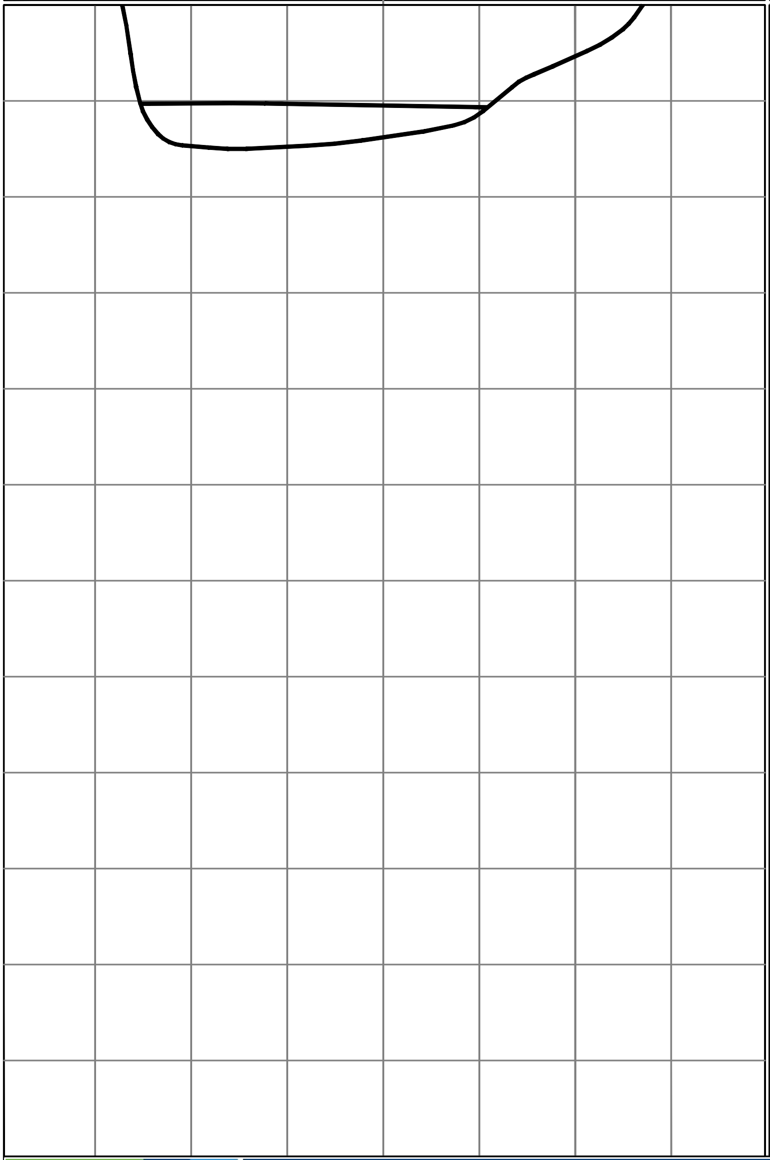
Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/19/2020 TEST PIT NO. TP-3
GROUND ELEVATION 2,032' ± (MSL) LOGGED BY BAB
METHOD OF EXCAVATION Backhoe
LOCATION Northeast Portion of Site



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					CL	TOPSOIL: Dark brown, moist, stiff to very stiff, sandy CLAY; with fine gravels and rootlets.
	■						DECOMPOSED GRANITIC ROCK: Mottled light brownish yellowish red, moist, unconsolidated, friable, DECOMPOSED GRANITIC ROCK.
4							Total Depth = 3.0 feet. Groundwater not encountered during excavation. Backfilled on 11/19/2020.
8							
12							
16							
20							
24							

Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./4 ft.

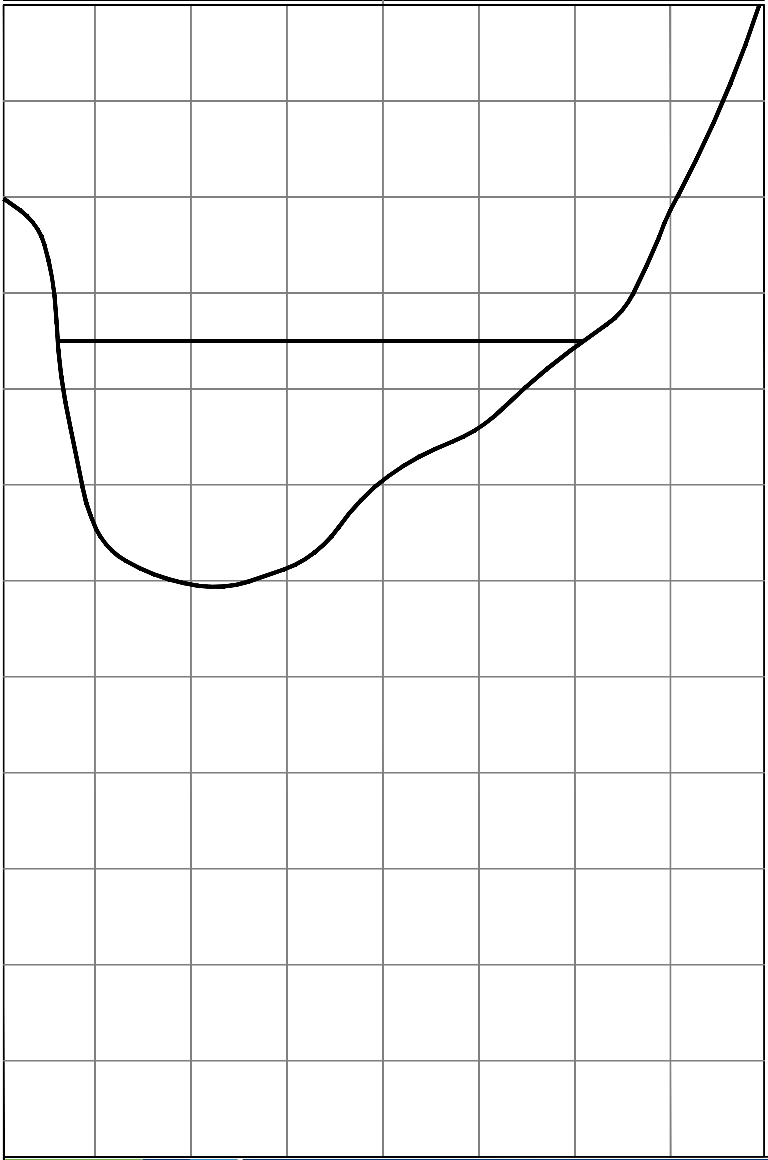
Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED	11/18/2020	TEST PIT NO.	TP-4
GROUND ELEVATION	2,028' ± (MSL)	LOGGED BY	SJQ
METHOD OF EXCAVATION	Backhoe		
LOCATION	Northwest Portion of Site		



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0 2	■					CL	<u>TOPSOIL</u>: Dark brown, moist, stiff to very stiff, silty sandy CLAY; with scattered gravels and rootlets.
4	■						<u>DECOMPOSED GRANITIC ROCK</u>: Yellowish brown, dry, moderately weathered, weakly to moderately friable, medium-grained DECOMPOSED GRANITIC ROCK; micaceous.
6 8 10 12							Total Depth = 6.0 feet. Groundwater not encountered during excavation. Backfilled on 11/18/2020. <u>Notes:</u> Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

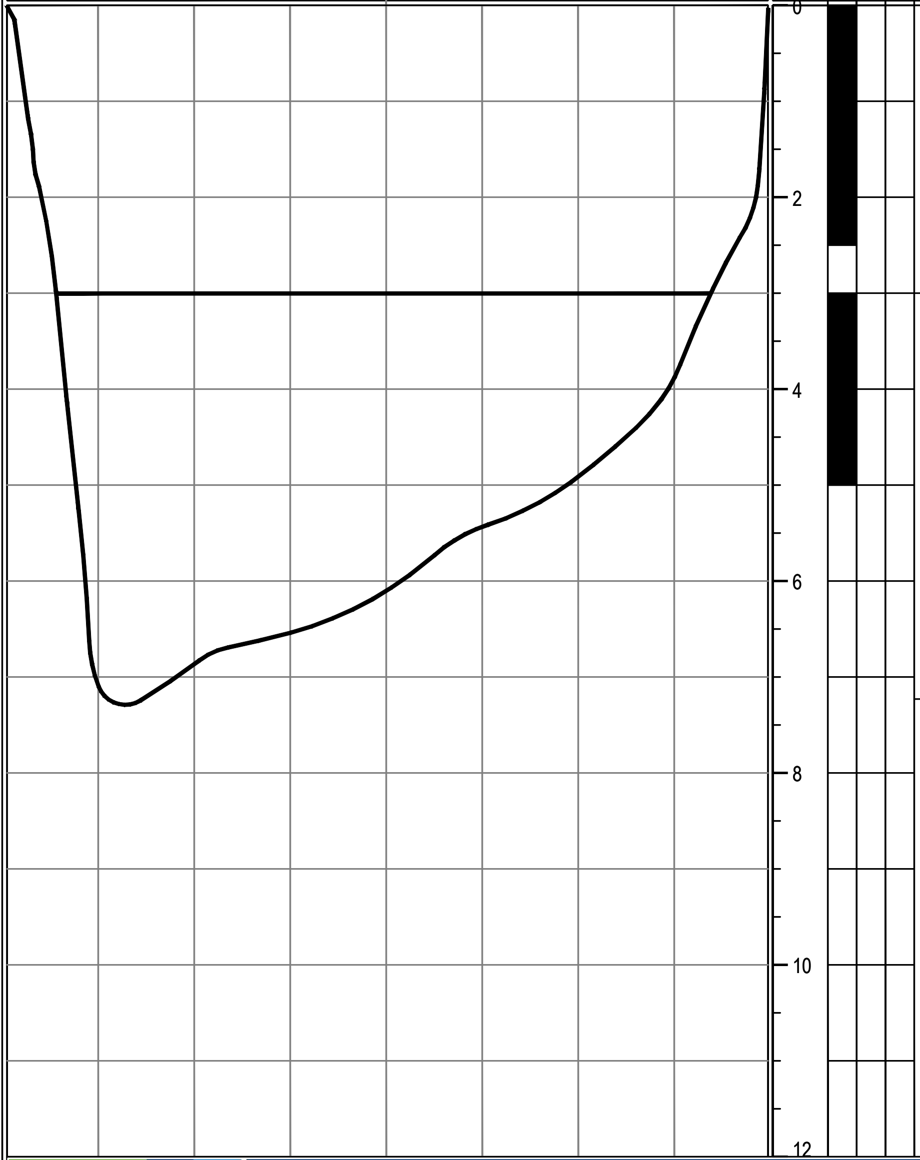
Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/18/2020
TEST PIT NO. TP-5
GROUND ELEVATION 2,026' ± (MSL)
LOGGED BY SJQ
METHOD OF EXCAVATION Backhoe
LOCATION North Portion of Site



DEPTH (FEET)	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0			CL	TOPSOIL: Dark brown, moist, stiff to very stiff, silty sandy CLAY; with scattered gravel and rootlets.
3				DECOMPOSED GRANITIC ROCK : Yellowish brown to reddish brown, moist, highly weathered, highly friable, DECOMPOSED GRANITIC ROCK.
7.2				Total Depth = 7.2 feet. Groundwater not encountered during excavation. Backfilled on 11/18/2020.

Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

FIGURE A-5

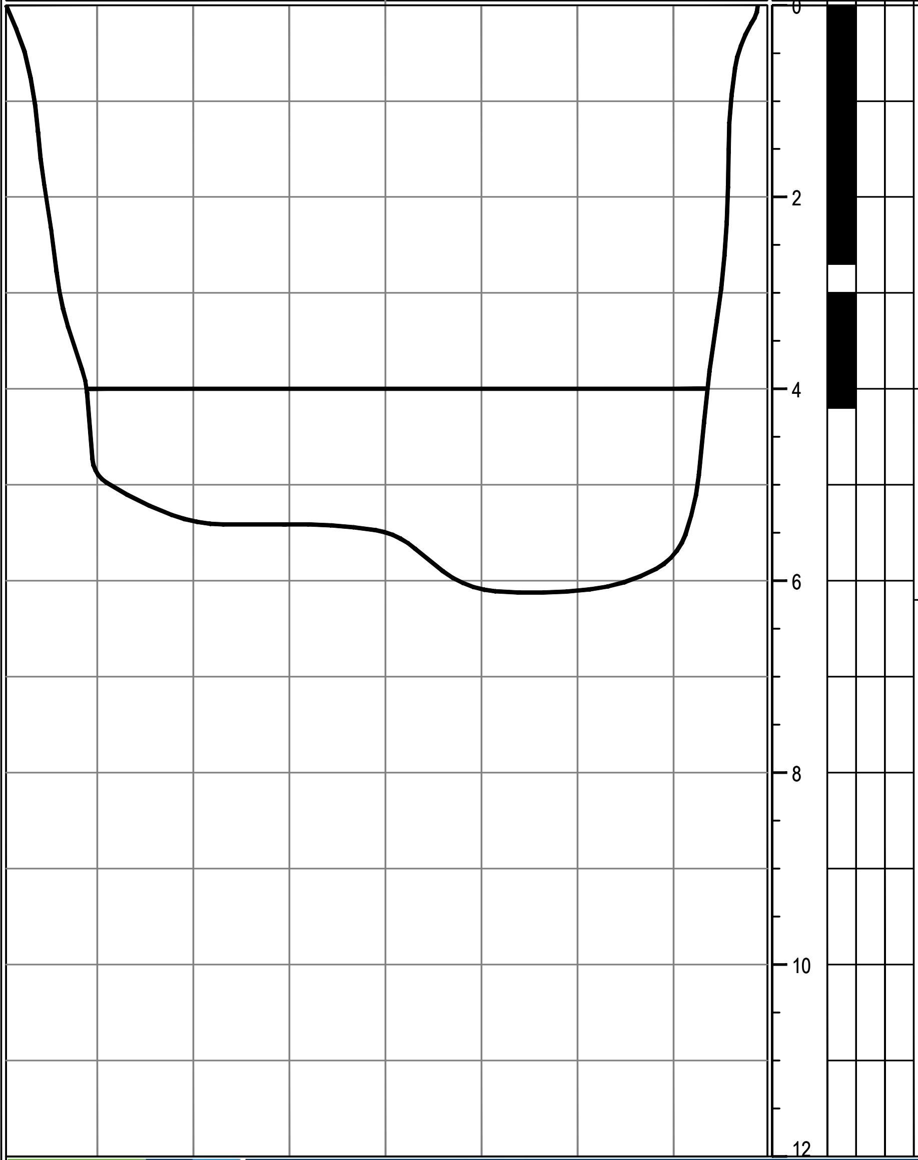
Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/18/2020
TEST PIT NO. TP-6
GROUND ELEVATION 2,024' ± (MSL)
LOGGED BY BAB
METHOD OF EXCAVATION Backhoe
LOCATION North Portion of Site



MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
		CL	<u>TOPSOIL</u>: Dark brown, moist, stiff to very stiff, silty sandy CLAY; with scattered gravel and rootlets.
			<u>DECOMPOSED GRANITIC ROCK</u>: Reddish brown to light yellowish brown, dry, moderately weathered, moderately friable, coarse-grained DECOMPOSED GRANITIC ROCK; micaceous.
			Total Depth = 6.2 feet. Groundwater not encountered during excavation. Backfilled on 11/18/2020. Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

Ninyo & Moore

TEST PIT LOG

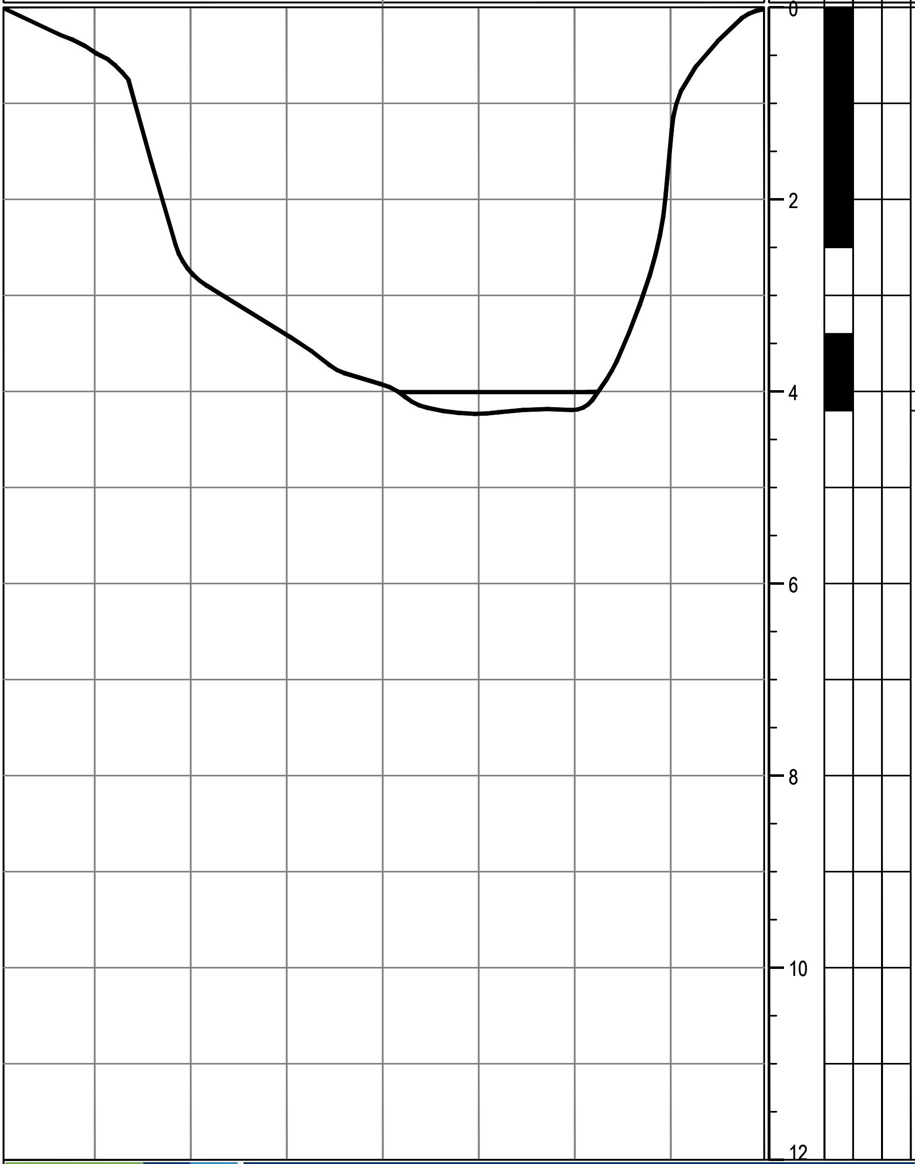
ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/18/2020 TEST PIT NO. TP-7 / IT-4
GROUND ELEVATION 2,010' ± (MSL) LOGGED BY BAB
METHOD OF EXCAVATION Backhoe
LOCATION Central Portion of Site

DEPTH (FEET)
SAMPLES
Bulk
Driven
Sand Cone
MOISTURE (%)
DRY DENSITY (PCF)
CLASSIFICATION U.S.C.S.

DESCRIPTION



CL

<u>TOPSOIL</u>:
Dark brown, moist, very stiff to hard, silty sandy CLAY; with scattered gravel.

<u>DECOMPOSED GRANITIC ROCK</u>:
Yellowish to reddish brown, dry, moderately to highly weathered, moderately to highly friable, medium to coarse-grained GRANITIC ROCK.

Total Depth = 4.2 feet.
Groundwater not encountered during excavation.
Backfilled on 11/18/2020.

<u>Notes:</u> Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/18/2020 TEST PIT NO. TP-8

GROUND ELEVATION 2,020' ± (MSL) LOGGED BY BAB

METHOD OF EXCAVATION Backhoe

LOCATION Central Portion of Site

DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SC	<u>TOPSOIL</u>: Dark brown, moist, medium dense, clayey SAND; with scattered gravel and coarse sand; scattered rootlets.
4							<u>DECOMPOSED GRANITIC ROCK</u>: Yellowish brown to reddish brown with green chlorite staining, dry, moderately to highly weathered, medium-grained DECOMPOSED GRANITIC ROCK.
							Total Depth = 4.2 feet. Groundwater not encountered during excavation. Backfilled on 11/18/2020.

<u>Notes:</u> Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

Depth scale: 0, 2, 4, 6, 8, 10, 12

SCALE = 1 in./2 ft.

FIGURE A-8

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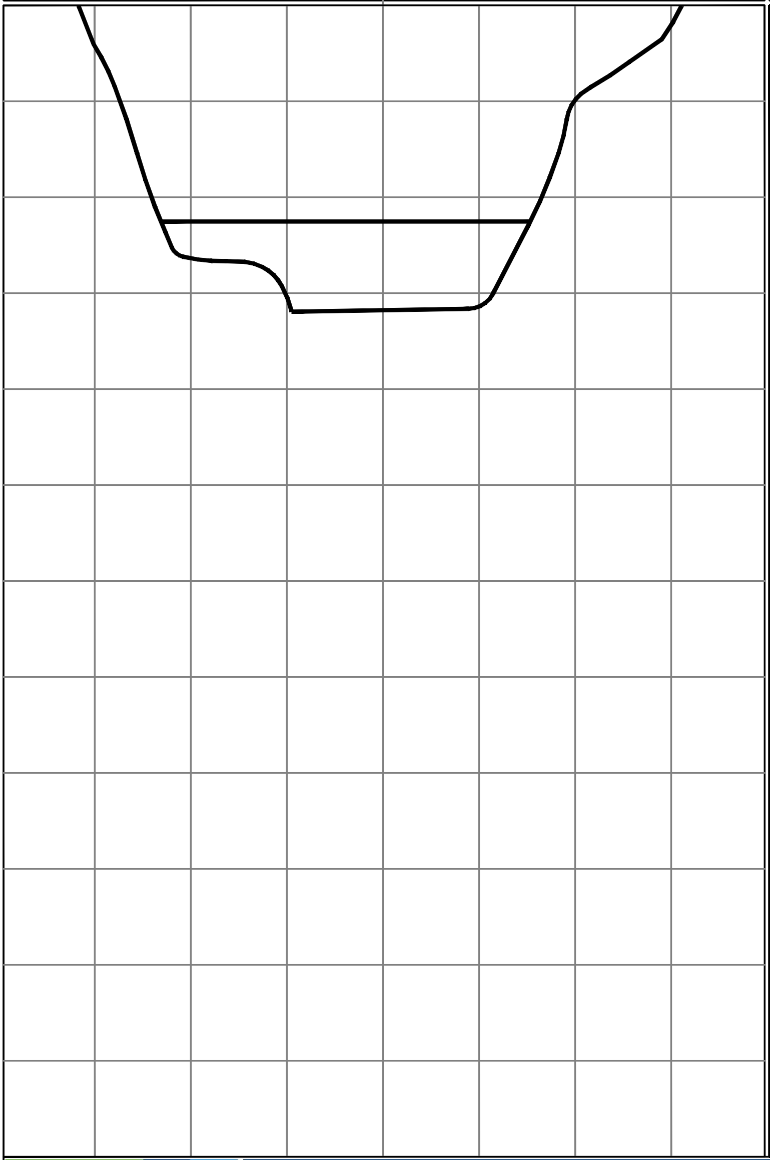
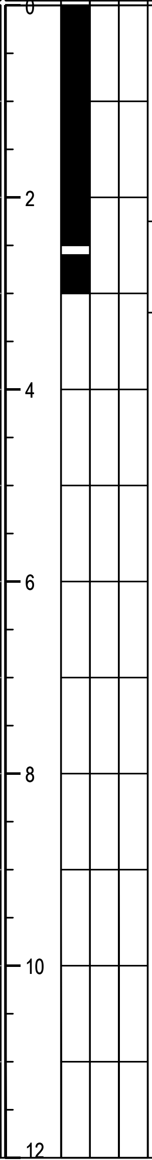
TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/18/2020 TEST PIT NO. TP-9 / IT-3
GROUND ELEVATION 2,011' ± (MSL) LOGGED BY BAB
METHOD OF EXCAVATION Backhoe
LOCATION East End of Site





DEPTH (FEET)	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0			CL	TOPSOIL: Dark brown, moist, very stiff, silty sandy CLAY; with scattered gravel and rootlets.
				DECOMPOSED GRANITIC ROCK : Yellowish brown to reddish brown, dry, highly weathered, strongly friable, GRANITIC ROCK; scattered iron oxide staining; scattered friable core stones approximately 3 inches diameter.

Total Depth = 3.2 feet.
Groundwater not encountered during excavation.
Backfilled on 11/18/2020.

Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

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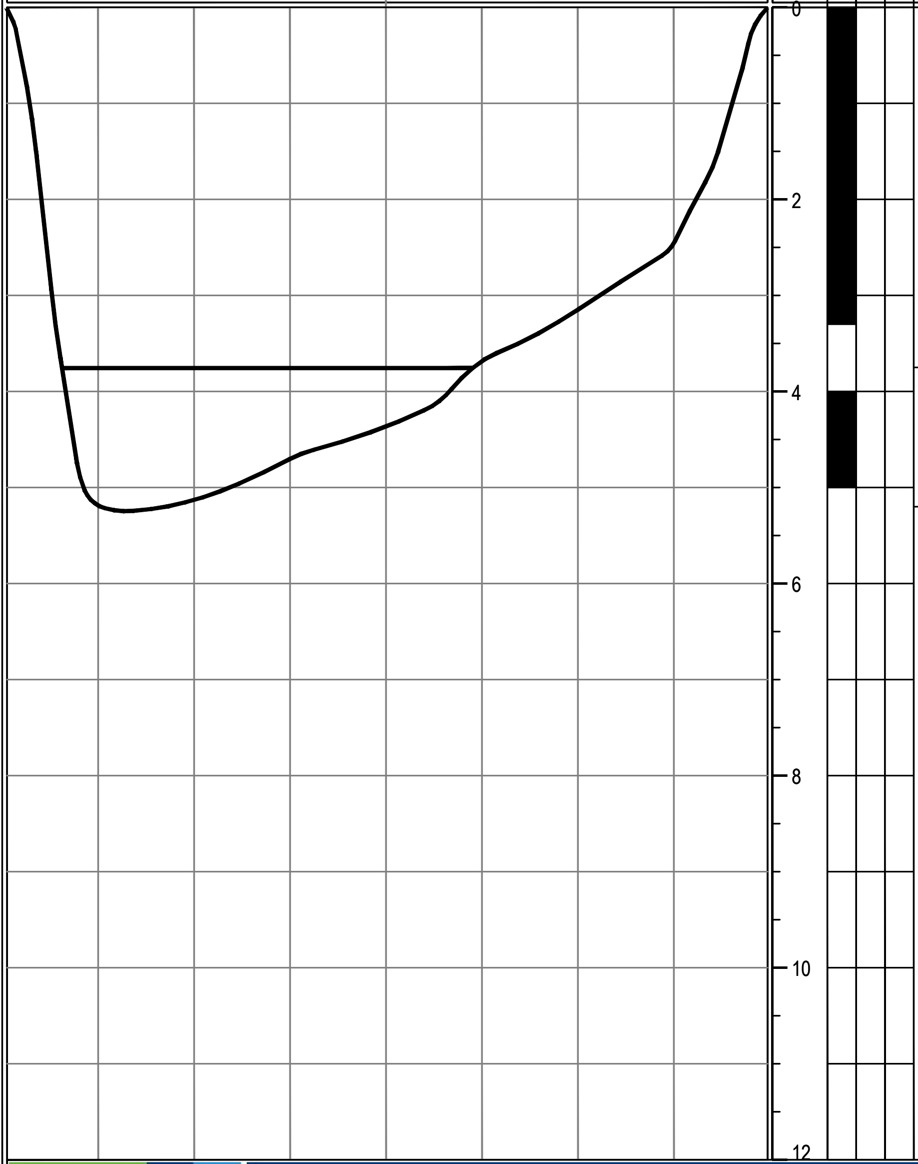
TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/18/2020
TEST PIT NO. TP-10
GROUND ELEVATION 2,002' ± (MSL)
LOGGED BY BAB
METHOD OF EXCAVATION Backhoe
LOCATION East End of Site



MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
		CL	TOPSOIL: Dark brown, very stiff, silty sandy CLAY; with scattered gravel, rootlets and caliche nodules and stringers.
			DECOMPOSED GRANITIC ROCK: Yellowish brown to whitish yellow, dry, moderately to strongly weathered, moderately friable, GRANITIC ROCK; scattered iron oxide and greenish cholorite staining; occasional tonalite corestones.
			Total Depth = 5.2 feet. Groundwater not encountered during excavation. Backfilled on 11/18/2020. Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

FIGURE A-10

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TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/19/2020

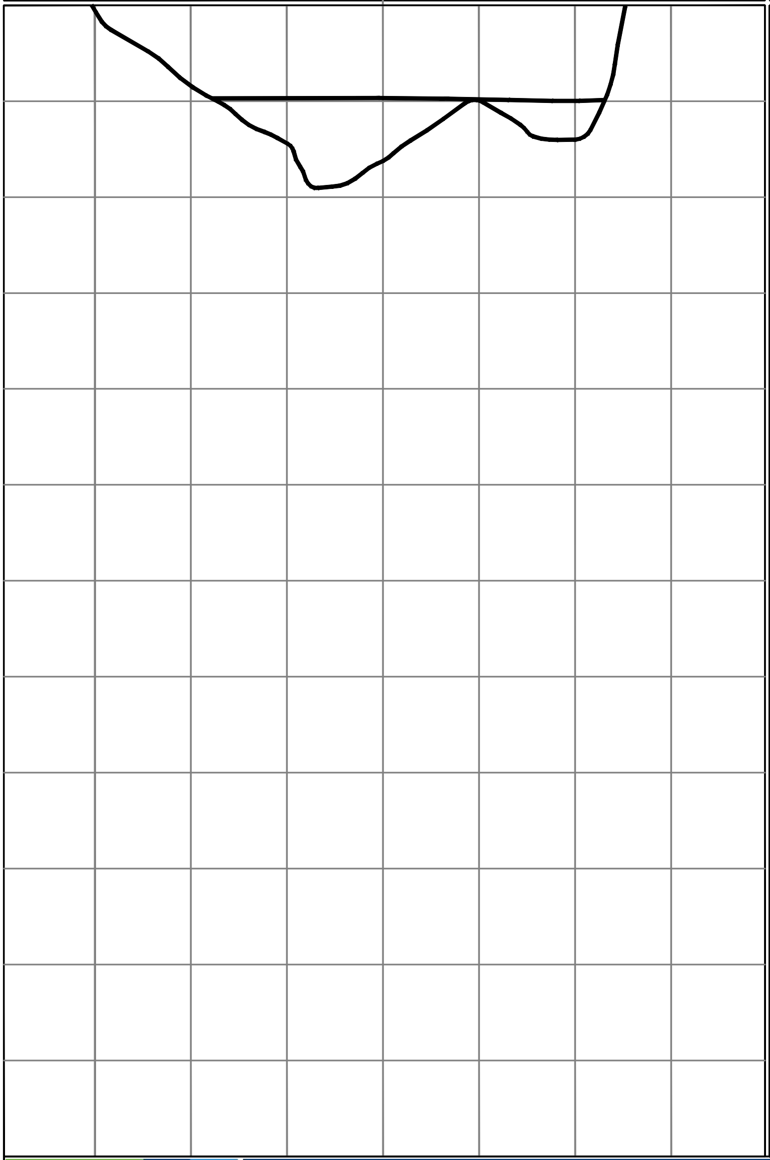
TEST PIT NO. TP-11

GROUND ELEVATION 2,015' ± (MSL)

LOGGED BY BAB

METHOD OF EXCAVATION Backhoe

LOCATION West Portion of Site



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SC	TOPSOIL: Dark brown, moist, medium dense, clayey SAND; with fine gravel and numerous large angular boulders of granitic rock; approximately 1 to 2-1/2 feet in size.
	■						DECOMPOSED GRANITIC ROCK : Mottled, brownish yellow to reddish brown, moist, unconsolidated, friable, DECOMPOSED GRANITIC ROCK; weathered; iron oxide staining; with boulder size corestones.
4							Total Depth = 3.8 feet. Groundwater not encountered during excavation. Backfilled on 11/19/2020.
8							
12							
16							
20							
24							

Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./4 ft.

FIGURE A-11

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TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/18/2020 TEST PIT NO. TP-12 / IT-5
GROUND ELEVATION 1,994' ± (MSL) LOGGED BY BAB
METHOD OF EXCAVATION Backhoe
LOCATION Southeast Portion of Site

DEPTH (FEET)	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0			CL	TOPSOIL: Dark brown, moist, stiff to very stiff, silty sandy CLAY; with scattered gravel and rootlets; occasional boulder.
2.5				DECOMPOSED GRANITIC ROCK: Light grayish brown to yellowish brown, dry, moderately to highly weathered, moderately friable, medium-grained, DECOMPOSED GRANITIC ROCK.

Total Depth = 3.8 feet.
Groundwater not encountered during excavation.
Backfilled on 11/18/2020.

Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

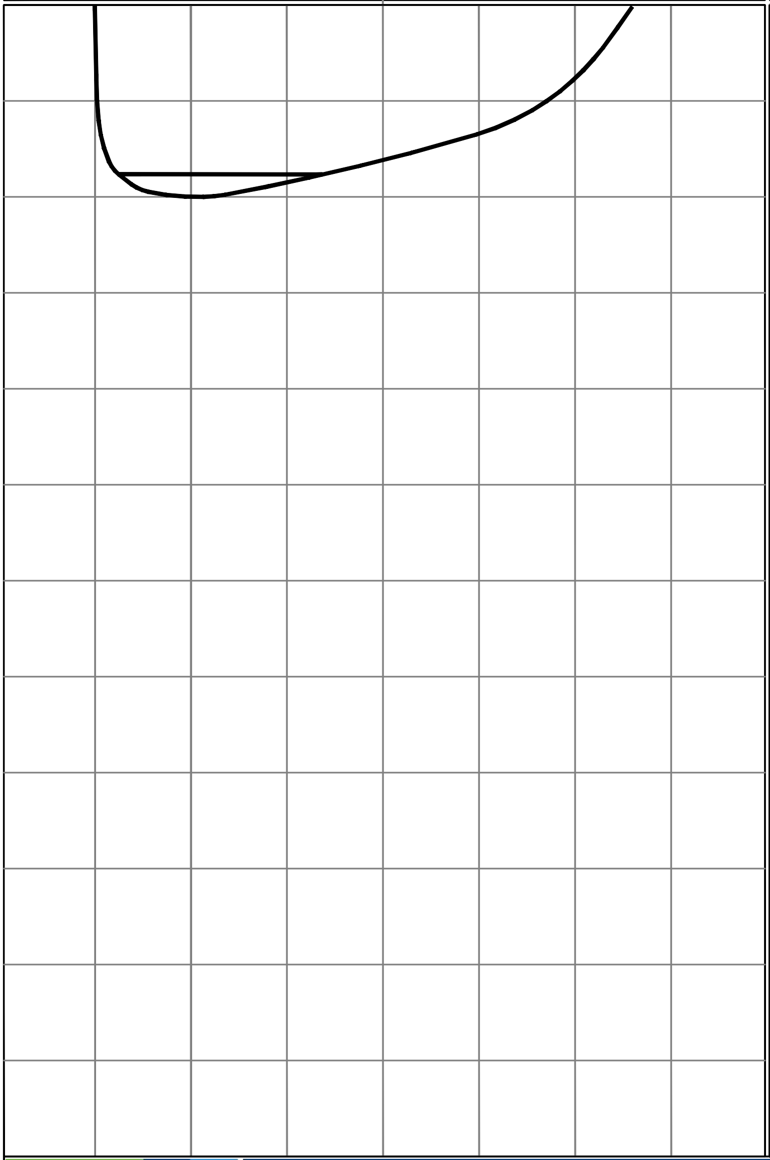
PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/19/2020 TEST PIT NO. TP-13

GROUND ELEVATION 1,985' ± (MSL) LOGGED BY BAB

METHOD OF EXCAVATION Backhoe

LOCATION South End of Site



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					CL	TOPSOIL: Dark brown to dark gray brown, moist, firm to very stiff, sandy CLAY; with fine gravel.
							DECOMPOSED GRANITIC ROCK: Mottled yellowish brown to reddish brown, moist, friable, unconsolidated to partially consolidated, DECOMPOSED GRANITIC ROCK.
4							Total Depth = 4.0 feet. Groundwater not encountered during excavation. Backfilled on 11/19/2020.
8							
12							
16							
20							
24							

Notes: Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

FIGURE A-13

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TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

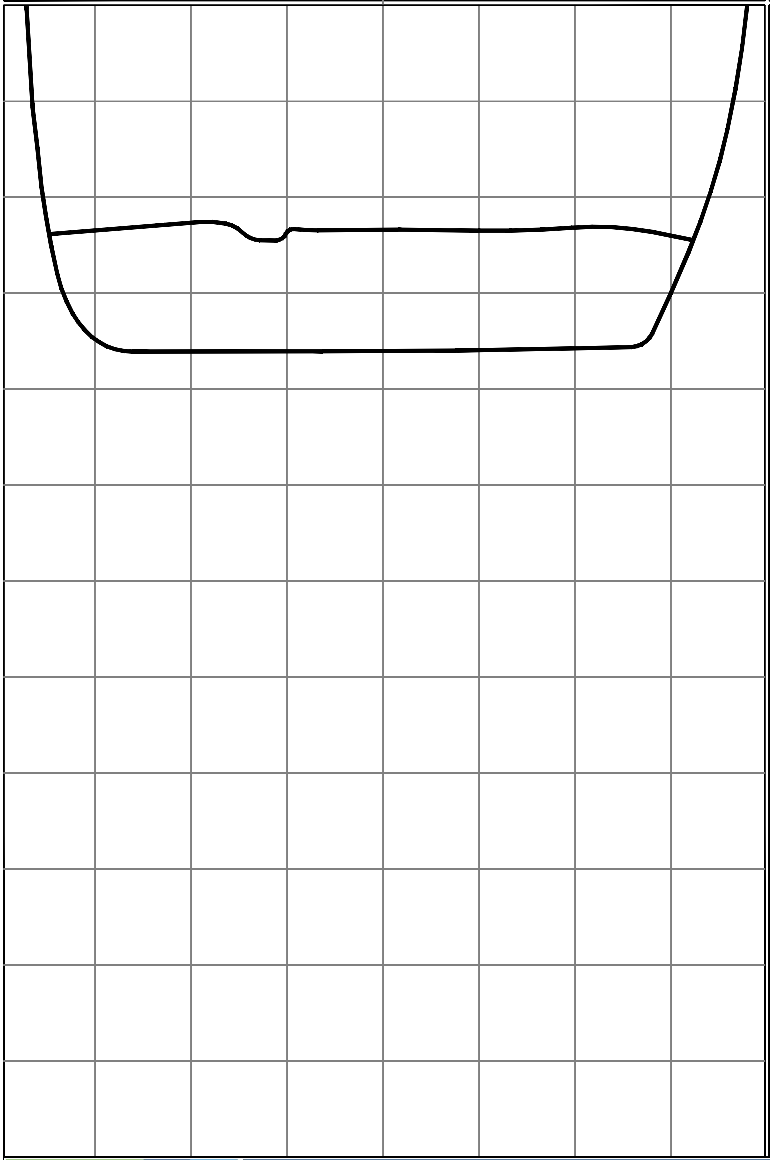
PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/19/2020 TEST PIT NO. TP-14 / IT-6

GROUND ELEVATION 1,989' ± (MSL) LOGGED BY BAB

METHOD OF EXCAVATION Backhoe

LOCATION South End of Site



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0 2	■					SC	<u>TOPSOIL</u>: Dark brown, moist, medium dense, clayey SAND; with fine gravel; several large boulders and rootlets.
	■						<u>DECOMPOSED GRANITIC ROCK</u>: Light brownish yellow, moist, friable, unconsolidated, DECOMPOSED GRANITIC ROCK; highly altered; iron oxide staining.
4 6 8 10 12							Total Depth = 3.6 feet. Groundwater not encountered during excavation. Backfilled on 11/19/2020. <u>Notes:</u> Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./2 ft.

FIGURE A-14

Ninyo & Moore

TEST PIT LOG

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

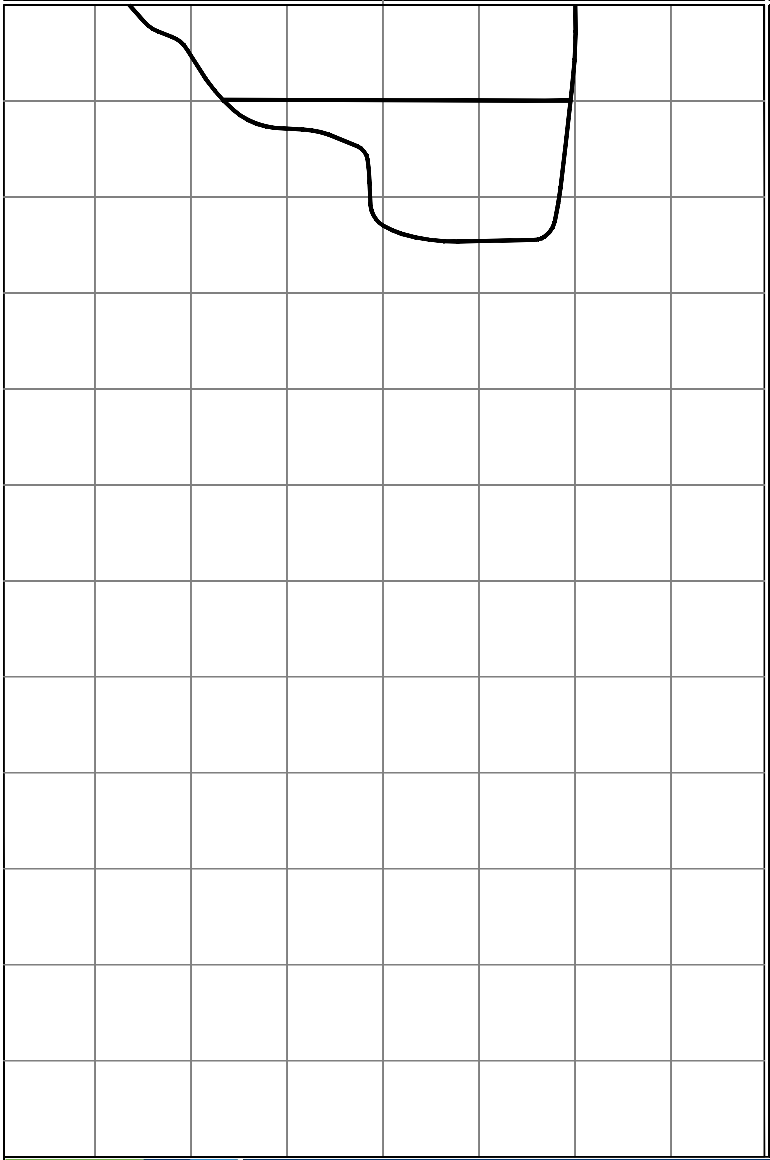
PROJECT NO.	DATE
109107001	12/20

DATE EXCAVATED 11/19/2020 TEST PIT NO. TP-15 / IT-7

GROUND ELEVATION 1,983' ± (MSL) LOGGED BY BAB

METHOD OF EXCAVATION Backhoe

LOCATION South End of Site



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SC	<u>TOPSOIL</u>: Dark brown, moist, medium dense, clayey SAND; with fine gravel; several boulders up to 15 inches in size.
	■						<u>DECOMPOSED GRANITIC ROCK</u> : Light brownish yellow, moist, friable, unconsolidated, DECOMPOSED GRANITIC ROCK.
4							
							Total Depth = 4.9 feet. Groundwater not encountered during excavation. Backfilled on 11/19/2020.
8							
12							
16							
20							
24							

<u>Notes:</u> Groundwater, though not encountered at the time of excavation may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./4 ft.

FIGURE A-15

APPENDIX B

Laboratory Testing

APPENDIX B

LABORATORY TESTING

Classification

Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488. Soil classifications are indicated on the logs of the exploratory test pits in Appendix A.

Gradation Analysis

Gradation analysis tests were performed on selected representative soil samples in general accordance with ASTM D 422. The grain size distribution curves are shown on Figures B-1 through B-5. These test results were utilized in evaluating the soil classifications in accordance with the USCS.

Expansion Index Tests

The expansion index of selected materials was evaluated in general accordance with ASTM D 4829. The specimens were molded under a specified compactive energy at approximately 50 percent saturation. The prepared 1-inch thick by 4-inch diameter specimens were loaded with a surcharge of 144 pounds per square foot and were inundated with tap water. Readings of volumetric swell were made for a period of 24 hours. The results of these tests are presented on Figure B-6.

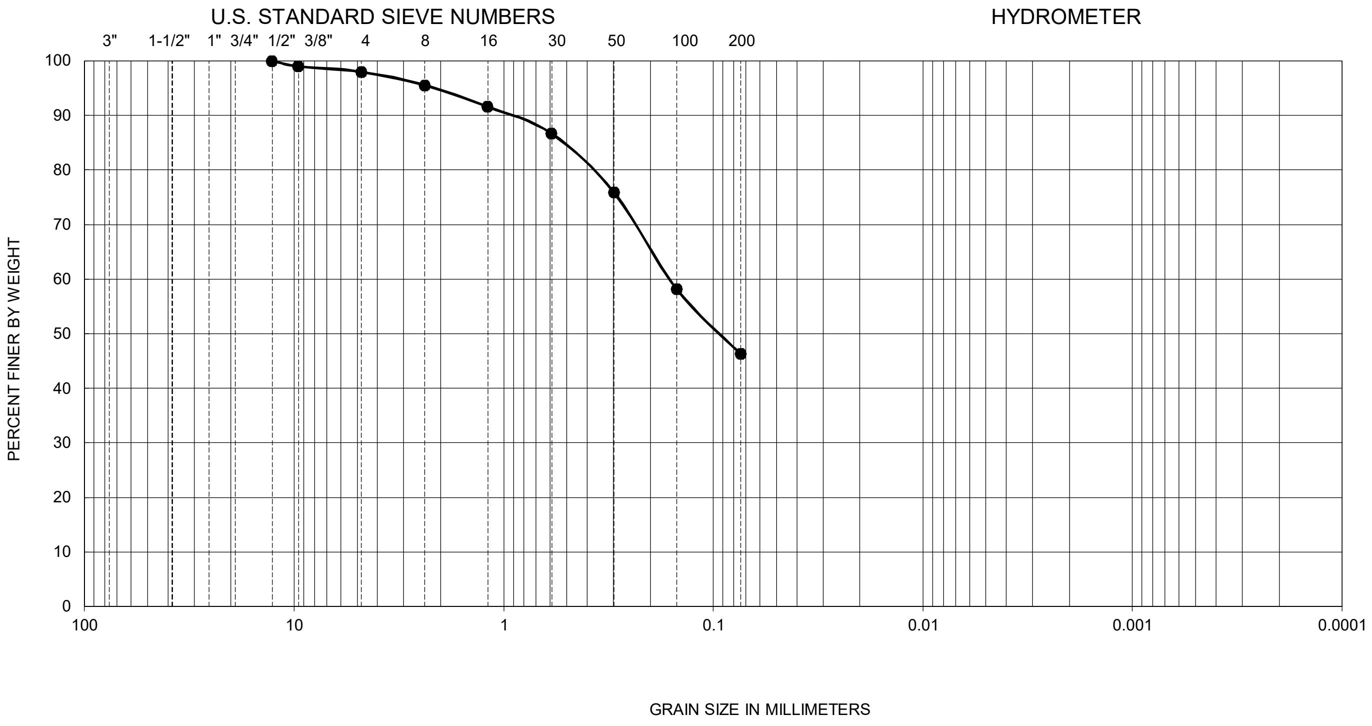
Soil Corrosivity Tests

Soil pH and resistivity tests were performed on representative samples in general accordance with CT 643. The soluble sulfate and chloride contents of the selected samples were evaluated in general accordance with CT 417 and CT 422, respectively. The test results are presented on Figure B-7.

R-Value

The resistance value, or R-value, for site soils was evaluated in general accordance with CT 301. Samples were prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results. The test results are shown on Figure B-8.

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	TP-8	0.0-2.5	--	--	--	--	--	--	--	--	46	SC

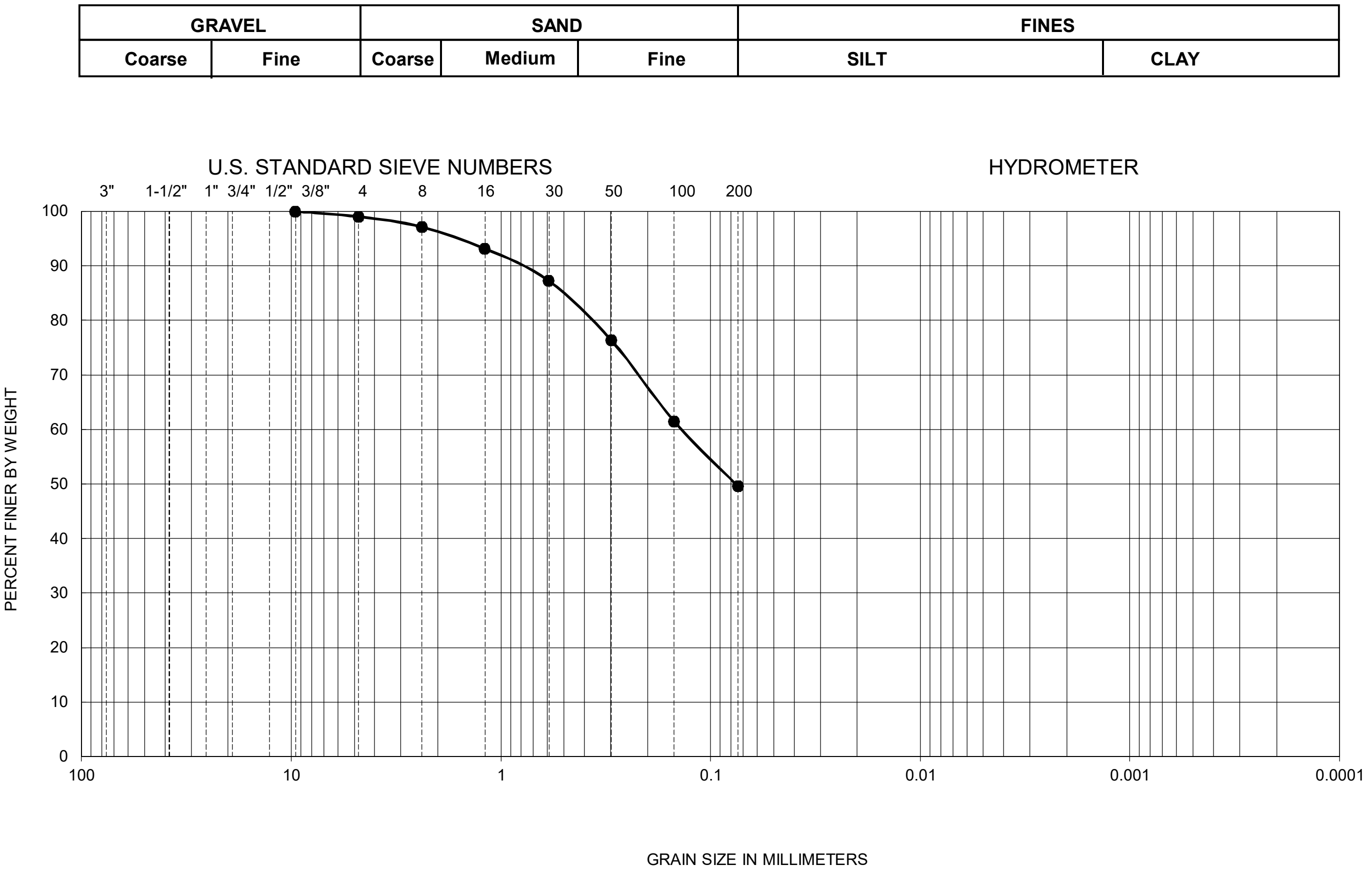
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422

FIGURE B-2

GRADATION TEST RESULTS

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	TP-10	0.0-3.3	--	--	--	--	--	--	--	--	50	CL

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422

FIGURE B-3

GRADATION TEST RESULTS

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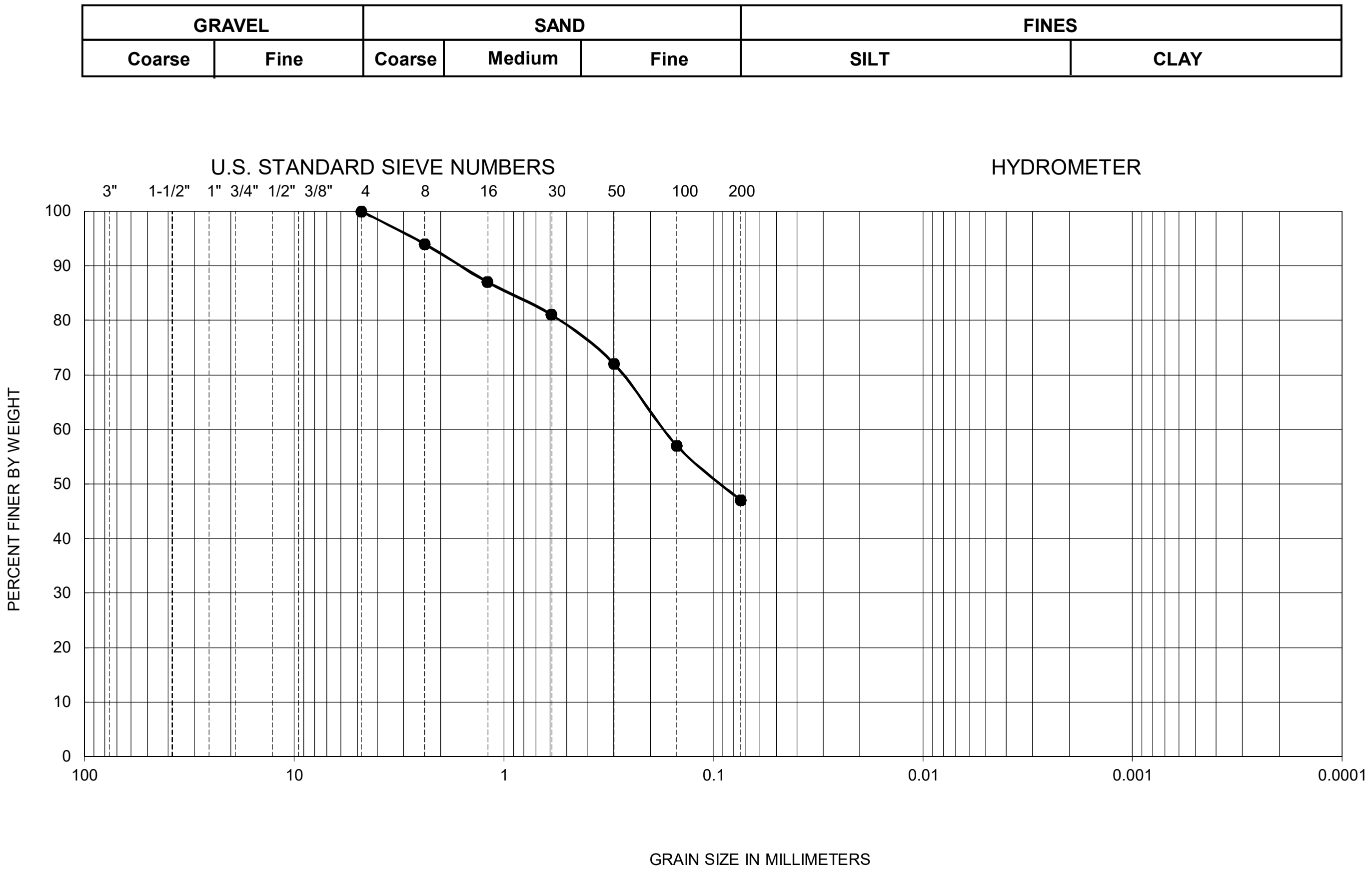
Geotechnical & Environmental Sciences Consultants

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	TP-11	0.0-1.9	--	--	--	--	--	--	--	--	47	SC

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422

FIGURE B-4

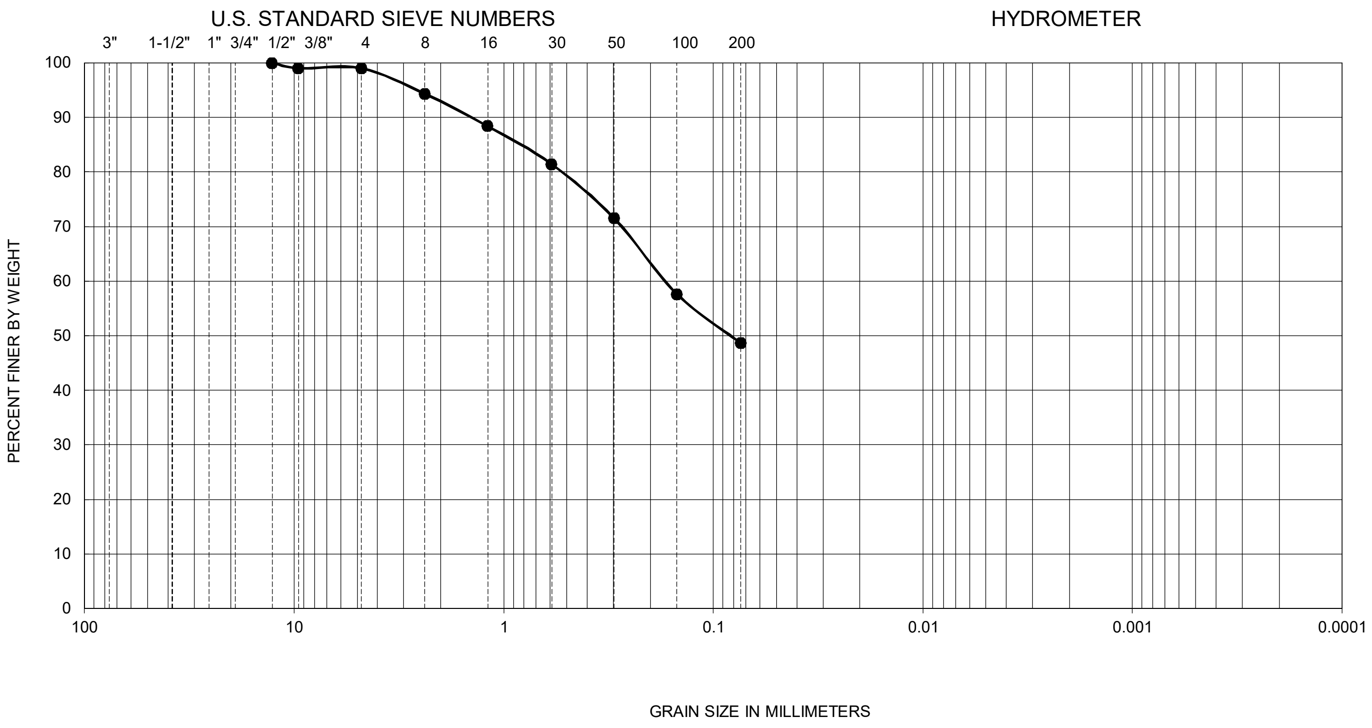
GRADATION TEST RESULTS

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	TP-14	0.0-2.4	--	--	--	--	--	--	--	--	49	SC

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422

FIGURE B-5

GRADATION TEST RESULTS

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

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Geotechnical & Environmental Sciences Consultants

SAMPLE LOCATION	SAMPLE DEPTH (ft)	INITIAL MOISTURE (percent)	COMPACTED DRY DENSITY (pcf)	FINAL MOISTURE (percent)	VOLUMETRIC SWELL (in)	EXPANSION INDEX	POTENTIAL EXPANSION
TP-4	0.0-2.5	12.0	100.9	23.3	0.094	94	High
TP-6	0.0-2.7	13.0	98.8	28.1	0.097	97	High
TP-11	0.0-1.9	12.0	103.3	23.3	0.088	88	Medium
TP-13	1.0-3.3	11.0	106.8	31.9	0.105	105	High
TP-15	0.0-2.0	11.0	107.1	23.5	0.061	61	Medium

PERFORMED IN GENERAL ACCORDANCE WITH ☐ UBC STANDARD 18-2 ☑ ASTM D 4829

FIGURE B-6

EXPANSION INDEX TEST RESULTS

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ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

SAMPLE LOCATION	SAMPLE DEPTH (ft)	pH [1]	RESISTIVITY [1] (ohm-cm)	SULFATE CONTENT [2]		CHLORIDE CONTENT [3] (ppm)
				(ppm)	(%)	
TP-1	0.0-2.0	7.4	1,600	10	0.001	40
TP-14	0.0-2.4	7.5	630	40	0.004	70

[1] PERFORMED IN ACCORDANCE WITH CALIFORNIA TEST METHOD 643

[2] PERFORMED IN ACCORDANCE WITH CALIFORNIA TEST METHOD 417

[3] PERFORMED IN ACCORDANCE WITH CALIFORNIA TEST METHOD 422

FIGURE B-7

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

CORROSIVITY TEST RESULTS

ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

SAMPLE LOCATION	SAMPLE DEPTH (ft)	SOIL TYPE	R-VALUE
TP-3	0.0-2.0	Sandy CLAY (CL)	LESS THAN 5
TP-13	1.0-3.3	Sandy CLAY (CL)	LESS THAN 5

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844/CT 301

FIGURE B-8

R-VALUE TEST RESULTS

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ALPINE COMMUNITY PARK
ALPINE, CALIFORNIA

109107001 | 12/20

APPENDIX C

Infiltration Test Data

Test Date: 11/19/2020
Infiltration Test No.: IT-1
Test Hole Dimensions, W x L (feet): 2 x 2
Excavation Depth (feet): 3.3
Test Area (ft^2 4
Test performed and recorded by: DP

t_1	d_1 (feet)	t_2	d_2 (feet)	Δt (min)	ΔH (feet)	Percolation Rate (min/in)	H_{avg} (feet)	Infiltration Rate (in/hr)
9:45 AM	2.75	9:55 AM	2.79	10	0.04	20.83	0.53	1.00
9:55 AM	2.79	10:05 AM	2.81	10	0.02	41.67	0.50	0.52
10:05 AM	2.81	10:15 AM	2.81	10	0.00	*DNI*	0.49	*DNI*
10:15 AM	2.81	10:25 AM	2.81	10	0.00	*DNI*	0.49	*DNI*
10:25 AM	2.81	10:35 AM	2.83	10	0.02	36.23	0.48	0.61
10:35 AM	2.83	10:45 AM	2.83	10	0.00	*DNI*	0.47	*DNI*
End of Test #1								
10:50 AM	2.79	11:00 AM	2.79	10	0.00	*DNI*	0.51	*DNI*
11:00 AM	2.79	11:10 AM	2.79	10	0.00	*DNI*	0.51	*DNI*
11:10 AM	2.79	11:20 AM	2.81	10	0.02	41.67	0.50	0.52
11:20 AM	2.81	11:30 AM	2.81	10	0.00	*DNI*	0.49	*DNI*
11:30 AM	2.81	11:40 AM	2.81	10	0.00	*DNI*	0.49	*DNI*
11:40 AM	2.81	11:50 AM	2.83	10	0.02	36.23	0.48	0.61
End of Test #2								
11:52 AM	2.79	12:02 PM	2.79	10	0.00	*DNI*	0.51	*DNI*
12:02 PM	2.79	12:12 PM	2.79	10	0.00	*DNI*	0.51	*DNI*
12:12 PM	2.79	12:22 PM	2.79	10	0.00	*DNI*	0.51	*DNI*
12:22 PM	2.79	12:32 PM	2.81	10	0.02	41.67	0.50	0.52
12:32 PM	2.81	12:42 PM	2.81	10	0.00	*DNI*	0.49	*DNI*
12:42 PM	2.81	12:52 PM	2.83	10	0.02	41.67	0.48	0.53
End of Test #3								

Notes:

DNI = did not infiltrate
t_1 = initial time when filling or refilling is completed
d_1 = initial depth to water in hole at t_1
t_2 = final time when incremental water level reading is taken
d_2 = final depth to water in hole at t_2
Δt = change in time between initial and final water level readings
ΔH = change in depth to water or change in height of water column (i.e., d_2 - d_1)
H_0 = Initial height of water column
in/hr = inches per hour

Percolation Rate to Infiltration Rate Conversion[1]

$$I_t = \frac{\Delta H \times 60 \times r}{\Delta t\left(r + 2H_{avg}\right)}$$

I_t = tested infiltration rate, inches/hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

[1] Based on the "Porchet Method" as presented in:
Riverside County Flood Control, 2011, Design Handbook for Low Impact Development Best Management Practices: dated September.

Test Date: 11/19/2020
Infiltration Test No.: IT-2
Test Hole Dimensions, W x L (feet): 2 x 2
Excavation Depth (feet): 3.8
Test Area (ft^2 4
Test performed and recorded by: DP

t_1	d_1 (feet)	t_2	d_2 (feet)	Δt (min)	ΔH (feet)	Percolation Rate (min/in)	H_{avg} (feet)	Infiltration Rate (in/hr)
9:30 AM	3.33	9:40 AM	3.35	10	0.02	40.00	0.46	0.57
9:40 AM	3.35	9:50 AM	3.38	10	0.02	40.00	0.44	0.59
9:50 AM	3.38	10:00 AM	3.38	10	0.00	*DNI*	0.43	*DNI*
10:00 AM	3.38	10:10 AM	3.38	10	0.00	*DNI*	0.43	*DNI*
10:10 AM	3.38	10:20 AM	3.38	10	0.00	*DNI*	0.43	*DNI*
10:20 AM	3.38	10:30 AM	3.38	10	0.00	*DNI*	0.43	*DNI*
End of Test #1								
10:32 AM	3.31	10:42 AM	3.31	10	0.00	*DNI*	0.49	*DNI*
10:42 AM	3.31	10:52 AM	3.33	10	0.02	40.00	0.48	0.56
10:52 AM	3.33	11:02 AM	3.33	10	0.00	*DNI*	0.47	*DNI*
11:02 AM	3.33	11:12 AM	3.35	10	0.02	40.00	0.46	0.57
11:12 AM	3.35	11:22 AM	3.35	10	0.00	*DNI*	0.45	*DNI*
11:22 AM	3.35	11:32 AM	3.35	10	0.00	*DNI*	0.45	*DNI*
End of Test #2								
11:35 AM	3.29	11:45 AM	3.29	10	0.00	*DNI*	0.51	*DNI*
11:45 AM	3.29	11:55 AM	3.29	10	0.00	*DNI*	0.51	*DNI*
11:55 AM	3.29	12:05 PM	3.29	10	0.00	*DNI*	0.51	*DNI*
12:05 PM	3.29	12:15 PM	3.29	10	0.00	*DNI*	0.51	*DNI*
12:15 PM	3.29	12:25 PM	3.29	10	0.00	*DNI*	0.51	*DNI*
12:25 PM	3.29	12:35 PM	3.29	10	0.00	*DNI*	0.51	*DNI*
End of Test #3								

Notes:

DNI = did not infiltrate
t_1 = initial time when filling or refilling is completed
d_1 = initial depth to water in hole at t_1
t_2 = final time when incremental water level reading is taken
d_2 = final depth to water in hole at t_2
Δt = change in time between initial and final water level readings
ΔH = change in depth to water or change in height of water column (i.e., $d_2 - d_1$)
H_0 = Initial height of water column
in/hr = inches per hour

Percolation Rate to Infiltration Rate Conversion[1]

$$I_t = \frac{\Delta H \times 60 \times r}{\Delta t\left(r + 2H_{avg}\right)}$$

I_t = tested infiltration rate, inches/hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

[1] Based on the "Porchet Method" as presented in:
Riverside County Flood Control, 2011, Design Handbook for Low Impact Development Best Management Practices: dated September.

Test Date: 11/18/2020

Infiltration Test No.: IT-3

Test Hole Dimensions, W x L (feet): 2 x 2

Excavation Depth (feet): 3.2

Test Area (ft^2 4

Test performed and recorded by: DP

t_1	d_1 (feet)	t_2	d_2 (feet)	Δt (min)	ΔH (feet)	Percolation Rate (min/in)	H_{avg} (feet)	Infiltration Rate (in/hr)
9:09 AM	2.67	9:19 AM	2.75	10	0.08	10.42	0.49	2.10
9:19 AM	2.75	9:29 AM	2.79	10	0.04	20.83	0.43	1.14
9:29 AM	2.79	9:39 AM	2.82	10	0.03	27.78	0.40	0.90
9:39 AM	2.82	9:49 AM	2.83	10	0.01	83.33	0.38	0.31
9:49 AM	2.83	9:59 AM	2.83	10	0.00	*DNI*	0.37	*DNI*
9:59 AM	2.83	10:09 AM	2.83	10	0.00	*DNI*	0.37	*DNI*
End of Test #1								
10:17 AM	2.65	10:27 AM	2.66	10	0.01	83.33	0.55	0.25
10:27 AM	2.66	10:37 AM	2.67	10	0.01	83.33	0.54	0.25
10:37 AM	2.67	10:47 AM	2.68	10	0.01	83.33	0.53	0.25
10:47 AM	2.68	10:57 AM	2.68	10	0.00	*DNI*	0.52	*DNI*
10:57 AM	2.68	11:07 AM	2.68	10	0.00	*DNI*	0.52	*DNI*
11:07 AM	2.68	11:17 AM	2.68	10	0.00	*DNI*	0.52	*DNI*
End of Test #2								
11:28 AM	2.68	11:38 AM	2.68	10	0.00	*DNI*	0.52	*DNI*
11:38 AM	2.68	11:48 AM	2.68	10	0.00	*DNI*	0.52	*DNI*
11:48 AM	2.68	11:58 AM	2.69	10	0.01	83.33	0.52	0.25
11:58 AM	2.69	12:08 PM	2.69	10	0.00	*DNI*	0.51	*DNI*
12:08 PM	2.69	12:18 PM	2.69	10	0.00	*DNI*	0.51	*DNI*
12:18 PM	2.69	12:28 PM	2.69	10	0.00	*DNI*	0.51	*DNI*
End of Test #3								

Notes:

DNI = did not infiltrate

t_1 = initial time when filling or refilling is completed

d_1 = initial depth to water in hole at t_1

t_2 = final time when incremental water level reading is taken

d_2 = final depth to water in hole at t_2

Δt = change in time between initial and final water level readings

ΔH = change in depth to water or change in height of water column (i.e., $d_2 - d_1$)

H_0 = Initial height of water column

in/hr = inches per hour

Percolation Rate to Infiltration Rate Conversion[1]

$$I_t = \frac{\Delta H \times 60 \times r}{\Delta t(r + 2H_{avg})}$$

I_t = tested infiltration rate, inches/hour

ΔH = change in head over the time interval, inches

Δt = time interval, minutes

r = effective radius of test hole

H_{avg} = average head over the time interval, inches

[1] Based on the "Porchet Method" as presented in:
Riverside County Flood Control, 2011, Design Handbook for Low Impact Development Best Management Practices: dated September.

Test Date: 11/18/2020 | Infiltration Test No.: IT-4

Test Hole Dimensions, W x L (feet): 2 x 2 | Excavation Depth (feet): 4.2

Test Area (ft^2 4 | Test performed and recorded by: DP

t_1	d_1 (feet)	t_2	d_2 (feet)	Δt (min)	ΔH (feet)	Percolation Rate (min/in)	H_{avg} (feet)	Infiltration Rate (in/hr)
1:40 PM	3.17	1:50 PM	3.19	10	0.02	41.67	1.02	0.31
1:50 PM	3.19	2:00 PM	3.21	10	0.02	41.67	1.00	0.32
2:00 PM	3.21	2:10 PM	3.21	10	0.00	*DNI*	0.99	*DNI*
2:10 PM	3.21	2:20 PM	3.23	10	0.02	41.67	0.98	0.32
2:20 PM	3.23	2:30 PM	3.23	10	0.00	*DNI*	0.97	*DNI*
2:30 PM	3.23	2:40 PM	3.23	10	0.00	*DNI*	0.97	*DNI*
End of Test #1								
2:41 PM	3.15	2:51 PM	3.17	10	0.02	41.67	1.04	0.31
2:51 PM	3.17	3:01 PM	3.17	10	0.00	*DNI*	1.03	*DNI*
3:01 PM	3.17	3:11 PM	3.19	10	0.02	41.67	1.02	0.31
3:11 PM	3.19	3:21 PM	3.19	10	0.00	*DNI*	1.01	*DNI*
3:21 PM	3.19	3:31 PM	3.19	10	0.00	*DNI*	1.01	*DNI*
3:31 PM	3.19	3:41 PM	3.19	10	0.00	*DNI*	1.01	*DNI*
End of Test #2								
3:46 PM	3.15	3:56 PM	3.15	10	0.00	*DNI*	1.05	*DNI*
3:56 PM	3.15	4:06 PM	3.15	10	0.00	*DNI*	1.05	*DNI*
4:06 PM	3.15	4:16 PM	3.15	10	0.00	*DNI*	1.05	*DNI*
4:16 PM	3.15	4:26 PM	3.15	10	0.00	*DNI*	1.05	*DNI*
4:26 PM	3.15	4:36 PM	3.17	10	0.02	41.67	1.04	0.31
4:36 PM	3.17	4:46 PM	3.17	10	0.00	*DNI*	1.03	*DNI*
End of Test #3								

Notes:

DNI = did not infiltrate

t_1 = initial time when filling or refilling is completed

d_1 = initial depth to water in hole at t_1

t_2 = final time when incremental water level reading is taken

d_2 = final depth to water in hole at t_2

Δt = change in time between initial and final water level readings

ΔH = change in depth to water or change in height of water column (i.e., d_2 - d_1)

H_0 = Initial height of water column

in/hr = inches per hour

Percolation Rate to Infiltration Rate Conversion [1]

$$I_t = \frac{\Delta H \times 60 \times r}{\Delta t\left(r + 2H_{avg}\right)}$$

I_t = tested infiltration rate, inches/hour

ΔH = change in head over the time interval, inches

Δt = time interval, minutes

r = effective radius of test hole

H_{avg} = average head over the time interval, inches

[1] Based on the "Porchet Method" as presented in: Riverside County Flood Control, 2011, Design Handbook for Low Impact Development Best Management Practices: dated September.

Test Date: 11/18/2020
Infiltration Test No.: IT-5
Test Hole Dimensions, W x L (feet): 2 x 2
Excavation Depth (feet): 3.8
Test Area (ft^2 4
Test performed and recorded by: DP

t_1	d_1 (feet)	t_2	d_2 (feet)	Δt (min)	ΔH (feet)	Percolation Rate (min/in)	H_{avg} (feet)	Infiltration Rate (in/hr)
11:50 AM	3.33	12:00 PM	3.38	10	0.05	16.67	0.45	1.40
12:00 PM	3.38	12:10 PM	3.40	10	0.02	41.67	0.41	0.59
12:10 PM	3.40	12:20 PM	3.42	10	0.02	41.67	0.39	0.60
12:20 PM	3.42	12:30 PM	3.42	10	0.00	*DNI*	0.38	*DNI*
12:30 PM	3.42	12:40 PM	3.44	10	0.02	41.67	0.37	0.62
12:40 PM	3.44	12:50 PM	3.44	10	0.00	*DNI*	0.36	*DNI*
End of Test #1								
1:35 PM	3.42	1:45 PM	3.42	10	0.00	*DNI*	0.38	*DNI*
1:45 PM	3.42	1:55 PM	3.44	10	0.02	41.67	0.37	0.62
1:55 PM	3.44	2:05 PM	3.44	10	0.00	*DNI*	0.36	*DNI*
2:05 PM	3.44	2:15 PM	3.44	10	0.00	*DNI*	0.36	*DNI*
2:15 PM	3.44	2:25 PM	3.44	10	0.00	*DNI*	0.36	*DNI*
2:25 PM	3.44	2:35 PM	3.46	10	0.02	41.67	0.35	0.64
End of Test #2								
2:38 PM	3.42	2:48 PM	3.44	10	0.02	41.67	0.37	0.62
2:48 PM	3.44	2:58 PM	3.44	10	0.00	*DNI*	0.36	*DNI*
2:58 PM	3.44	3:08 PM	3.44	10	0.00	*DNI*	0.36	*DNI*
3:08 PM	3.44	3:18 PM	3.46	10	0.02	41.67	0.35	0.64
3:18 PM	3.46	3:28 PM	3.46	10	0.00	*DNI*	0.34	*DNI*
3:28 PM	3.46	3:38 PM	3.48	10	0.02	41.67	0.33	0.66
End of Test #3								

Notes:

DNI = did not infiltrate

t_1 = initial time when filling or refilling is completed

d_1 = initial depth to water in hole at t_1

t_2 = final time when incremental water level reading is taken

d_2 = final depth to water in hole at t_2

Δt = change in time between initial and final water level readings

ΔH = change in depth to water or change in height of water column (i.e., $d_2 - d_1$)

H_0 = Initial height of water column

in/hr = inches per hour

Percolation Rate to Infiltration Rate Conversion [1]

$$I_t = \frac{\Delta H \times 60 \times r}{\Delta t\left(r + 2H_{avg}\right)}$$

I_t = tested infiltration rate, inches/hour

ΔH = change in head over the time interval, inches

Δt = time interval, minutes

r = effective radius of test hole

H_{avg} = average head over the time interval, inches

[1] Based on the "Porchet Method" as presented in:
Riverside County Flood Control, 2011, Design Handbook for Low Impact Development Best Management Practices: dated September.

Test Date: 11/19/2020

Infiltration Test No.: IT-6

Test Hole Dimensions, W x L (feet): 2 x 2

Excavation Depth (feet): 3.6

Test Area (ft^2 4

Test performed and recorded by: DP

t_1	d_1 (feet)	t_2	d_2 (feet)	Δt (min)	ΔH (feet)	Percolation Rate (min/in)	H_{avg} (feet)	Infiltration Rate (in/hr)
2:13 PM	3.13	2:23 PM	3.15	10	0.02	40.00	0.46	0.57
2:23 PM	3.15	2:33 PM	3.15	10	0.00	*DNI*	0.45	*DNI*
2:33 PM	3.15	2:43 PM	3.17	10	0.02	40.00	0.44	0.58
2:43 PM	3.17	2:53 PM	3.17	10	0.00	*DNI*	0.43	*DNI*
2:53 PM	3.17	3:03 PM	3.19	10	0.02	40.00	0.42	0.60
3:03 PM	3.19	3:13 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
End of Test #1								
3:13 PM	3.19	3:23 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
3:23 PM	3.19	3:33 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
3:33 PM	3.19	3:43 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
3:43 PM	3.19	3:53 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
3:53 PM	3.19	4:03 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
4:03 PM	3.19	4:13 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
End of Test #2								
4:13 PM	3.19	4:23 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
4:23 PM	3.19	4:33 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
4:33 PM	3.19	4:43 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
4:43 PM	3.19	4:53 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
4:53 PM	3.19	5:03 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
5:03 PM	3.19	5:13 PM	3.19	10	0.00	*DNI*	0.41	*DNI*
End of Test #3								

Notes:

DNI = did not infiltrate

t_1 = initial time when filling or refilling is completed

d_1 = initial depth to water in hole at t_1

t_2 = final time when incremental water level reading is taken

d_2 = final depth to water in hole at t_2

Δt = change in time between initial and final water level readings

ΔH = change in depth to water or change in height of water column (i.e., $d_2 - d_1$)

H_0 = Initial height of water column

in/hr = inches per hour

Percolation Rate to Infiltration Rate Conversion[1]

$$I_t = \frac{\Delta H \times 60 \times r}{\Delta t\left(r + 2H_{avg}\right)}$$

I_t = tested infiltration rate, inches/hour

ΔH = change in head over the time interval, inches

Δt = time interval, minutes

r = effective radius of test hole

H_{avg} = average head over the time interval, inches

[1] Based on the "Porchet Method" as presented in:
Riverside County Flood Control, 2011, Design Handbook for Low Impact Development Best Management Practices: dated September.

Test Date: 11/19/2020
Infiltration Test No.: IT-7
Test Hole Dimensions, W x L (feet): 2 x 2
Excavation Depth (feet): 4.9
Test Area (ft^2 4
Test performed and recorded by: DP

t_1	d_1 (feet)	t_2	d_2 (feet)	Δt (min)	ΔH (feet)	Percolation Rate (min/in)	H_{avg} (feet)	Infiltration Rate (in/hr)
2:07 PM	4.46	2:17 PM	4.48	10	0.02	40.00	0.43	0.59
2:17 PM	4.48	2:27 PM	4.50	10	0.02	40.00	0.41	0.61
2:27 PM	4.50	2:37 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
2:37 PM	4.50	2:47 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
2:47 PM	4.50	2:57 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
2:57 PM	4.50	3:07 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
End of Test #1								
3:07 PM	4.50	3:17 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
3:17 PM	4.50	3:27 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
3:27 PM	4.50	3:37 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
3:37 PM	4.50	3:47 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
3:47 PM	4.50	3:57 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
3:57 PM	4.50	4:07 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
End of Test #2								
4:07 PM	4.50	4:17 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
4:17 PM	4.50	4:27 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
4:27 PM	4.50	4:37 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
4:37 PM	4.50	4:47 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
4:47 PM	4.50	4:57 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
4:57 PM	4.50	5:07 PM	4.50	10	0.00	*DNI*	0.40	*DNI*
End of Test #3								

Notes:

DNI = did not infiltrate
t_1 = initial time when filling or refilling is completed
d_1 = initial depth to water in hole at t_1
t_2 = final time when incremental water level reading is taken
d_2 = final depth to water in hole at t_2
Δt = change in time between initial and final water level readings
ΔH = change in depth to water or change in height of water column (i.e., d_2 - d_1)
H_0 = Initial height of water column
in/hr = inches per hour

Percolation Rate to Infiltration Rate Conversion [1]

$$I_t = \frac{\Delta H \times 60 \times r}{\Delta t\left(r + 2H_{avg}\right)}$$

I_t = tested infiltration rate, inches/hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

[1] Based on the "Porchet Method" as presented in: Riverside County Flood Control, 2011, Design Handbook for Low Impact Development Best Management Practices: dated September.

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Ninyo & Moore

Geotechnical & Environmental Sciences Consultants

Appendix G

Noise Data

FIELD NOISE MEASUREMENT DATA

PROJECT: Alpine Park PROJ. # 00098.20

SITE IDENTIFICATION: ST 1 OBSERVER(S): JCR

ADDRESS: Near 2501 Engelmann Oak Ln

START DATE / TIME: 3/31/20 ~ 9:45 AM END DATE / TIME: 3/31/20 - 10:05Am

METEROLOGICAL CONDITIONS:

TEMP: 62 °F HUMIDITY: 70.0 %R.H. WIND: [✓ CALM] LIGHT MODERATE VARIABLE

WINDSPEED: 0-1 MPH DIR: N NE E SE S SW W NW STEADY GUSTY

SKY: SUNNY CLEAR [✓ OVRCST] PRTLY CLOUDY FOG RAIN OTHER:

ACOUSTIC MEASUREMENTS:

INSTRUMENT: LD LXT TYPE: [✓ 1] 2 SERIAL #: 4005

CALIBRATOR: CAL 200 SERIAL #: 2976

CALIBRATION CHECK, BEFORE: 114.0 AFTER 113.98 WINDSCREEN X

SETTINGS: [✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL [✓ RANDOM] [✓ ANSI] OTHER:

FILE / MEAS #	START TIME	END TIME	L_{eq}	max	L						
					1.67	8.33	25	50	90	99	min
.814	9:45am	10:05Am	46.5	57.3	55.4	51.5	46.6	41.7	34.7	31.7	29.6

COMMENTS:

NOISE SOURCE INFO:

PRIMARY NOISE SOURCE: [✓ TRAFFIC] AIRCRAFT RAIL INDUSTRIAL [✓ AMBIENT] OTHER:

ROADWAY TYPE:

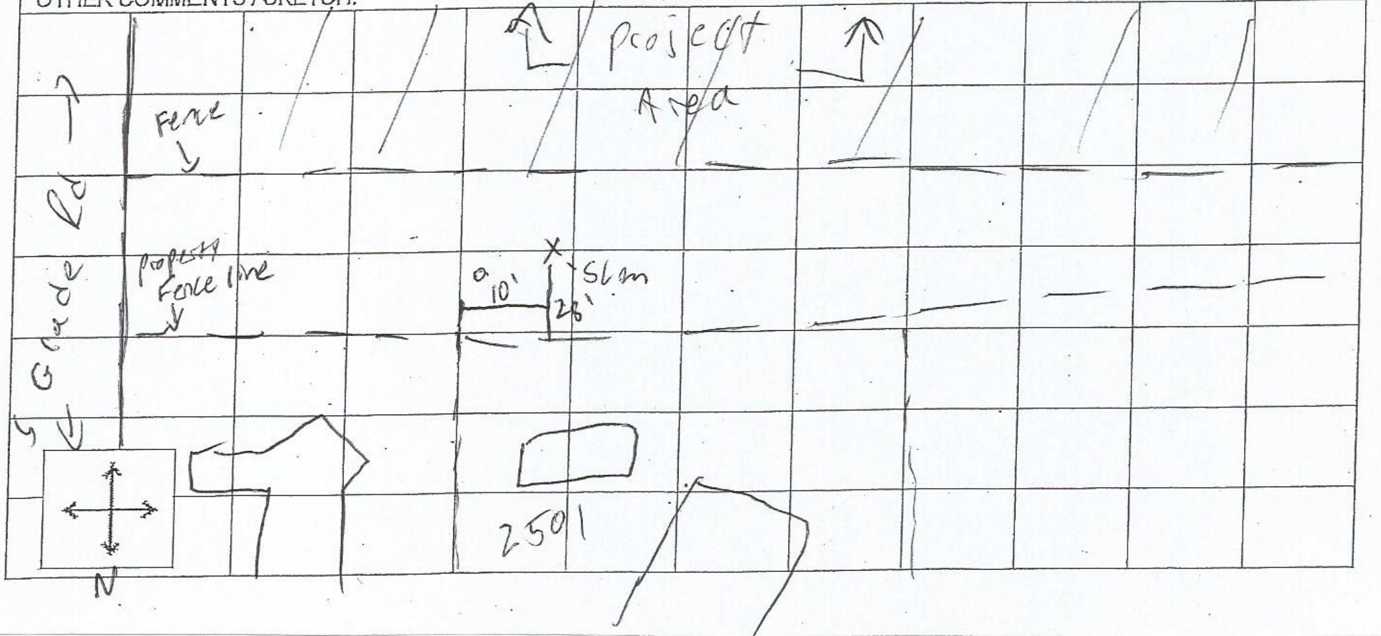
OTHER SOURCES: DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / [✓ BIRDS] / DIST. INDUSTRIAL / DIST. CHILDREN PLAYING / DIST. TRAFFIC / [✓ DIST. LANDSCAPING ACTIVITIES] / OTHER:

DESCRIPTION / SKETCH:

TERRAIN: HARD SOFT MIXED FLAT OTHER:

PHOTOS:

OTHER COMMENTS / SKETCH:



FIELD NOISE MEASUREMENT DATA

PROJECT: Alpine park PROJ. #0 0098.20

SITE IDENTIFICATION: ST2
OBSERVER(S): JcR
ADDRESS: near 2620 via viegas
START DATE / TIME: 3/31/20 · 10:48 Am
END DATE / TIME: 3/31/20 · 11:08 Am

METEROLOGICAL CONDITIONS:

TEMP: 68 °F
HUMIDITY: 52.0 %R.H.
WIND: [✓ CALM] LIGHT MODERATE VARIABLE STEADY GUSTY
WINDSPEED: 0-1 MPH
DIR: N NE E SE S SW [✓ W NW]
SKY: SUNNY CLEAR [✓ OVRCST] PRTLY CLOUDY FOG RAIN OTHER:

ACOUSTIC MEASUREMENTS:

INSTRUMENT: LD LXT
TYPE: [✓ 1] 2
SERIAL #: 4005
CALIBRATOR: CAL 200
SERIAL #: 2916
CALIBRATION CHECK, BEFORE: 114.0 AFTER 113.96
WINDSCREEN X
SETTINGS: [✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL [✓ RANDOM] [✓ ANSI] OTHER:

FILE / MEAS #	START TIME	END TIME	L_{eq}	L max	L 1.67	L 8.33	L 25	L 50	L 90	L 99	L min
.815	10:48am	11:08	51.2	68.5	61.8	54.6	50.3	45.3	37.7	35.3	33.1

COMMENTS:

NOISE SOURCE INFO:

PRIMARY NOISE SOURCE: [✓ TRAFFIC] AIRCRAFT RAIL INDUSTRIAL [✓ AMBIENT] OTHER:
ROADWAY TYPE:
OTHER SOURCES: DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / [✓ BIRDS] / DIST. INDUSTRIAL
DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:

DESCRIPTION / SKETCH:

TERRAIN: HARD SOFT [✓ MIXED] FLAT OTHER:
PHOTOS:
OTHER COMMENTS / SKETCH:

FIELD NOISE MEASUREMENT DATA

PROJECT: Alpine Park PROJ. # 00098.20

SITE IDENTIFICATION: ST3

ADDRESS: Park Area North of Grade Rd

START DATE / TIME: 3/31/20 11:48am

OBSERVER(S): JCR

END DATE / TIME: 3/31/20 . 12:08pm

METEROLOGICAL CONDITIONS:

TEMP: 68 °F HUMIDITY: 49.0 %R.H.

WIND: [✓ CALM] LIGHT MODERATE VARIABLE

WINDSPEED: 0-1 MPH DIR: N NE E SE [✓ S] [✓ SW] W NW STEADY GUSTY

SKY: SUNNY CLEAR [✓ OVRCST] PRTLY CLOUDY FOG RAIN OTHER:

ACOUSTIC MEASUREMENTS:

INSTRUMENT: LD LXT TYPE: [✓ 1] 2 SERIAL #: 4605

CALIBRATOR: CAL 200 SERIAL #: 2916

CALIBRATION CHECK, BEFORE: 114.0 AFTER 113.93 WINDSCREEN X

SETTINGS: [✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL [✓ RANDOM] [✓ ANSI] OTHER:

FILE / MEAS #	START TIME	END TIME	L_{eq}	L max	L 1.67	L 8.33	L 25	L 50	L 90	L 99	L min
1816	11:48	12:08	45.6	55.1	52.5	50.2	46.8	42.1	37.7	34.4	32.3

COMMENTS:

NOISE SOURCE INFO:

PRIMARY NOISE SOURCE: [✓ TRAFFIC] AIRCRAFT RAIL INDUSTRIAL [✓ AMBIENT] OTHER:

ROADWAY TYPE:

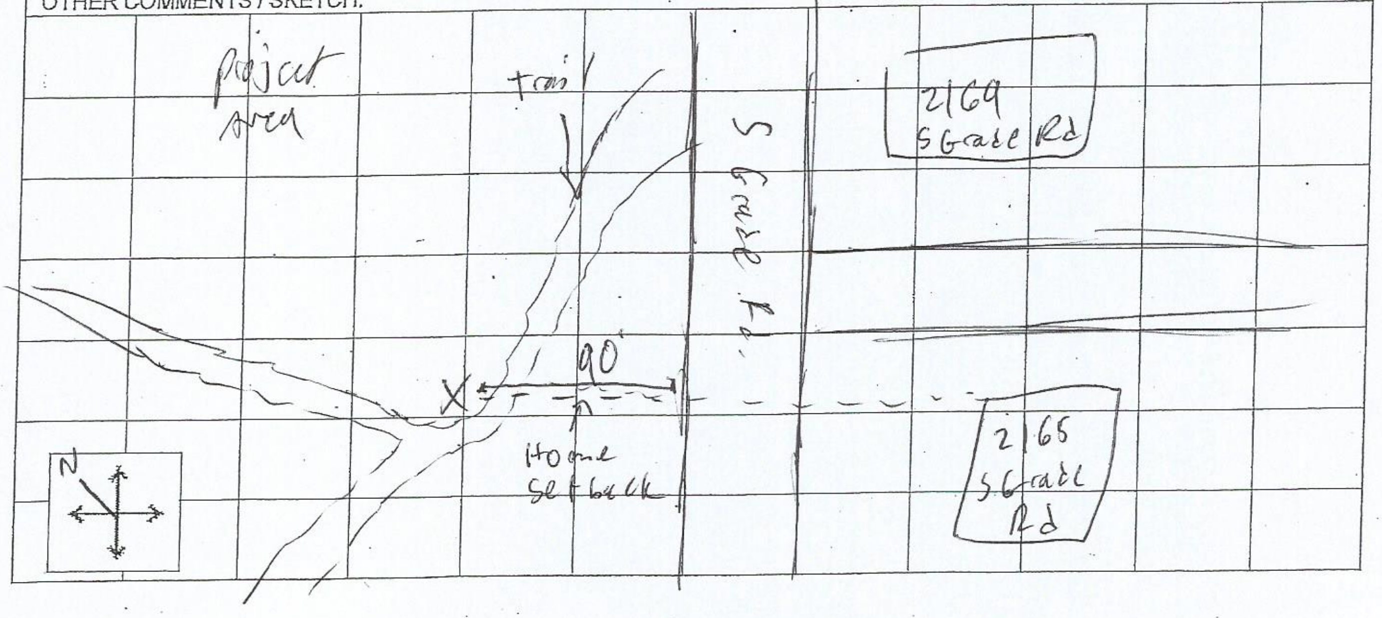
OTHER SOURCES: DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / [✓ BIRDS] / DIST. INDUSTRIAL DIST. CHILDREN PLAYING / DIST. TRAFFIC / [✓ DIST. LANDSCAPING] ACTIVITIES / OTHER:

DESCRIPTION / SKETCH:

TERRAIN: HARD [✓ SOFT] MIXED FLAT OTHER:

PHOTOS:

OTHER COMMENTS / SKETCH:



FIELD NOISE MEASUREMENT DATA

PROJECT: Alpine park PROJ. # 00098.20

SITE IDENTIFICATION: LT1 OBSERVER(S): JCK

ADDRESS: Open park near Grade Rd & Calle de compadres

START DATE / TIME: 3/27/20 - 11:05 AM END DATE / TIME: 3/31/20 - 10:26 AM

METEROLOGICAL CONDITIONS:

TEMP: ____ °F HUMIDITY: ____ %R.H. WIND: CALM LIGHT MODERATE VARIABLE

WINDSPEED: ____ MPH DIR: N NE E SE S SW W NW STEADY GUSTY

SKY: SUNNY CLEAR OVRCST PRTLY CLOUDY FOG RAIN OTHER:

ACOUSTIC MEASUREMENTS:

INSTRUMENT: ~~[illegible]~~ Piccolo II - D TYPE: 1 [✓ 2] SERIAL #: 2602

CALIBRATOR: CAL 200 SERIAL #: 2916

CALIBRATION CHECK, BEFORE: 94.0 AFTER 94.2 WINDSCREEN X

SETTINGS: [✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL [✓ RANDOM] [✓ ANSI] OTHER: ____

FILE / MEAS #	START TIME	END TIME	L_{eq}	max	L 1.67	8.33	25	50	90	99	min

COMMENTS: mounted @ 11:40, cleared @ 11:50 Am

pick up: 10:20 Am

NOISE SOURCE INFO:

PRIMARY NOISE SOURCE: TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER: ____

ROADWAY TYPE: ____

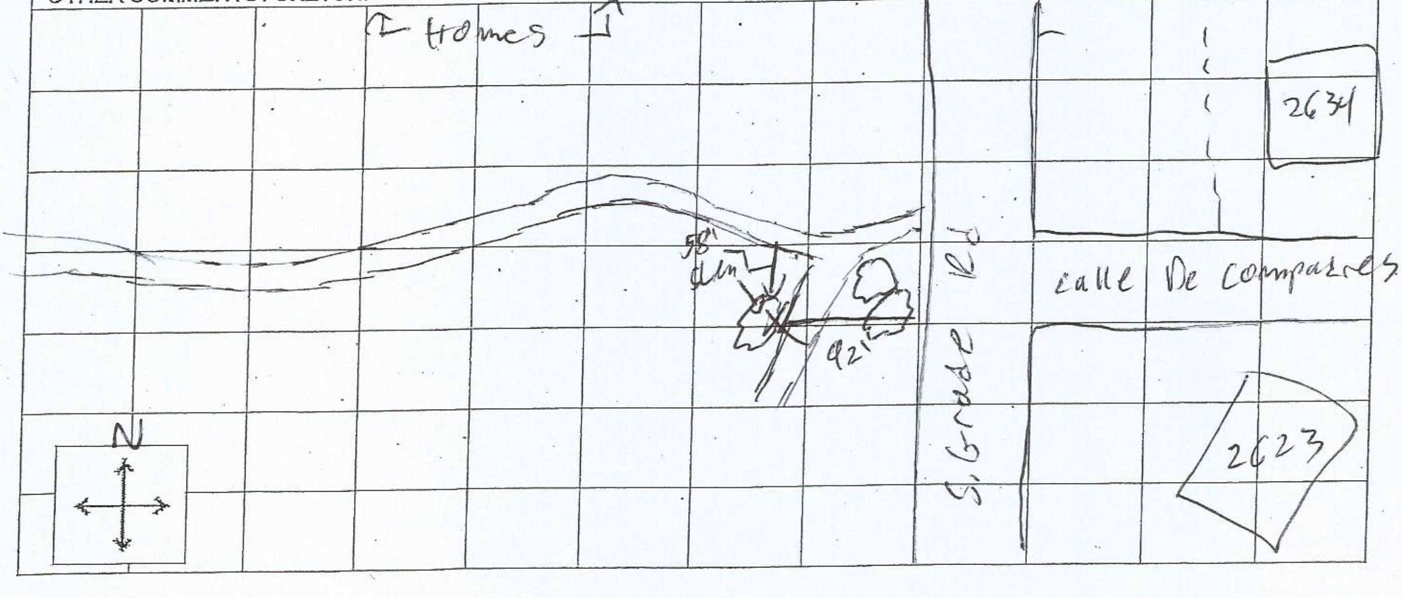
OTHER SOURCES: DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / BIRDS / DIST. INDUSTRIAL / DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:

DESCRIPTION / SKETCH:

TERRAIN: HARD [✓ SOFT] MIXED FLAT OTHER: ____

PHOTOS:

OTHER COMMENTS / SKETCH:



FIELD NOISE MEASUREMENT DATA

PROJECT: Alpine park PROJ. # 00098.20

SITE IDENTIFICATION: LT2
OBSERVER(S): JCK
ADDRESS: Near 2387 S Grase Rd
START DATE / TIME: 3/27/20 11:07 Am
END DATE / TIME: 3/31/20 11:28

METEROLOGICAL CONDITIONS:
TEMP: °F HUMIDITY: %R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: MPH DIR: N NE E SE S SW W NW STEADY GUSTY
SKY: SUNNY CLEAR OVRCST PRTLY CLOUDY FOG RAIN OTHER:

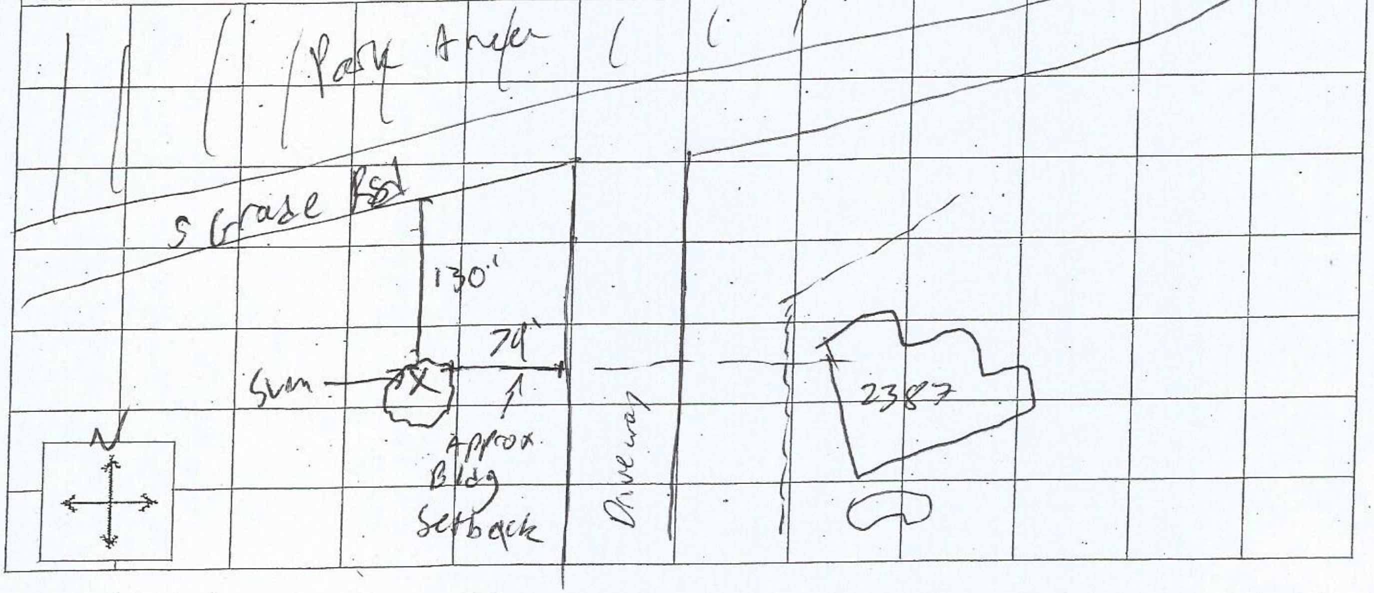
ACOUSTIC MEASUREMENTS:
INSTRUMENT: Piccolo II - E TYPE: 1 [✓ 2] SERIAL #: 2502
CALIBRATOR: CAL200 SERIAL #: 2916
CALIBRATION CHECK, BEFORE: 94.0 AFTER 94.2 WINDSCREEN X
SETTINGS: [✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL [✓ RANDOM] [✓ ANSI] OTHER:

					L						
FILE / MEAS #	START TIME	END TIME	L_{eq}	max	1.67	8.33	25	50	90	99	min

COMMENTS: clears @ 1:30
pick up: 11:20 Am

NOISE SOURCE INFO:
PRIMARY NOISE SOURCE: TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER:
ROADWAY TYPE:
OTHER SOURCES: DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / BIRDS / DIST. INDUSTRIAL
DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:

DESCRIPTION / SKETCH:
TERRAIN: HARD [✓ SOFT] MIXED FLAT OTHER:
PHOTOS:
OTHER COMMENTS / SKETCH:



General

1st measurement – Reference Measurement 131

11:49 Am Start

- 10:00 am session Ended @ 11:45 Am, Skate park was cleared for Sanitation and 12pm session

Skate park is empty

- noise sources: Traffic on 241, music from Skate park Sound System, Distant skate activity near parking lot, Birds

SLM is positioned at the eastern end (least amount of traffic noise from lake forest and parking lot, various rails and ledges. Skaters ride or grind across these features.,

Start - 11:49 Am Pre-cal 114.0

End - 12:00 pm

- Measured empty skate park as a reference

Leq	Max	1.67	8.33	25	50	90	99	min
57.0	65.9	61.5	59.5	57.9	56.4	53.5	51.2	49.3

File #: .131

Measurement 2 - active park

Pre cal : 114.0

Notes: 12:00 pm session
SLM placed on eastern end
~ 15 active skaters in park :

12:08 pm start ~ 4 active skaters at this end of the park

12:09. Skaters riding up Ramp and Jumping over bench. Talking / shouting. Music / speech from Speakers
Skater landing ~ 69 - 71 dBA

12:11 : limited activity, skaters preparing for tricks

12:13: multiple skaters attempting the same trick. riding up a ramp and jumping over a bench. Skater starts near the middle of the park, heads toward SLM, lands near sewer cap.

12:14: Group of skaters passed near SLM, outside of the park.

12:15 - Skaters attempt tricks on the flat surface part of the skate park

General note
Primary noise sources are skateboards landing or sliding accross flat concrete, ledges or metal rails.
- music is present, some traffic noise and talking / shouting

weather data

68°F 49% humidity Sunny, clear

wind: 3-4 mph SSW

12:21 pm

10 active skaters at eastern end, near SLM

- skater is instructing younger skaters. having them jump off a short ledge.

12:24

~6 skaters jumping and landing near SLM

~12-15 ft from SLM

- some talking and shouting

Leq(10s) Range 65-72 dBA at skaters jumping off ledge near SLM

12:28 ~19-20 total skaters in park.

~7 skaters active near SLM

12:30 less activity

~3 skaters attempting to jump and land off ledge

12:32 - skaters pass near SLM, outside of park.

12:33 - low activity at eastern end

~3 active skaters attempting various tricks

- music is constant, ~57-58 dBA
- traffic nearly inaudible

12:35

~5 skaters, similar activity

12:36 - roller skaters show up

~4 roller skaters, activity not very loud.

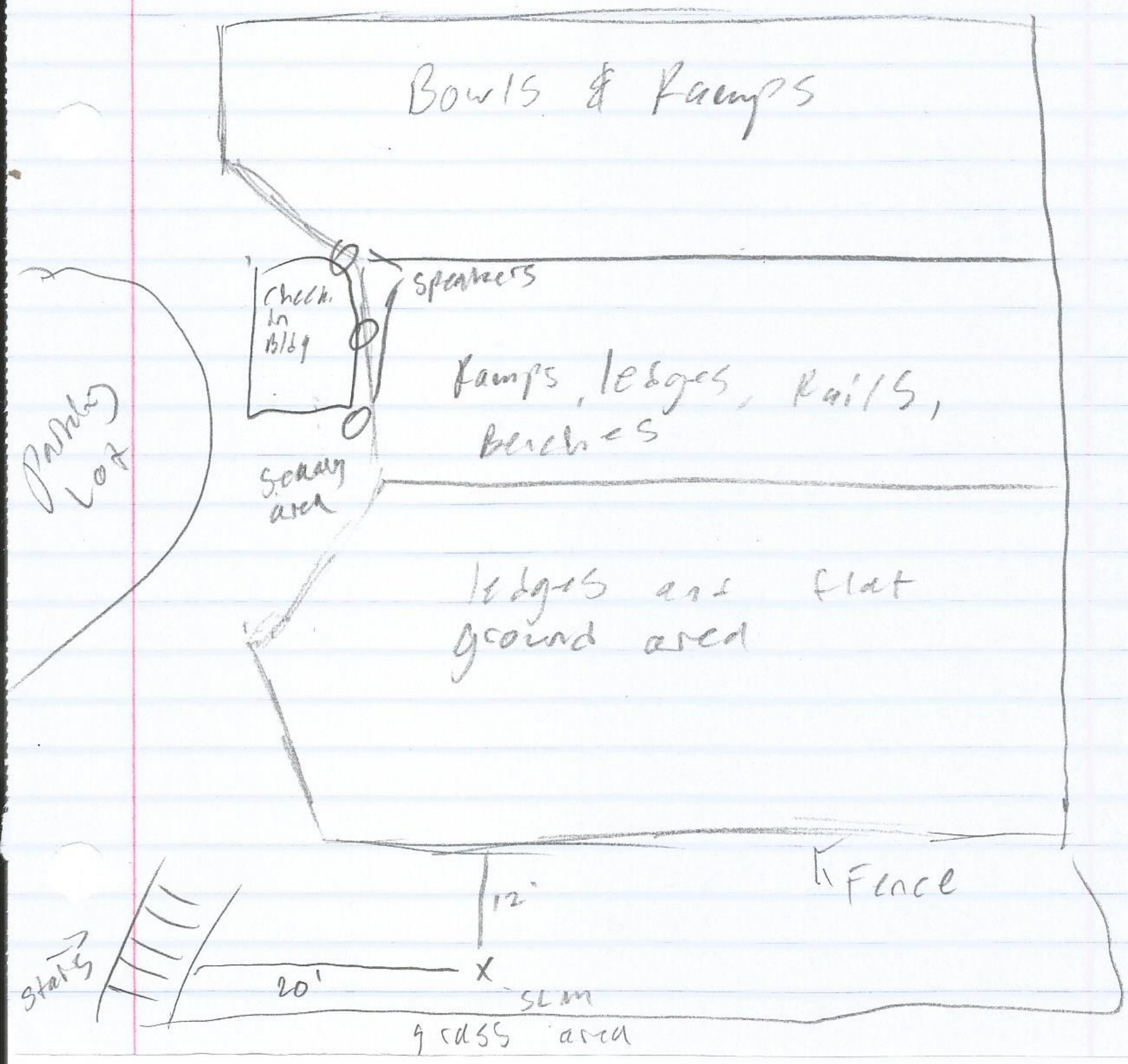
12:37 - limited activity 1 skater near SLM

12:38pm measurement stopped

File #: .132

Leq: 66.5
Max: 85.0
min: 53.0

70ft
12ft



weather
65 °F
wind: 2-6 mph SSE
Ladera Ranch

63% hum.
sunny, clear

Start 1:30 pm

pre-cal 114.0

~1:30
3 scooters & 2 skate boarders
scooters are very quiet, nearly inaudible
- skateboarders occasionally pass by SLM

noise sources include traffic noise (~53-56 dBA)

1:32 - 1 additional skate boarder (3 total)
- skaters start skating from southern side into northern side, where there are bowls

1:34
- active skateboarder skating in bowl for about 1 min

notes
skaters drop into and out of bowls, creating wheel on concrete noise and noise from the board landing on pavement

1:36 - 1:37
single skater riding inside bowl

1:38 pm limited to no activity, single skater to riding around the whole park
1:40 pm

1:41 - 2 active skaters in the bowl area

1:42 - more scooters showed up. 5 total.

1:43 - limited activity, talking and shouting from visiters.

1:44 - varied activity, 1 skateboarder left the park

1:46 activity is calm, mostly scooters near SLM

1:47 - 2 skateboarders active at southern end of park, further from SLM

1:47 to 1:52.
skateboarders are active near southern end.
4 scooters active near SLM but activity is quiet. occasional scooter noise occurs when the body strikes the metal rail on the bowl

1:52 - 1:54
Motor bike active behind SLM

1:55 8 scooters active near SLM in Bowl area. Some scooter noise, mostly spech, traffic noise

1:56 - another skateboarder arrived 3 total
11 active visitors total.

1:57 - 1:58 - contaminated, spoke with park visitor

End at 2:00 pm
File# .133.
Leq 57.1
max: 74.1
min: 44.2

2nd measurement - southern end
2:02pm Start

- 2 active skateboarders riding around the ramp/ledge/rail area.

Noise sources: skateboards impacting with the ground, boards sliding on ground, ledges and rails, boards landing on rails. Skate activity is the primary noise source.

2:06 1 active skateboarder, 3-4 scooters riding around creating minimal noise.

2:07 - motor bike passed SLM.

2:09 - Single skateboarder doing tricks near south corner of skate park, occasional scooter noise.

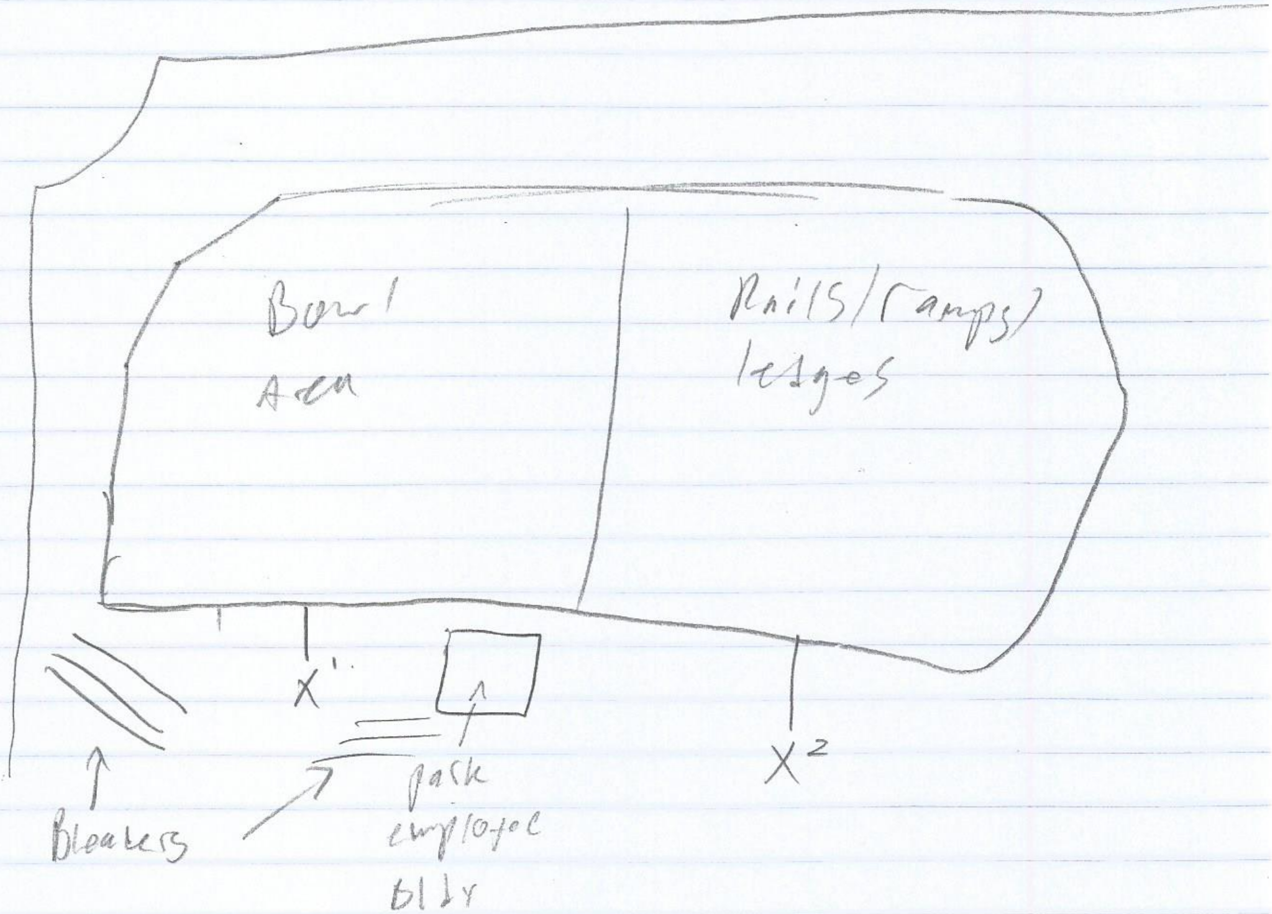
2:12 - motor bike passes by SLM

2:13 - 2 scooters exit park
- 3 skateboarders enter park, passing near SLM.

2:15 - 1 skater leaves and 1 arrives,
2 scooters leave

2:17 landscaping activity started near SLM, stopped measurement
File #: 134
Leq 59.6
Lmax 75.1
Lmin 45.3

Post Cal: 113.9



Noise Measurement Photographs

LT01 Looking North

LT01 Looking East

LT01 Looking South

LT01 Looking West

Noise Measurement Photographs

 LT02 Looking North	 LT02 Looking East
 LT02 Looking South	 LT02 Looking West

Noise Measurement Photographs


ST1 Looking North


ST01 Looking East


ST01 Looking South


ST01 Looking West

Noise Measurement Photographs

 ST02 Looking North	 ST02 Looking East
 ST02 Looking South	 ST02 Looking West

Noise Measurement Photographs


ST03 Looking Northeast


ST03 Looking Northwest


ST03 Looking Southeast


ST03 Looking Southwest

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2021
Case Description: Grubbing

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
North	Residential	1	1	1

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Excavator	No	40		80.7	310	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		64.9	60.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	65.8	67.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
East	Residential	1	1	1

				Equipment			
				Spec	Actual	Receptor	Estimated
		Impact		Lmax	Lmax	Distance	Shielding
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer		No	40		81.7	225	0
Dozer		No	40		81.7	225	0
Dozer		No	40		81.7	225	0
Excavator		No	40		80.7	225	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		67.6	63.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	68.6	70.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
South	Residential	1	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	283	0
Dozer	No	40		81.7	283	0
Dozer	No	40		81.7	283	0
Excavator	No	40		80.7	283	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		65.7	61.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	66.6	68.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
50'	Residential	1	1	1

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Excavator	No	40		80.7	50	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)					Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	81.7	83.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2021
Case Description Grading

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
North	Residential	1	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Excavator	No	40		80.7	310	0
Roller	No	20		80	310	0
Front End Loader	No	40		79.1	310	0
Backhoe	No	40		77.6	310	0
Scraper	No	40		83.6	310	0

			Results											
	Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	64.9	60.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	64.2	57.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	63.3	59.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	61.7	57.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	67.7	63.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	67.7	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
East	Residential	1	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	225	0
Dozer	No	40		81.7	225	0
Dozer	No	40		81.7	225	0
Excavator	No	40		80.7	225	0
Roller	No	20		80	225	0
Front End Loader	No	40		79.1	225	0
Backhoe	No	40		77.6	225	0
Scraper	No	40		83.6	225	0

			Results											
	Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	67.6	63.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	66.9	59.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	66	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	64.5	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	70.5	66.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.5	72.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
South	Residential	1	1	1

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer		No	40		81.7	283	0
Dozer		No	40		81.7	283	0
Dozer		No	40		81.7	283	0
Excavator		No	40		80.7	283	0
Roller		No	20		80	283	0
Front End Loader		No	40		79.1	283	0
Backhoe		No	40		77.6	283	0
Scraper		No	40		83.6	283	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		65.7	61.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller		64.9	58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.1	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		62.5	58.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper		68.5	64.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	68.5	70.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
50'	Residential	1	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Excavator	No	40		80.7	50	0
Roller	No	20		80	50	0
Front End Loader	No	40		79.1	50	0
Backhoe	No	40		77.6	50	0
Scraper	No	40		83.6	50	0

			Results											
	Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	80	73	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	77.6	73.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	83.6	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	83.6	85.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2021
Case Description: Drainage

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
North	Residential	1	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Compressor (air)	No	40	80		310	0
Backhoe	No	40		77.6	310	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		64.2	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		61.7	57.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	65.8	67.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
East	Residential	1	1	1

				Equipment			
				Spec	Actual	Receptor	Estimated
		Impact		Lmax	Lmax	Distance	Shielding
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer		No	40		81.7	225	0
Dozer		No	40		81.7	225	0
Dozer		No	40		81.7	225	0
Compressor (air)		No	40	80		225	0
Backhoe		No	40		77.6	225	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		66.9	63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		64.5	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	68.6	70.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
South	Residential	1	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	283	0
Dozer	No	40		81.7	283	0
Dozer	No	40		81.7	283	0
Compressor (air)	No	40	80		283	0
Backhoe	No	40		77.6	283	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		64.9	61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		62.5	58.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	66.6	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
50'	Residential	1	1	1

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Compressor (air)	No	40	80		50	0
Backhoe	No	40		77.6	50	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		80	76	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		77.6	73.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	81.7	83.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2021
Case Description: Construction

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
North	Residential	1	1	1

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Crane	No	16		80.6	310	0
Compressor (air)	No	40	80		310	0
Generator	No	50		80.6	310	0
Front End Loader	No	40		79.1	310	0
Front End Loader	No	40		79.1	310	0
Front End Loader	No	40		79.1	310	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane		64.7	56.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		64.2	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		64.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		63.3	59.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		63.3	59.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		63.3	59.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	65.8	69.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
East	Residential	1	1	1

				Equipment			
				Spec	Actual	Receptor	Estimated
		Impact		Lmax	Lmax	Distance	Shielding
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer		No	40		81.7	225	0
Dozer		No	40		81.7	225	0
Crane		No	16		80.6	225	0
Compressor (air)		No	40	80		225	0
Generator		No	50		80.6	225	0
Front End Loader		No	40		79.1	225	0
Front End Loader		No	40		79.1	225	0
Front End Loader		No	40		79.1	225	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		68.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane		67.5	59.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		66.9	63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		67.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		66	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		66	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		66	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	68.6	72.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
South	Residential	1	1	1

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	283	0
Dozer	No	40		81.7	283	0
Crane	No	16		80.6	283	0
Compressor (air)	No	40	80		283	0
Generator	No	50		80.6	283	0
Front End Loader	No	40		79.1	283	0
Front End Loader	No	40		79.1	283	0
Front End Loader	No	40		79.1	283	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		66.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane		65.5	57.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		64.9	61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		65.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.1	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.1	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.1	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	66.6	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
50'	Residential	1	1	1

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Crane	No	16		80.6	50	0
Compressor (air)	No	40	80		50	0
Generator	No	50		80.6	50	0
Front End Loader	No	40		79.1	50	0
Front End Loader	No	40		79.1	50	0
Front End Loader	No	40		79.1	50	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane		80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)		80	76	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	81.7	85.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2021
Case Description: Trenching

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
North	Residential	1	1	1

Equipment

Description		Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator		No	40		80.7	50	0
Front End Loader		No	40		79.1	50	0

Results

		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator		80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	80.7	79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
East	Residential	1	1	1

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Excavator	No	40		80.7	50	0
Front End Loader	No	40		79.1	50	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator		80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	80.7	79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
South	Residential	1	1	1

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator		No	40		80.7	50	0
Front End Loader		No	40		79.1	50	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator		80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	80.7	79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
50'	Residential	1	1	1

Equipment

Description		Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator		No	40		80.7	50	0
Front End Loader		No	40		79.1	50	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator		80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	80.7	79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Alpine Park Project Construction Assumptions

Phase	Equipment	CalEEMod Equivalent	Quantity	Start Date	End Date	# of Workdays	Personnel Ave Daily	Worker Trips per day (In/Out)	Total Haul Trucks	Total Haul Truck Trips (In/Out)	Haul Truck Trips per day (In/Out)
Grubbing/Land Clearing	Crawler Tractors	Crawler Tractors	3	10/1/2022	10/15/2022	10	8	16			
Grubbing/Land Clearing	Excavators	Excavators	1	10/1/2022	10/15/2022	10					
Grading/Excavation	Crawler Tractors	Crawler Tractors	3	10/1/2022	5/31/2023	173	18	36	518	1,036	6
Grading/Excavation	Excavators	Excavators	1	10/1/2022	5/31/2023	173					
Grading/Excavation	Rollers	Rollers	1	10/1/2022	5/31/2023	173					
Grading/Excavation	Rubber Tired Loaders	Rubber Tired Loaders	1	10/1/2022	5/31/2023	173					
Grading/Excavation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	1	10/1/2022	5/31/2023	173					
Grading/Excavation	Wheel Tractor Scraper	Scrapers	2	10/1/2022	5/31/2023	173					
Drainage/Utilities/Subgrade	Air Compressors	Air Compressors	1	5/1/2023	8/31/2023	89	12	24			
Drainage/Utilities/Subgrade	Generator Sets	Generator Sets	1	5/1/2023	8/31/2023	89					
Drainage/Utilities/Subgrade	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	4	5/1/2023	8/31/2023	89					
Sewer Line Installation	Excavators	Excavators	1	10/1/2022	6/1/2023	174	6	12			
Sewer Line Installation	Rollers	Rollers	1	10/1/2022	6/1/2023	174					
Sewer Line Installation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	1	10/1/2022	6/1/2023	174					
Construction	Air Compressors	Air Compressors	1	6/1/2023	1/31/2024	175	16	32	328	656	4
Construction	Cranes	Cranes	1	6/1/2023	1/31/2024	175					
Construction	Forklifts	Forklifts	3	6/1/2023	1/31/2024	175					
Construction	Generator Sets	Generator Sets	1	6/1/2023	1/31/2024	175					
Construction	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	2	6/1/2023	1/31/2024	175					
Paving	Pavers	Pavers	1	11/30/2023	1/31/2024	45	6	12			
Paving	Paving Equipment	Paving Equipment	1	11/30/2023	1/31/2024	45					
Paving	Rollers	Rollers	1	11/30/2023	1/31/2024	45					
Architectural Coating	Air Compressors	Air Compressors	1	12/14/2023	1/31/2024	35	2	4			

This spreadsheet calculates traffic noise levels based on TNM Version 2.5 Lookup Tables.

**** Type in yellow cells only.**

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Traffic Data:

● **Enter ADT Traffic**

○ **Enter Loudest-hour Traffic**

Units:

○ **Metric**

● **English**

Calculate

Link	Roadway	Segment Location	Hard or Soft Ground (H or S)	BARRIER			Total Daily Traffic Volumes **(ADT)**	Traffic Mix		Vehicle Speed	Sound Levels at Receiver Locations			
				Present 1=yes	Height min. 7 ft. max. 32 ft.	Distance 35 ft. or 100 ft.		Number #	Description	mph max. 80	Distance feet, min. 33 max. 1000	dB Ldn	dB CNEL	dBA Leq1h (loudest hour)
1	**Existing south Grade Rd**	**west of Via Viejas**	S				4,042	4	Generic - Local (From Local/Lodi)	40	50	**60.8**	**61.2**	**59.1**
2	**Existing south Grade Rd**	**east of Via Viejas**	S				3,097	4	Generic - Local (From Local/Lodi)	40	50	**59.7**	**60.1**	**58.0**
3	**Existing+project south Grade Rd**	**west of Via Viejas**	S				4,282	4	Generic - Local (From Local/Lodi)	40	50	**61.1**	**61.5**	**59.4**
4	**Existing+project south Grade Rd**	**east of Via Viejas**	S				3,337	4	Generic - Local (From Local/Lodi)	40	50	**60.0**	**60.4**	**58.3**
5	**near-term south Grade Rd**	**west of Via Viejas**	S				4,130	4	Generic - Local (From Local/Lodi)	40	50	**60.9**	**61.3**	**59.2**
6	**near-term south Grade Rd**	**east of Via Viejas**	S				3,185	4	Generic - Local (From Local/Lodi)	40	50	**59.8**	**60.2**	**58.1**
7	**near-term+project south Grade Rd**	**west of Via Viejas**	S				4,370	4	Generic - Local (From Local/Lodi)	40	50	**61.1**	**61.6**	**59.5**
8	**near-term+project south Grade Rd**	**east of Via Viejas**	S				3,425	4	Generic - Local (From Local/Lodi)	40	50	**60.1**	**60.5**	**58.4**
9														
10														
11														
12														

Appendix H
Alpine Community Park VMT Analysis

TO: Mary Bilse, ICF

FROM: Jonathan Sanchez, PE, TE, PTOE; CR Associates

DATE: September 24, 2021

RE: Alpine Community Park – Vehicle Miles Traveled Analysis

The purpose of this memorandum is to document the results of the Vehicle Miles Traveled (VMT) Analysis conducted for the Alpine Community Park project (the "Proposed Project"). The analysis is based on the revised (2021) State of California Environmental Quality Act (CEQA) Guidelines Section 15064.3. Under Section 15064.3, VMT, which includes the amount and distance of automobile traffic attributable to a project, is identified as the "most appropriate measure of transportation impacts". This methodology is consistent with the guidance provided in the Technical Advisory on Evaluating Transportation Impacts in CEQA, December 2018, authored by the Governor's Office of Planning and Research (OPR).

Project Description

The Proposed Project will be located on the west side of South Grade Road, east of Tavern Road, and south of Alpine Boulevard, within the unincorporated community of Alpine, in San Diego County. The Proposed Project will construct 24 acres of community park including baseball fields, soccer fields, a skate park, equine staging area, corral, amphitheater, dog park, bike park, community garden, playground, shade structure, restrooms, picnic areas, RV Volunteer pad, and a parking lot. **Figures 1** and **2** illustrate the project's regional location and site plan, respectively, while **Figure 3** displays the location of other County Parks in relation to the proposed project.

Analysis Methodology

On September 15th, 2021, the San Diego County Board of Supervisors took action to rescind the currently adopted County of San Diego Transportation Study Guidelines (County TSG) for analyzing VMT as part of the discretionary and CEQA review process. Therefore, the VMT analysis for this project was conducted following the State's OPR guidance.

OPR's technical advisory suggests that lead agencies may screen out VMT using project size, location, transit availability, and provision of affordable housing. Many agencies use these screening thresholds to quickly identify when a project should be expected to cause a less-than-significant impact without conducting a detailed study, and these thresholds are identified below:

- Small Project – Projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than-significant transportation impact.
- Map-Based Screening for Residential and Office Projects – Residential and office projects located in areas with low VMT per capita, and that incorporate similar features (i.e., density, mix of uses, transit accessibility), will tend to exhibit similarly low VMT.
- Presumption of Less Than Significant Impact Near Transit Stations – Certain projects (including residential, retail, and office projects, as well as projects that are a mix of these uses) proposed within ½ mile of an existing major transit stop or an existing stop along a high-quality transit corridor will have a less-than-significant impact on VMT.

Alpine Community Park
VMT Analysis

Figure 1
Proposed Project Regional Location

SITE ELEMENT KEY

① MULTI-USE TRAIL
② ADMIN/RESTROOM
③ RESTROOM
④ SHADE PAVILION
⑤ SHADE SHELTER
⑥ SHADE SAIL
⑦ LEACH FIELD
⑧ SKATE PARK GATEWAY
⑨ COMMUNITY GARDEN
⑩ GARDEN STORAGE
⑪ NATURE PLAY AREA
⑫ 2-5 PLAY AREA
⑬ VOLUNTEER PAD
⑭ PICKLEBALL COURTS
⑮ BASKETBALL COURT
⑯ GAME TABLE PLAZA
⑰ PICNIC AREA
⑱ CORRAL
⑲ EQUESTRIAN STAGING
⑳ DROP-OFF/PICK-UP
㉑ BIKE PARK
㉒ SKATE PARK
㉓ BASEBALL FIELD
㉔ SOCCER FIELD OUTLINE
㉕ SECONDARY PARK ENTRANCE
㉖ PRIMARY PARK ENTRANCE
㉗ PARKING
㉘ DOG PARK
㉙ EXISTING TRAIL
㉚ EXISTING TREE/SHRUB
㉛ BERMED LANDSCAPE SCREEN
㉜ PARK MONUMENT SIGN
㉝ OPEN LAWN AREA
㉞ FITNESS STATIONS
㉟ ENGINEERED WOOD FIBER
㊱ TRASH ENCLOSURE
㊲ RETENTION BASIN
㊳ EXISTING LANDSCAPE/TERRAIN

PARKING SUMMARY

229	STANDARD SPACES
10	ADA SPACES
2	VOLUNTEER PAD SPACE
5	EQUESTRIAN STAGING SPACES
246	TOTAL SPACES

DPR DIRECTOR SIGNATURE/APPROVAL DATE

NORTH

Figure 2
Proposed Project Site Plan

Alpine Community Park

VMT Analysis

C+R

Figure 3

County Parks Relative to the Project Site

- Presumption of Less Than Significant Impact for Affordable Residential Development – Adding affordable housing to infill locations generally improves jobs-housing match in turn shortening commutes and reducing VMT per capita. In areas where existing jobs-housing match is closer to optimal, affordable housing nevertheless generates less VMT than market-rate housing. Therefore, a project consisting of a high percentage of affordable housing may be a basis for the lead agency to find a less-than-significant impact on VMT.

Based upon the criterion provided at above, the Proposed Project would not be screened out from conducting a VMT Analysis because of the following reasons:

- Project is anticipated to generate 480 ADT (more than 110 ADT);
- Project is not a residential nor office project in a VMT efficient area;
- Project is not located near a high-quality transit station; and
- Project is not an affordable residential development.

Transportation Impact Analysis

The Proposed Project will construct 24 acres of much-needed park space in a community where there currently is no other park space with the same amenities. The proposed park is a locally serving public facility that will serve the community of Alpine and surrounding communities. While a "local serving public facility" category is not included in OPR's Technical Advisory screening criteria, the technical advisory does state the following for local serving land uses, such as local serving retail:

> "Because new retail development typically redistributes shopping trips rather than creating new trips, estimating the total change in VMT (i.e., the difference in total VMT in the area affected with and without the project) is the best way to analyze a retail project's transportation impacts. By adding retail opportunities into the urban fabric and thereby improving retail destination proximity, local-serving retail development tends to shorten trips and reduce VMT. Thus, lead agencies generally may presume such development creates a less-than-significant transportation impact."

Similar to local serving retail, local serving public facilities would redistribute trips rather than creating new trips. Thus, trips are generally shortened as longer trips from a regional facility are redistributed to the local serving public facility.

Based on a GIS exercise as well as aerial imagery, the nearest parks to the residents of Alpine and surrounding communities with comparable amenities are Flinn Springs County Park and Pine Valley County Park (See Figure 3), located approximately 8.2 miles (driving distance – one way) and 15.1 miles (driving distance – one way) away from the community of Alpine.

Therefore, with the construction of the Proposed Project, trips made by Alpine residents associated with parks would be largely internalized within the community of Alpine, hence, shortening trips and reducing their VMT per capita. Reduction in VMT per capita helps the County of San Diego to achieve its long-term climate goals of reducing GHG emissions.

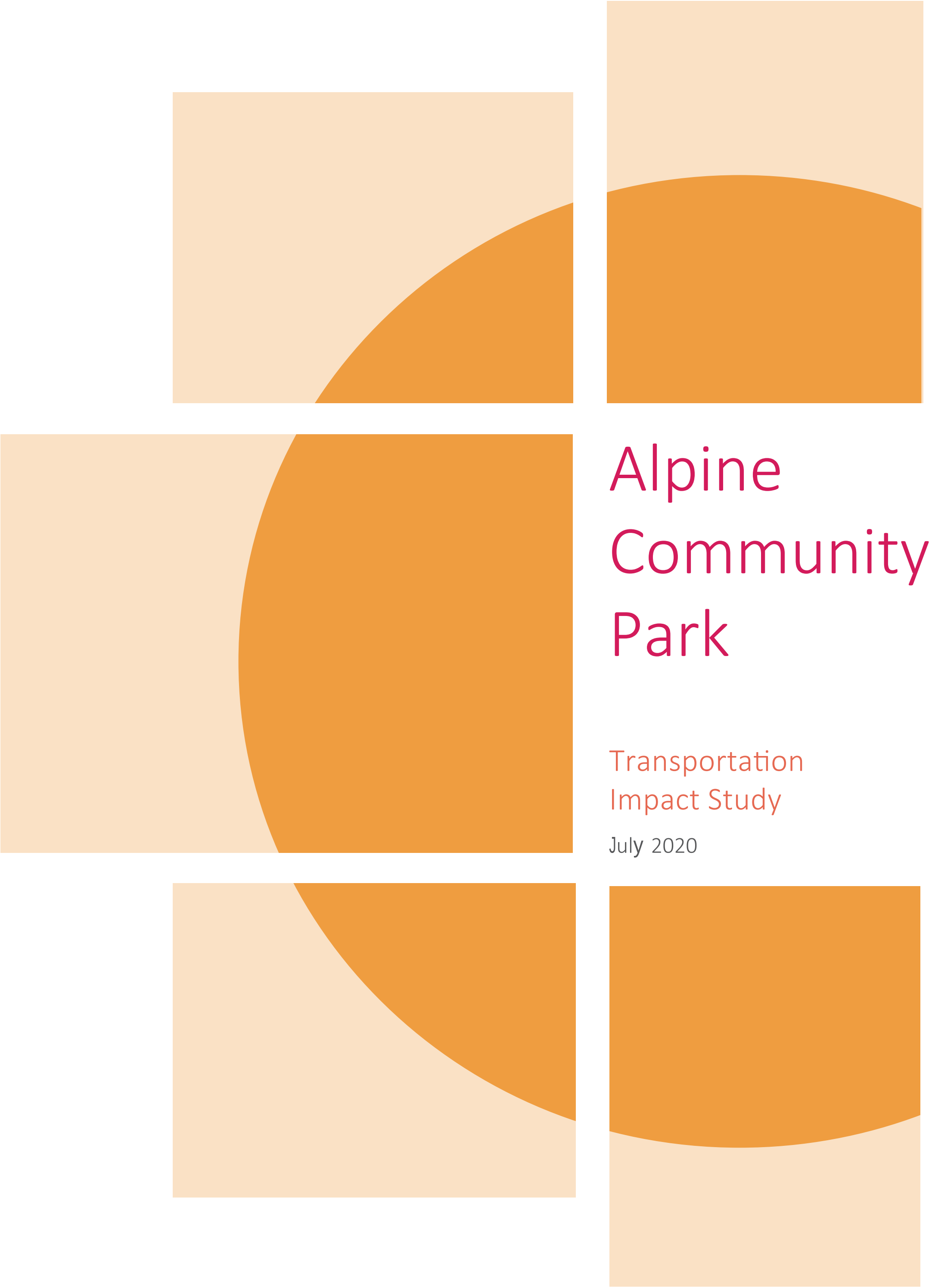
Finally, according to Section 15064.3 "Determining the Significance of Transportation Impacts" of the 2021 CEQA Statute & Guidelines, projects that decrease VMT in the project area compared to existing conditions should be presumed to have a less than significant transportation impact.

Conclusion

Based on the analysis results documented above, the Proposed Project is presumed to have a less than significant VMT impact, and no additional analysis would be required.

Appendix I

Alpine Community Park Transportation Impact Study



Alpine Community Park

Transportation Impact Study

July 2020

Prepared for

ICF
525 B Street, Suite 1700
San Diego, CA 92101

Prepared by

CHEN RYAN

3900 Fifth Avenue, Suite 310
San Diego, CA 92103

ES.1 Project Setting

The Proposed Project will be located on the west side of South Grade Road, east of Tavern Road, and south of Alpine Boulevard, within the unincorporated community of Alpine, in San Diego County. The Proposed Project will construct 24 acres of regional park space including baseball fields, soccer fields, a skate park, equine staging area, corral, amphitheater, dog park, bike park, community garden, playground, shade structure, restrooms, picnic areas, RV Volunteer pad, and a parking lot.

Trip generation rates for the Proposed Project were derived from the SANDAG's (not so) Brief Guide to Vehicular Traffic Generation Rates for the San Diego Region (April 2002). Trip generation calculations are provided in Chapter 3. The Proposed Project would generate a total of 480 daily trips, including 20 trips (10-in / 10-out) during the AM peak hour and 39 trips (20-in / 19-out) during the PM peak hour.

Project access will be provided via two driveways located along South Grade Road. The first driveway will be located on the eastern side of the property as a new intersection leg of the South Grade Road and Calle de Compadres intersection and it will operate as an all-way stop-controlled intersection. The second driveway will be a new intersection located at the southern end of the property and it will operate as a side-street stop-controlled intersection. Both driveways will allow for full access.

The following two (2) roadway segments and five (5) intersections were analyzed in the study:

Roadway Segments

- South Grade Road, between Alpine Boulevard and Via Viejas
- South Grade Road, between Via Viejas and Tavern Road

After implementation of the Proposed Project, the roadway segment of South Grade Road, between Alpine Boulevard and Tavern Road will be divided as follows:

- South Grade Road, between Alpine Boulevard and Project Driveway #1 / Calle de Compadres
- South Grade Road, between Project Driveway #1 / Calle de Compadres and Via Viejas
- South Grade Road, between Via Viejas and Project Driveway #2
- South Grade Road, between Project Driveway #2 and Tavern Road

Intersections

1. East Victoria Road / South Grade Road & Alpine Boulevard (Signal)
2. South Grade Road & Project Driveway #1 / Calle De Compadres (SSSC)
3. South Grade Road & Via Viejas (SSSC)
4. Tavern Road & South Grade Road (AWSC)
5. Project Driveway #2 & South Grade Road (SSSC)[1]

[1] Project driveway does not exist under Existing conditions; therefore, it is only analyzed under "With Project" scenarios.

Freeway mainline segments were not analyzed since the Proposed Project is not anticipated to add more than 50 peak hour trips, in either direction, to a freeway mainline segment.

ES.2 Significant Impacts to Roadway Network and Mitigation Measures

The Proposed Project will not have a significant impact on any of the study roadway segments and intersections under each of the studied scenarios.

Existing Conditions

Roadway Segment Analysis

All roadway segments within the project study area currently operate at acceptable LOS B under Existing Conditions.

All roadway segments are also projected to operate at LOS C or better with the addition of Proposed Project traffic.

Based on the County of San Diego significance criteria outlined in Section 2.5 of this report, since the traffic associated with the Proposed Project would not cause a Circulation Element Road to operate at LOS E or F, the Proposed Project would not be associated with a significant impact to these roadway segments.

Intersection Analysis

All intersections within the project study area currently operate at acceptable LOS B during both the AM and PM peak hours.

All intersections are also projected to operate at LOS B or better during both the AM and PM peak hours with the addition of Proposed Project traffic.

Based on the County of San Diego significance criteria outlined in Section 2.5 of this report, the traffic associated with the Proposed Project would not add more than five peak hour trips to the critical movement of an unsignalized intersection and/or add more than one second of delay to a signalized intersection operating at a substandard level under Near-Term Year 2023 Base with Project conditions. Therefore, no significant project related impacts were identified, and no mitigation is required.

Near-Term Year 2023 Base Conditions

Roadway Segment Analysis

All roadway segments within the project study area would operate at acceptable LOS C or better under Near-Term Year 2023 Base Conditions.

All roadway segments are also projected to operate at LOS C or better with the addition of Proposed Project traffic.

Based on the County of San Diego significance criteria outlined in Section 2.5 of this report, since the traffic associated with the Proposed Project would not cause a Circulation Element Road to operate at LOS E or F, the Proposed Project would not be associated with a significant impact to these roadway segments.

Intersection Analysis

All intersections within the project study area would operate at acceptable LOS B during both the AM and PM peak hours under Near-Term Year 2023 Base conditions.

All intersections are also projected to operate at LOS B or better during both the AM and PM peak hours with the addition of Proposed Project traffic.

Based on the County of San Diego significance criteria outlined in Section 2.5 of this report, the traffic associated with the Proposed Project would not add more than five peak hour trips to the critical movement of an unsignalized intersection and/or add more than one second of delay to a signalized intersection operating at a substandard level under Near-Term Year 2023 Base with Project conditions. Therefore, no significant project related impacts were identified, and no mitigation is required.

ES.3 Site Access

The Proposed Project will be located north of South Grade Road, east of Tavern Road, and south of Alpine Boulevard, within the unincorporated community of Alpine, in San Diego County. Project access will be provided via the following two (2) driveways:

- South Grade Road & Project Driveway #1 / Calle de Compadres – This driveway would be a new leg of the South Grade Road / Calle Compadres intersection (opposing Calle de Compadres). It is located at the northern end of the property and would allow for full access. This would be an unsignalized all-way stop-controlled intersection. This driveway would include one inbound lane and one outbound lane.

  It is important to note that under Existing conditions this intersection is a three-legged T-intersection functioning as side-street stop-controlled with South Grade Road being uncontrolled and Calle De Compadres being stop-controlled. Thus, all-way stop-controlled intersection guidelines and options were considered to determine if the peak hour volumes at the intersection justified the installation of stop signs at the intersection for all directions of traffic. According to Caltrans California Manual on Uniform Traffic Control Devices (MUTCD) (2014), the intersection does not meet the minimum peak hour volumes for an all-way stop-controlled intersection. However, due to a number of pedestrian collisions occurring in the vicinity of this intersection, and since the project driveway at this intersection is considered an important and integral safety design feature of the Proposed Project, it is suggested that this intersection to be converted to an all-way stop-controlled intersection with implementation of the Alpine Community Park. All-way stop-controls would provide for an enhanced pedestrian safety route from the residential neighborhood on the east side of South Grade Road to the park as well as reduce the potential severity conflict between pedestrians and motorists.

- Project Driveway #2 & South Grade Road – This driveway would be a new intersection located on the southern end of the property and would allow for full-access. This is an unsignalized, side street stop-controlled intersection, with South Grade Road as uncontrolled and Project Driveway #2 being stop-controlled. This driveway would include one inbound lane and one outbound lane.

All project driveways are projected to operate at LOS A during both the AM and PM peak hours with the addition of Proposed Project traffic.

Table of Contents

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Appendices

1.0 Introduction

The purpose of this Transportation Impact Study (TIS) is to identify and document potential transportation related impacts associated with the Alpine Community Park Project (Proposed Project), as well as to recommend mitigation measures, as necessary, for any identified impacts to roadway segments, intersections, and freeway on-ramps associated with the Proposed Project.

1.1 Project Background

The Proposed Project will be located on the west side of South Grade Road, east of Tavern Road, and south of Alpine Boulevard, within the unincorporated community of Alpine, in San Diego County. The Proposed Project will construct 24 acres of regional park uses including baseball fields, soccer fields, a skate park, equine staging area, corral, amphitheater, dog park, bike park, community garden, playground, shade structure, restrooms, picnic areas, RV Volunteer pad, and a parking lot. **Table 1.1** provides more detailed information about the proposed amenities. **Figure 1.1** displays the Proposed Project regional location.

Proposed Project access will be provided via two driveways located along South Grade Road. The first driveway will be located on the eastern side of the property as a new leg of the South Grade Road and Calle de Compadres intersection and will operate as an all-way stop-controlled intersection. The second driveway will be a new intersection located at the southern end of the property and it will operate as a new side-street stop-controlled intersection. Both driveways will allow for full access.

Table 1.1 Project Amenities

Amenity	Count	Size
Baseball Field	1	90,000 sf
Basketball Courts	2	5,000 sf
Bike Skills Park	1	20,000 sf
Community Garden	1	5,000 sf
Concession Building	1	1,500 sf
Equestrian Staging Area	1	20,000 sf
Dog Park	1	2.5 acres
Multi-use trails	TBD	TBD
Open Lawn Area	TBD	TBD
Parking Lot	1	215,000 sf
Playground	2	(1) Playground 2-5 = 13,000 sf (1) Playground 5-12 = 21,000 sf
Ranger Office/Restroom	1	2,000 sf
Restroom	2	1,000 sf
RV Host Site	1	1,200 sf
Shaded Picnic Area	TBD	1,000 sf
Skate Park	1	20,000 sf
Soccer/Multi-use Field	4	(2) U12 - 49,500 sf (165x300) (2) U8 - 21,600 sf (120x180)
Softball Field	2	45,000 sf
Tennis Court	2	7,200 sf

1.2 Report Organization

Following this introduction chapter, this report is organized into the following sections:

2.0 Analysis Methodology – This chapter describes the methodologies and standards utilized to analyze the intersection traffic conditions.

3.0 Project Description – This chapter describes the Proposed Project including project trip generation, trip distribution, trip assignment, and study area.

4.0 Existing Conditions – This chapter describes the existing traffic network within the study area and provides analysis results for existing traffic conditions and existing traffic conditions with the addition of the Proposed Project. Mitigation measures, if necessary, for project related impacts are also identified.

5.0 Near-Term Traffic Conditions – This chapter describes near-term developments anticipated to generate additional study area trips by year 2023, the Proposed Project's opening year. Analysis results are provided for the No-Project (Year 2023 Base) and Year 2023 Base with Project conditions, along with recommended mitigation measures, if necessary.

6.0 Site Access, On-Site Circulation, Parking, and Queuing – This chapter addresses access and internal circulation within the project site, parking provided, and driveway queuing.

7.0 Pedestrian, Bicycle, and Transit Assessment – This chapter discusses the Proposed Project site's alternative transportation modes (walking, bicycling, and transit).

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Figure 1.1
Proposed Project Regional Location

2.0 Analysis Methodology

This TIS was performed in accordance with the requirements of the County of San Diego Traffic Study Guidelines and in conformance with the enhanced California Environmental Quality Act (CEQA) project review process. Detailed information on roadway and intersection analysis methodologies, standards, and thresholds are discussed in the following sections.

2.1 Level of Service Definition

Level of Service (LOS) is a quantitative measure describing operational conditions within a traffic stream, and the motorist's and/or passengers' perception of operations. A LOS definition generally describes these conditions in terms of such factors as delay, speed, travel time, freedom to maneuver, interruptions in traffic flow, queuing, comfort, and convenience. **Table 2.1** describes generalized definitions of the various LOS categories (A through F) as applied to roadway operations.

Table 2.1 Level of Service Definitions

LOS Category	Definition of Operation
A	This LOS represents a completely free-flow condition, where the operation of vehicles is virtually unaffected by the presence of other vehicles and only constrained by the geometric features of the highway and by driver preferences.
B	This LOS represents a relatively free-flow condition, although the presence of other vehicles becomes noticeable. Average travel speeds are the same as in LOS A, but drivers have slightly less freedom to maneuver.
C	At this LOS the influence of traffic density on operations becomes marked. The ability to maneuver within the traffic stream is clearly affected by other vehicles.
D	At this LOS, the ability to maneuver is notably restricted due to traffic congestion, and only minor disruptions can be absorbed without extensive queues forming and the service deteriorating.
E	This LOS represents operations at or near capacity. LOS E is an unstable level, with vehicles operating with minimum spacing for maintaining uniform flow. At LOS E, disruptions cannot be dissipated readily thus causing deterioration down to LOS F.
F	At this LOS, forced or breakdown of traffic flow occurs, although operations appear to be at capacity, queues form behind these breakdowns. Operations within queues are highly unstable, with vehicles experiencing brief periods of movement followed by stoppages.

Source: Highway Capacity Manual 6th Edition

2.2 Roadway Segment Level of Service Standards and Thresholds

Roadway segment LOS standards and thresholds provide the basis for analysis of arterial roadway segment performance. The analysis of roadway segment LOS is based on the functional classification of the roadway, the maximum capacity, roadway geometrics, and existing or forecast Average Daily Traffic (ADT) volumes. **Table 2.2** presents the roadway segment capacity and LOS standards utilized to analyze roadways evaluated in this report. The actual capacity of a roadway facility varies according to its physical attributes. LOS D is considered acceptable within the County of San Diego. Typically, the performance and level of service of a roadway segment is heavily influenced by the ability of the arterial intersections to accommodate peak hour volumes.

Table 2.2 County of San Diego – Roadway Classifications and LOS Standards

No.	Travel Lanes	Design Speed	Road Classification	Level of Service (in ADT)		
				LOS C	LOS D	LOS E
6.1	6	65 mph	Expressway	70,000	**86,000**	108,000
6.2			Prime Arterial	44,600	**50,000**	57,000
4.1A	4	55 mph	Major Road with Raised Median	29,600	**33,400**	37,000
4.1B			Major Road with Intermittent Turn Lanes	27,400	**30,800**	34,200
4.2A		40 mph	Boulevard with Raised Median	24,000	**27,000**	30,000
4.2B			Boulevard with Intermittent Turn Lane	22,500	**25,000**	28,000
2.1A	2	45 mph	Community Collector with Raised Median	13,400	**15,000**	19,000
2.1B			Community Collector w/ Continuous Turn Lane	9,500	**13,500**	19,000
2.1C			Community Collector w/ Intermittent Turn Lane	9,500	**13,500**	19,000
2.1D			Community Collector with Improvement Options	9,500	**13500**	19,000
2.1E			Community Collector	7,100	**10,900**	16,200
2.2A	2	40 mph	Light Collector with Raised Median	9,500	**13,500**	19,000
2.2B			Light Collector with Continuous Turn Lane	9,500	**13,500**	19,000
2.2C			Light Collector with Intermittent Turn Lanes	9,500	**13,500**	19,000
2.2D			Light Collector with Improvement Options	9,500	**13,500**	19,000
2.2E			Light Collector	7,100	**10,900**	16,200
2.2F			Light Collector with Reduced Shoulder	7,800	**8,700**	9,700
2.3A	2	35 mph	Minor Collector with Raised Median	7,000	**8,000**	9,000
2.3B			Minor Collector with Intermittent Turn Lane	7,000	**8,000**	9,000
2.3C			Minor Collector	6,000	**7,000**	8,000

Source: County of San Diego, August 2011

Notes:
Bold numbers indicate the ADT thresholds for acceptable LOS.

These standards are generally used as long-range planning guidelines to determine the functional classification of roadways. The actual capacity of a roadway varies according to its physical attributes. Typically, the performance and LOS of a roadway segment is heavily influenced by the ability of its intersections to accommodate peak hour traffic volumes. For the purposes of this traffic analysis, LOS D is considered acceptable for circulation element roadway segments.

2.3 Peak Hour Intersection Level of Service Standards and Thresholds

This section presents the methodologies used to perform peak hour intersection capacity analysis for signalized intersections and unsignalized intersections. The following assumptions were utilized in conducting all intersection level of service analysis:

- Peak Hour Factor: Based on existing peak hour counts and applied to existing and near-term conditions.
- Signal Timing: Based on existing signal timing plans (as of April 2020), provided in **Appendix A**.

2.3.1 Signalized Intersection Analysis

The analysis of signalized intersections utilized the operational analysis procedure as outlined in the Highway Capacity Manual (HCM) 6th Edition signalized intersection analysis methodology. This method defines LOS in terms of delay, or more specifically, average stopped delay per vehicle. Delay is a measure of driver and/or passenger discomfort, frustration, fuel consumption and lost travel time. This technique uses 1,900 vehicles per hour per lane (VPHPL) as the maximum saturation volume of an intersection. This saturation volume is adjusted to account for lane width, on-street parking, pedestrians, traffic composition (i.e., percentage trucks) and shared lane movements (i.e. through and right-turn movements originating from the same lane). The LOS criteria used for the analysis of signalized intersections are described in **Table 2.3**, identifying the thresholds of control delays and the associated LOS. The computerized analysis of intersection operations was performed utilizing the Synchro Version 10 traffic analysis software by Trafficware Ltd.

Table 2.3 Signalized Intersection LOS Operational Analysis

Average Stopped Delay Per Vehicle	Level of Service (LOS) Characteristics
<u><</u>10	LOS A describes operations with very low delay. This occurs when progression is extremely favorable, and most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
>10 – 20	LOS B describes operations with generally good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
>20 – 35	LOS C describes operations with higher delays, which may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
>35 – 55	LOS D describes operations with high delay, resulting from some combination of unfavorable progression, long cycle lengths, or high volumes. The influence of congestion becomes more noticeable, and individual cycle failures are noticeable.
>55 – 80	LOS E is considered the limit of acceptable delay. Individual cycle failures are frequent occurrences.
>80	LOS F describes a condition of excessively high delay, considered unacceptable to most drivers. This condition often occurs when arrival flow rates exceed the LOS D capacity of the intersection. Poor progression and long cycle lengths may also be major contributing causes to such delay.

Source: Highway Capacity Manual 6th Edition

2.3.2 Unsignalized Intersection Analysis

Unsignalized intersections, including side street and all way stop controlled intersections, were analyzed using the Highway Capacity Manual 6th Edition unsignalized intersection analysis methodology. The Synchro Version 10 traffic analysis software supports this methodology and was utilized to produce LOS results. The LOS for a side street stop controlled (SSSC) intersection is determined by the computed control delay and is defined for each minor movement. **Table 2.4** summarizes the LOS criteria for unsignalized intersections.

Table 2.4 LOS Criteria for Stop-Controlled Unsignalized Intersections

Average Stopped Delay Per Vehicle (sec/veh)	LOS
<10	A
>10 to <15	B
>15 to <25	C
>25 to <35	D
>35 to <50	E
>50	F

Source: Highway Capacity Manual 6th Edition

2.4 Determination of Study Area

County Guidelines require that the project study area includes all County Mobility Element roadways and intersections where the Proposed Project is projected to add 200 or more ADT and/or 25 or more peak hour trips.

2.5 Determination of Significant Impacts

This section outlines the thresholds for determination of significant project-related impacts on study area facilities.

2.5.1 Roadway Segments

Traffic volume increases from public or private projects that result in one or more of the following criteria will have a significant traffic volume of Level of Service traffic impact on a roadway segment, unless specific facts show that there are other circumstances that mitigate or avoid such impacts:

- The additional or redistributed ADT generated by the Proposed Project will significantly increase congestion on a Circulation Element Road or State Highway currently operating at LOS E or LOS F as identified in **Table 2.5**, or will cause a Circulation Element Road or State Highway to operate at LOS E or LOS F as a result of the Proposed Project, or

- The additional or redistributed ADT generated by the Proposed Project will cause a residential street to exceed its design capacity.

Table 2.5 Measures of Significant Project Impacts to Congestion on Roadway Segments – Allowable Increases on Congested Roadway Segments

Level of Service	Two-Lane Road	Four-Lane Road	Six-Lane Road
LOS E	200 ADT	400 ADT	600 ADT
LOS F	100 ADT	200 ADT	300 ADT

Source: County of San Diego, August 2011

Notes:

1. By adding Proposed Project trips to all other trips from a list of projects, this same table must be used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project is responsible for mitigating its share of the cumulative impact.
2. The County may also determine impacts have occurred on roads even when a project’s traffic or cumulative impacts do not trigger an unacceptable Level of Service, when such traffic uses a significant amount of remaining road capacity.

2.5.2 Signalized Intersections

Table 2.6 displays the measures of significant project impacts to congestion at signalized intersections.

Table 2.6 Measures of Significant Project Impacts to Congestion at Intersections – Allowable Increases at Congested Intersections

Level of Service	Signalized	Unsignalized
LOS E	Delay of 2 seconds	20 peak hour trips on a critical movement
LOS F	Delay of 1 second, or 5 peak hour trips on a critical movement	5 peak hour trips on a critical movement

Source: County of San Diego, August 2011

Notes:

1. A critical movement is an intersection movement (right turn, left turn, and through-movement) that experiences excessive queues, which typically operate at LOS F. Additionally, if a project adds significant volume to a minor roadway approach, a gap study should be provided that details the headways between vehicles on the major roadway.
2. By adding Proposed Project trips to all other trips from a list of projects, these same tables are used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project is responsible for mitigating its share of the cumulative impact.
3. The County may also determine impacts have occurred on roads even when a project's direct or cumulative impacts do not trigger an unacceptable level of service, when such traffic uses a significant amount of remaining road capacity.
4. For determining significance at signalized intersections with LOS F conditions, the analysis must evaluate both the delay and the number of trips on a critical movement, exceedance of either criteria result in a significant impact.

2.5.3 Unsignalized Intersections

Traffic volume increases from public or private projects that result in one or more of the following criteria will have a significant traffic volume or Level of Service traffic impact on a roadway segment:

- The additional or redistributed ADT generated by the Proposed Project will add 20 or more peak hour trips to a critical movement of an unsignalized intersection, and cause the unsignalized intersection to operate below LOS D, or

- The additional or redistributed ADT generated by the Proposed Project will add 20 or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS E, or

- The additional or redistributed ADT generated by the Proposed Project will add 5 or more peak hour trips to a critical movement of an unsignalized intersection, and cause the unsignalized intersection to operate at LOS F.

- The additional or redistributed ADT generated by the Proposed Project will add 5 or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS F.

- Based upon an evaluation of existing accident rates, the signal priority list, intersection geometrics, proximity of adjacent driveways, sight distance or other factors, the project would significantly impact the operations of the intersection.

3.0 Project Traffic

This section describes the Proposed Project including the project's trip generation, trip distribution, and trip assignment.

3.1 Project Description

The Proposed Project will be located on the west side of South Grade Road, east of Tavern Road, and south of Alpine Boulevard, within the unincorporated community of Alpine, in San Diego County. The Proposed Project will construct 24 acres of regional park use including baseball fields, soccer fields, a skate park, equine staging area, corral, amphitheater, dog park, bike park, community garden, playground, shade structure, restrooms, picnic areas, RV Volunteer pad, and a parking lot. **Figure 3.1** illustrates the Proposed Project site plan.

3.2 Project Trip Generation, Distribution, and Assignment

3.2.1 Project Trip Generation

Trip generation rates for the Proposed Project were derived from the SANDAG's (not so) Brief Guide to Vehicular Traffic Generation Rates for the San Diego Region (April 2002). The project site is currently inactive open space; therefore, no existing trips were credited towards the project's net vehicle trip generation.

Table 3.1 displays the projected daily, as well as AM and PM peak hour, project trip generation.

Table 3.1 Project Trip Generation

Land Use	Units	Trip Rate	ADT	AM Peak Hour					PM Peak Hour				
				%	Trips	Split	In	Out	%	Trips	Split	In	Out
Regional Park (developed)	24 acres	20 / acre	480	4%	20	5:5	10	10	8%	39	5:5	20	19

Source: SANDAG (not so) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region, April 2002

As shown in Table 3.1, the Proposed Project would generate a total of 480 daily trips, including 20 trips (10-in / 10-out) during the AM peak hour and 39 trips (20-in / 19-out) during the PM peak hour.

3.2.2 Project Trip Distribution

In accordance to County of San Diego guidelines, since the Proposed Project is estimated to generate 480 daily trips, the project trip distribution was manually developed based upon project land uses, location, proximity to freeway access points, and corresponding land uses in the vicinity of the project site. **Figure 3.2** displays the trip distribution patterns associated with the Proposed Project.

3.2.3 Project Trip Assignment

Based upon the project trip generation and distribution, AM/PM peak hour project trips were assigned to the adjacent roadway network, as displayed in **Figure 3.3**.

SITE ELEMENT KEY

① MULTI-USE TRAIL
② ADMIN/RESTROOM
③ RESTROOM
④ SHADE PAVILION
⑤ SHADE SHELTER
⑥ SHADE SAIL
⑦ LEACH FIELD
⑧ SKATE PARK GATEWAY
⑨ COMMUNITY GARDEN
⑩ GARDEN STORAGE
⑪ NATURE PLAY AREA
⑫ 2-5 PLAY AREA
⑬ VOLUNTEER PAD
⑭ PICKLEBALL COURTS
⑮ BASKETBALL COURT
⑯ GAME TABLE PLAZA
⑰ PICNIC AREA
⑱ CORRAL
⑲ EQUESTRIAN STAGING
⑳ DROP-OFF/PICK-UP
㉑ BIKE PARK
㉒ SKATE PARK
㉓ BASEBALL FIELD
㉔ SOCCER FIELD OUTLINE
㉕ SECONDARY PARK ENTRANCE
㉖ PRIMARY PARK ENTRANCE
㉗ PARKING
㉘ DOG PARK
㉙ EXISTING TRAIL
㉚ EXISTING TREE/SHRUB
㉛ BERMED LANDSCAPE SCREEN
㉜ PARK MONUMENT SIGN
㉝ OPEN LAWN AREA
㉞ FITNESS STATIONS
㉟ ENGINEERED WOOD FIBER
㊱ TRASH ENCLOSURE
㊲ RETENTION BASIN
㊳ EXISTING LANDSCAPE/TERRAIN

PARKING SUMMARY

229	STANDARD SPACES
10	ADA SPACES
2	VOLUNTEER PAD SPACE
5	EQUESTRIAN STAGING SPACES
246	TOTAL SPACES

DPR DIRECTOR SIGNATURE/APPROVAL DATE

NORTH

Figure 3.1
Proposed Project Site Plan

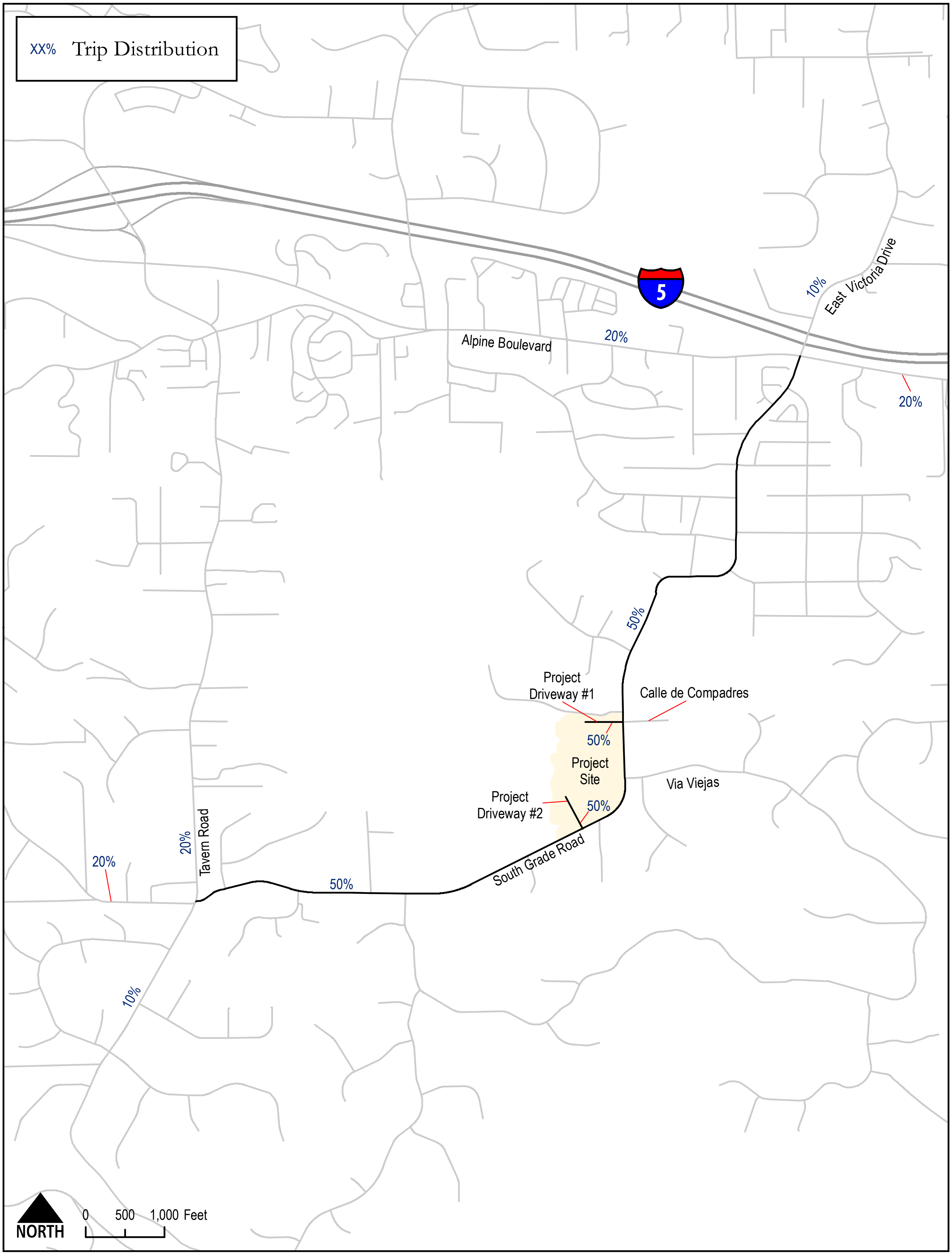

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Figure 3.2
Project Trip Distribution

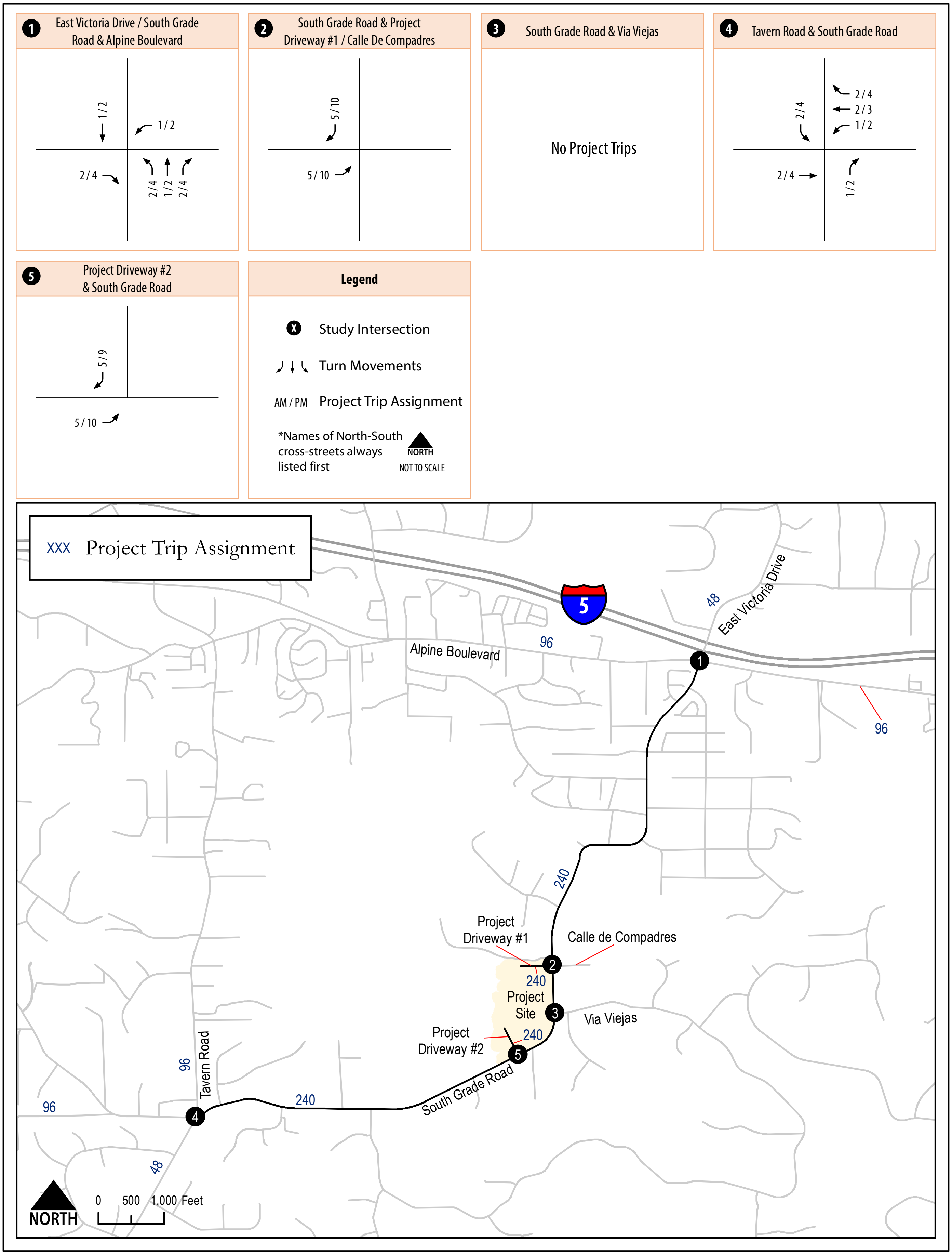

Figure 3.3
Project Trip Assignment

3.3 Project Study Area

Based on the criteria previously outlines in Section 2.5 and the project trips assignment shown in Figure 3.3, the following two (2) roadway segments and five (5) intersections were analyzed in the study:

Roadway Segments

- South Grade Road, between Alpine Boulevard and Via Viejas
- South Grade Road, between Via Viejas and Tavern Road

After implementation of the proposed project, the roadway segment of South Grade Road, between Alpine Boulevard and Tavern Road will be divided as follows:

- South Grade Road, between Alpine Boulevard and Project Driveway #1 / Calle de Compadres
- South Grade Road, between Project Driveway #1 / Calle de Compadres and Via Viejas
- South Grade Road, between Via Viejas and Project Driveway #2
- South Grade Road, between Project Driveway #2 and Tavern Road

Intersections

1. East Victoria Road / South Grade Road & Alpine Boulevard (Signal)
2. South Grade Road & Project Driveway #1 / Calle De Compadres (SSSC)
3. South Grade Road & Via Viejas (SSSC)
4. Tavern Road & South Grade Road (AWSC)
5. Project Driveway #2 & South Grade Road (SSSC) [1]

[1] Project driveway does not exist under Existing conditions; therefore, it is only analyzed under "With Project" scenarios.

Additionally, the Proposed Project would not contribute 50 or more peak hour trips in either direction on Interstate 8 (I-8). Similarly, the Proposed Project would not add 20 or more peak hour trips to I-8 on/off ramps. Therefore, freeway and ramp impact analyses were not conducted. **Figure 3.4** illustrates the project study area.

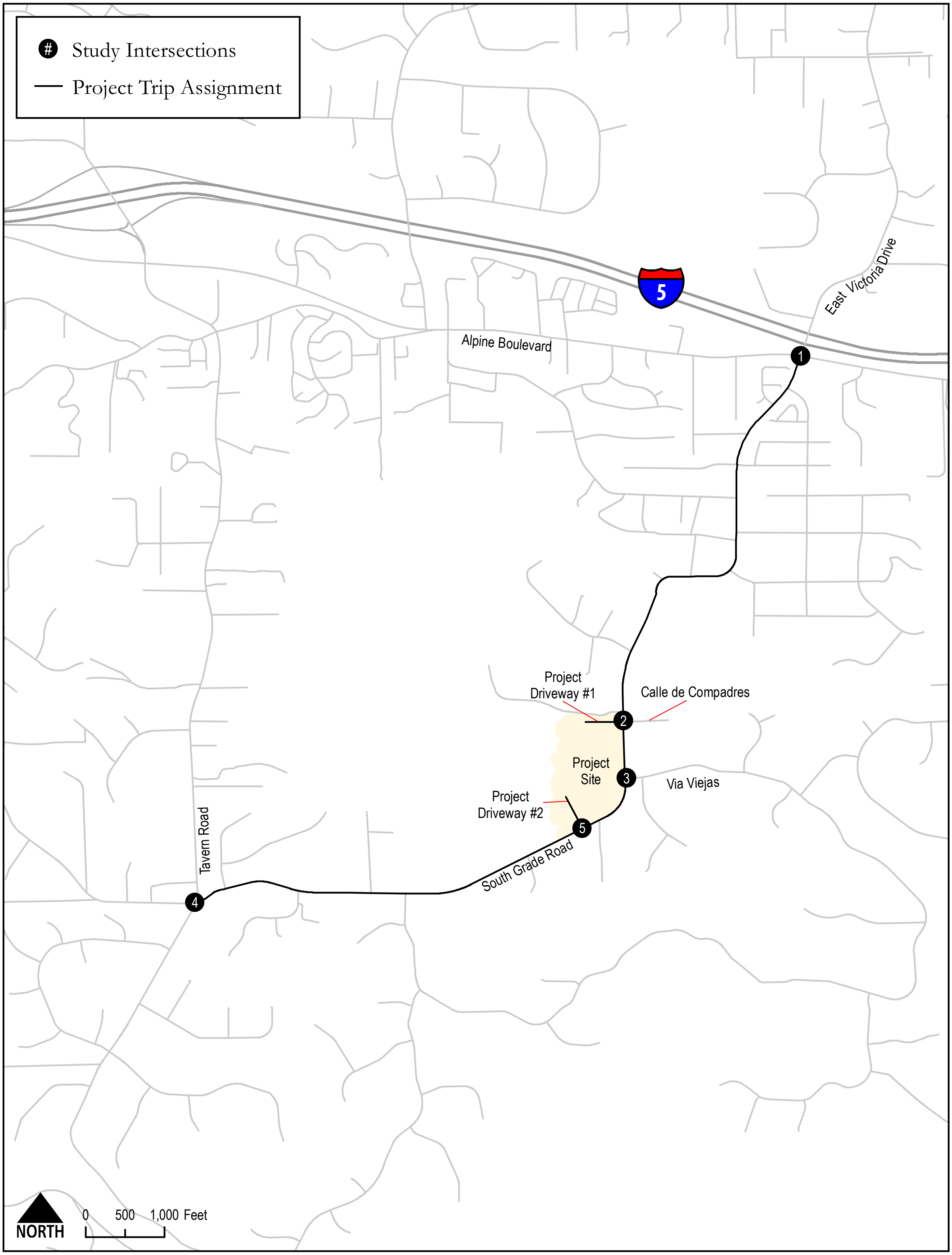

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Figure 3.4
Project Study Area

4.0 Existing Conditions

This section describes key study roadway segments, key study intersections, and daily roadway and peak hour intersection traffic volume information. Additionally, this section provides an analysis of Existing conditions both with and without the addition of project traffic. The scenarios analyzed in this section include:

- Existing
- Existing with Project

4.1 Existing Roadway Network

The following regional and locally significant roadway traverses the study area. The roadway characteristics are described below.

South Grade Road – Within the project study area, South Grade Road is a two-lane undivided roadway between Alpine Boulevard and Tavern Road with a posted speed limit of 40 miles per hour. Sidewalk facilities are intermittently present along both sides of the roadway. Additionally, there are no bicycle facilities along the roadway and parking is prohibited along both sides of the roadway. According to the County of San Diego General Plan Update, South Grade Road is classified as a Two-Lane Light Collector Roadway.

Table 4.1 provides a summary of the roadway characteristics for roadway that traverse the study area.

Table 4.1 Existing Roadway Characteristics

Roadway	From	To	Number of Lanes	Median Type	Sidewalk?	Bike lanes?	Transit Route	Posted Speed Limit
South Grade Road	Alpine Boulevard	Tavern Road	1 NB / 1 SB	None	Mostly Non-contiguous	None	None	40

As documented in Section 3.3, four intersections are included as part of the study area. **Figure 4.1** displays the existing functional classifications and intersection geometrics for the study area roadways and intersections.

4.2 Existing Roadway and Intersection Volumes

Traffic counts for roadway segments and intersections were conducted in March 2020 (prior to the shelter-in-place order associated with COVID-19) and June 2020 (during the shelter-in-place order) by Elite Traffic Dynamics, LLC. Traffic counts conducted in June reflected a decrease of at least 10% when compared to counts from March. Therefore, counts from June were adjusted to reflect normal conditions. Roadway segment counts from March were compared to those from June, and the average percent difference between both traffic counts was utilized to adjust counts from June.

Figure 4.2 shows both existing daily traffic volumes for study area roadway segments and the AM/PM peak hour turning movements for the study intersections. Traffic counts, including the adjusted traffic counts, are provided in **Appendix B**.

4.3 Existing Traffic Conditions

LOS analyses under Existing conditions were conducted using the methodologies described in Chapter 2.0. Roadway segment and intersection LOS analysis results are discussed below.

4.3.1 Roadway Segment Analysis

Table 4.2 displays roadway segment LOS and analysis results for key study roadway segments under Existing conditions.

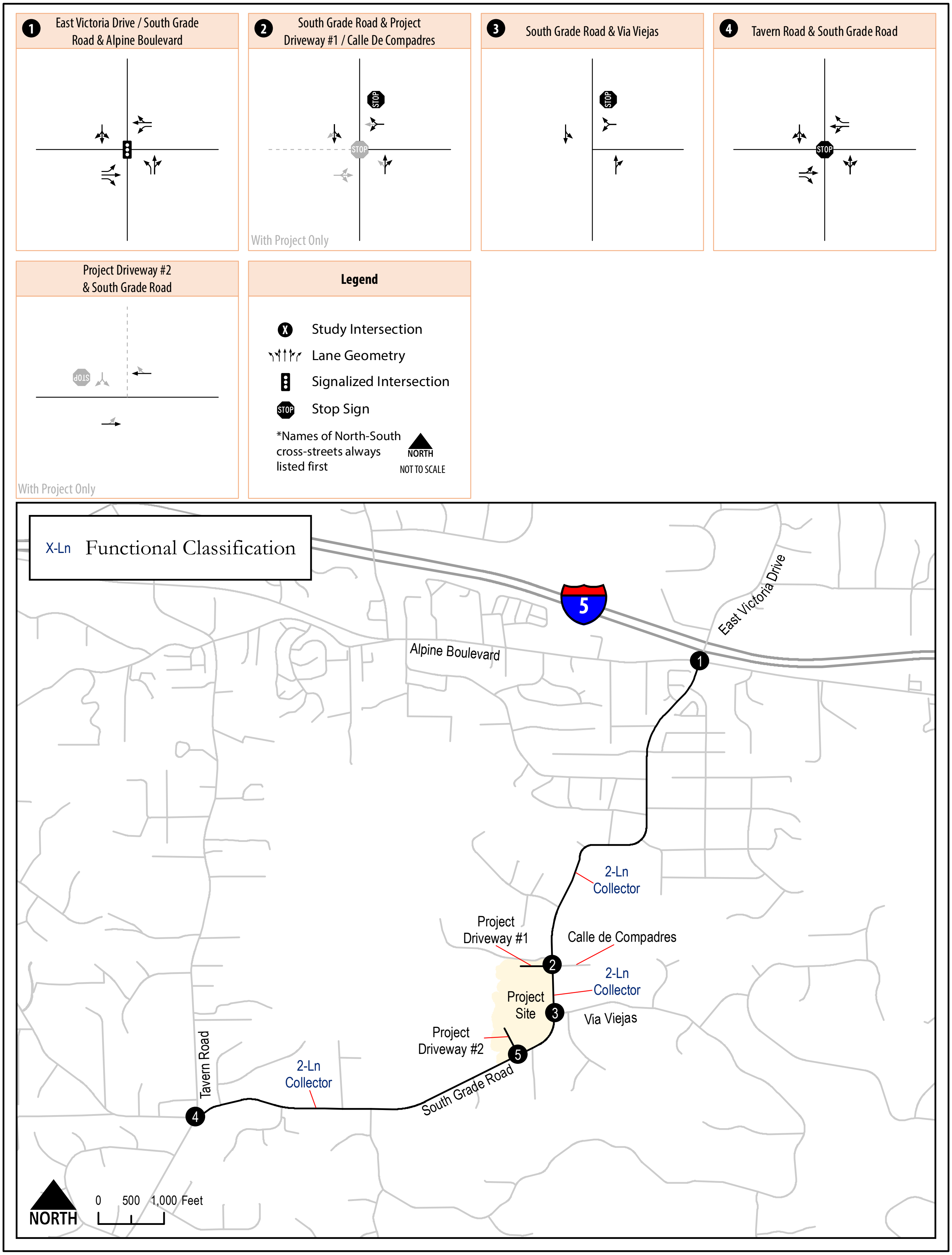

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Figure 4.1
Roadway and Intersection Geometrics

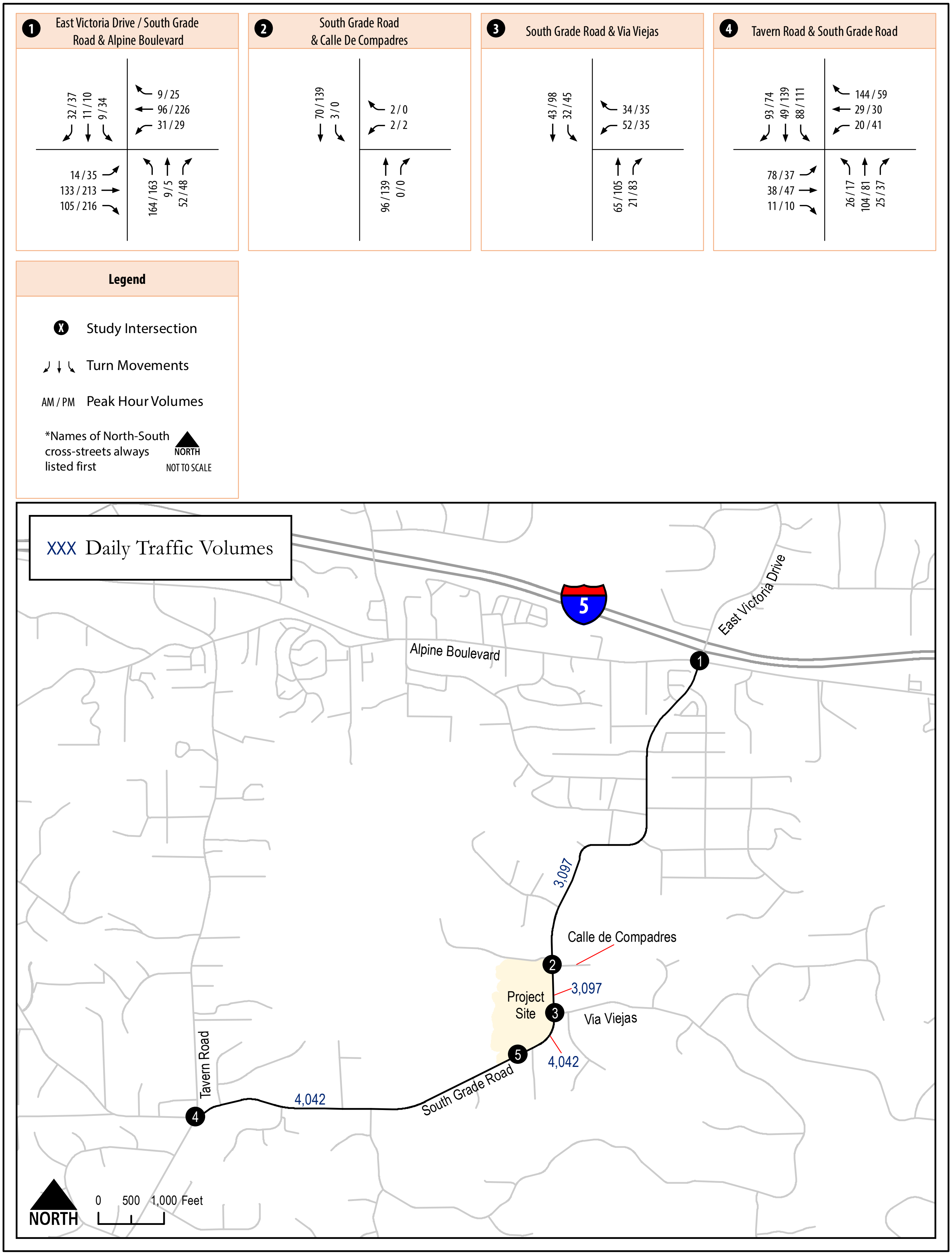

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Figure 4.2
Traffic Volumes
Existing Conditions

Table 4.2 Roadway Segment Level of Service Results – Existing Conditions

Roadway	Segment	Functional Classification	Daily Volume	LOS Threshold (LOS E)	V/C	LOS
South Grade Road	Alpine Boulevard to Via Viejas	2-Lane Light Collector	3,097	16,200	0.191	B
South Grade Road	Via Viejas to Tavern Road	2-Lane Light Collector	4,042	16,200	0.250	B

Notes:
V/C = Volume / Capacity

As shown in Table 4.2, all of the study roadway segments currently operate at acceptable LOS B.

4.3.2 Intersection Analysis

Table 4.3 displays intersection LOS and average vehicle delay results for the key study area intersections under Existing conditions. LOS calculation worksheets for Existing conditions are provided in **Appendix C**.

Table 4.3 Peak Hour Intersection Level of Service Results – Existing Conditions

#	Intersection	Control Type	AM Peak Hour		PM Peak Hour	
			Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS
1	East Victoria Road / South Grade Road & Alpine Boulevard	Signal	16.3	B	16.9	B
2	South Grade Road / Calle De Compadres	SSSC	9.2	A	10.3	B
3	South Grade Road / Via Viejas	SSSC	10.2	B	11.0	B
4	Tavern Road & South Grade Road	AWSC	13.4	B	10.6	B

Notes:
SSSC = Side-Street Stop-Controlled. For SSSC, the delay shown is the worst delay experienced by any of the approaches.
AWSC = All-Way Stop-Controlled. For AWSC, the delay shown is the average delay experienced by all approaches.

As shown in Table 4.3, all study area intersections currently operate at an acceptable LOS B during both the AM and PM peak hours.

4.4 Existing with Project Roadway Network and Traffic Volumes

Roadway and intersection geometrics under Existing with Project conditions were assumed to be identical to existing geometrics (displayed in Figure 4.1) with the addition of the following two project driveways:

- South Grade Road & Project Driveway #1 / Calle de Compadres – This driveway would be a new leg of the South Grade Road / Calle Compadres intersection (opposing Calle de Compadres). It is located at the northern end of the property and would allow for full access. This would be an unsignalized all-way stop-controlled intersection. This driveway would include one inbound lane and one outbound lane.

  It is important to note that under Existing conditions, this intersection is a three-legged T-intersection functioning as side-street stop-controlled with South Grade Road being uncontrolled and Calle De Compadres being stop-controlled. Thus, all-way stop-controlled intersection guidelines and options were considered to determine if the peak hour volumes at the intersection justified the installation of stop signs at the intersection for all directions of traffic. According to

Caltrans California Manual on Uniform Traffic Control Devices (MUTCD) (2014), the intersection does not meet the minimum peak hour volumes for an all-way stop-controlled intersection. However, due to a number of pedestrian collisions occurring in the vicinity of this intersection, and since the project driveway at this intersection is considered an important and integral safety design feature of the Proposed Project, it is suggested that this intersection to be converted to an all-way stop-controlled intersection with implementation of the Alpine Community Park. All-way stop-controls would provide for an enhanced pedestrian safety route from the residential neighborhood on the east side of South Grade Road to the park as well as reduce the potential severity conflict between pedestrians and motorists.

- Project Driveway #2 & South Grade Road – This driveway would be a new intersection located on the southern end of the property and would allow for full-access. This is an unsignalized, side street stop-controlled intersection, with South Grade Road as uncontrolled and Project Driveway #2 being stop-controlled. This driveway would include one inbound lane and one outbound lane.

Existing with Project traffic volumes were derived by combining the existing traffic volumes (displayed in Figure 4.2) and the project trip assignment volumes (displayed in Figure 3.3). Daily roadway and peak hour intersection volumes for this scenario are displayed in **Figure 4.3**.

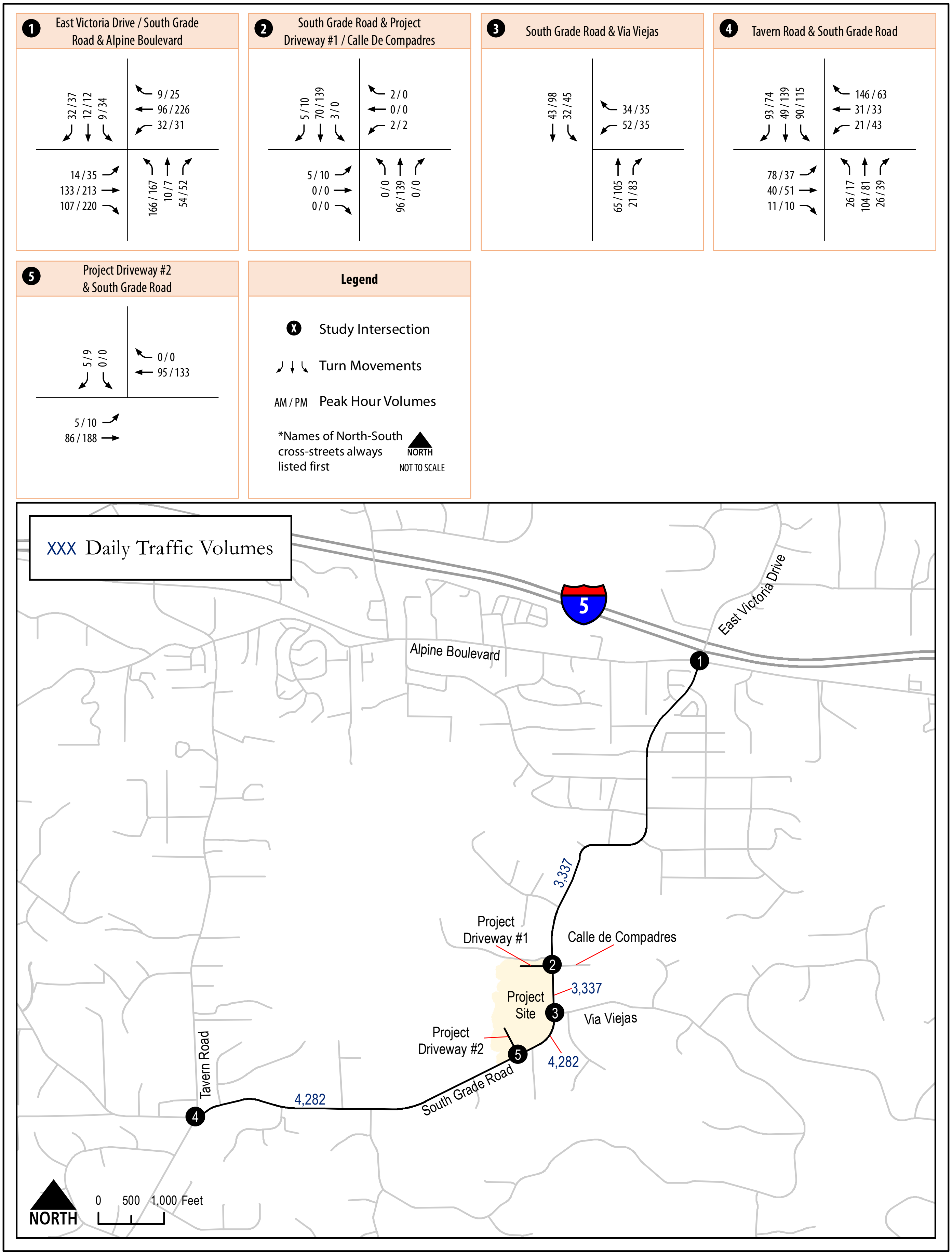

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Figure 4.3
Traffic Volumes
Existing with Project Conditions

4.5 Existing with Project Traffic Conditions

Analyses were conducted using the methodologies described in Chapter 2.0. Roadway segment and intersection LOS analysis results are discussed below.

4.5.1 Roadway Segment Analysis

Table 4.5 displays the LOS analysis results for key study area roadway segments under Existing with Project conditions.

Table 4.4 Roadway Segment Level of Service Results – Existing with Project Conditions

Roadway	Segment	Functional Classification	ADT	LOS Threshold (LOS E)	V/C	LOS	LOS w/o Project	ΔV/C	SI?
South Grade Road	Alpine Boulevard to Project Driveway #1 / Calle de Compadres	2-Lane Light Collector	3,337	16,200	0.206	B	B	0.015	N
South Grade Road	Project Driveway #1 / Calle de Compadres to Via de Viejas	2-Lane Light Collector	3,337	16,200	0.206	B	B	0.015	N
South Grade Road	Via de Viejas to Project Driveway #2	2-Lane Light Collector	4,282	16,200	0.264	C	B	0.015	N
South Grade Road	Project Driveway #2 to Tavern Road	2-Lane Light Collector	4,282	16,200	0.264	C	B	0.015	N

Notes:
V/C = Volume / Capacity
LOS = Level of Service
SI? = Significant Impact?

As shown in Table 4.5, all study area roadway segments are anticipated to operate at acceptable LOS C or better under Existing with Project conditions.

4.5.2 Intersection Analysis

Table 4.5 displays intersection LOS and average vehicle delay results under Existing with Project conditions. LOS calculation worksheets for Existing with Project conditions are provided in **Appendix D**.

Table 4.5 Peak Hour Intersection Level of Service Results – Existing with Project Conditions

#	Intersection	Control Type	AM Peak Hour		PM Peak Hour		Delay w/o Project (sec) AM/PM	LOS w/o Project AM/PM	Change in Delay (sec) AM/PM	SI?
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS				
1	East Victoria Road / South Grade Road & Alpine Boulevard	Signal	16.4	B	17.1	B	16.3 / 16.9	B / B	0.1 / 0.2	N
2	South Grade Road & Project Driveway #1 / Calle De Compadres	AWSC	7.6	A	8.0	A	9.2 / 10.3	A / B	-1.6 / -2.3	N
3	South Grade Road / Via Viejas	SSSC	10.2	B	11.0	B	10.2 / 11.0	B / B	0.0 / 0.0	N
4	Tavern Road & South Grade Road	AWSC	13.6	B	10.8	B	13.4 / 10.6	B / B	0.2 / 0.2	N
5	Project Driveway #2 & South Grade Road	SSSC	8.8	A	9.0	A	N/A	N/A	N/A	N

Notes:
LOS = Level of Service
AWSC = All-Way Stop-Controlled. For AWSC, the delay shown is the average delay experienced by all approaches.
SSSC = Side-Street Stop-Controlled. For SSSC, the delay shown is the worst delay experienced by any of the approaches.
SI = Significant Impact?

As shown in Table 4.5, all of the study area intersections are anticipated continue to operate at acceptable LOS B or better during both the AM and PM peak hours with the addition of Proposed Project traffic.

4.6 Impact Significance and Mitigation

Based upon the significance criteria presented in Section 2.5 of this report, the addition of Proposed Project traffic would not cause a significant impact to study area roadway segments and intersections under Existing with Project conditions.

5.0 Near-Term Year Traffic Conditions

This section provides an analysis of Near-Term Base conditions both with and without the Proposed Project. The scenarios analyzed in this section include:

- Near-Term Year 2023 Base
- Near-Term Year 2023 Base with Project

5.1 Cumulative Project Traffic

The following project was identified by County of San Diego staff as a cumulative project, since it is anticipated to contribute traffic within the project study area:

- Rancho Nuevo Major Subdivision – This project is located at the eastern terminus of Via Tesoro in the Rancho Palo Verde Estates, a residential development in the Alpine community of unincorporated San Diego County. This project proposes to create 14 residential parcels on a 60.15-acre site.

The traffic generated from the project listed above was included in the Near-Term Year 2023 Base scenario. **Figure 5.1** displays the location of the cumulative project identified above.

5.2 Cumulative Projects Trip Generation

Table 5.1 displays the projected trip generation for the cumulative project described above. The trip generation assumptions were developed using trip generation rates outlined in SANDAG's (not so) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (April, 2002). Trip distribution patterns and trip assignments were manually derived based on the geographical location of the cumulative project, the characteristics of the proposed land uses, and the nearest freeway facilities. Relevant excerpts from the source of information regarding the cumulative project are provided in **Appendix E**.

Table 5.1 Cumulative Project Trip Generation

Cumulative Project	Land Use	Daily Trips	AM Peak Hour (In / Out)	PM Peak Hour (In / Out)
Rancho Nuevo Major Subdivision	Estate	168	14 (4-in / 10-out)	17 (12-in / 5-out)

Source: SANDAG (not so) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region, April 2002

As shown, the cumulative project is anticipated to generate 168 daily trips, including 14 trips during the AM peak hour and 17 trips during the PM peak hour that will be dispersed throughout the Alpine community and beyond the Proposed Project's study area.

Figure 5.1 displays the location of the cumulative project and **Figure 5.2** displays the cumulative project trip assignment.

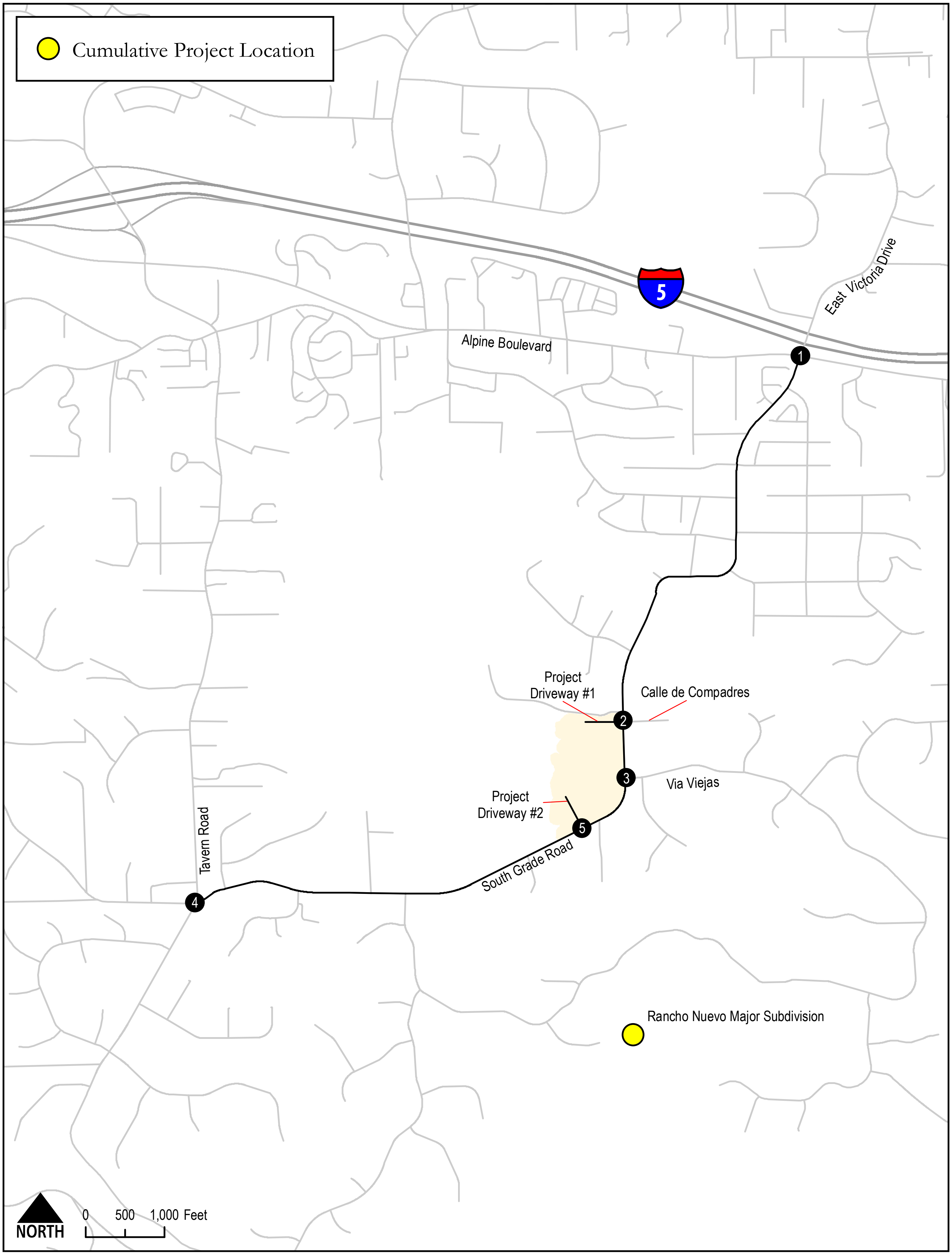

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Figure 5.1
Cumulative Project Location

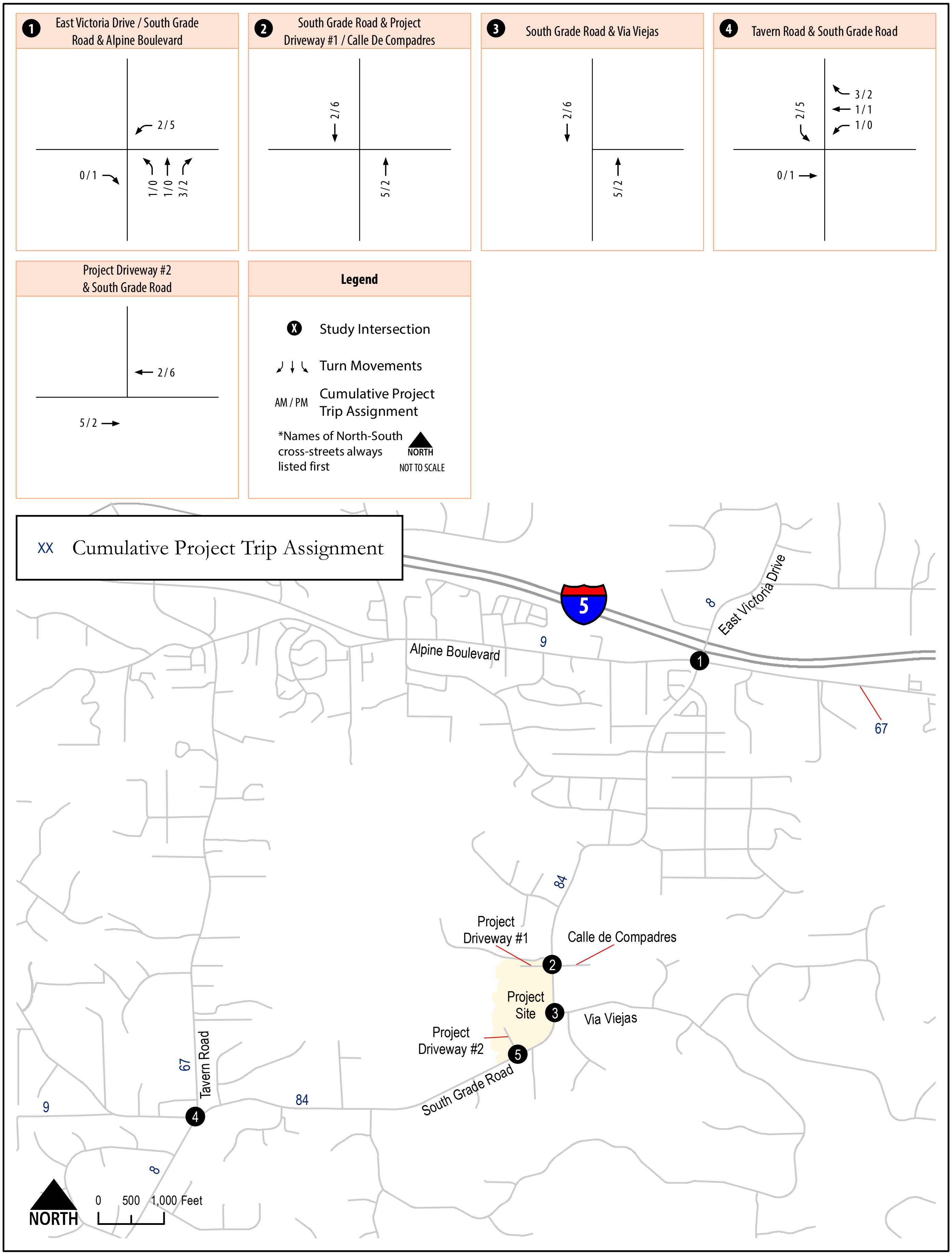

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Figure 5.2
Cumulative Project Trip Assignment

5.3 Near-Term Year 2023 Base Roadway Network and Traffic Volumes

Roadway and intersection geometrics under Near-Term Base conditions were assumed to be identical to the existing roadway geometrics, as shown in Figure 4.1.

The Near-Term Base scenario traffic volumes were derived by adding the additional trips generated by the cumulative projects listed in Section 5.1 (Figure 5.2) to the existing traffic volumes (Figure 4.2). **Figure 5.3** displays the average daily roadway and peak hour intersection volumes for the study roadway segments and intersections under the Near-Term Base conditions.

5.4 Near-Term Year 2023 Base Traffic Conditions

LOS analyses for Near-Term Base conditions were conducted using the methodologies described in Chapter 2.0. Roadway segment and intersection LOS analysis results are discussed separately below.

5.4.1 Roadway Segment Analysis

Table 5.2 displays the LOS analysis results for key roadway segments under Near-Term Year 2023 Base conditions.

Table 5.2 Roadway Segment Level of Service Results – Near-Term Year 2023 Base Conditions

Roadway	Segment	Functional Classification	Daily Volume	LOS Threshold (LOS E)	V/C	LOS
South Grade Road	Alpine Boulevard to Via Viejas	2-Lane Light Collector	3,185	16,200	0.197	B
South Grade Road	Via Viejas to Tavern Road	2-Lane Light Collector	4,130	16,200	0.255	C

Notes:
V/C = Volume / Capacity
LOS = Level of Service

As shown in Table 5.2, all of the study area roadway segments are anticipated to operate at acceptable LOS C or better under Near-Term Year 2023 Base conditions.

5.4.2 Intersection Analysis

Table 5.3 displays intersection LOS and average vehicle delay results for the key study area intersections under Near-Term Year Base conditions. LOS calculation worksheets for Near-Term Year 2023 Base conditions are provided in **Appendix F**.

Table 5.3 Peak Hour Intersection Level of Service Results – Near-Term Year 2023 Base Conditions

#	Intersection	Control Type	AM Peak Hour		PM Peak Hour	
			Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS
1	East Victoria Road / South Grade Road & Alpine Boulevard	Signal	16.3	B	17.0	B
2	South Grade Road / Calle De Compadres	SSSC	9.3	A	10.4	B
3	South Grade Road / Via Viejas	SSSC	10.2	B	11.0	B
4	Tavern Road & South Grade Road	AWSC	13.5	B	10.7	B

Notes:
SSSC = Side-Street Stop-Controlled. For SSSC, the delay shown is the worst delay experienced by any of the approaches.
AWSC = All-Way Stop-Controlled. For AWSC, the delay shown is the average delay experienced by all approaches.

As shown in Table 5.3, all study area intersections are anticipated to operate at an acceptable LOS B during both AM and PM peak hours under Near-Term Year 2023 Base conditions.

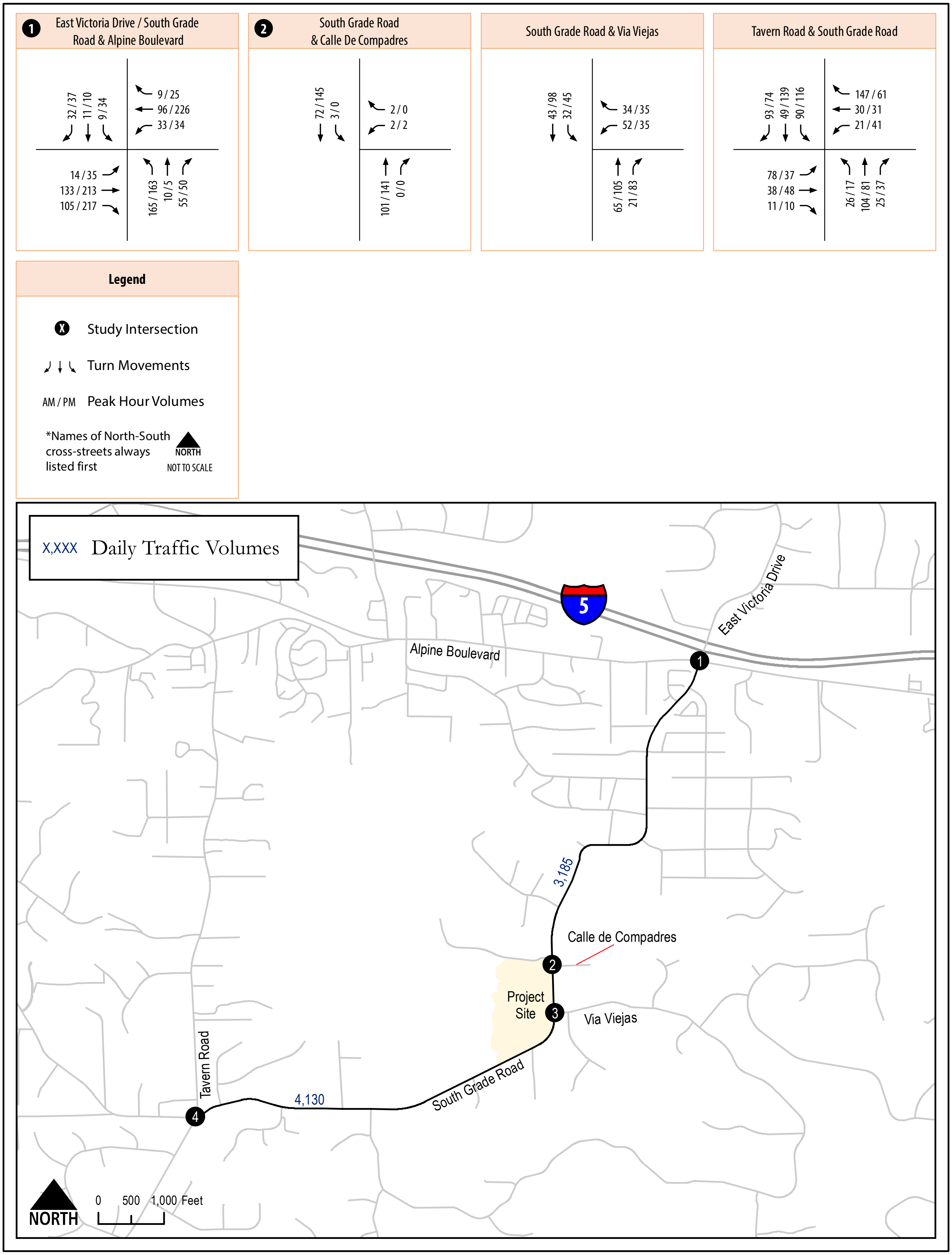

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Figure 5.3
Traffic Volumes
Near-Term Year 2023 Base Conditions

5.5 Near-Term Year 2023 Base with Project Roadway Network and Traffic Volumes

Roadway and intersection geometrics under Near-Term Year 2023 Base with Project conditions were assumed to be identical to existing geometrics (displayed in Figure 4.1) with the addition of the following two project driveways:

- South Grade Road & Project Driveway #1 / Calle de Compadres – This driveway would be a new leg of the South Grade Road / Calle Compadres intersection (Opposing Calle de Compadres). It is located at the northern end of the property and would allow for full access. This would be an unsignalized all-way stop-controlled intersection. This driveway would include one inbound lane and one outbound lane.

  It is important to note that under Existing conditions, this intersection is a three-legged T-intersection functioning as side-street stop-controlled with South Grade Road being uncontrolled and Calle De Compadres being stop-controlled. Thus, all-way stop-controlled intersection guidelines and options were considered to determine if the peak hour volumes at the intersection justified the installation of stop signs at the intersection for all directions of traffic. According to Caltrans MUTCD (2014), the intersection does not meet the minimum peak hour volumes for an all-way stop-controlled intersection. However, due to a number of pedestrian collisions occurring in the vicinity of this intersection, and since the project driveway at this intersection is considered an important and integral safety design feature of the Proposed Project, it is suggested that this intersection to be converted to an all-way stop-controlled intersection with implementation of the Alpine Community Park. All-way stop-controls would provide for an enhanced pedestrian safety route from the residential neighborhood on the east side of South Grade Road to the park as well as reduce the potential severity conflict between pedestrians and motorists.

- Project Driveway #2 & South Grade Road – This driveway would be a new intersection located on the southern end of the property and would allow for full-access. This is an unsignalized, side street stop-controlled intersection, with South Grade Road as uncontrolled and Project Driveway #2 being stop-controlled. This driveway would include one inbound lane and one outbound lane.

Near-Term Year 2023 Base with Project traffic volumes were derived by combining the Near-Term Year 2023 Base traffic volumes (displayed in Figure 5.3) and the project trip assignment volumes (displayed in Figure 3.3). Daily roadway and peak hour intersection volumes for this scenario are displayed in **Figure 5.4**.

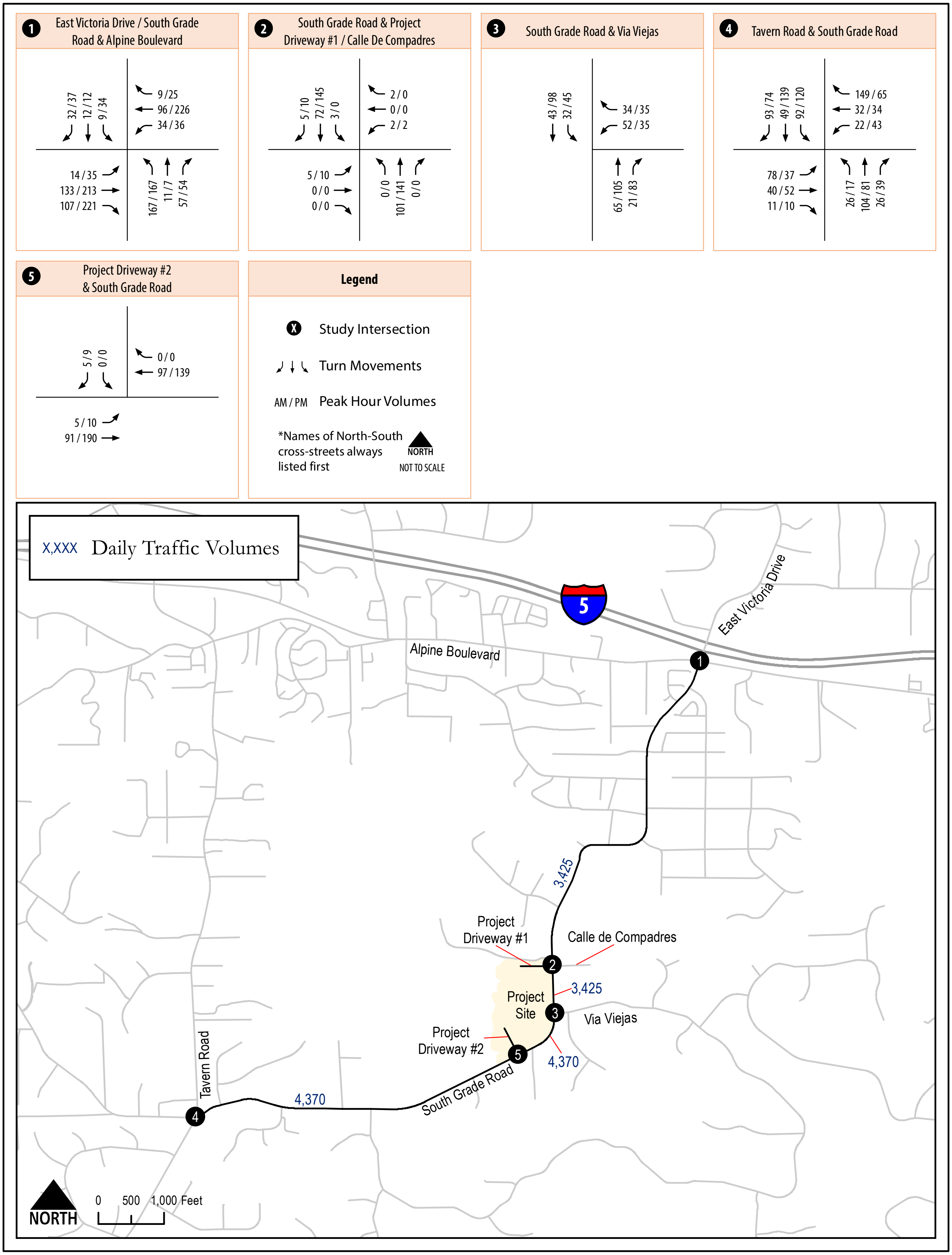


Figure 5.4
Traffic Volumes
Near-Term Year 2023 Base with Project Conditions

5.6 Near-Term Year Base with Project Traffic Conditions

LOS analyses were conducted using the methodologies described in Chapter 2.0. Roadway segment and intersection LOS analysis results are discussed separately in the following sections.

5.6.1 Roadway Segment Analysis

Table 5.4 displays the LOS analysis results for key study area roadway segments under Near-Term Year 2023 Base with Project.

Table 5.4 Roadway Segment Level of Service Results – Near-Term Year 2023 Base with Project Conditions

Roadway	Segment	Functional Classification	ADT	LOS Threshold (LOS E)	V/C	LOS	LOS w/o Project	ΔV/C	SI?
South Grade Road	Alpine Boulevard to Project Driveway #1 / Calle de Compadres	2-Lane Light Collector	3,425	16,200	0.211	B	B	0.015	N
South Grade Road	Project Driveway #1 / Calle de Compadres to Via de Viejas	2-Lane Light Collector	3,425	16,200	0.211	B	B	0.015	N
South Grade Road	Via de Viejas to Project Driveway #2	2-Lane Light Collector	4,370	16,200	0.270	C	C	0.015	N
South Grade Road	Project Driveway #2 to Tavern Road	2-Lane Light Collector	4,370	16,200	0.270	C	C	0.015	N

Notes:
V/C = Volume / Capacity
LOS = Level of Service
SI? = Significant Impact?

As shown in Table 5.4, similar to Near-Term Year 2023 Base conditions, all study area roadway segments are anticipated to operate at acceptable LOS C or better under Near-Term Year 2023 Base conditions.

5.6.2 Intersection Analysis

Table 5.6 displays intersection LOS and average vehicle delay results under Near-Term Year 2023 Base with Project conditions. LOS calculation worksheets for Near-Term Year 2023 Base with Project conditions are provided in **Appendix G**.

Table 5.5 Peak Hour Intersection Level of Service Results – Near-Term Year 2023 Base with Project Conditions

#	Intersection	Control Type	AM Peak Hour		PM Peak Hour		Delay w/o Project (sec) AM/PM	LOS w/o Project AM/PM	Change in Delay (sec) AM/PM	SI?
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS				
1	East Victoria Road / South Grade Road & Alpine Boulevard	Signal	14.2	B	17.2	B	16.3 / 17.0	B / B	-3.0 / 0.2	N
2	South Grade Road & Project Driveway #1 / Calle De Compadres	AWSC	7.6	A	8.1	A	9.3 / 10.4	A / B	-1.7 / - 2.3	N
3	South Grade Road / Via Viejas	SSSC	10.2	B	11.0	B	10.2 / 11.0	B / B	0.0 / 0.0	N
4	Tavern Road & South Grade Road	AWSC	13.7	B	10.9	B	13.5 / 10.7	B / B	0.2 / 0.2	N
5	Project Driveway #2 & South Grade Road	SSSC	8.8	A	9.1	A	N/A	N/A	N/A	N

Notes:
AWSC = All-Way Stop-Controlled. For AWSC, the delay shown is the average delay experienced by all approaches.
SSSC = Side-Street Stop-Controlled. For SSSC, the delay shown is the worst delay experienced by any of the approaches.
SI? = Significant Impact?

As shown in Table 5.5, all of the study intersections are anticipated to operate at acceptable LOS B or better during both the AM and PM peak hours with the addition of project traffic.

5.7 Impact Significance and Mitigation

Based upon the significance criteria presented in Section 2.5 of this report, the addition of Proposed Project traffic would not cause a significant impact to study area roadway segments and intersections under Near-Term Year 2023 Base with Project conditions. Therefore, no mitigation measures are required.

6.0 Site Access, On-Site Circulation, Driveway Queuing, and Parking

This chapter addresses access to the project site. Topics discussed include site-access and on-site circulation, parking, and driveway queuing.

6.1 Site Access and On-Site Vehicle Circulation

The Proposed Project will be located north of South Grade Road, east of Tavern Road, and south of Alpine Boulevard, within the unincorporated community of Alpine, in San Diego County. Project access will be provided via the following two (2) driveways:

- South Grade Road & Project Driveway #1 / Calle de Compadres – This driveway would be a new leg of the South Grade Road / Calle Compadres intersection (Opposing Calle de Compadres). It is located at the northern end of the property and would allow for full access. This would be an unsignalized all-way stop-controlled intersection. This driveway would include one inbound lane and one outbound lane.

  It is important to note that under Existing conditions, this intersection is a three-legged T-intersection functioning as side-street stop-controlled with South Grade Road being uncontrolled and Calle De Compadres being stop-controlled. Thus, all-way stop-controlled intersection guidelines and options were considered to determine if the peak hour volumes at the intersection justified the installation of stop signs at the intersection for all directions of traffic. According to Caltrans MUTCD (2014), the intersection does not meet the minimum peak hour volumes for an all-way stop-controlled intersection. However, due to a number of pedestrian collisions occurring in the vicinity of this intersection, and since the project driveway at this intersection is considered an important and integral safety design feature of the Proposed Project, it is suggested that this intersection to be converted to an all-way stop-controlled intersection with implementation of the Alpine Community Park. All-way stop-controls would provide for an enhanced pedestrian safety route from the residential neighborhood on the east side of South Grade Road to the park as well as reduce the potential severity conflict between pedestrians and motorists.

- Project Driveway #2 & South Grade Road – This driveway would be a new intersection located on the southern end of the property and would allow for full-access. This is an unsignalized, side street stop-controlled intersection, with South Grade Road as uncontrolled and Project Driveway #2 being stop-controlled. This driveway would include one inbound lane and one outbound lane.

The site is bisected by a primary internal north/south roadway that provides parking along sides and connects the two project driveways.

Table 6.1 displays intersection LOS and average vehicle delay results for the two analyzed project driveways under Existing with Project and Near-Term Year 2023 Base with Project conditions, as shown previously in Chapter 4 and Chapter 5, respectively, of this report.

Table 6.1 Peak Hour Project Driveway Level of Service Results

#	Intersection	Control Type	Existing with Project				Near-Term Base with Project			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS
15	South Grade Road & Project Driveway #1 / Calle de Compadres	AWSC	8.0	A	8.9	A	8.0	A	8.9	A
16	Project Driveway #2 & South Grade Road	SSSC	9.1	A	9.8	A	9.1	A	9.8	A

Notes:

AWSC = All-Way Stop-Controlled. For AWSC, the delay shown is the average delay experienced by all approaches.

SSSC = Side-Street Stop-Controlled. For SSSC, the delay shown is the worst delay experienced by any of the approaches.

As shown in Table 6.1, the project driveways are projected to operate at LOS A during both the AM and PM peak hours with the addition of Proposed Project traffic.

6.2 Driveway Queueing

A queuing analysis was conducted for the Proposed Project's two driveways and the movements on South Grade Road to determine if extensive queues that impede with driveway operations could form along the roadways.

Table 6.2 shows the 95th percentile queue at the intersections of the project driveways and South Grade Road.

Table 6.2 Project Driveways and South Grade Road Queuing Analysis

Intersection	Movement	Storage (ft)[1]	95th Percentile Queue[2]			
			Existing + Project		Near Term + Project	
			AM	PM	AM	PM
South Grade Road & Project Driveway #1 / Calle de Compadres	NB	100	25	25	25	25
	SB	100	25	50	25	50
Project Driveway #2 & South Grade Road	SBR	100	0	0	0	0

Notes:

[1] Queues are rounded to the nearest 25 feet to represent one vehicle length.

As shown in Table 6.2, the vehicle queues at the project driveways and South Grade Road are expected to fit within the existing storage and would not impede traffic at the driveways or adjacent roadway system. Queuing analysis results are provided in **Appendix H**.

6.3 Parking

Parking will be incorporated within the proposed development. Per the County of San Diego Ordinance No. 10251, adopted in 2013, the Proposed Project is required to supply 240 vehicle spaces for the regional park. **Table 6.3** displays the Proposed Project's parking requirements.

Table 6.3 Parking Requirements

Type of Occupancy	Units	Requirement	Parking Spaces Required
County of San Diego Ordinance No. 10251			
Park with Structured Active Uses (e.g. basketball, ball fields, tennis, etc.)	24 acres	10 spaces / acre	240 spaces

7.0 Pedestrian, Bicycle, and Transit Assessment

This chapter discusses the project site's alternative transportation modes (walking, bicycling, and transit).

7.1 Pedestrian Facilities

There are no sidewalks directly adjacent to the project site along South Grade Road. As mentioned previously, the Project proposes to convert the intersection of South Grade Road & Calle De Compadres to an all-way stop-controlled and add Project Driveway #1 as the west leg. This would provide for an enhanced pedestrian safety route from the adjacent residential neighborhood as well as reduce the potential severity conflict between pedestrians and motorists.

Additionally, the intersection of South Grade Road & Via Viejas was considered to be converted to an all-way stop-controlled intersection and a warrant analysis was conducted based on all-way stop-control guidelines and options. According to Caltrans MUTCD (2014), this intersection does not meet the minimum peak hour volumes for an all-way stop-controlled intersection. However, due to the high pedestrian volumes that the Alpine Community Park is anticipated to generate, it is recommended to convert the intersection to an all-way stop-controlled intersection to control vehicle/pedestrian conflicts. All-way stop-controls would provide for an enhanced pedestrian safety route from the residential neighborhood on the east side of South Grade Road to the park as well as reduce the potential severity conflict between pedestrian and motorists. It is important to note that "STOP AHEAD" signs are recommended to be installed on the south leg of the intersection as the stopping sight distance at this approach is not met (360 feet required). All work shall be designed to the County's Traffic Engineer satisfaction.

Based on the preliminary review of the Proposed Project's site plan, the Proposed Project would not result in any impacts to pedestrians and would not conflict with existing or planned pedestrian facilities.

7.2 Bicycle Facilities

There are no bicycle lanes directly adjacent to the project site along South Grade Road. However, the County of San Diego General Plan Update specifies proposed Class II bike lanes along both sides of South Grade Road.

Based on the preliminary review of the Proposed Project's site plan, the Proposed Project would not result in any impacts to bicyclists and would not conflict with existing or planned bicycle facilities.

7.3 Transit

There are no transit facilities within a one-mile walking distance of the project site. Additionally, there are no future planned transit projects within the study area. Therefore, the Proposed Project would not conflict with existing or planned transit facilities and would not result in any impacts to transit facilities.

Appendix A
Signal Timing Sheets

Phase Timing - Bank 1

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
Min Green	**4**	**6**	**0**	**0**	**4**	**6**	**4**	**4**
Extension	**2.0**	**2.0**	**0.0**	**0.0**	**2.0**	**2.0**	**2.0**	**3.0**
Max	**17**	**40**	**0**	**0**	**17**	**40**	**25**	**25**
Max 2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cond Serve Check	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Clearance Timing								
Yellow Change	**4.1**	**4.8**	**0.0**	**0.0**	**4.1**	**4.8**	**4.4**	**4.4**
Red Clear	**0.5**	**1.0**	**0.0**	**0.0**	**0.5**	**1.0**	**1.0**	**1.0**
Pedestrian Timing								
Walk	**0**	**7**	**0**	**0**	**0**	**7**	**7**	**7**
Pedestrian Change	**0**	**18**	**0**	**0**	**0**	**14**	**27**	**20**
Advance/Delay Walk	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PE Min. Ped. Change	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Volume-Density								
Type 3 Disconnect	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Add per Vehicle	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Max Added Initial	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Min Gap	**2.0**	**1.5**	**0.0**	**0.0**	**2.0**	**1.5**	**2.0**	**3.0**
Max Gap	**2.0**	**2.1**	**0.0**	**0.0**	**2.0**	**2.1**	**2.0**	**3.0**
Reduce Every	**0.0**	**6.2**	**0.0**	**0.0**	**0.0**	**6.2**	**0.0**	**0.0**
Alternate Timing								
Alternate Walk	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Alternate Ped. Change	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Alternate Minimum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Alternate Extension	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Phase Timing - Exclusive Pedestrian

Exclusive Ped Assignment	________
Exclusive Walk	**0**
Exclusive Pedestrian Change	**0**
Red Clear	**0.0**
Walk Output	**0**
Don't Walk Output	**0**

Phase Functions - Page 1

Red Lock	________
Yellow Lock	________
Simultaneous Gap	________
Rest In Walk	________
Advance Walk	________
Flashing Walk	________
Max Extension	________
Red Rest	________
Dual Entry	________
Sequential Timing	________
Inhibit Ped Reservice	________
Delay Walk	________
Guaranteed Passage	________
Conditional Service	________

Phase Functions - Page 2

Minimum Recall	**_2___6__**
Ped Recall	________
Maximum Recall	________
Green Flash	________
Overlap Green Flash	________
Flashing Yellow Arrow for PPLT	________
Max2	________
Soft Recall	________
External Recall	________
Manual Control Calls	________
Fast Green Flash	________
Fast Overlap Green Flash	________
Semi-Actuated	________

Appendix B
Traffic Counts

WEDNESDAY - MARCH 11, 2020 AREA: ALPINE PROJECT: ETD20-0313-02

S GRADE - ALPINE PARK TO ALPINE BL

AM	NB		SB		EB	WB		PM	NB		SB		EB	WB	
00:00	2		1					12:00	21		27				
00:15	2		1					12:15	26		23				
00:30	0		2					12:30	24		22				
00:45	1	5	4	8			13	12:45	23	94	24	96			190
01:00	1		3					13:00	19		31				
01:15	0		1					13:15	16		25				
01:30	0		0					13:30	34		25				
01:45	1	2	0	4			6	13:45	24	93	28	109			202
02:00	1		3					14:00	21		34				
02:15	0		3					14:15	15		43				
02:30	0		0					14:30	44		28				
02:45	3	4	2	8			12	14:45	28	108	40	145			253
03:00	1		1					15:00	55		43				
03:15	2		0					15:15	75		49				
03:30	1		0					15:30	35		38				
03:45	0	4	0	1			5	15:45	36	201	29	159			360
04:00	1		0					16:00	23		26				
04:15	0		1					16:15	31		30				
04:30	1		2					16:30	29		25				
04:45	3	5	2	5			10	16:45	24	107	27	108			215
05:00	1		0					17:00	28		31				
05:15	2		1					17:15	14		39				
05:30	7		2					17:30	31		33				
05:45	2	12	5	8			20	17:45	17	90	24	127			217
06:00	10		7					18:00	23		29				
06:15	9		6					18:15	18		27				
06:30	12		10					18:30	21		19				
06:45	9	40	11	34			74	18:45	19	81	24	99			180
07:00	19		20					19:00	26		26				
07:15	16		20					19:15	16		12				
07:30	19		37					19:30	15		12				
07:45	26	80	28	105			185	19:45	12	69	18	68			137
08:00	24		13					20:00	11		15				
08:15	12		24					20:15	14		11				
08:30	50		45					20:30	9		10				
08:45	70	156	30	112			268	20:45	6	40	15	51			91
09:00	39		29					21:00	4		13				
09:15	41		17					21:15	7		11				
09:30	19		18					21:30	5		13				
09:45	24	123	19	83			206	21:45	5	21	11	48			69
10:00	14		19					22:00	5		5				
10:15	19		23					22:15	5		4				
10:30	22		19					22:30	2		5				
10:45	31	86	20	81			167	22:45	1	13	2	16			29
11:00	25		18					23:00	1		1				
11:15	15		26					23:15	3		2				
11:30	20		23					23:30	1		3				
11:45	20	80	25	92			172	23:45	1	6	4	10			16
Total Vol.		597		541			1138			923		1036			1959

Daily Totals

NB	SB	EB	WB	Combined
1520	1577			3097

	AM			PM		
Split %	52.5%	47.5%	36.7%	47.1%	52.9%	63.3%
Peak Hour	08:30	08:15	08:30	14:30	14:45	14:45
Volume	200	128	321	202	170	363
P.H.F.	0.71	0.71	0.80	0.83	0.87	0.73

PREPARED BY: ELITE TRAFFIC DYNAMICS, LLC

WEDNESDAY - MARCH 11, 2020 AREA: ALPINE PROJECT: ETD20-0313-02

S GRADE - ALPINE PARK TO TAVERN RD

AM	NB	SB	EB		WB			PM	NB	SB	EB		WB		
00:00			3		2			12:00			19		21		
00:15			2		2			12:15			36		21		
00:30			0		2			12:30			37		24		
00:45			1	6	2	8	14	12:45			30	122	33	99	221
01:00			1		4			13:00			24		42		
01:15			1		2			13:15			27		35		
01:30			1		1			13:30			44		28		
01:45			1	4	0	7	11	13:45			31	126	31	136	262
02:00			1		2			14:00			36		33		
02:15			0		0			14:15			26		55		
02:30			1		1			14:30			55		35		
02:45			2	4	2	5	9	14:45			38	155	40	163	318
03:00			1		2			15:00			68		46		
03:15			2		0			15:15			95		50		
03:30			2		0			15:30			37		45		
03:45			2	7	2	4	11	15:45			59	259	39	180	439
04:00			1		1			16:00			38		19		
04:15			0		4			16:15			46		28		
04:30			1		6			16:30			42		25		
04:45			3	5	6	17	22	16:45			38	164	19	91	255
05:00			1		10			17:00			44		38		
05:15			2		6			17:15			38		34		
05:30			7		13			17:30			46		23		
05:45			3	13	20	49	62	17:45			29	157	32	127	284
06:00			6		22			18:00			27		29		
06:15			4		25			18:15			35		30		
06:30			13		25			18:30			34		17		
06:45			11	34	28	100	134	18:45			41	137	22	98	235
07:00			22		36			19:00			43		20		
07:15			26		52			19:15			28		18		
07:30			19		55			19:30			29		12		
07:45			32	99	45	188	287	19:45			18	118	10	60	178
08:00			32		25			20:00			28		14		
08:15			29		46			20:15			15		11		
08:30			51		68			20:30			31		10		
08:45			65	177	43	182	359	20:45			17	91	14	49	140
09:00			46		33			21:00			15		10		
09:15			31		42			21:15			8		8		
09:30			26		35			21:30			15		12		
09:45			20	123	31	141	264	21:45			6	44	13	43	87
10:00			17		23			22:00			6		3		
10:15			18		31			22:15			9		5		
10:30			25		31			22:30			3		4		
10:45			16	76	28	113	189	22:45			3	21	2	14	35
11:00			20		27			23:00			5		0		
11:15			20		21			23:15			5		3		
11:30			23		33			23:30			1		3		
11:45			28	91	32	113	204	23:45			2	13	3	9	22
Total Vol.				639		927	1566					1407		1069	2476

Daily Totals

NB	SB	EB	WB	Combined
		2046	1996	4042

	AM			PM		
Split %	40.8%	59.2%	38.7%	56.8%	43.2%	61.3%
Peak Hour	08:30	08:15	08:15	15:00	14:45	15:00
Volume	193	190	381	259	181	439
P.H.F.	0.74	0.70	0.80	0.68	0.91	0.76

PREPARED BY: ELITE TRAFFIC DYNAMICS, LLC

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: ELITE TRAFFIC DYNAMICS, LLC

DATE:
3/11/20
WEDNESDAY

LOCATION: ALPINE
NORTH & SOUTH: S GRADE
EAST & WEST: ALPINE BL

PROJECT #: ETD20-0313-02
LOCATION #: 1
CONTROL: SIGNAL

NOTES:

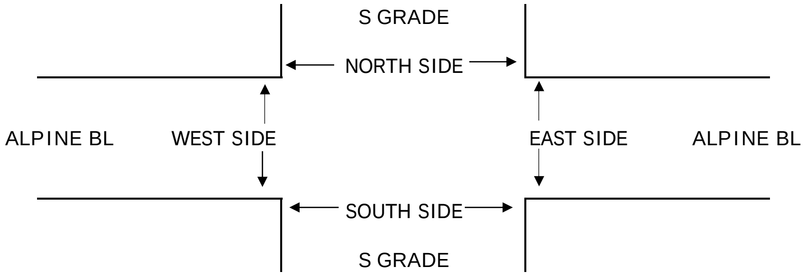
INCLUDES BIKE & PED

AM
PM
MD
OTHER
OTHER

▲ N
◀ W
E ▶
S ▼

		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
		S GRADE			S GRADE			ALPINE BL			ALPINE BL			
	LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
AM	7:00 AM	18	3	15	4	2	7	2	22	8	6	21	0	108
	7:15 AM	28	2	9	5	4	8	1	19	11	6	25	4	122
	7:30 AM	24	1	11	2	5	7	1	23	14	10	28	4	130
	7:45 AM	22	1	9	6	2	2	7	31	17	9	22	1	129
	8:00 AM	32	3	11	2	2	3	2	34	21	6	21	0	137
	8:15 AM	36	1	4	1	5	11	2	23	26	6	25	4	144
	8:30 AM	45	3	13	1	2	6	5	32	27	10	28	4	176
	8:45 AM	51	2	24	5	2	12	5	44	31	9	22	1	208
	VOLUMES	256	16	96	26	24	56	25	228	155	62	192	18	1,154
	APPROACH %	70%	4%	26%	25%	23%	53%	6%	56%	38%	23%	71%	7%	
	APP/DEPART	368	/	59	106	/	241	408	/	350	272	/	504	0
	BEGIN PEAK HR		8:00 AM											
	VOLUMES	164	9	52	9	11	32	14	133	105	31	96	9	665
	APPROACH %	73%	4%	23%	17%	21%	62%	6%	53%	42%	23%	71%	7%	
	PEAK HR FACTOR		0.731			0.684			0.788			0.810		0.799
	APP/DEPART	225	/	32	52	/	147	252	/	194	136	/	292	0
PM	4:00 PM	38	3	13	5	3	4	7	58	51	9	46	6	243
	4:15 PM	47	0	15	4	2	4	5	69	47	7	37	7	244
	4:30 PM	29	5	7	0	0	7	9	62	54	11	44	8	236
	4:45 PM	45	2	12	6	2	8	12	57	41	6	51	6	248
	5:00 PM	49	0	15	8	1	10	11	51	58	4	54	5	266
	5:15 PM	28	2	11	11	4	8	7	57	62	9	62	10	271
	5:30 PM	41	1	10	9	3	11	5	48	55	10	59	4	256
	5:45 PM	32	4	7	10	2	12	10	46	44	9	50	7	233
	VOLUMES	309	17	90	53	17	64	66	448	412	65	403	53	1,997
	APPROACH %	74%	4%	22%	40%	13%	48%	7%	48%	44%	12%	77%	10%	
	APP/DEPART	416	/	136	134	/	494	926	/	591	521	/	776	0
	BEGIN PEAK HR		4:45 PM											
	VOLUMES	163	5	48	34	10	37	35	213	216	29	226	25	1,041
	APPROACH %	75%	2%	22%	42%	12%	46%	8%	46%	47%	10%	81%	9%	
	PEAK HR FACTOR		0.844			0.880			0.921			0.864		0.960
	APP/DEPART	216	/	65	81	/	255	464	/	295	280	/	426	0

U-TURNS				
NB	SB	EB	WB	TTL
X	X	X	X	
				0
				0
				0
		1		1
				0
				0
				0
				0
0	0	1	0	1
				0
				0
				0
		1		1
				0
		1		1
				0
				0
0	0	2	0	2



		PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM					0					0					0
	7:15 AM		1		1	2					0	1				1
	7:30 AM				1	1					0					0
	7:45 AM					0					0					0
	8:00 AM					0					0					0
	8:15 AM				1	1					0					0
	8:30 AM					0					0		1			1
	8:45 AM		1			1					0	1				1
	TOTAL	0	2	0	3	5	0	0	0	0	0	2	1	0	0	3
PM	4:00 PM		1			1					0					0
	4:15 PM					0					0		1			1
	4:30 PM		2		1	3					0	1	2			3
	4:45 PM					0					0					0
	5:00 PM					0					0		1			1
	5:15 PM		1		1	2					0					0
	5:30 PM					0					0	1				1
	5:45 PM					0					0					0
	TOTAL	0	4	0	2	6	0	0	0	0	0	2	4	0	0	6

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: ELITE TRAFFIC DYNAMICS, LLC

DATE: 3/11/20 WEDNESDAY	LOCATION: ALPINE	PROJECT #:	ETD20-0313-02
	NORTH & SOUTH: TAVERN RD	LOCATION #:	2
	EAST & WEST: S GRADE	CONTROL:	STOP

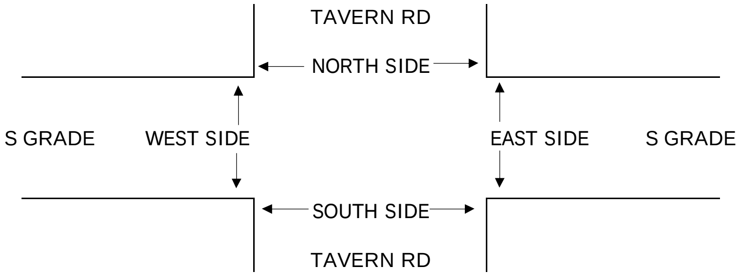
NOTES:

INCLUDES BIKE & PED

AM
PM
MD
OTHER
OTHER

▲ N
◄ W E ►
S ▼

		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				U-TURNS				
		TAVERN RD			TAVERN RD			S GRADE			S GRADE								
	LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB	TTL
															X	X	X	X	
AM	7:00 AM	1	23	7	6	9	6	13	6	4	5	5	26	111		1			1
	7:15 AM	5	33	6	7	14	5	12	3	2	13	4	33	137					0
	7:30 AM	1	42	2	16	13	14	31	2	4	9	4	47	185					0
	7:45 AM	2	40	12	22	24	13	25	5	2	8	3	36	192					0
	8:00 AM	3	23	7	9	15	8	6	5	3	0	5	19	103					0
	8:15 AM	9	30	1	9	7	11	17	1	2	5	8	35	135					0
	8:30 AM	10	29	10	26	13	39	31	16	2	9	12	48	245					0
	8:45 AM	4	22	7	44	14	35	24	16	4	6	4	42	222					0
	VOLUMES	35	242	52	139	109	131	159	54	23	55	45	286	1,330	0	1	0	0	1
	APPROACH %	11%	74%	16%	37%	29%	35%	67%	23%	10%	14%	12%	74%						
	APP/DEPART	329	/	687	379	/	187	236	/	245	386	/	211	0					
	BEGIN PEAK HR		8:00 AM																
	VOLUMES	26	104	25	88	49	93	78	38	11	20	29	144	705					
	APPROACH %	17%	67%	16%	38%	21%	40%	61%	30%	9%	10%	15%	75%						
	PEAK HR FACTOR		0.791			0.618			0.648			0.699		0.719					
	APP/DEPART	155	/	326	230	/	80	127	/	151	193	/	148	0					
PM	4:00 PM	4	20	6	26	33	14	13	12	3	6	3	9	149					0
	4:15 PM	3	16	10	33	37	27	11	9	2	3	10	16	177					0
	4:30 PM	2	19	3	27	19	16	8	8	1	7	6	13	129					0
	4:45 PM	1	14	11	21	23	10	8	6	4	4	6	11	119					0
	5:00 PM	4	22	9	33	33	18	5	15	3	13	9	18	182					0
	5:15 PM	3	13	14	22	35	20	8	6	1	10	9	20	161					0
	5:30 PM	5	23	7	28	36	18	12	12	3	9	6	11	170					0
	5:45 PM	5	23	7	28	35	18	12	14	3	9	6	10	170					0
	VOLUMES	27	150	67	218	251	141	77	82	20	61	55	108	1,257	0	0	0	0	0
	APPROACH %	11%	61%	27%	36%	41%	23%	43%	46%	11%	27%	25%	48%						
	APP/DEPART	244	/	335	610	/	332	179	/	367	224	/	223	0					
	BEGIN PEAK HR		5:00 PM																
	VOLUMES	17	81	37	111	139	74	37	47	10	41	30	59	683					
	APPROACH %	13%	60%	27%	34%	43%	23%	39%	50%	11%	32%	23%	45%						
	PEAK HR FACTOR		0.964			0.964			0.810			0.813		0.938					
	APP/DEPART	135	/	177	324	/	190	94	/	195	130	/	121	0					



		PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM					0					0					0
	7:15 AM					0					0					0
	7:30 AM					0					0					0
	7:45 AM					0					0			1		1
	8:00 AM					0					0					0
	8:15 AM				1	1					0					0
	8:30 AM					0					0	1				1
	8:45 AM					0					0			1		1
	TOTAL	0	0	0	1	1	0	0	0	0	0	1	0	2	0	3
PM	4:00 PM				1	1					0					0
	4:15 PM			1	2	3					0	1			1	2
	4:30 PM					0					0					0
	4:45 PM					0					0					0
	5:00 PM			1		1					0					0
	5:15 PM					0					0				1	1
	5:30 PM					0					0					0
	5:45 PM					0					0					0
	TOTAL	0	0	2	3	5	0	0	0	0	0	1	0	0	2	3

		ADT		
Roadway	Segment	March	June	Δ%
South Grade Road	Alpine Park to Alpine Boulevard	3097	2787	-10%
South Grade Road	Alpine Park to Tavern Road	4042	3468	-14%
			Average	-12%

Intersection	Peak Hour	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
South Grade Road & Calle De Compadres	AM	0	85	0	2	62	0	0	0	0	1	0	1
	PM	0	124	0	0	124	0	0	0	0	1	0	0
Adjusted Traffic Counts	AM	0	96	0	3	70	0	0	0	0	2	0	2
	PM	0	139	0	0	139	0	0	0	0	2	0	0

Intersection	Peak Hour	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
South Grade Road & Via Viejas	AM	0	58	18	28	38	0	0	0	0	46	0	30
	PM	0	93	74	40	87	0	0	0	0	31	0	31
Adjusted Traffic Counts	AM	0	65	21	32	43	0	0	0	0	52	0	34
	PM	0	105	83	45	98	0	0	0	0	35	0	35

*Traffic counts conducted June 2020 were adjusted to display an increase of 12% to account for traffic reduction since pre-COVID19 (March 2020 traffic counts)

Appendix C
Peak Hour Intersection Capacity Worksheets Existing Conditions

HCM 6th Signalized Intersection Summary
1: South Grade Road/East Victoria Road & Alpine Boulevard

Existing AM
AM Peak Hour

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↑↱			✥	
Traffic Volume (veh/h)	14	133	105	31	96	9	164	9	52	9	11	32
Future Volume (veh/h)	14	133	105	31	96	9	164	9	52	9	11	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	168	106	38	119	10	225	12	64	13	16	43
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.73	0.73	0.73	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	295	245	62	296	25	338	49	260	18	22	60
Arrive On Green	0.02	0.16	0.16	0.03	0.17	0.17	0.19	0.19	0.19	0.06	0.06	0.06
Sat Flow, veh/h	1781	1870	1550	1781	1698	143	1781	256	1368	302	371	997
Grp Volume(v), veh/h	18	168	106	38	0	129	225	0	76	72	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1550	1781	0	1840	1781	0	1624	1670	0	0
Q Serve(g_s), s	0.4	3.2	2.4	0.8	0.0	2.4	4.5	0.0	1.5	1.6	0.0	0.0
Cycle Q Clear(g_c), s	0.4	3.2	2.4	0.8	0.0	2.4	4.5	0.0	1.5	1.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.84	0.18		0.60
Lane Grp Cap(c), veh/h	32	295	245	62	0	321	338	0	308	100	0	0
V/C Ratio(X)	0.55	0.57	0.43	0.61	0.00	0.40	0.67	0.00	0.25	0.72	0.00	0.00
Avail Cap(c_a), veh/h	984	2264	1875	984	0	2227	1359	0	1239	1274	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.5	14.8	14.5	18.1	0.0	13.9	14.3	0.0	13.1	17.6	0.0	0.0
Incr Delay (d2), s/veh	5.4	0.6	0.5	3.6	0.0	0.3	2.3	0.0	0.4	3.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.2	0.7	0.3	0.0	0.8	1.7	0.0	0.5	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.9	15.5	14.9	21.7	0.0	14.2	16.5	0.0	13.5	21.2	0.0	0.0
LnGrp LOS	C	B	B	C	A	B	B	A	B	C	A	A
Approach Vol, veh/h		292			167			301			72	
Approach Delay, s/veh		15.8			15.9			15.8			21.2	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	11.8		7.7	5.3	12.4		12.6				
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4				
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0				
Max Q Clear Time (g_c+I1), s	2.8	5.2		3.6	2.4	4.4		6.5				
Green Ext Time (p_c), s	0.0	0.8		0.2	0.0	0.5		1.1				

Intersection Summary			
HCM 6th Ctrl Delay			16.3
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	2	2	96	0	3	70
Future Vol, veh/h	2	2	96	0	3	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	50	50	92	92	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	4	104	0	4	96

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	208	104	0	0	104	0
Stage 1	104	-	-	-	-	-
Stage 2	104	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	780	951	-	-	1488	-
Stage 1	920	-	-	-	-	-
Stage 2	920	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	778	951	-	-	1488	-
Mov Cap-2 Maneuver	778	-	-	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	917	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	856	1488	-
HCM Lane V/C Ratio	-	-	0.009	0.003	-
HCM Control Delay (s)	-	-	9.2	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	52	34	65	21	32	43
Future Vol, veh/h	52	34	65	21	32	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	76	76	86	86	69	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	45	76	24	46	62

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	242	88	0	0	100	0
Stage 1	88	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	746	970	-	-	1493	-
Stage 1	935	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	722	970	-	-	1493	-
Mov Cap-2 Maneuver	722	-	-	-	-	-
Stage 1	935	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	3.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	803	1493	-
HCM Lane V/C Ratio	-	-	0.141	0.031	-
HCM Control Delay (s)	-	-	10.2	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Intersection Delay, s/veh	13.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✥			✥	
Traffic Vol, veh/h	78	38	11	20	29	144	26	104	25	88	49	93
Future Vol, veh/h	78	38	11	20	29	144	26	104	25	88	49	93
Peak Hour Factor	0.65	0.65	0.65	0.70	0.70	0.70	0.79	0.79	0.79	0.62	0.62	0.62
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	120	58	17	29	41	206	33	132	32	142	79	150
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	13.1	11.3	11.9	15.8
HCM LOS	B	B	B	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	17%	67%	0%	41%	0%	38%
Vol Thru, %	67%	33%	0%	59%	0%	21%
Vol Right, %	16%	0%	100%	0%	100%	40%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	155	116	11	49	144	230
LT Vol	26	78	0	20	0	88
Through Vol	104	38	0	29	0	49
RT Vol	25	0	11	0	144	93
Lane Flow Rate	196	178	17	70	206	371
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.324	0.346	0.028	0.131	0.333	0.57
Departure Headway (Hd)	5.954	6.975	5.916	6.759	5.836	5.535
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	598	512	600	527	611	649
Service Time	4.041	4.761	3.701	4.541	3.617	3.607
HCM Lane V/C Ratio	0.328	0.348	0.028	0.133	0.337	0.572
HCM Control Delay	11.9	13.5	8.9	10.6	11.5	15.8
HCM Lane LOS	B	B	A	B	B	C
HCM 95th-tile Q	1.4	1.5	0.1	0.4	1.5	3.6

HCM 6th Signalized Intersection Summary
1: South Grade Road/East Victoria Road & Alpine Boulevard

Existing PM
PM Peak Hour

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations	↰	↑	↱	↰	↱		↰	↱			✥	
Traffic Volume (veh/h)	35	213	216	29	226	25	163	5	48	34	10	37
Future Volume (veh/h)	35	213	216	29	226	25	163	5	48	34	10	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	232	188	34	263	26	194	6	51	39	11	37
Peak Hour Factor	0.92	0.92	0.92	0.86	0.86	0.86	0.84	0.84	0.84	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	420	348	56	371	37	288	27	233	53	15	51
Arrive On Green	0.03	0.22	0.22	0.03	0.22	0.22	0.16	0.16	0.16	0.07	0.07	0.07
Sat Flow, veh/h	1781	1870	1547	1781	1671	165	1781	170	1441	761	215	722
Grp Volume(v), veh/h	38	232	188	34	0	289	194	0	57	87	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1547	1781	0	1836	1781	0	1611	1698	0	0
Q Serve(g_s), s	0.9	4.5	4.4	0.8	0.0	6.0	4.2	0.0	1.3	2.1	0.0	0.0
Cycle Q Clear(g_c), s	0.9	4.5	4.4	0.8	0.0	6.0	4.2	0.0	1.3	2.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.89	0.45		0.43
Lane Grp Cap(c), veh/h	61	420	348	56	0	407	288	0	261	119	0	0
V/C Ratio(X)	0.62	0.55	0.54	0.61	0.00	0.71	0.67	0.00	0.22	0.73	0.00	0.00
Avail Cap(c_a), veh/h	903	2077	1718	903	0	2039	1247	0	1128	1189	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.7	14.2	14.2	19.8	0.0	14.9	16.3	0.0	15.1	18.9	0.0	0.0
Incr Delay (d2), s/veh	3.8	0.4	0.5	4.0	0.0	0.9	2.7	0.0	0.4	3.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.6	1.3	0.3	0.0	2.2	1.7	0.0	0.4	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.6	14.6	14.7	23.8	0.0	15.7	19.0	0.0	15.5	22.0	0.0	0.0
LnGrp LOS	C	B	B	C	A	B	B	A	B	C	A	A
Approach Vol, veh/h		458			323			251			87	
Approach Delay, s/veh		15.4			16.6			18.2			22.0	
Approach LOS		B			B			B			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	15.1		8.3	6.0	15.0		12.1				
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4				
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0				
Max Q Clear Time (g_c+I1), s	2.8	6.5		4.1	2.9	8.0		6.2				
Green Ext Time (p_c), s	0.0	1.2		0.3	0.0	1.2		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			16.9									
HCM 6th LOS			B									

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
2: South Grade Road & Calle De Compadres

Existing PM
PM Peak Hour

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	2	0	139	0	0	139
Future Vol, veh/h	2	0	139	0	0	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	156	0	0	156

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	312	156	0	0	156	0
Stage 1	156	-	-	-	-	-
Stage 2	156	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	681	890	-	-	1424	-
Stage 1	872	-	-	-	-	-
Stage 2	872	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	681	890	-	-	1424	-
Mov Cap-2 Maneuver	681	-	-	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	872	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	681	1424	-
HCM Lane V/C Ratio	-	-	0.012	-	-
HCM Control Delay (s)	-	-	10.3	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖↗		↑↱			↰↑
Traffic Vol, veh/h	35	35	105	83	45	98
Future Vol, veh/h	35	35	105	83	45	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	79	79	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	45	133	105	51	111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	399	186	0	0	238	0
Stage 1	186	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	607	856	-	-	1329	-
Stage 1	846	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	582	856	-	-	1329	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	789	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	2.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	693	1329	-
HCM Lane V/C Ratio	-	-	0.13	0.038	-
HCM Control Delay (s)	-	-	11	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Intersection Delay, s/veh	10.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✣			✣	
Traffic Vol, veh/h	37	47	10	41	30	59	17	81	37	111	139	74
Future Vol, veh/h	37	47	10	41	30	59	17	81	37	111	139	74
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	58	12	51	37	73	18	84	39	116	145	77
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	10.1	9.4	9.3	11.8
HCM LOS	B	A	A	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	13%	44%	0%	58%	0%	34%
Vol Thru, %	60%	56%	0%	42%	0%	43%
Vol Right, %	27%	0%	100%	0%	100%	23%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	135	84	10	71	59	324
LT Vol	17	37	0	41	0	111
Through Vol	81	47	0	30	0	139
RT Vol	37	0	10	0	59	74
Lane Flow Rate	141	104	12	88	73	338
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.199	0.179	0.018	0.152	0.106	0.449
Departure Headway (Hd)	5.082	6.227	5.292	6.241	5.237	4.792
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	710	579	679	577	687	743
Service Time	3.082	3.941	3.006	3.953	2.949	2.884
HCM Lane V/C Ratio	0.199	0.18	0.018	0.153	0.106	0.455
HCM Control Delay	9.3	10.3	8.1	10.1	8.6	11.8
HCM Lane LOS	A	B	A	B	A	B
HCM 95th-tile Q	0.7	0.6	0.1	0.5	0.4	2.3

Appendix D

Peak Hour Intersection Capacity Worksheets Existing with Project Conditions

HCM 6th Signalized Intersection Summary
1: South Grade Road/East Victoria Road & Alpine Boulevard

Existing AM with Project

AM Peak Hour

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↑↱			✥	
Traffic Volume (veh/h)	14	133	107	32	96	9	166	10	54	9	12	32
Future Volume (veh/h)	14	133	107	32	96	9	166	10	54	9	12	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	168	108	40	119	10	227	14	67	13	18	43
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.73	0.73	0.73	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	293	243	64	297	25	342	54	258	18	25	59
Arrive On Green	0.02	0.16	0.16	0.04	0.17	0.17	0.19	0.19	0.19	0.06	0.06	0.06
Sat Flow, veh/h	1781	1870	1550	1781	1698	143	1781	281	1347	294	407	973
Grp Volume(v), veh/h	18	168	108	40	0	129	227	0	81	74	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1550	1781	0	1840	1781	0	1628	1675	0	0
Q Serve(g_s), s	0.4	3.2	2.4	0.8	0.0	2.4	4.5	0.0	1.6	1.7	0.0	0.0
Cycle Q Clear(g_c), s	0.4	3.2	2.4	0.8	0.0	2.4	4.5	0.0	1.6	1.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.83	0.18		0.58
Lane Grp Cap(c), veh/h	32	293	243	64	0	322	342	0	312	102	0	0
V/C Ratio(X)	0.56	0.57	0.44	0.62	0.00	0.40	0.66	0.00	0.26	0.73	0.00	0.00
Avail Cap(c_a), veh/h	978	2250	1864	978	0	2214	1351	0	1234	1270	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.6	14.9	14.6	18.2	0.0	14.0	14.3	0.0	13.1	17.6	0.0	0.0
Incr Delay (d2), s/veh	5.4	0.7	0.5	3.6	0.0	0.3	2.2	0.0	0.4	3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.2	0.7	0.4	0.0	0.8	1.7	0.0	0.5	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.0	15.6	15.1	21.8	0.0	14.3	16.5	0.0	13.6	21.3	0.0	0.0
LnGrp LOS	C	B	B	C	A	B	B	A	B	C	A	A
Approach Vol, veh/h		294			169			308			74	
Approach Delay, s/veh		15.9			16.1			15.8			21.3	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	11.8		7.7	5.3	12.5		12.7				
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4				
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0				
Max Q Clear Time (g_c+I1), s	2.8	5.2		3.7	2.4	4.4		6.5				
Green Ext Time (p_c), s	0.0	0.8		0.2	0.0	0.5		1.1				

Intersection Summary			
HCM 6th Ctrl Delay			16.4
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	5	0	0	2	0	2	0	96	0	3	70	5
Future Vol, veh/h	5	0	0	2	0	2	0	96	0	3	70	5
Peak Hour Factor	0.92	0.92	0.92	0.50	0.50	0.50	0.92	0.92	0.92	0.73	0.73	0.73
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	0	4	0	4	0	104	0	4	96	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.2	7.6	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	50%	4%
Vol Thru, %	100%	0%	0%	90%
Vol Right, %	0%	0%	50%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	5	4	78
LT Vol	0	5	2	3
Through Vol	96	0	0	70
RT Vol	0	0	2	5
Lane Flow Rate	104	5	8	107
Geometry Grp	1	1	1	1
Degree of Util (X)	0.117	0.007	0.009	0.119
Departure Headway (Hd)	4.037	4.504	4.1	4.005
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	887	783	859	894
Service Time	2.065	2.596	2.193	2.033
HCM Lane V/C Ratio	0.117	0.006	0.009	0.12
HCM Control Delay	7.6	7.6	7.2	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0	0	0.4

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	52	34	65	21	32	43
Future Vol, veh/h	52	34	65	21	32	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	76	76	86	86	69	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	45	76	24	46	62

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	242	88	0	0	100	0
Stage 1	88	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	746	970	-	-	1493	-
Stage 1	935	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	722	970	-	-	1493	-
Mov Cap-2 Maneuver	722	-	-	-	-	-
Stage 1	935	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	10.2		0		3.2	
HCM LOS	B					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	803	1493	-
HCM Lane V/C Ratio	-	-	0.141	0.031	-
HCM Control Delay (s)	-	-	10.2	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Intersection Delay, s/veh	13.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✥			✥	
Traffic Vol, veh/h	78	40	11	21	31	146	26	104	26	90	49	93
Future Vol, veh/h	78	40	11	21	31	146	26	104	26	90	49	93
Peak Hour Factor	0.65	0.65	0.65	0.70	0.70	0.70	0.79	0.79	0.79	0.62	0.62	0.62
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	120	62	17	30	44	209	33	132	33	145	79	150
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	13.2	11.4	12.1	16.2
HCM LOS	B	B	B	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	17%	66%	0%	40%	0%	39%
Vol Thru, %	67%	34%	0%	60%	0%	21%
Vol Right, %	17%	0%	100%	0%	100%	40%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	156	118	11	52	146	232
LT Vol	26	78	0	21	0	90
Through Vol	104	40	0	31	0	49
RT Vol	26	0	11	0	146	93
Lane Flow Rate	197	182	17	74	209	374
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.329	0.353	0.028	0.14	0.34	0.58
Departure Headway (Hd)	5.999	7.008	5.954	6.789	5.868	5.577
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	594	510	596	524	607	644
Service Time	4.092	4.802	3.747	4.578	3.655	3.653
HCM Lane V/C Ratio	0.332	0.357	0.029	0.141	0.344	0.581
HCM Control Delay	12.1	13.6	8.9	10.7	11.7	16.2
HCM Lane LOS	B	B	A	B	B	C
HCM 95th-tile Q	1.4	1.6	0.1	0.5	1.5	3.7

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⋎	
Traffic Vol, veh/h	5	86	95	0	0	5
Future Vol, veh/h	5	86	95	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	93	103	0	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	103	0	-	0	206	103
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	103	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1489	-	-	-	782	952
Stage 1	-	-	-	-	921	-
Stage 2	-	-	-	-	921	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1489	-	-	-	779	952
Mov Cap-2 Maneuver	-	-	-	-	779	-
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	921	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1489	-	-	-	952
HCM Lane V/C Ratio	0.004	-	-	-	0.006
HCM Control Delay (s)	7.4	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

HCM 6th Signalized Intersection Summary
1: South Grade Road/East Victoria Road & Alpine Boulevard

Existing PM with Project
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↑↱			✥	
Traffic Volume (veh/h)	35	213	220	31	226	25	167	7	52	34	12	37
Future Volume (veh/h)	35	213	220	31	226	25	167	7	52	34	12	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	232	192	36	263	26	199	8	56	39	14	37
Peak Hour Factor	0.92	0.92	0.92	0.86	0.86	0.86	0.84	0.84	0.84	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	416	344	58	369	37	296	34	235	54	19	51
Arrive On Green	0.03	0.22	0.22	0.03	0.22	0.22	0.17	0.17	0.17	0.07	0.07	0.07
Sat Flow, veh/h	1781	1870	1547	1781	1671	165	1781	202	1414	738	265	700
Grp Volume(v), veh/h	38	232	192	36	0	289	199	0	64	90	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1547	1781	0	1836	1781	0	1616	1703	0	0
Q Serve(g_s), s	0.9	4.6	4.6	0.8	0.0	6.1	4.4	0.0	1.4	2.2	0.0	0.0
Cycle Q Clear(g_c), s	0.9	4.6	4.6	0.8	0.0	6.1	4.4	0.0	1.4	2.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.88	0.43		0.41
Lane Grp Cap(c), veh/h	61	416	344	58	0	406	296	0	269	124	0	0
V/C Ratio(X)	0.63	0.56	0.56	0.62	0.00	0.71	0.67	0.00	0.24	0.73	0.00	0.00
Avail Cap(c_a), veh/h	892	2053	1698	892	0	2015	1232	0	1118	1178	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.0	14.5	14.5	20.0	0.0	15.1	16.4	0.0	15.2	19.0	0.0	0.0
Incr Delay (d2), s/veh	3.9	0.4	0.5	3.9	0.0	0.9	2.6	0.0	0.5	3.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.7	1.4	0.4	0.0	2.2	1.7	0.0	0.5	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.9	14.9	15.0	23.9	0.0	16.0	19.0	0.0	15.6	22.0	0.0	0.0
LnGrp LOS	C	B	B	C	A	B	B	A	B	C	A	A
Approach Vol, veh/h		462			325			263			90	
Approach Delay, s/veh		15.7			16.8			18.2			22.0	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	15.1		8.4	6.0	15.1		12.4				
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4				
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0				
Max Q Clear Time (g_c+I1), s	2.8	6.6		4.2	2.9	8.1		6.4				
Green Ext Time (p_c), s	0.0	1.2		0.3	0.0	1.2		0.9				

Intersection Summary			
HCM 6th Ctrl Delay			17.1
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	10	0	0	2	0	0	0	139	0	0	139	10
Future Vol, veh/h	10	0	0	2	0	0	0	139	0	0	139	10
Peak Hour Factor	0.92	0.92	0.92	0.25	0.25	0.25	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	0	0	8	0	0	0	156	0	0	156	11
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	7.9	8	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	100%	0%
Vol Thru, %	100%	0%	0%	93%
Vol Right, %	0%	0%	0%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	139	10	2	149
LT Vol	0	10	2	0
Through Vol	139	0	0	139
RT Vol	0	0	0	10
Lane Flow Rate	156	11	8	167
Geometry Grp	1	1	1	1
Degree of Util (X)	0.178	0.015	0.011	0.188
Departure Headway (Hd)	4.092	4.84	4.844	4.044
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	871	744	743	882
Service Time	2.144	2.841	2.845	2.095
HCM Lane V/C Ratio	0.179	0.015	0.011	0.189
HCM Control Delay	8	7.9	7.9	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0	0	0.7

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰↱		↑↱			↰↑
Traffic Vol, veh/h	35	35	105	83	45	98
Future Vol, veh/h	35	35	105	83	45	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	79	79	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	45	133	105	51	111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	399	186	0	0	238	0
Stage 1	186	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	607	856	-	-	1329	-
Stage 1	846	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	582	856	-	-	1329	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	789	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	2.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	693	1329	-
HCM Lane V/C Ratio	-	-	0.13	0.038	-
HCM Control Delay (s)	-	-	11	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✥			✥	
Traffic Vol, veh/h	37	51	10	43	33	63	17	81	39	115	139	74
Future Vol, veh/h	37	51	10	43	33	63	17	81	39	115	139	74
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	63	12	53	41	78	18	84	41	120	145	77
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	10.3	9.5	9.5	12.2
HCM LOS	B	A	A	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	42%	0%	57%	0%	35%
Vol Thru, %	59%	58%	0%	43%	0%	42%
Vol Right, %	28%	0%	100%	0%	100%	23%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	137	88	10	76	63	328
LT Vol	17	37	0	43	0	115
Through Vol	81	51	0	33	0	139
RT Vol	39	0	10	0	63	74
Lane Flow Rate	143	109	12	94	78	342
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.203	0.189	0.018	0.164	0.114	0.469
Departure Headway (Hd)	5.123	6.266	5.341	6.275	5.277	4.944
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	701	574	670	572	680	735
Service Time	3.154	3.999	3.074	4.005	3.006	2.944
HCM Lane V/C Ratio	0.204	0.19	0.018	0.164	0.115	0.465
HCM Control Delay	9.5	10.5	8.2	10.2	8.7	12.2
HCM Lane LOS	A	B	A	B	A	B
HCM 95th-tile Q	0.8	0.7	0.1	0.6	0.4	2.5

5: South Grade Road & Project Driveway #2

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Vol, veh/h	10	188	133	0	0	9
Future Vol, veh/h	10	188	133	0	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	204	145	0	0	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	145	0	-	0	371	145
Stage 1	-	-	-	-	145	-
Stage 2	-	-	-	-	226	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1437	-	-	-	630	902
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	812	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1437	-	-	-	624	902
Mov Cap-2 Maneuver	-	-	-	-	624	-
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	812	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1437	-	-	-	902
HCM Lane V/C Ratio	0.008	-	-	-	0.011
HCM Control Delay (s)	7.5	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Appendix E
Cumulative Project Information

Rancho Nuevo Major Subdivision; 3100 5475 (TM)

Summary

SCH Number	2011021015
Lead Agency	San Diego County
Document Title	Rancho Nuevo Major Subdivision; 3100 5475 (TM)
Document Type	NOD - Notice of Determination
Received	7/26/2012
Posted	7/26/2012
Present Land Use	A 70; Limited Agriculture; (1) Residential

Document Description The proposed project is a major subdivision to create 14 residential parcels on a 60.15-acre site; three additional lots are proposed for private roads that would be maintained in accordance with a Private Road Maintenance Agreement. The project site is located at the eastern terminus of Via Tesoro in the Rancho Palo Verde Estates residential development, which is located south of Interstate 8 in the Alpine Community Planning area of unincorporated San Diego County.

Contact Information

Kristina Jeffers
San Diego County
5201 Ruffin Road, Suite B
San Diego, CA 92123
Phone : (858) 694-2604

Location

Coordinates	32°48'41"N 116°45'21"W
Counties	San Diego
Cross Streets	Via Viejas Oeste/ Via Tesoro
Zip	91901
Total Acres	60.15
Parcel #	520-060-08-00, 520-160-02-00
State Highways	I-8
Schools	Boulder Oaks ES, Joan MacQueen MS, Alpine Community Day
Township	16S
Range	02E
Section	3
Base	SBB&M
Other Location Info	City/Nearest Community: Alpine
Other Information	Cont. Schools: Alpine Christian, Day-McKellar Preparatory

Notice of Determination

Approving Agency	County of San Diego Planning Commission

Approving Agency Role Lead Agency

Approved On 7/20/2012

Final Environmental Document Available at

County of San Diego Department of Planning and Land Use, M.S. O650 5201 Ruffin Road, Suite B, San Diego, CA 92123

Determinations

(1) The project will have a significant impact on the environment

No

(2a) An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA

No

(2b) A Mitigated or a Negative Declaration was prepared for this project pursuant to the provisions of CEQA

Yes

(2c) An other document type was prepared for this project pursuant to the provisions of CEQA

No

(3) Mitigated measures were made a condition of the approval of the project

Yes

(4) A mitigation reporting or monitoring plan was adopted for this project

N/A

(5) A Statement of Overriding Considerations was adopted for this project

N/A

(6) Findings were made pursuant to the provisions of CEQA

N/A

Disclaimer: The document was originally posted before CEQAnet had the capability to host attachments for the public. To obtain the original attachments for this document, please contact the lead agency at the contact information listed above. You may also contact the OPR via email at state.clearinghouse@opr.ca.gov or via phone at (916) 445-0613.

CB

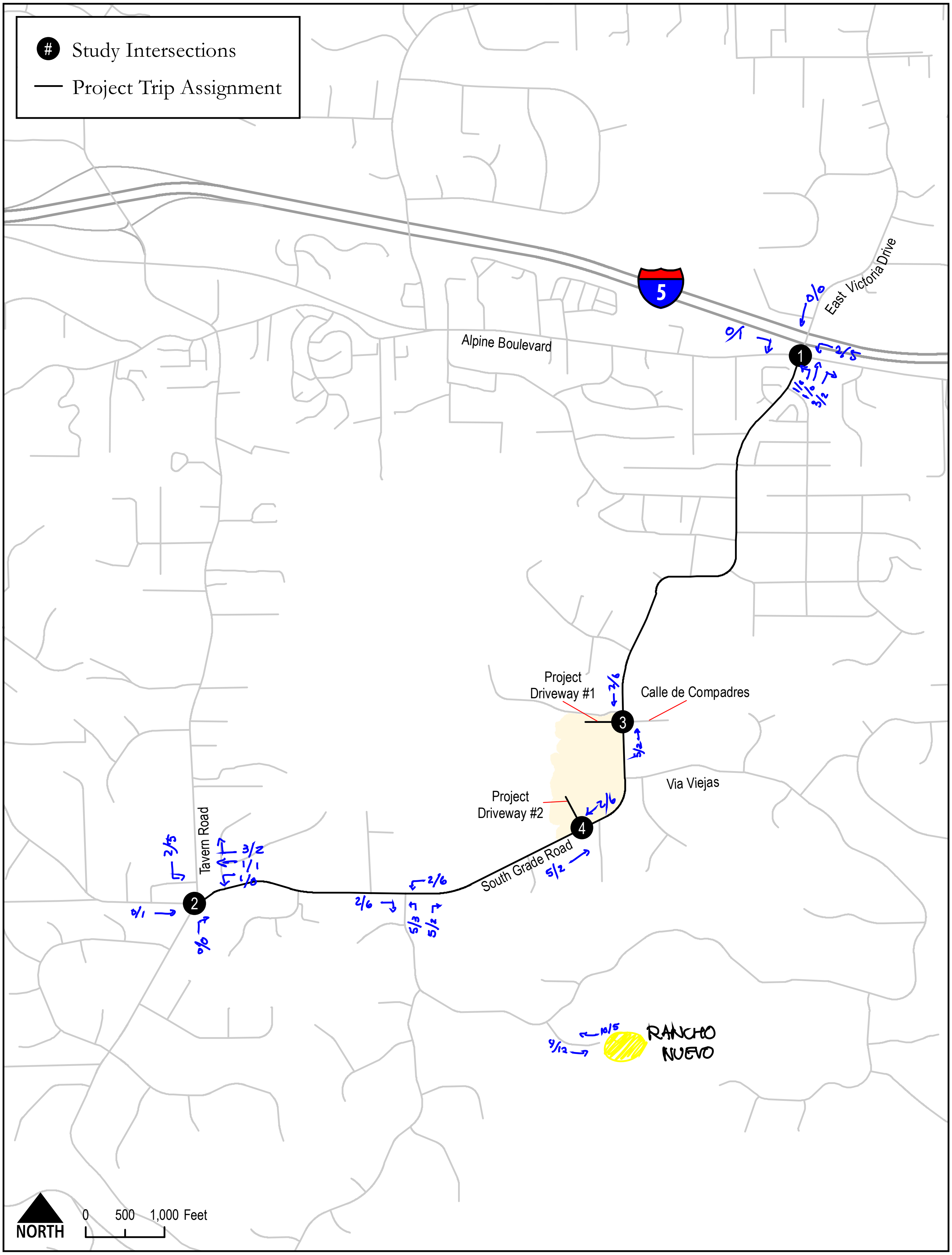
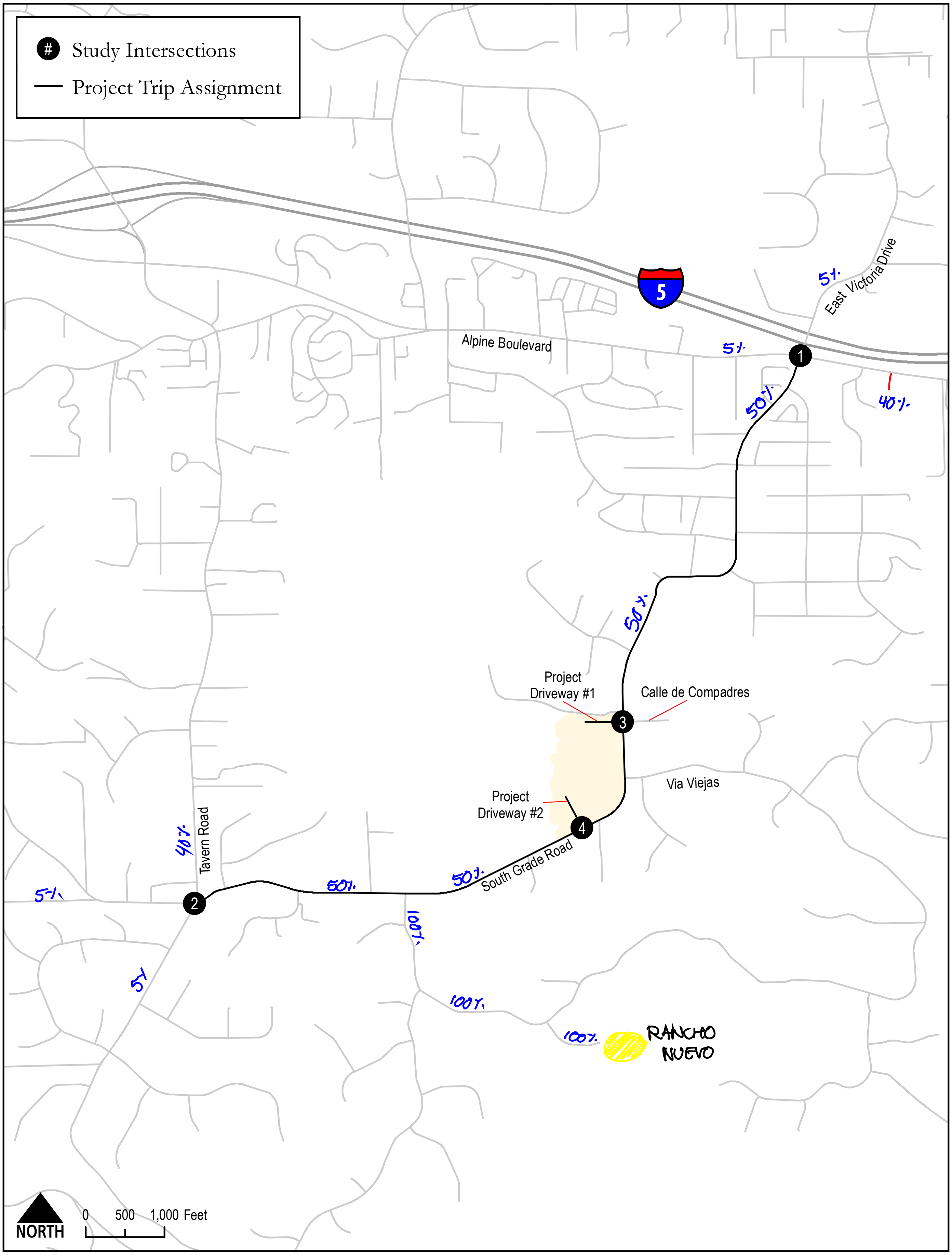


Figure 5

~~Project Study Area~~

Cum. PROJ. TRIP ASSIGN.



Alpine Community Park
Traffic Analysis Memorandum
CHEN RYAN

Figure 5
~~*Project Study Area*~~
CUMULATIVE PROJECT TRIP DIST.

Appendix F
Peak Hour Intersection Capacity Worksheets Near-Term Base Conditions

1: South Grade Road/East Victoria Road & Alpine Boulevard

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱		↰	↱			✣	
Traffic Volume (veh/h)	14	133	105	33	96	9	165	10	55	9	11	32
Future Volume (veh/h)	14	133	105	33	96	9	165	10	55	9	11	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	168	106	41	119	10	226	14	68	13	16	43
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.73	0.73	0.73	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	294	243	66	298	25	341	53	258	18	22	60
Arrive On Green	0.02	0.16	0.16	0.04	0.18	0.18	0.19	0.19	0.19	0.06	0.06	0.06
Sat Flow, veh/h	1781	1870	1550	1781	1698	143	1781	278	1350	302	371	997
Grp Volume(v), veh/h	18	168	106	41	0	129	226	0	82	72	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1550	1781	0	1840	1781	0	1627	1670	0	0
Q Serve(g_s), s	0.4	3.2	2.4	0.9	0.0	2.4	4.5	0.0	1.6	1.6	0.0	0.0
Cycle Q Clear(g_c), s	0.4	3.2	2.4	0.9	0.0	2.4	4.5	0.0	1.6	1.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.83	0.18		0.60
Lane Grp Cap(c), veh/h	32	294	243	66	0	323	341	0	312	100	0	0
V/C Ratio(X)	0.56	0.57	0.44	0.62	0.00	0.40	0.66	0.00	0.26	0.72	0.00	0.00
Avail Cap(c_a), veh/h	979	2252	1866	979	0	2216	1352	0	1235	1268	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.6	14.9	14.6	18.1	0.0	14.0	14.3	0.0	13.2	17.7	0.0	0.0
Incr Delay (d2), s/veh	5.4	0.7	0.5	3.6	0.0	0.3	2.2	0.0	0.4	3.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.2	0.7	0.4	0.0	0.8	1.7	0.0	0.5	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.0	15.6	15.0	21.7	0.0	14.3	16.5	0.0	13.6	21.3	0.0	0.0
LnGrp LOS	C	B	B	C	A	B	B	A	B	C	A	A
Approach Vol, veh/h		292			170			308			72	
Approach Delay, s/veh		15.9			16.0			15.7			21.3	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	11.8		7.7	5.3	12.5		12.7
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0
Max Q Clear Time (g_c+I1), s	2.9	5.2		3.6	2.4	4.4		6.5
Green Ext Time (p_c), s	0.0	0.8		0.2	0.0	0.5		1.1

Intersection Summary

HCM 6th Ctrl Delay	16.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰↱		↱			↰
Traffic Vol, veh/h	2	2	101	0	3	72
Future Vol, veh/h	2	2	101	0	3	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	50	50	92	92	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	4	110	0	4	99

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	217	110	0	0	110	0
Stage 1	110	-	-	-	-	-
Stage 2	107	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	771	943	-	-	1480	-
Stage 1	915	-	-	-	-	-
Stage 2	917	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	769	943	-	-	1480	-
Mov Cap-2 Maneuver	769	-	-	-	-	-
Stage 1	915	-	-	-	-	-
Stage 2	914	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	9.3		0		0.3
HCM LOS	A				

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	847	1480	-
HCM Lane V/C Ratio	-	-	0.009	0.003	-
HCM Control Delay (s)	-	-	9.3	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

3: South Grade Road & Via Viejas

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	52	34	65	21	32	43
Future Vol, veh/h	52	34	65	21	32	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	76	76	86	86	69	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	45	76	24	46	62

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	242	88	0	0	100	0
Stage 1	88	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	746	970	-	-	1493	-
Stage 1	935	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	722	970	-	-	1493	-
Mov Cap-2 Maneuver	722	-	-	-	-	-
Stage 1	935	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	3.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	803	1493	-
HCM Lane V/C Ratio	-	-	0.141	0.031	-
HCM Control Delay (s)	-	-	10.2	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

4: Tavern Road & South Grade Road

Intersection	
Intersection Delay, s/veh	13.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✥			✥	
Traffic Vol, veh/h	78	38	11	21	30	147	26	104	25	90	49	93
Future Vol, veh/h	78	38	11	21	30	147	26	104	25	90	49	93
Peak Hour Factor	0.65	0.65	0.65	0.70	0.70	0.70	0.79	0.79	0.79	0.62	0.62	0.62
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	120	58	17	30	43	210	33	132	32	145	79	150
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	13.1	11.4	12	16.1
HCM LOS	B	B	B	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	17%	67%	0%	41%	0%	39%
Vol Thru, %	67%	33%	0%	59%	0%	21%
Vol Right, %	16%	0%	100%	0%	100%	40%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	155	116	11	51	147	232
LT Vol	26	78	0	21	0	90
Through Vol	104	38	0	30	0	49
RT Vol	25	0	11	0	147	93
Lane Flow Rate	196	178	17	73	210	374
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.326	0.347	0.028	0.137	0.342	0.578
Departure Headway (Hd)	5.988	7.007	5.947	6.78	5.855	5.563
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	594	510	597	525	609	644
Service Time	4.079	4.798	3.737	4.565	3.638	3.637
HCM Lane V/C Ratio	0.33	0.349	0.028	0.139	0.345	0.581
HCM Control Delay	12	13.5	8.9	10.7	11.7	16.1
HCM Lane LOS	B	B	A	B	B	C
HCM 95th-tile Q	1.4	1.5	0.1	0.5	1.5	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱		↰	↱			✥	
Traffic Volume (veh/h)	35	213	217	34	226	25	163	5	50	34	10	37
Future Volume (veh/h)	35	213	217	34	226	25	163	5	50	34	10	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	232	189	40	263	26	194	6	54	39	11	37
Peak Hour Factor	0.92	0.92	0.92	0.86	0.86	0.86	0.84	0.84	0.84	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	412	341	63	371	37	290	26	235	53	15	51
Arrive On Green	0.03	0.22	0.22	0.04	0.22	0.22	0.16	0.16	0.16	0.07	0.07	0.07
Sat Flow, veh/h	1781	1870	1547	1781	1671	165	1781	161	1449	761	215	722
Grp Volume(v), veh/h	38	232	189	40	0	289	194	0	60	87	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1547	1781	0	1836	1781	0	1610	1698	0	0
Q Serve(g_s), s	0.9	4.6	4.5	0.9	0.0	6.0	4.2	0.0	1.3	2.1	0.0	0.0
Cycle Q Clear(g_c), s	0.9	4.6	4.5	0.9	0.0	6.0	4.2	0.0	1.3	2.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.90	0.45		0.43
Lane Grp Cap(c), veh/h	61	412	341	63	0	407	290	0	262	119	0	0
V/C Ratio(X)	0.62	0.56	0.55	0.63	0.00	0.71	0.67	0.00	0.23	0.73	0.00	0.00
Avail Cap(c_a), veh/h	902	2075	1716	902	0	2037	1246	0	1126	1187	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.8	14.4	14.4	19.7	0.0	14.9	16.3	0.0	15.1	18.9	0.0	0.0
Incr Delay (d2), s/veh	3.8	0.5	0.5	3.8	0.0	0.9	2.7	0.0	0.4	3.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.7	1.4	0.4	0.0	2.2	1.7	0.0	0.5	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.6	14.8	14.9	23.5	0.0	15.8	19.0	0.0	15.5	22.1	0.0	0.0
LnGrp LOS	C	B	B	C	A	B	B	A	B	C	A	A
Approach Vol, veh/h		459			329			254			87	
Approach Delay, s/veh		15.6			16.7			18.2			22.1	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.1	14.9		8.3	6.0	15.0		12.1				
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4				
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0				
Max Q Clear Time (g_c+I1), s	2.9	6.6		4.1	2.9	8.0		6.2				
Green Ext Time (p_c), s	0.0	1.2		0.3	0.0	1.2		0.9				

Intersection Summary	
HCM 6th Ctrl Delay	17.0
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

2: South Grade Road & Calle De Compadres

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	2	0	141	0	0	145
Future Vol, veh/h	2	0	141	0	0	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	158	0	0	163

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	321	158	0	0	158	0
Stage 1	158	-	-	-	-	-
Stage 2	163	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	673	887	-	-	1422	-
Stage 1	871	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	673	887	-	-	1422	-
Mov Cap-2 Maneuver	673	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	866	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	10.4		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	673	1422	-
HCM Lane V/C Ratio	-	-	0.012	-	-
HCM Control Delay (s)	-	-	10.4	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	35	35	105	83	45	98
Future Vol, veh/h	35	35	105	83	45	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	79	79	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	45	133	105	51	111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	399	186	0	0	238	0
Stage 1	186	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	607	856	-	-	1329	-
Stage 1	846	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	582	856	-	-	1329	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	789	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	2.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	693	1329	-
HCM Lane V/C Ratio	-	-	0.13	0.038	-
HCM Control Delay (s)	-	-	11	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Intersection Delay, s/veh	10.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✥			✥	
Traffic Vol, veh/h	37	48	10	41	31	61	17	81	37	116	139	74
Future Vol, veh/h	37	48	10	41	31	61	17	81	37	116	139	74
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	59	12	51	38	75	18	84	39	121	145	77
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	10.2	9.4	9.4	12
HCM LOS	B	A	A	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	13%	44%	0%	57%	0%	35%
Vol Thru, %	60%	56%	0%	43%	0%	42%
Vol Right, %	27%	0%	100%	0%	100%	22%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	135	85	10	72	61	329
LT Vol	17	37	0	41	0	116
Through Vol	81	48	0	31	0	139
RT Vol	37	0	10	0	61	74
Lane Flow Rate	141	105	12	89	75	343
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.199	0.182	0.018	0.155	0.11	0.458
Departure Headway (Hd)	5.096	6.251	5.319	6.259	5.26	4.808
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	706	576	675	575	685	740
Service Time	3.111	3.963	3.031	3.97	2.97	2.905
HCM Lane V/C Ratio	0.2	0.182	0.018	0.155	0.109	0.464
HCM Control Delay	9.4	10.4	8.1	10.1	8.6	12
HCM Lane LOS	A	B	A	B	A	B
HCM 95th-tile Q	0.7	0.7	0.1	0.5	0.4	2.4

Appendix G

Arterial Level of Service Analysis Worksheets Near-Term Base with Project

HCM 6th Signalized Intersection Summary
1: South Grade Road/East Victoria Road & Alpine Boulevard

Near-Term AM with Project
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↑↱			✣	
Traffic Volume (veh/h)	14	133	107	34	96	9	167	11	57	9	12	32
Future Volume (veh/h)	14	133	107	34	96	9	167	11	57	9	12	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	168	108	42	119	10	229	15	71	13	18	43
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.73	0.73	0.73	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	60	382	317	95	380	32	403	64	304	29	40	95
Arrive On Green	0.03	0.20	0.20	0.05	0.22	0.18	0.23	0.23	0.19	0.10	0.10	0.06
Sat Flow, veh/h	1781	1870	1550	1781	1698	143	1781	284	1344	294	407	973
Grp Volume(v), veh/h	18	168	108	42	0	129	229	0	86	74	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1550	1781	0	1840	1781	0	1628	1675	0	0
Q Serve(g_s), s	0.4	3.0	2.3	0.9	0.0	2.2	4.4	0.0	1.7	1.6	0.0	0.0
Cycle Q Clear(g_c), s	0.4	3.0	2.3	0.9	0.0	2.2	4.4	0.0	1.7	1.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.83	0.18		0.58
Lane Grp Cap(c), veh/h	60	382	317	95	0	412	403	0	369	163	0	0
V/C Ratio(X)	0.30	0.44	0.34	0.44	0.00	0.31	0.57	0.00	0.23	0.45	0.00	0.00
Avail Cap(c_a), veh/h	1007	2340	1940	1007	0	2303	1417	0	1296	1333	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.0	13.3	13.0	17.5	0.0	12.4	13.1	0.0	12.6	16.7	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.3	0.2	1.2	0.0	0.2	1.3	0.0	0.3	0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.1	0.7	0.3	0.0	0.8	1.5	0.0	0.5	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	13.6	13.2	18.7	0.0	12.6	14.4	0.0	12.9	17.4	0.0	0.0
LnGrp LOS	B	B	B	B	A	B	B	A	B	B	A	A
Approach Vol, veh/h		294			171			315			74	
Approach Delay, s/veh		13.8			14.1			14.0			17.4	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	11.8		7.7	5.3	12.5		12.6
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0
Max Q Clear Time (g_c+I1), s	2.9	5.0		3.6	2.4	4.2		6.4
Green Ext Time (p_c), s	0.0	0.8		0.2	0.0	0.5		1.2

Intersection Summary			
HCM 6th Ctrl Delay			14.2
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	5	0	0	2	0	2	0	101	0	3	72	5
Future Vol, veh/h	5	0	0	2	0	2	0	101	0	3	72	5
Peak Hour Factor	0.92	0.92	0.92	0.50	0.50	0.50	0.92	0.92	0.92	0.73	0.73	0.73
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	0	4	0	4	0	110	0	4	99	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.2	7.6	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	50%	4%
Vol Thru, %	100%	0%	0%	90%
Vol Right, %	0%	0%	50%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	101	5	4	80
LT Vol	0	5	2	3
Through Vol	101	0	0	72
RT Vol	0	0	2	5
Lane Flow Rate	110	5	8	110
Geometry Grp	1	1	1	1
Degree of Util (X)	0.123	0.007	0.009	0.122
Departure Headway (Hd)	4.039	4.517	4.114	4.01
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	887	780	855	893
Service Time	2.068	2.613	2.21	2.039
HCM Lane V/C Ratio	0.124	0.006	0.009	0.123
HCM Control Delay	7.6	7.6	7.2	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0	0	0.4

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰↱		↱			↰
Traffic Vol, veh/h	52	34	65	21	32	43
Future Vol, veh/h	52	34	65	21	32	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	76	76	86	86	69	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	45	76	24	46	62

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	242	88	0	0	100	0
Stage 1	88	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	746	970	-	-	1493	-
Stage 1	935	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	722	970	-	-	1493	-
Mov Cap-2 Maneuver	722	-	-	-	-	-
Stage 1	935	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	3.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	803	1493	-
HCM Lane V/C Ratio	-	-	0.141	0.031	-
HCM Control Delay (s)	-	-	10.2	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Intersection Delay, s/veh	13.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✥			✥	
Traffic Vol, veh/h	78	40	11	22	32	149	26	104	26	92	49	93
Future Vol, veh/h	78	40	11	22	32	149	26	104	26	92	49	93
Peak Hour Factor	0.65	0.65	0.65	0.70	0.70	0.70	0.79	0.79	0.79	0.62	0.62	0.62
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	120	62	17	31	46	213	33	132	33	148	79	150
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	13.3	11.5	12.1	16.4
HCM LOS	B	B	B	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	17%	66%	0%	41%	0%	39%
Vol Thru, %	67%	34%	0%	59%	0%	21%
Vol Right, %	17%	0%	100%	0%	100%	40%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	156	118	11	54	149	234
LT Vol	26	78	0	22	0	92
Through Vol	104	40	0	32	0	49
RT Vol	26	0	11	0	149	93
Lane Flow Rate	197	182	17	77	213	377
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.331	0.355	0.028	0.146	0.348	0.587
Departure Headway (Hd)	6.03	7.039	5.985	6.81	5.887	5.603
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	590	506	592	523	607	638
Service Time	4.129	4.836	3.78	4.6	3.675	3.684
HCM Lane V/C Ratio	0.334	0.36	0.029	0.147	0.351	0.591
HCM Control Delay	12.1	13.7	9	10.8	11.8	16.4
HCM Lane LOS	B	B	A	B	B	C
HCM 95th-tile Q	1.4	1.6	0.1	0.5	1.6	3.8

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Vol, veh/h	5	91	97	0	0	5
Future Vol, veh/h	5	91	97	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	99	105	0	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	105	0	-	0	214	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	109	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1486	-	-	-	774	949
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	916	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1486	-	-	-	771	949
Mov Cap-2 Maneuver	-	-	-	-	771	-
Stage 1	-	-	-	-	915	-
Stage 2	-	-	-	-	916	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1486	-	-	-	949
HCM Lane V/C Ratio	0.004	-	-	-	0.006
HCM Control Delay (s)	7.4	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

1: South Grade Road/East Victoria Road & Alpine Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱		↰	↱			✥	
Traffic Volume (veh/h)	35	213	221	36	226	25	167	7	54	34	12	37
Future Volume (veh/h)	35	213	221	36	226	25	167	7	54	34	12	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	232	193	42	263	26	199	8	58	39	14	37
Peak Hour Factor	0.92	0.92	0.92	0.86	0.86	0.86	0.84	0.84	0.84	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	408	338	66	369	37	297	33	237	54	19	51
Arrive On Green	0.03	0.22	0.22	0.04	0.22	0.22	0.17	0.17	0.17	0.07	0.07	0.07
Sat Flow, veh/h	1781	1870	1547	1781	1671	165	1781	196	1419	738	265	700
Grp Volume(v), veh/h	38	232	193	42	0	289	199	0	66	90	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1547	1781	0	1836	1781	0	1615	1703	0	0
Q Serve(g_s), s	0.9	4.6	4.7	1.0	0.0	6.1	4.4	0.0	1.5	2.2	0.0	0.0
Cycle Q Clear(g_c), s	0.9	4.6	4.7	1.0	0.0	6.1	4.4	0.0	1.5	2.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.88	0.43		0.41
Lane Grp Cap(c), veh/h	61	408	338	66	0	406	297	0	269	124	0	0
V/C Ratio(X)	0.63	0.57	0.57	0.64	0.00	0.71	0.67	0.00	0.25	0.73	0.00	0.00
Avail Cap(c_a), veh/h	892	2051	1697	892	0	2014	1232	0	1117	1177	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.0	14.6	14.6	19.9	0.0	15.1	16.4	0.0	15.2	19.0	0.0	0.0
Incr Delay (d2), s/veh	3.9	0.5	0.6	3.8	0.0	0.9	2.6	0.0	0.5	3.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.7	1.4	0.4	0.0	2.2	1.7	0.0	0.5	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.9	15.1	15.2	23.7	0.0	16.0	19.0	0.0	15.7	22.1	0.0	0.0
LnGrp LOS	C	B	B	C	A	B	B	A	B	C	A	A
Approach Vol, veh/h		463			331			265			90	
Approach Delay, s/veh		15.9			17.0			18.2			22.1	
Approach LOS		B			B			B			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.1	15.0		8.5	6.0	15.1		12.4				
Change Period (Y+Rc), s	4.6	5.8		5.4	4.6	5.8		5.4				
Max Green Setting (Gmax), s	21.0	46.0		29.0	21.0	46.0		29.0				
Max Q Clear Time (g_c+I1), s	3.0	6.7		4.2	2.9	8.1		6.4				
Green Ext Time (p_c), s	0.0	1.2		0.3	0.0	1.2		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			17.2									
HCM 6th LOS			B									

Notes

User approved pedestrian interval to be less than phase max green.

2: South Grade Road & Project Driveway #1/Calle de Compadres

PM Peak Hour

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	10	0	0	2	0	0	0	141	0	0	145	10
Future Vol, veh/h	10	0	0	2	0	0	0	141	0	0	145	10
Peak Hour Factor	0.92	0.92	0.92	0.25	0.25	0.25	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	0	0	8	0	0	0	158	0	0	163	11
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	7.9	8.1	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	100%	0%
Vol Thru, %	100%	0%	0%	94%
Vol Right, %	0%	0%	0%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	141	10	2	155
LT Vol	0	10	2	0
Through Vol	141	0	0	145
RT Vol	0	0	0	10
Lane Flow Rate	158	11	8	174
Geometry Grp	1	1	1	1
Degree of Util (X)	0.18	0.015	0.011	0.196
Departure Headway (Hd)	4.097	4.858	4.863	4.047
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	870	741	740	881
Service Time	2.15	2.859	2.864	2.098
HCM Lane V/C Ratio	0.182	0.015	0.011	0.198
HCM Control Delay	8.1	7.9	7.9	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0	0	0.7

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	35	35	105	83	45	98
Future Vol, veh/h	35	35	105	83	45	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	78	78	79	79	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	45	133	105	51	111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	399	186	0	0	238	0
Stage 1	186	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	607	856	-	-	1329	-
Stage 1	846	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	582	856	-	-	1329	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	789	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	2.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	693	1329	-
HCM Lane V/C Ratio	-	-	0.13	0.038	-
HCM Control Delay (s)	-	-	11	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		✥			✥	
Traffic Vol, veh/h	37	52	10	43	34	65	17	81	39	120	139	74
Future Vol, veh/h	37	52	10	43	34	65	17	81	39	120	139	74
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	64	12	53	42	80	18	84	41	125	145	77
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	10.3	9.6	9.5	12.4
HCM LOS	B	A	A	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	12%	42%	0%	56%	0%	36%
Vol Thru, %	59%	58%	0%	44%	0%	42%
Vol Right, %	28%	0%	100%	0%	100%	22%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	137	89	10	77	65	333
LT Vol	17	37	0	43	0	120
Through Vol	81	52	0	34	0	139
RT Vol	39	0	10	0	65	74
Lane Flow Rate	143	110	12	95	80	347
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.204	0.192	0.018	0.166	0.118	0.478
Departure Headway (Hd)	5.151	6.289	5.366	6.292	5.298	4.964
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	696	571	667	570	676	732
Service Time	3.181	4.022	3.099	4.024	3.029	2.964
HCM Lane V/C Ratio	0.205	0.193	0.018	0.167	0.118	0.474
HCM Control Delay	9.5	10.5	8.2	10.3	8.7	12.4
HCM Lane LOS	A	B	A	B	A	B
HCM 95th-tile Q	0.8	0.7	0.1	0.6	0.4	2.6

Intersection	
Int Delay, s/veh	0.5

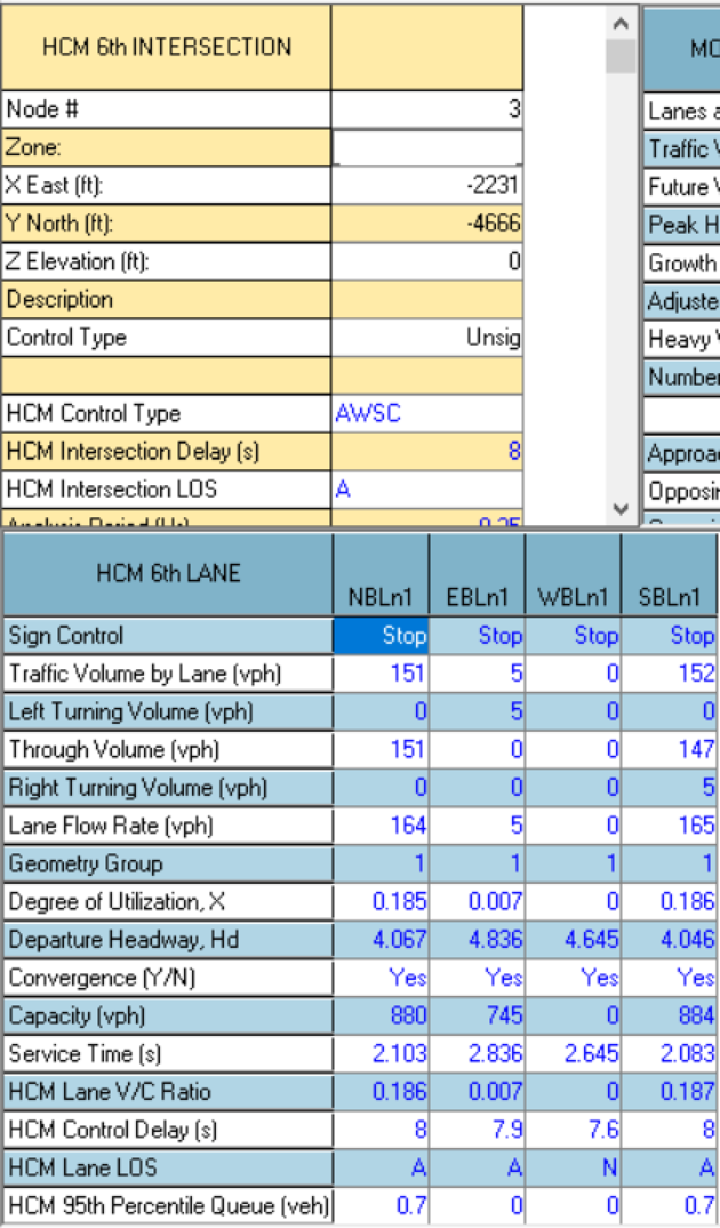
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Vol, veh/h	10	190	139	0	0	9
Future Vol, veh/h	10	190	139	0	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	207	151	0	0	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	151	0	-	0	380	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1430	-	-	-	622	895
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	809	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1430	-	-	-	616	895
Mov Cap-2 Maneuver	-	-	-	-	616	-
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	809	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9.1
HCM LOS			A

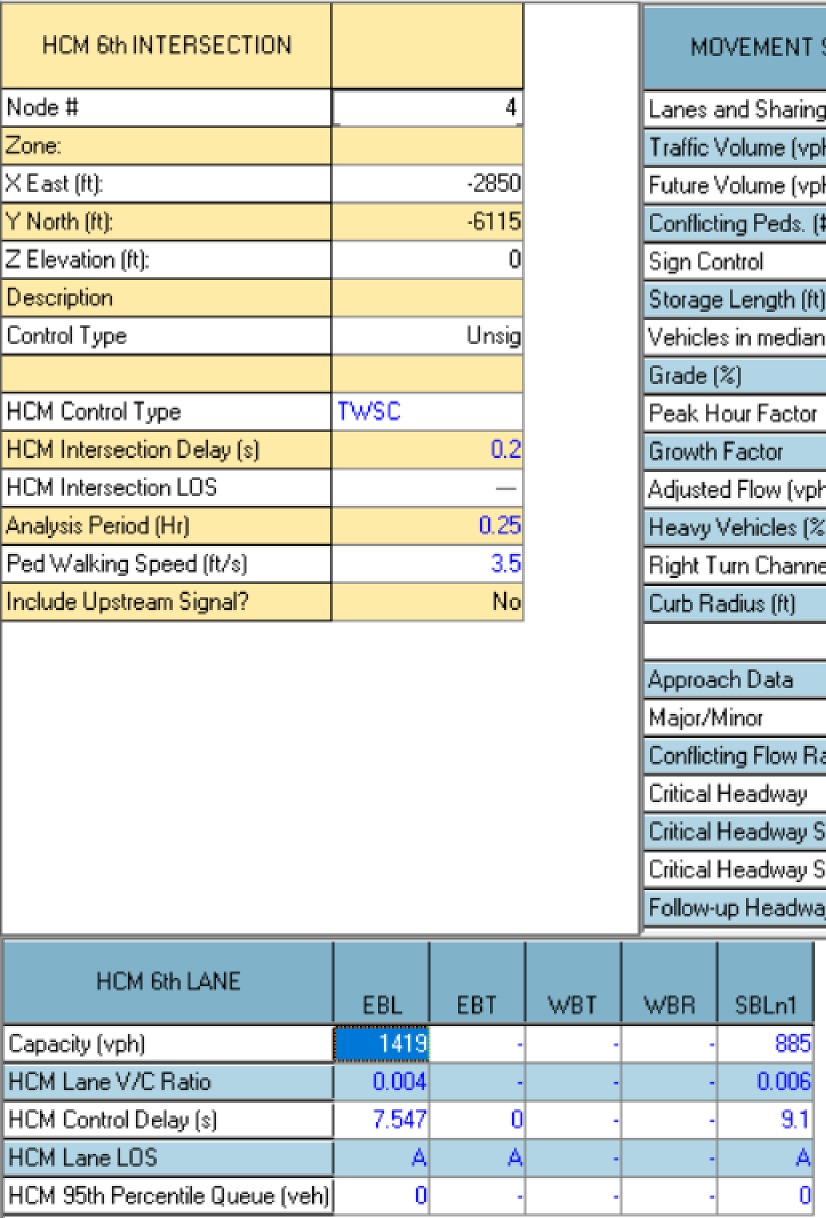
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1430	-	-	-	895
HCM Lane V/C Ratio	0.008	-	-	-	0.011
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Appendix H
Queuing Analysis Results



HCM 6th INTERSECTION	
Node #	3
Zone:	
X East (ft):	-2231
Y North (ft):	-4666
Z Elevation (ft):	0
Description	
Control Type	Unsig
HCM Control Type	AWSC
HCM Intersection Delay (s)	8
HCM Intersection LOS	A
Analysis Period (Hr)	0.25

HCM 6th LANE	NBLn1	EBLn1	WBLn1	SBLn1
Sign Control	Stop	Stop	Stop	Stop
Traffic Volume by Lane (vph)	151	5	0	152
Left Turning Volume (vph)	0	5	0	0
Through Volume (vph)	151	0	0	147
Right Turning Volume (vph)	0	0	0	5
Lane Flow Rate (vph)	164	5	0	165
Geometry Group	1	1	1	1
Degree of Utilization, X	0.185	0.007	0	0.186
Departure Headway, Hd	4.067	4.836	4.645	4.046
Convergence (Y/N)	Yes	Yes	Yes	Yes
Capacity (vph)	880	745	0	884
Service Time (s)	2.103	2.836	2.645	2.083
HCM Lane V/C Ratio	0.186	0.007	0	0.187
HCM Control Delay (s)	8	7.9	7.6	8
HCM Lane LOS	A	A	N	A
HCM 95th Percentile Queue (veh)	0.7	0	0	0.7



HCM 6th INTERSECTION	
Node #	4
Zone:	
X East (ft):	-2850
Y North (ft):	-6115
Z Elevation (ft):	0
Description	
Control Type	Unsig
HCM Control Type	TWSC
HCM Intersection Delay (s)	0.2
HCM Intersection LOS	—
Analysis Period (Hr)	0.25
Ped Walking Speed (ft/s)	3.5
Include Upstream Signal?	No

MOVEMENT
Lanes and Sharing
Traffic Volume (vp
Future Volume (vp
Conflicting Peds. (
Sign Control
Storage Length (ft)
Vehicles in median
Grade (%)
Peak Hour Factor
Growth Factor
Adjusted Flow (vp
Heavy Vehicles (%
Right Turn Channe
Curb Radius (ft)
Approach Data
Major/Minor
Conflicting Flow Ra
Critical Headway
Critical Headway S
Critical Headway S
Follow-up Headwa

HCM 6th LANE	EBL	EBT	WBT	WBR	SBLn1
Capacity (vph)	1419	-	-	-	885
HCM Lane V/C Ratio	0.004	-	-	-	0.006
HCM Control Delay (s)	7.547	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th Percentile Queue (veh)	0	-	-	-	0